

**TESTING ROOM AND WINDOW DESIGN  
PARAMETERS FOR DAYLIGHT PERFORMANCE  
ACCORDING TO BREEAM ASSESSMENT  
CRITERIA: CASES OF LONDON AND İZMİR**

**A Thesis Submitted to  
the Graduate School of Engineering and Sciences of  
İzmir Institute of Technology  
in Partial Fulfillment of the Requirements for the Degree of**

**MASTER OF SCIENCE**

**in Architecture**

**by  
İrem SÖNMEZ**

**June 2019**

**İZMİR**

We approve the thesis of İrem SÖNMEZ

Examining Committee Members:



**Prof. Dr. Zehra Tuğçe KAZANASMAZ**  
Department of Architecture, İzmir Institute of Technology



**Assoc. Prof. Dr. Mustafa Emre İLAL**  
Department of Architecture, İzmir Institute of Technology



**Assoc. Prof. Dr. Başak KUNDAKÇI KOYUNBABA**  
Department of Architecture, Yaşar University

14 June 2019



**Prof. Dr. Zehra Tuğçe KAZANASMAZ**  
Supervisor, Department of Architecture, İzmir Institute of Technology



**Prof. Dr. Koray KORKMAZ**  
Head of the Department of Architecture

**Prof. Dr. Aysun SOFUOĞLU**  
Dean of the Graduate School of  
Engineering and Sciences

## **ACKNOWLEDGEMENT**

I would like to begin with a major thank to my dear supervisor Prof. Dr. Zehra Tuğçe KAZANASMAZ for giving her support and expert guidance that made this research more meaningful for me. Thank you for your patience, kindness, and encouragement. Thank also to Instructor Dr. Can GÜNDÜZ for inspiring me to choose this research field.

My deepest gratitude goes to my parents Yaşar SÖNMEZ and Günnur SÖNMEZ and my brother İlter SÖNMEZ for their support, understanding, patience, and faith that they offered throughout my education life.

# ABSTRACT

## TESTING ROOM AND WINDOW DESIGN PARAMETERS FOR DAYLIGHT PERFORMANCE ACCORDING TO BREEAM ASSESSMENT CRITERIA: CASES OF LONDON AND İZMİR

Daylight affects occupants' visual performance in the indoor environment. The amount of daylight determines the quality of the interior. If daylighting is controlled properly, it provides comfortable and healthy spaces for the occupants. It is the primary light source of interior and it saves energy decreasing the use of artificial lighting in the interior. Because of these reasons, daylight performance has a significant role in environmental assessment tools. As BREEAM is the first environmental assessment tool in the world which is published in the UK, it has been the subject matter in this thesis.

BREEAM has 'Daylight' section in 'Health and Wellbeing' category. The illuminance value determines whether to get the credits or not in this category. It has been known that there are architectural parameters such as window size and surface reflectance that affect the illuminance value of the interiors. Each color combination of floor, wall, and ceiling results in a significant average reflectance value. Thus, the purpose of this thesis is to test the whole impact of these room and window design parameters on daylight performance according to BREEAM (universities, colleges, and higher education-occupied spaces) criteria with the cases of London and İzmir. The daylight performance simulation models of the reference rooms generated with four material alternatives were built in RELUX, under clear and overcast sky conditions. Simulations run for London and İzmir covering solstice and equinox days. Findings were discussed in the view of daylighting criteria of BREEAM. In general, daylight criteria of BREEAM which is based on conditions of London (UK) were found to be suitable and applicable for cases in İzmir.

# ÖZET

## ODA VE PENCERE TASARIM PARAMETRELERİNİN BREEAM DEĞERLENDİRME KRİTERLERİNE GÖRE DOĞAL AYDINLATMA PERFORMANSI İÇİN TEST EDİLMESİ: LONDRA VE İZMİR ÖRNEKLERİ

Doğal aydınlatma, kullanıcıların iç mekandaki görsel performansını etkiler. Doğal aydınlatma miktarı iç mekanın kalitesini belirler. Eğer doğal aydınlatma uygun şekillerde kontrol altında tutulursa kullanıcılar için konforlu ve sağlıklı mekanlar sağlar. Doğal aydınlatma iç mekanın birincil ışık kaynağıdır ve iç meknlarda yapay aydınlatma kullanımını azaltarak enerji tasarrufu sağlar. Bu nedenlerden dolayı, doğal aydınlatma performansının çevresel değerlendirme araçlarında önemli bir rolü vardır. BREEAM dünyada yayınlanan ilk çevresel değerlendirme aracıdır ve İngiltere'de yayınlanmıştır, bu sebeple bu tezin konusu olmuştur.

BREEAM'in 'Sağlık ve Refah' kategorisinde 'Doğal Aydınlatma' bölümü bulunmaktadır. Aydınlik değeri bu kategoriden kredi alınıp alınamayacağını belirler. İç mekanın aydınlık değerini etkileyen pencere boyutu ve yüzey yansıması gibi mimari parametreler olduğu bilinmektedir. Zemin, duvar ve tavanın her renk kombinasyonu önemli bir ortalama yansıtma değeri oluşturur. Bu nedenle, bu tezin amacı, oda ve pencere tasarım parametrelerinin BREEAM (üniversiteler, kolejler ve yüksek öğretimde kullanılan alanlar) kriterlerine göre Londra ve İzmir örneklerinde doğal aydınlatma performansı üzerindeki etkisini test etmektir. Dört malzeme alternatifi ile oluşturulan referans odaların günışığı performansı simülasyon modelleri RELUX programında açık ve bulutlu gökyüzü koşullarında üretildi. Simülasyonlar gündönümü ve ekinoks günlerini kapsayan şekilde Londra ve İzmir için yapıldı. Elde edilen sonuçlar BREEAM'in doğal aydınlatma kriterleri doğrultusunda tartışıldı. Genel olarak, Londra'daki (İngiltere) koşullara dayanan BREEAM'in doğal aydınlatma kriterlerinin İzmir'deki durumlar için uygun ve uygulanabilir olduğu tespit edildi.

# TABLE OF CONTENTS

LIST OF FIGURES .....	x
LIST OF TABLES .....	xiv
CHAPTER 1. INTRODUCTION .....	1
1.1. Problem Definition.....	1
1.2. Objective of the Study.....	3
1.3. General Method and Outline.....	4
CHAPTER 2. REVIEW OF THE RELATED LITERATURE.....	5
2.1. Daylighting Performance of Educational Buildings .....	5
2.1.1. Design Criteria of Daylighting Performance .....	5
2.1.2. Measurement Standards of Daylighting .....	7
2.2. Environmental Performance Assessment Tools.....	8
2.2.1. What is BREEAM?.....	10
2.2.2. Visual Comfort Criteria for BREEAM.....	12
2.2.2.1. Daylighting.....	13
2.2.3. Room and Window Design Parameters .....	16
2.2.3.1. Room Materials and Colors .....	16
2.2.3.2. Window Size .....	17
2.3. Selected Research About Daylighting Issues of BREEAM.....	18
CHAPTER 3. THE PROCEDURE.....	21
3.1. The Geometry of Reference Rooms.....	21
3.2. Location of the Rooms .....	23

3.3. Daylighting Performance Simulation Models in RELUX .....	26
3.3.1. BREEAM Criteria.....	26
3.3.2. Material Alternatives .....	26
3.3.3. RELUX Modeling.....	31
CHAPTER 4. RESEARCH FINDINGS.....	35
4.1. Material Alternative I.....	35
4.2. Material Alternative II .....	40
4.3. Material Alternative III .....	45
4.4. Material Alternative IV .....	49
CHAPTER 5. DISCUSSION.....	54
CHAPTER 6. CONCLUSION .....	56
REFERENCES .....	58
APPENDICES	
APPENDIX A. CALCULATION RESULTS OF RELUX SIMULATIONS; RENDERS, CALCULATION POINTS AND THEIR ILLUMINANCE VALUES .....	64
APPENDIX B. CALCULATION RESULTS OF RELUX SIMULATIONS; AVERAGE, MINIMUM, AND MAXIMUM ILLUMINANCE VALUES.....	73

# LIST OF FIGURES

<b><u>Figure</u></b>	<b><u>Page</u></b>
Figure 3.1. Front and perspective view of the reference room A which has a 3 meter width window.....	22
Figure 3.2. Front and perspective view of the reference room B which has a 1.5 meter width window. ....	22
Figure 3.3. Horizontal reference plane and the calculation (84 calculation points) points of the reference room A and B.....	34
Figure B.1. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	73
Figure B.2. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	73
Figure B.3. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	74
Figure B.4. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	74
Figure B.5. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	75
Figure B.6. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	75
Figure B.7. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	76

<b><u>Figure</u></b>	<b><u>Page</u></b>
Figure B.8. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	76
Figure B.9. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	77
Figure B.10. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	77
Figure B.11. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	78
Figure B.12. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	78
Figure B.13. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	79
Figure B.14. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	79
Figure B.15. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	80
Figure B.16. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	80
Figure B.17. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	81

<b><u>Figure</u></b>	<b><u>Page</u></b>
Figure B.18. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	81
Figure B.19. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	82
Figure B.20. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	82
Figure B.21. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	83
Figure B.22. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	83
Figure B.23. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	84
Figure B.24. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	84
Figure B.25. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	85
Figure B.26. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	85
Figure B.27. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	86

<b><u>Figure</u></b>	<b><u>Page</u></b>
Figure B.28. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	86
Figure B.29. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> March. ....	87
Figure B.30. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> June. ....	87
Figure B.31. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> September. ....	88
Figure B.32. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21 <sup>st</sup> December. ....	88

## LIST OF TABLES

<b><u>Table</u></b>	<b><u>Page</u></b>
Table 3.1. Geometrical properties of the reference rooms. ....	23
Table 3.2. An average temperature of daytime for London, England, UK. ....	24
Table 3.3. Altitude and azimuth values of critical dates and hour for London, England, UK. ....	24
Table 3.4. An average daylight and sunlight information for London and İzmir. ....	25
Table 3.5. An average temperature of daytime for İzmir, Turkey. ....	25
Table 3.6. Altitude and azimuth values of critical dates and hour for İzmir, Turkey. ....	26
Table 3.7. Reflectance value for maximum room depths (m) and head heights (m). ....	27
Table 3.8. The material alternative I for reference room A and B. ....	28
Table 3.9. Material alternative II for reference room A and B. ....	29
Table 3.10. Material alternative III for reference room A and B. ....	30
Table 3.11. Material alternative IV for reference room A and B. ....	31
Table 3.12. The number of a simulation model for reference room A. ....	33
Table 3.13. The number of a simulation model for reference room B. ....	33
Table 4.1. Reference room A, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	37
Table 4.2. Reference room A, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm. ....	38
Table 4.3. Reference room A and B, the material alternative I, yearly daylight illuminance comparison under clear and overcast sky conditions for London and İzmir. ....	39
Table 4.4. Reference room A, material alternative II, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	42
Table 4.5. Reference room A, material alternative II, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm. ....	43

<b><u>Table</u></b>	<b><u>Page</u></b>
Table 4.6. Reference room A and B, material alternative II, yearly daylight illuminance comparison under clear and overcast sky conditions for London and İzmir. ....	44
Table 4.7. Reference room A, material alternative III, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	46
Table 4.8. Reference room A, material alternative III, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm.....	47
Table 4.9. Reference room A and B, material alternative III, yearly daylight illuminance comparison under clear and overcast sky conditions for London and İzmir. ....	49
Table 4.10. Reference room A, material alternative IV, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	50
Table 4.11. Reference room A, material alternative IV, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm. ....	51
Table 4.12. Reference room A and B, material alternative IV, yearly daylight illuminance comparison under clear and overcast sky conditions for London and İzmir.....	53
Table A.1. Reference room B, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	65
Table A.2. Reference room B, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm. ....	66
Table A.3. Reference room B, material alternative II, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	67

<b><u>Table</u></b>	<b><u>Page</u></b>
Table A.4. Reference room B, material alternative II, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm. ....	68
Table A.5. Reference room B, material alternative III, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	69
Table A.6. Reference room B, material alternative III, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm. ....	70
Table A.7. Reference room B, material alternative IV, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> March and 21 <sup>st</sup> June at 12:00 pm. ....	71
Table A.8. Reference room B, material alternative IV, clear sky and overcast sky RELUX simulation results for London and İzmir in 21 <sup>st</sup> September and 21 <sup>st</sup> December at 12:00 pm. ....	72

# CHAPTER 1

## INTRODUCTION

### 1.1. Problem Definition

Daylight is an important issue for an indoor environment that affects the user's visual performance and comfort. Daylight is the best light source for interior spaces. It creates comfortable, healthy and workable interiors (Galatioto and Beccali 2016). It saves energy decreasing the use of artificial light. These two concerns make daylighting significant in 'green building rating schemes'(C. Reinhart and Selkowitz 2006).

Environmental performance assessment tools and methods serve as green building rating schemes. They score and rate building according to criteria of several sections, such as energy, health, comfort. Some of these, at the same time, are related to daylighting performance and factors of indoor spaces (Giarma, Tsikaloudaki, and Aravantinos 2017). BREEAM, for example, is well-known and has a wider application in practice and research. It pays attention especially to daylighting due to several criteria (health and comfort). To test BREEAM assessment tool's daylighting criteria which are based on daylight factor and illuminance, room and window design parameters are needed to be analyzed using a lighting simulation program.

BREEAM (Building Research Establishment Environmental Assessment Methodology) (1990), the first environmental assessment tool, is published in the United Kingdom. In BREEAM there are several criteria topics which is related to the building's environmental consideration. These are 'Management', 'Health and Wellbeing', 'Energy', 'Transport', 'Water', 'Materials', 'Pollution', 'Waste', 'Land Use and Ecology' and additional section 'Innovation' (Giarma, Tsikaloudaki, and Aravantinos 2017). The building gets credits according to these topics. It gets the total score collecting points from every category at the end. In BREEAM, there are parameters which are related to daylighting. They are situated under the 'Health and Wellbeing' section as a 'Visual Comfort' section. These parameters are 'Glare Control', 'Daylighting', 'View Out', and 'Internal and External Lighting Levels, Zoning and Control' (Giarma, Tsikaloudaki, and Aravantinos 2017).

The 'Daylighting' parameter of BREEAM considers the daylighting performance of the interior. There are two main alternatives for measuring the sufficiency of it. The first alternative is daylighting factor and the second one is illuminance levels of indoor area (Giarma, Tsikaloudaki, and Aravantinos 2017). Daylight performance of the interior is studied by researchers over the years, daylighting factor and illuminance values are the key points of it. In view of this knowledge, this study examines the room and window design parameters by the view of daylighting criteria of BREEAM.

Daylight factor is the most common and easiest measuring element for quantifying daylight which is in the indoor environment that going into through the window (Acosta et al. 2015). The ratio of the inside horizontal illuminance to the outside horizontal illuminance is calculated as the daylight factor. It is observed under the lowest exterior daylight in the sky which is the overcast sky condition (Acosta, Campano, and Molina 2016).

The daylight comes directly from the sky. However, according to Li et al. (2006), the daylight is going into indoor by the effect of internal and external factors. The width, length, height, and location of the indoor environment and size of the window and also, the material of the floor, ceiling, and walls have an impact on the performance of the daylight as internal factors. In addition, the light which is reflected from outside from the ground and other buildings or blocked by other elements from outside can be classified as external factors that affect the performance of daylight (Li et al. 2006). There are different parameters which can change the illuminance value of the indoor environment. Especially, interior design parameters as the choice of materials and colors are the most important elements that affect daylighting performance. Also, the combination of materials determine the average reflectance value of the room and it affects the illuminance value of the interior.

Several case studies have tested daylight performance with the view of different criteria. For example, Li et al. (2006) analyzed daylighting performance and energy use using computer simulation techniques for the typical domestic unit in Hong Kong. He cared about building area and orientation, glass type, window type, shading, and external obstruction as building parameters that affect indoor daylight illuminance. Width, depth, and height of the room, glass area, window sill height, the transmittance of the window, average reflectance of the interior surface, and reflectance for ground and external obstructions were used for calculation of daylighting as parameters (Li et

al. 2006). In another example, Acosta et al. (2015) studied windows under overcast sky circumstances which affect daylight factor and energy saving. The dimension, location, and form of the window and room reflectance were changeable. A total of 28 different simulation models were prepared in lighting simulation program Daylight Visualizer 2.6 integrating these geometrical parameters (Acosta et al. 2015). Konis (2013) studied daylighting performance with daily and seasonal sun and sky parameters for an open-plan office building in San Francisco, California (Konis 2013). Ochoa et al. (2012) examined low energy consumption and high visual comfort by the parameter of changing the window size and analyzed by using computer simulation programs (Ochoa et al. 2012). In addition, Giarma, Tsikaloudaki, and Aravantinos (2017) made a critical review of environmental performance assessment tools from the viewpoint of daylighting and visual comfort criteria. BREEAM, LEED, SBToll and CASBEE assessment tools have been dealing with to understand their potentials in satisfying general considerations of visual comfort (Giarma, Tsikaloudaki, and Aravantinos 2017). In view of all these recent researches in daylight performance, there was a need to test the impact of room and window design parameters on daylight performance in a reference room. To achieve this, BREEAM assessment criteria become to key concern whether it is applicable in such a room located both in İzmir and London (two significant locations corresponding to different seasonal sky conditions). No specific study directly showing this comparison was found.

## **1.2. Objective of the Study**

The purpose of this study is to test room and window design parameters for daylight performance according to BREEAM assessment criteria with cases of London and İzmir. There are two reference rooms which are located in London and İzmir. The reference room for London has two alternative window size and four different interior material combination which has different indoor illuminance value. Also, the same alternatives are applying to the other reference room which is located in İzmir. Finally, a total of 128 simulations are provided by lighting simulation program which is RELUX. Geographical location differences of the rooms will show how much convenient daylighting criteria of BREEAM for İzmir location because BREEAM is developed in the United Kingdom.

### **1.3. General Method and Outline**

This section gives information about the whole of outline and method of the thesis. This thesis consists of five chapters. The first chapter is 'Introduction'. The importance of visual comfort and daylighting in the indoor environment and the relationship between the environmental assessment tool which is BREEAM is explained. The necessity of testing room and window design parameters for daylighting performance is mentioned and how they are evaluated with BREEAM assessment criteria.

In the second chapter, related literature about the general design criteria and measurements standards of daylighting performance for educational buildings are investigated. The daylighting and visual comfort criteria of BREEAM assessment tool are clarified. Then, the impact of room materials, colors, and window size are explained from the point of daylighting performance of interior. Also, the other researches about daylighting issues of BREEAM are selected and explained with their similar and different aspects.

In the third chapter, firstly, the geometry of the reference room is introduced with the reference researches. Then, the location and climate data about London and İzmir are clarified with detailed information. After that, the daylighting performance simulation models of reference rooms in RELUX are explained with specifications of daylighting criteria of BREEAM, material alternatives of reference rooms, and how they are simulated in RELUX.

In chapter four, the simulations are activated for the reference room A and B by using four different material combinations. Every reference room and material combination are activated for four different dates in a year. According to the simulation results, the room and window design parameters differences and their illuminance values are compared and evaluated with daylighting criteria of BREEAM.

In the last chapter, the conclusion and discussion are derived from the analysis results, and the thesis sums up briefly.

## **CHAPTER 2**

### **REVIEW OF THE RELATED LITERATURE**

In this chapter, firstly, daylighting performance is explained shortly and design criteria of daylighting performance and measurements standards of daylighting are explained. The following section gives information about environmental assessment tools. It focuses on BREEAM as an environmental assessment tool and its visual comfort criteria related to daylighting. This section also includes room and window design parameters based on room materials, colors and window size. The last section focuses on selected research about daylighting issues of BREEAM.

#### **2.1. Daylighting Performance of Educational Buildings**

In educational buildings, daylight is an important factor that affects students' learning capacity, performance, and health (Winterbottom and Wilkins 2009; Wu and Ng 2003). A sufficient amount of light in the interior makes the classroom charming to students. It provides the sense of being in a wider space and has a favorable effect for learning motivation and also it increases the quality of teaching (Yener, Güvenkaya, and Sener 2009; Al-Khatatbeh and Ma'bdeh 2017).

##### **2.1.1. Design Criteria of Daylighting Performance**

The daylight is the primary light source for the buildings. However, the important point is not the amount of daylight that coming into the interior. The important point is the quality of daylight that coming into the indoor environment and how it creates comfortable places for the users (Tsikra and Andreou 2017). Daylighting performance of the interior space has a direct impact on the building occupants performance. If the daylighting is used correctly in the interior, it provides comfortable, healthy, and remarkable spaces for the users. However, if it is not used completely right, it creates an uncomfortable and inadequate visual performance for the occupants of the building (Leslie 2003).

Educational buildings are mostly using in the day time. The daylighting performance is an important factor for the indoor environment of educational buildings and its occupants (Heschong, Wright, and Okura 2002). Educational buildings are using for teaching and working activity by the teachers and also, studying and learning activity by the students. In addition, reading and writing are the primary activity that students do in the classroom and they need proper visual comfort in order to read and write easily (Yener, Güvenkaya, and Sener 2009). In the classroom, the student reads what teacher write to the board and then writes to his or her notebook. When the student is doing this activity, she or he has to look long and close distance one after the other. Because of this, daylighting has an important role for concentration and visual comfort of the student (Yener, Güvenkaya, and Sener 2009).

The analysis of daylighting performance in the educational building shows that students' concentration and exam results increase and they spend their time in a better and comfortable physical condition (Plympton et al. 2000; Erlalelitepe, Aral, and Kazanasmaz 2011). Students performance and learning capacity are increasing with daylight. It is approximately changing 7% to 37%. If an average student changes her or his standard classroom to the classroom that is used effective daylight performance, the performance and learning capacity of an average student is supposed to increase approximately 11% (Heschong, Elzeyadi, and Knecht 2002). All these positive effects of daylight create better and effective educational indoor environments for its occupants.

There is a critical point about the daylight which is the intensity of daylight. There is no rule like more daylight is creating better indoor environments. The proper daylight performance should provide adequate lighting in the interior in order to not disturb any occupant (Leslie 2003; Erlalelitepe, Aral, and Kazanasmaz 2011). In the indoor environment, if there is a zone in the screen or surface which is brighter than the total brightness of the surface, this position creates glare in the interior. The glare divide into two which is disability glare and discomfort glare. Disability glare affects the visual performance of occupant and visibility of the environment. In addition, discomfort glare creates headache and the eyes getting tired (Winterbottom and Wilkins 2009). As a result of this, the visual performance and comfort of the user are getting worse and difficult (Osterhaus 2005; Winterbottom and Wilkins 2009). The aim of the designing daylighting performance is providing better, comfortable and healthier interiors for the

occupants. All the educational building types, primary schools to university buildings, have the same importance about daylighting.

### **2.1.2.Measurement Standards of Daylighting**

The educational buildings are important because of their function. The daylighting measurements have specific regulations and standards for the educational buildings. The aim of this is controlling and providing the occupants' needs. However, specifications about daylighting are not yet improved properly because of the variable form of the daylight and differentiation of every interior spaces (Erlalelitepe, Aral, and Kazanasmaz 2011). The classrooms should have enough value of illuminance in order to write and read in between the vertical board and horizontal desk surface (Yener 2002). There are parameters for measuring daylight such as; daylight factor, illuminance, daylight and window size, and glare.

The daylight factor is one of the parameters that evaluate the daylight in the indoor environment. The explanation of daylight factor is the ratio of internal horizontal illuminance at a random point in the interior without shadow to outer horizontal illuminance under a CIE overcast sky (C. F. Reinhart, Mardaljevic, and Rogers 2006; Mardaljevic and Christoffersen 2017). French daylight regulations suggest 1.5% daylight factor in an overcast sky condition for classrooms. However, British regulations suggest 2% daylight factor for classrooms (Erlalelitepe, Aral, and Kazanasmaz 2011).

The illuminance is the other parameter for measuring daylight. The unit of illuminance is lux. The International Commission on Illumination (CIE) is published the illuminance standard of classrooms as 300 lux. When the illuminance is measured, the reference planes are considered. There are two kinds of reference planes which are the horizontal reference plane that is above the desks and the vertical reference planes that are parallel to each wall. CIBSE (2004) recommends a range of illuminance which is in between 300 to 500 lux according to the types of classrooms (Winterbottom and Wilkins 2009). In general, 300 lux for the horizontal plane which is above the desks and 500 lux for the vertical plane which is on the board (Yener 2002; Erlalelitepe, Aral, and Kazanasmaz 2011; Al-Khatatbeh and Ma'bdeh 2017). The minimum value of the reference plane, which is on the board, is 300 lux. Because, it should not under the

horizontal reference plane value in order to focus the students to the board (Yener, Güvenkaya, and Sener 2009).

The building envelope has openings and windows and the daylight is coming from these apertures. The size of the apertures affects the calculation of the daylight factor and the illuminance (Erlalelitepe, Aral, and Kazanasmaz 2011). Because it directly affects the amount of daylight that comes to the indoor environment. According to the British regulations, if the room depth is under 8 meter, the area of the window is 20% of the wall area which has the window on it. If the room depth above 14 meters, the area of the window is 35% of the wall area which has the window on it (Erlalelitepe, Aral, and Kazanasmaz 2011).

The glare has to be under controlled in order to not affect negatively the visual comfort of occupants. If the sunlight enters directly from the window, it reflects from other surfaces and disturbs the occupant's eyes (Osterhaus 2005). The main aim is to avoid glare in the indoor environment in order to increase daylight quality of the interior.

There some other parameters that affect the measurement of daylighting such as; illumination level of the exterior, location of the room, the dimension of the room, the dimension of the window, type of window glazing, and reflectance of interior surfaces (Yener 2002).

## **2.2. Environmental Performance Assessment Tools**

The construction industry has a significant mission for the countries. It has to correspond to the requirement of community and increase the standard of living. It helps to build up the economy of a country. However, the construction industry is a kind of a consumption industry for a country. Natural resources and energy are the main elements that firstly are affected negatively by the construction industry. For example, fresh water sources, green fields, forest lands, and raw materials are damaged and consumed directly or indirectly for the construction industry. Also, the production process of construction materials consumes global energy. As a result of these negative sides of the construction industry, there are global effects which are increasing carbon emission, global warming and environmental breakdown (Doan et al. 2017).

The idea of sustainable design and high-performance buildings began to appear in the 1990s. They try to reduce the negative effects of the construction industry. On the other hand, the buildings' quality has an impact on the users. They directly affect the quality of life, performance of the work, motivation of employee and health of the user with air and daylight standard. These concepts come to the forefront in the building design stage because of the environmental and user-oriented concerns. Moreover, the awareness of sustainability and the environmental impact bring the new systems to the building marketplace. The environmental assessment tools come to exist as a result of the idea of sustainability. These tools creating a common language that using by architects, builders, interior architects, landscape architects, construction managers, and building owners (Todd et al. 2001; Lachman et al. 2013; Doan et al. 2017).

These environmental assessment tools evaluating the sustainability of the buildings however, there is no necessity to use these tools. If the building evaluated by one of the environmental assessment tools and receive a certificate, this brings prestige to the building. Also, it encourages the other buildings to apply to the environmental assessment tools (Uyan 2010).

The environmental assessment tools are rating systems for sustainable buildings to control environmental pollution, provide energy efficiency, improve user's health conditions, and minimize consumption of natural resources.(Doan et al. 2017; Suzer 2019) There is more or less 600 green rating system in the world (Doan et al. 2017). These green rating systems are prepared according to the needs of each country by the professionals in different disciplines and scientific organizations of them. There are also countries that do not have their own green rating system. In this situation, they have to use other countries green rating systems which are widely used across the globe (Uyan 2010). There is no international environmental assessment tool which is answering all the requirements of Turkey (Said and CANKAYA UNIVERSITY 2019). The concerns about sustainability and green building started in the begging of 2000s with the effects of the World Green Building Council and Kyoto Protocol. After that awareness of green building's importance, the Turkish Green Building Association was established in 2009. It is called ÇEDBİK (Çevre Dostu Yeşil Binalar Derneği). However, ÇEDBİK does not give certification to all types of buildings, it gives certification only the new housing buildings. In order to answer all types of buildings, ÇEDBİK suggests applying BREEAM and LEED as environmental assessment tools. Because there is no specific

environmental assessment tool in Turkey (Chergia 2012; Said and CANKAYA UNIVERSITY 2019).

The first environmental assessment tool is BREEAM (Building Research Establishment Environmental Assessment Method) which is published in 1990 and developed by Building Research Establishment in the UK (Nguyen and Altan 2011). The second tool is LEED (Leadership in Energy and Environmental Design) which is developed by the US Green Building Council (USGBC) in 1998 (Awadh 2017). In 2009, the Gulf Organization of Research and Development ( GORD) published GSAS (Global Sustainability Assessment System) in Qatar. In 2010, Abu Dhabi Urban Planning Council (UPC) published Estidama Pearl Building Rating System (PBRS) as a green rating system (Awadh 2017). There are some other green rating tools that are using by other countries. For instance, CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) in Japan, GREEN GLOBES in Canada, BEAM (Building Environmental Assessment Method) in Hong Kong, DGNB (Deutsche Gesellschaft für Nachhaltiges Bauene. V.) in Germany, BCA (Building and Construction Authority) in Singapore, and Green Star in Australia are using for rating sustainability of building performances (Doan et al. 2017; Awadh 2017). All of these green rating systems are leading and guiding the building design stages into the framework of sustainability (Awadh 2017).

### **2.2.1. What is BREEAM?**

BREEAM (Building Research Establishment Environmental Assessment Method) is the first environmental assessment tool in the world published in 1990. It was launched by the Building Research Establishment in the UK (Doan et al. 2017). BREEAM evaluates environmental impacts and minimizes the negative environmental effects of the building throughout its life. Because of this, it encourages to design and builds sustainable and green-friendly buildings (Diş and Canbaz 2015). The new building, renewed building, additional building, whole building or part of a building can be evaluated by BREEAM. Moreover, the categories and criteria of BREEAM are updated according to the new improvements in technology (Uyan 2010; Iyer-Raniga and Wasiluk 2007).

In 1993, the first revision of BREEAM was published and it contained offices. The second was version developed in 1998 and it involved education building, office building, industrial building, and retail building types. After that, BREEAM New Construction 2011 and 2014 was launched. BREEAM International for New Construction was prepared in 2016 and it is the latest version of it that is used in worldwide (Sinou and Kyvelou 2006; Lee 2013; Awadh 2017).

BREEAM International New Construction 2016 has nine different environmental categories and the tenth one has a different character. According to these categories, the building takes credits from each other (BINC16 2017a). The first category is Management (21 credits) that contains project brief, design, life cycle cost and service life planning, construction, commissioning, handover, and aftercare of the building. The second category is Health and Wellbeing (25 credits) which supports the enhance visual and thermal comfort, indoor air quality, health and safety of users, acoustic performance, water quality and accessibility (BINC16 2017b). The third category is Energy (37 credits), it encourages the energy efficient building design and reducing the use of energy and carbon emission. Also, it is important to use sustainable and energy efficiency solutions for the life cycle of the building (BINC16 2017c). The next category is Transport (13 credits), it is promoting sustainable transportation solutions and focusing easy access to public transportations (BINC16 2017d). The fifth category is Water (10 credits), it is encouraging the sustainable use of water with controlled water consumption (BINC16 2017e). The sixth category is Materials (12 credits), it focuses on decreasing the effect of the material through producing, manufacturing and recycling process of it (BINC16 2017f). The seventh category is Waste (10 credits), the aim is reducing the waste of building in the construction process and operational process (BINC16 2017g). The eight categories are Land Use and Ecology (10 credits), it encourages ecological protection of the land use (BINC16 2017h). The ninth category is Pollution (13 credits), it controls the night time light, air, noise, water, and land pollution in the life cycle of building (BINC16 2017i). And the additional category is Innovation. In consequence of this scoring system, the building takes credits from each category and has a total score. As a result of evaluation, the building takes a certified according to its percentage of total score which can be unclassified (<30%), pass ( $\geq 30\%$ ), good ( $\geq 45\%$ ), very good ( $\geq 55\%$ ), excellent ( $\geq 70\%$ ), outstanding ( $\geq 85\%$ ) (BINC16 2017a; Lee 2013; Awadh 2017).

## **2.2.2. Visual Comfort Criteria for BREEAM**

BREEAM has nine environmental categories. Health and wellbeing category is the second category with the most point weight (25 credits). In general, this category gives weight to indoor environmental quality with considering comfort, health, and safety of building users (BINC16 2017b; Awadh 2017).

Visual comfort is the first section of health and wellbeing category. The aim is providing the best visual performance, perception, control, and comfort for building occupants in an indoor environment. The daylighting, artificial lighting and user control are important for the design process. In the visual comfort section, the credit that building gets can be changed according to building type or area type. Education buildings (preschools, schools, universities, colleges, and higher education buildings), residential institutions (kitchen, living rooms, dining rooms, studies, non-residential or communal occupied spaces), residential dwellings (kitchen, living rooms, dining rooms, and studies), retail buildings (sales area and other occupied areas), industrial, office, and all other building types (internal association or atrium area, teaching, lecture and seminar spaces) are the building types that are evaluating and getting different credits from visual comfort section in BREEAM (Uyan 2010; BINC16 2017b).

The assessment criteria of visual comfort are separated into five-part. These are prerequisite, glare control (1 credit), daylighting (up to 4 credits - depending on building type), view out (1 credit), internal and external lighting (1 credit). The first criteria of visual comfort are prerequisite and there is no credit for this section. The fluorescent lamps of the building have to arrange and fit as high-frequency ballast. The buildings have to take 'criterion 1 only (high-frequency ballast)' to have minimum standards of BREEAM rating level (BINC16 2017c). The second criteria is glare control. The aim of glare control is preventing energy consumption for lightings. To use maximum daylight in the workspaces and other critical spaces, the glare control systems are designed properly. The important point about the glare control system is not to block entering daylight into the indoor environment, in the cloudy weather conditions. The position of shading elements are compatible with lighting systems to control glare (BINC16 2017b). The third criterion of visual comfort is daylighting. In order to get credit, average daylight factor, uniformity, illuminance, and space type are determinative factors (Giarma, Tsikaloudaki, and Aravantinos 2017; BINC16 2017b). The fourth

criterion is the view out. In this section, the aim is providing an adequate view out for building occupants. Area of the window opening and room depth are the measurement of criteria. If the distance from the window to the workspace is 7 meter or less, the window opening size has to be 20% of the surrounding wall. If the distance from the window to the workspace is 8 meter -11 meters, the window opening size has to be 25% of the surrounding wall area. If the distance from the window to the workspace is 11 meter - 14 meter or less, window opening size has to be 30% of the surrounding wall area. If the distance from the window to the workspace is 14 meter or more, window opening size has to be 35% of the surrounding wall area. For the residential buildings and institutions, the distance from the window to the relevant area is 5 meter and window opening size has to be  $\geq 20\%$  of the surrounding wall area (Uyan 2010; Giarma, Tsikaloudaki, and Aravantinos 2017; BINC16 2017b). The fifth criteria of visual comfort is internal and external lighting levels, zoning and control. Interior lighting is designed according to appropriate illuminance (lux) levels of each area in order to provide convenient concentration and comfort level of building occupant. In the areas that computer screens are used, there are special provisions for lighting design in order to control glare in the indoor area and avoid screen reflections. All of the external lightings of the construction site are organized according to proper illuminance levels. There are specifications about external lighting such as EN 13201 Road Lighting and EN 12464-2:2014 Lighting of workplaces (Uyan 2010; BINC16 2017b). Internal lighting is divided into the zones and is controlled by the building occupants. In the office spaces, the zones can include a maximum of four workplaces and are controlled independently. Also, window neighbor workplaces and other workplaces are zoned and controlled separately. For the seminar rooms, speaker and audience areas are zoned and controlled separately. Moreover, in the educational buildings, the teachers can access and manually control the lightings easily in the classrooms (Uyan 2010; BINC16 2017b).

### **2.2.2.1.Daylighting**

The third criteria of visual comfort section in BREEAM is daylighting. There are two alternatives for evaluation of daylighting. The first evaluation procedure is looking for average daylight factor and daylighting uniformity. And the second

evaluation procedure is looking for space types and their illuminance requirements (BINC16 2017b).

For the daylight factor of the first alternative procedure; the average daylight factor required by latitude (degrees) can change according to building type. Also, the minimum area to comply with daylight factor affects the number of credits that can take from this section. In order to have adequate daylight in the building, minimum 80% of the floor area needs 2%an average daylight factor. The average daylight factor changes according to building types, these are education buildings, residential institutions, residential dwellings, retail buildings, and industrial, office, and all other building types (Giarma, Tsikaloudaki, and Aravantinos 2017; BINC16 2017b).

The education buildings are split into two categories which are preschools, schools and universities, colleges, and higher education buildings. If preschools and schools have an average daylight factor in 80% of the floor area, they take 2 credit. Universities, colleges, and higher education buildings have an average daylight factor in 60% of the floor area, they gain 1 credit or 80% of the floor area they gain 2 credits. The other building type is residential institutions, which contains a kitchen, living rooms, dining rooms, study areas, and non-residential or communal occupied spaces. They receive 1 credit if all of them have an average daylight factor in the 80% of the floor area. Residential dwellings are the other building type that contains a kitchen, living rooms, dining rooms, and study areas. If they have an average daylight factor in the 80% of the floor area, they take 2 credits for kitchen and 2 credits for other spaces. The retail buildings divide as sales areas and other occupied areas. If sales areas have an average daylight factor in the 35% of the floor area, they receive 1 credit. And also, other occupied areas receive 1 credit, if they have an average daylight factor in the 80% of the floor area. The last building type contains industrial, office and all other building types. They include internal association or atrium area, teaching, lecture and seminar spaces, and all occupied spaces. If they have an average daylight factor in the 80% of the floor area, they take 1 credit (BINC16 2017b).

The first alternative procedure has a second part which is about the daylighting uniformity criteria. There is a ratio between the minimum and average weight of daylight factor, this is the daylighting uniformity ratio (Giarma, Tsikaloudaki, and Aravantinos 2017). The value of a uniformity ratio is at least 0.3. If space has a glazed roof like an atrium, the value of a uniformity ratio minimum of 0.7. Moreover,

Minimum 80% of the area has a view from a tabletop height which is 0.85 meter for residential buildings and residential institutions and 0.7 meters for other types of buildings. Also, the room depth criterion is satisfied with:  $d/w + d/HW < 2/(1-RB)$ . According to the formula; d is the room depth, w is the room width, HW is the window head height from floor level, and RB is the average reflectance of surfaces in the rear half of the room (Giarma, Tsikaloudaki, and Aravantinos 2017; BINC16 2017b).

The illuminance level of the indoor area type is using as the second evaluation procedure of daylighting in visual comfort section. The space type, minimum area to comply, average daylight illuminance (averaged over entire space), and minimum daylight illuminance at the worst lit point are the evaluation criteria for the daylight illuminance criteria. The amount of light, which is falling on a surface per unit area, is the illuminance and it is measured with lux (BINC16 2017b).

The education buildings can take up to 2 credits available. Preschools and schools have to have minimum 80% area to comply in order to take 2 credits and university, colleges, and higher education building types have to have minimum 60% area to comply in order to take 1 credit. In detail, they need to have the average daylight illuminance can be at least 300 lux for 2000 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 90 lux for more than 2000 hours per year. In the residential institutions, if kitchens have 100% area to comply, they receive 1 credit. Also, they need to have the average daylight illuminance can be at least 100 lux for 3450 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 30 lux for more than 3450 hours per year. If non-residential or communal spaces have 80% area to comply, they receive 1 credit. They need to have the average daylight illuminance can be at least 200 lux for 2650 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 60 lux for more than 2650 hours per year. In residential dwellings, kitchens have 100% area to comply, they receive 2 credit. Also, they need to have the average daylight illuminance can be at least 100 lux for 3450 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 30 lux for more than 3450 hours per year. Living rooms, dining rooms, and study areas have 100% area to comply, they receive 1 credit. Also, they need to have the average daylight illuminance can be at least 100 lux for 3450 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 30 lux for more than 3450 hours per year. In retail

buildings, sales areas have 35% area to comply, they receive 1 credit. They need to have at least 200 lux point daylight illuminance for 2650 hours per year or more. Other occupied areas that in the retail buildings have 80% area to comply, they receive 1 credit. In addition, they need to have the average daylight illuminance can be at least 200 lux for 2650 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 60 lux for more than 2650 hours per year. Industrial, office, and all the other building types are the last building section. Internal association or atrium area of them have 80% area to comply, they receive 1 credit. They need to have the average daylight illuminance can be at least 300 lux for 2650 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 210 lux for more than 2650 hours per year. Moreover, teaching, lecture, seminar spaces and all occupied spaces need to have the average daylight illuminance can be at least 300 lux for 2000 hours per year or more and the minimum daylight illuminance at the worst lit point can be at least 90 lux for more than 2000 hours per year.

### **2.2.3.Room and Window Design Parameters**

The amount of daylight affects the occupants' comfort and visual performance (Galatioto and Beccali 2016). Room and window design parameters are the factors that affect daylight in the first degree. The reflection of light is changing the value of daylight in the indoor environment. The room surfaces which are floor, walls, and ceiling can be made of different material which has different color, texture, matte or shiny finishing. And also, the size of the window directly affects the quantity of daylight that reaches the interior.

#### **2.2.3.1.Room Materials and Colors**

The daylight is not only coming from the sky as one direction to the indoor environment. The amount of daylight is increasing with the surfaces that reflect the daylight. In that position, the materials, textures, and the surface color of the indoor environment has an important role for daylighting (Acosta et al. 2015; Schmid and Uehara 2017).

Every material surface has a different reflectance value. The reflectance of the surface has the ability to distribute and reflect daylight. As general information, light colors for interior elements provide to create brighter indoor environments and white is the most emitting color that spread daylight (Schmid and Uehara 2017; Jafarian et al. 2018). As a result of this, the quality and amount of daylight can change the visual perception of the interior spaces. The walls, floor, ceiling, and furnishings are the surfaces of the indoor environment which have reflectance value. The materials, textures, and colors of interior surfaces are chosen according to the needs of function and its users of the interior space (Oral, Yener, and Bayazit 2004). According to the combination of interior surface materials, they can provide an appropriate indoor environment for occupants. At the same time, they can create an interior space that has the glare of daylight which gives a feeling of discomfort and inefficient visual perception with the different reflectance value of material surfaces.

The daylight comes from outside to the inside as a form of the ray with a stable form and angle. The amount of reflectance is calculated with the light that reflected the contrary angle. Moreover, the reflectance value of the surface is changing with its color and material. The value is changing in between 0% and 100%. The color and brightness level of the surface directly affects the amount of reflectance. For instance, white matte paint wall has 80% value in reflectance. However, if the same color white has a shiny finishing, it has 90% value in reflectance. Also, the black matte painting wall has 5% value in reflectance (Jafarian et al. 2018). The brightness level of the surface effects the reflectance value of the material. Moreover, the daylight, window, and surfaces of an interior connected to each other with the light. In order to not create a sharp contrast between the surfaces and daylight, the lighter colors are chosen for the surfaces (Leslie 2003). In this way, the occupants have better visual comfort in the interior.

### **2.2.3.2. Window Size**

Windows are one of the most important elements of the building envelope. The windows are designed in the early building design stage with building enclosure and plan organization. They are directly affecting the daylighting, cooling, heating, and acoustic performance of the building (Hiyama and Wen 2015). Also, they separate the outside environment from the indoor environment. Moreover, they physically separate

the outside and inside of the building from heat, light, wind, and noise. However, they visually connect the outside and inside of the building with view out (Oral, Yener, and Bayazit 2004).

Usually, the occupants want bright and spacious indoor environments in order to feel healthy and wellbeing (CIBSE, n.d.). The windows have an important role in order to provide these specifications. The geometry of the window affects the indoor environment quality in the first stage. The windows need some necessities in order to create proper interior space, such as; the dimension and the position (Fontenelle and Bastos 2014). The proper size and location of the windows allow the daylight to the interior space. According to the amount of daylight, it has positive and negative effects on building occupants. As positive effects, it increases motivation, learning level, productivity, concentration, and health. However, as negative effects, it creates glare and uncomfortable visual environment (Kazanasmaz et al. 2016; Osterhaus 2005).

The windows are used technically as a daylight source. However, it can create a glare if, direct sunlight reflects from neighbor building facades or enters the indoor environment. As a result of this, the daylight is shining into the eyes of building users and creates visual discomfort in the interior space. For example, if there is an indoor area that is used computers, the glare has to prevent. Because there is no visual comfort between the eyes of the occupant and the computer screen (Osterhaus 2005).

In the design stage of the window, the dimension of it is important. Because the proper window dimension increases the positive effects and decreases the negative effects of daylight. The glazing and the opaque area have a balance between them in order to use efficient daylight availability in the indoor environment. The window-to-wall ratio (WWR) determine the transparency of the building envelop. Because of this, WWR is planned at the beginning of the design (Kazanasmaz et al. 2016; Goia 2016).

### **2.3. Selected Research About Daylighting Issues of BREEAM**

This section focuses on the selected researches about daylighting issues of BREEAM. It explains how researches looking at daylighting issues from different sides. Also, it tries to show the importance of daylighting criteria rather than other criteria of BREEAM.

Uyan (2010) wrote a thesis about sustainability assessment principles of lighting systems in the buildings. Before focuses on lighting systems, the author explains, in general, starting from the concept of sustainability and architecture, the history and today's meaning of sustainability. After that, he continues the idea of sustainable lighting systems and their effects. Then, the author explains the character of LEED, BREEAM, CASBEE, and GreenStar and their lighting criteria in detail. In the chapter of BREEAM and lighting, he gives general scoring information about BREEAM and the possible credits that can get from visual comfort section which contains daylighting and lighting criteria. Also, the assessment criteria of visual comfort are clarified. The measurement specifications and the credits of them are explained. However, there are some other lighting specifications which are related to general building condition. They are not directly about lighting. As a conclusion, the author gives the regulations and standards of lighting in Turkey and in the world (Uyan 2010).

Giarma, Tsikaloudaki, and Aravantinos (2017) wrote an article about daylighting and visual comfort in buildings' environmental performance assessment tools and its critical review. The starting point of the article is environmental performance assessment tools and their importance. BREEAM, LEED, CASBEE, and SBTool are the tools that are examined. Firstly, the authors explain each assessment tool with their history, valid building types, versions of them for different regions, assessment categories, the classification system of tools and general considerations. After that general information, the authors focus on daylighting and visual comfort parameters of each tool in detail. They give an explanation about measurement standards, evaluation criteria, and available credits for BREEAM and other assessment tools (Giarma, Tsikaloudaki, and Aravantinos 2017).

Altomonte et al. (2017) wrote an article about occupant satisfaction with indoor environmental quality with a comparison of BREEAM and non-BREEAM certified office building. Firstly, the authors explain the importance of indoor environmental quality and its relation to environmental assessment tools. Then, they give information about BREEAM's categories and rating system. After that, four buildings are selected for comparison of health and wellbeing category in order to analyze indoor environmental quality. Glare control, internal and external lighting levels are the items of health and wellbeing category that is related to daylight. Information about the category is collected by using questionnaires and surveys. The results of them show the

satisfaction of occupants. Amount of light and visual comfort are the categories that are about daylight (Altomonte et al. 2017).

Piasecki et al. (2018), wrote an article about the approach of including TVOCs (total volatile organic compounds) concentration in the indoor environmental quality model with the case studies of BREEAM certified office buildings. Indoor environmental quality is important for office buildings because the officers should use their working hours effectively. Air quality, visual, acoustic, and thermal comfort are the categories that affect indoor environmental quality. And also, they affect the rating of BREEAM certification. Satisfaction with the quality of lighting is one of the subjects of the internal environment quality. In order to evaluate the visual comfort category of BREEAM, the daylight illuminance level is determinant for evaluation of the amount of daylight. After that, four buildings are selected for the case study and they are compared and contrasted by emissions, environmental performance, and indoor air quality tests. And they analyzed according to the BREEAM requirements (Piasecki et al. 2018).

## CHAPTER 3

### THE PROCEDURE

This chapter involves three subsections which are reference room, locations, and simulation models. Firstly, the dimensions of the reference rooms and general material selection are explained. Then, detailed climate and sun path information about London and İzmir location are given. The last section includes BREEAM criteria of analysis, material alternatives of reference rooms, and the steps of the modeling phase in RELUX.

#### 3.1. The Geometry of Reference Rooms

The reference room is using as a default model for the simulation of building performance tools in order to compare and contrast the parameters of simulations. The definition of the reference room is taken from a study of C. Reinhart, Jakubiec, and Ibarra (2013) and visual comfort criteria of BREEAM (BINC16 2017b). According to C. Reinhart, Jakubiec, and Ibarra (2013), the sizes of the reference room should be 3 to 5 meter width, 5 to 8 meter depth, and 3 to 4 meter height. However, visual comfort category of BREEAM gives maximum room dimensions for reflectance values. If the room is 3 meter width and 5.4 meter depth, the window head height has to be 2.5 meters. According to these dimensions, the value of reflectance of the room is 0.5 (BINC16 2017b). The reference room dimensions of this study is a combination of this information.

The reference room has two variations according to its window size. The reference room A is a rectangular box whose dimensions are 3 meter width and 5.4 meter depth (Table 3.1). Its height is 2.7 meters and 2.5 meter window head height with a 0.8 m-canopy on the south elevation (Figure 3.1). The window is in a south facing one which is 3 meter in width, 1.5 meters in height; while the reference room B is 1.5 meter in width and 1.5 meters in height (Figure 3.2).

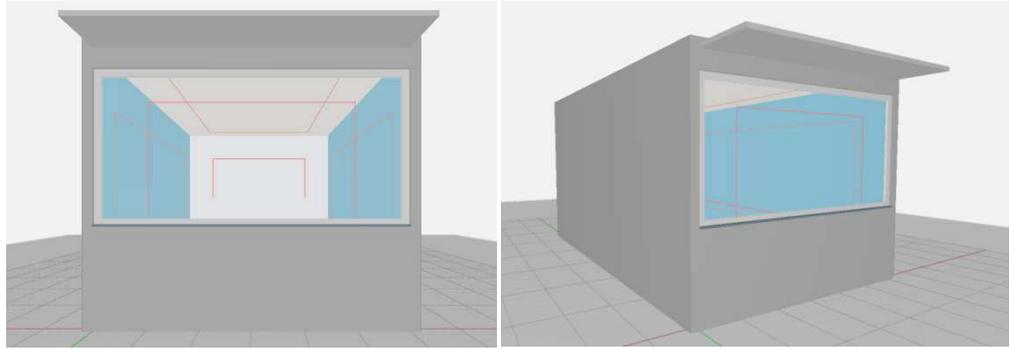


Figure 3.1. Front and perspective view of the reference room A which has a 3 meter width window.

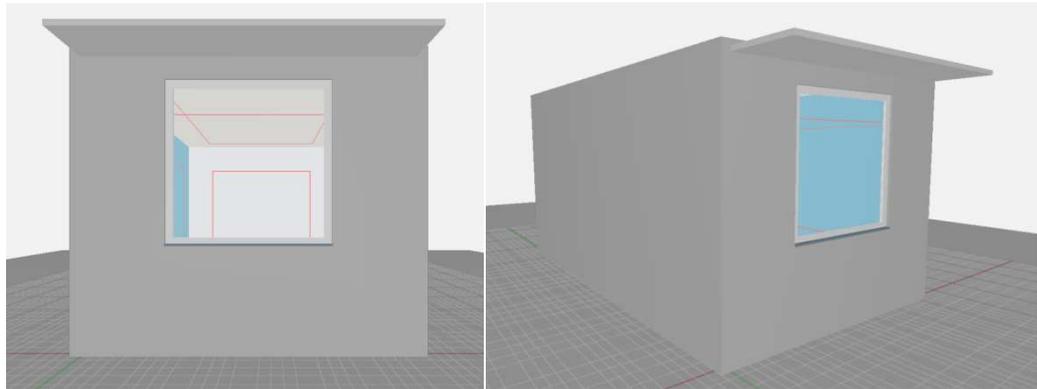


Figure 3.2. Front and perspective view of the reference room B which has a 1.5 meter width window.

The materials of the reference room defined for floor, ceiling, and walls. They have different reflectance values. For the reference room, A; the floor has 22%, ceiling 22%, and walls 56% reflectance values of the total room. For reference room B; the floor has 21.5%, ceiling 21.5%, and walls 57% reflectance values of the total room. The reflectance values of interior surfaces directly affect the average reflectance value of the reference room. Four different floor material alternatives are applied for the floor. Two of them are wood parquet and two of them are marble flooring. Different RAL colors are chosen for the ceiling and walls. The material variety creates a difference between the average reflectance values of material combinations.

Table 3.1. Geometrical properties of the reference rooms.

<b>Geometry</b>	<b>Reference Room A</b>	Width	3 m
		Depth	5.4 m
		Height	2.7 m
		Window Head Height	2.5 m
		Canopy	0.8 m
		Interior Surface Area	73.26 m <sup>2</sup>
		Glazed Area	4.5 m <sup>2</sup>
	<b>Reference Room B</b>	Width	3 m
		Depth	5.4 m
		Height	2.7 m
		Window Head Height	2.5 m
		Canopy	0.8 m
		Interior Surface Area	75.51 m <sup>2</sup>
		Glazed Area	2.25 m <sup>2</sup>

### 3.2. Location of the Rooms

The first location of the reference room is in London, England, UK (latitude 51° 5' North, longitude -0°1' East). The time zoning of London is UTC+0. The climate type of London is a marine west coast climate. It is explained as mild with no dry season and warm summers. An average temperature of daytime (Table 3.2) in spring 13.3°C, in summer 21°C, in autumn, 14.3°C, and in winter 6.7°C. Moreover, 13.5°C is the average monthly temperature of London (London, England Climate & Temperature n.d.). June, July and August have higher daily average temperatures than other months. The hottest month is July. In addition, December, January, and February have lower daily average temperature than other months. The coldest month is January in London (Average Temperatures in London, England, UK n.d.). The altitude and azimuth angles are determining the position of the sun (Table 3.3). It is changing in every date and hour. In this study, 21<sup>st</sup> of March, 21<sup>st</sup> of June, 21<sup>st</sup> of September, and 21<sup>st</sup> of December are critical dates for analysis. For these dates, 12:30 pm is specified as a critical hour for activation of the simulation tool. In spring, the sun angles are 38.62° altitude and

187.14° azimuth in at 12:30 pm on 21<sup>st</sup>of March. In summer, the sun angles are 61.43° altitude and 193.36° azimuth in at 12:30 pm on 21<sup>st</sup>of June. In autumn, the sun angles are 38.52° altitude and 191.66° azimuth at 12:30 pm on 21<sup>st</sup>of September. In winter, the sun angles are 14.74° altitude and 187.45° azimuth at 12:30 pm on 21<sup>st</sup> of December (Sun Position 2019). London has an average of 1460 hours of sunlight per year that means 3:59 hours sunlight per day in a year (Table 3.4). Moreover, 12:00 hours is the average daylight per day in a year. Also, 33.3% of the daylight hours are sunny and 66.7% of daylight hours are cloudy in London (Sunshine & Daylight Hours in London, England, UK n.d.).

Table 3.2. An average temperature of daytime for London, England, UK.

<b>London, England, UK</b>					
<b>Latitude 51° 5' North, Longitude -0°1' East, UTC+0</b>					
<b>An Average Temperature of Daytime</b>	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>	<b>Winter</b>	<b>Average Monthly</b>
	13.3°C	21°C	14.3°C	6.7°C	13.5°C

Table 3.3. Altitude and azimuth values of critical dates and hour for London, England, UK.

<b>London at 12:30 pm</b>	<b>21<sup>st</sup> of March</b>	<b>21<sup>st</sup> of June</b>	<b>21<sup>st</sup> of September</b>	<b>21<sup>st</sup> of December</b>
<b>Altitude</b>	38.62°	61.43°	38.52°	14.74°
<b>Azimuth</b>	187.14°	193.36°	191.66°	187.45°

The second location of the reference room is İzmir, Turkey (latitude 38° 4' North, longitude 27°1' East). The time zoning of İzmir is UTC+3. The climate type of İzmir is explained as a hot Mediterranean climate type which is a subtropical climate. It is a mild climate and it has dry and hot summers (Izmir Climate & Temperature n.d.). An average temperature of daytime in spring 21°C, in summer 31.8°C, in autumn at 23.6°C, and in winter is 13°C (Table 3.5). The monthly average temperature of İzmir is

Table 3.4. An average daylight and sunlight information for London and İzmir.

	<b>London</b> <b>Latitude 51° 5' North</b> <b>Longitude -0°1'</b> <b>EastUTC+0</b>	<b>İzmir</b> <b>Latitude 38° 4' North</b> <b>Longitude 27°1' East</b> <b>UTC+3</b>
<b>Average sunlight per year</b>	1460 hours	3008 hours
<b>Average sunlight per day</b>	3:59 hours	8:14 hours
<b>Average daylight per year</b>	12:00 hours	12:00 hours
<b>Sunny daylight hours</b>	33.3%	68.6%
<b>Cloudy daylight hours</b>	66.7%	31.4%

18.9°C. June, July, and August are the months that have higher daily average temperatures than the other months. In addition, July is the hottest month in İzmir. December, January, and February are the months that have a lower daily average temperature than others. Also, January is the coldest month (Average Temperatures in İzmir, Turkey n.d.). The sun position of the critical dates and hour of simulation tool are important. In spring, the sun angles are 44.42° altitude and 140.26° azimuth in at 12:30 pm on 21<sup>st</sup> of March. In summer, the sun angles are 63.42° altitude and 116.8° azimuth in at 12:30 pm on 21<sup>st</sup> of June. In autumn, the sun angles are 46.45° altitude and 144.4° azimuth at 12:30 pm on 21<sup>st</sup> of September. In winter, the sun angles are 23.89° altitude and 155.05° azimuth at 12:30 pm on 21<sup>st</sup> of December (Table 3.6) (Sun Position 2019). İzmir has an average of 3008 hours of sunlight per a year which means an average of 8:14 hours sunlight per a day in a year (Table 3.4). Also, it has an average of 12:00 hours of daylight per day in a year. Moreover, 68.6% of daylight hours are sunny and 31.4% of daylight hours are cloudy (Sunshine & Daylight Hours in İzmir, Turkey n.d.).

Table 3.5. An average temperature of daytime for İzmir, Turkey.

<b>İzmir, Turkey</b> <b>Latitude 38° 4' North, Longitude 27°1' East, UTC+3</b>					
<b>An Average Temperature of Daytime</b>	<b>Spring</b>	<b>Summer</b>	<b>Autumn</b>	<b>Winter</b>	<b>Average Monthly</b>
	21°C	31.8°C	23.6°C	13°C	18.9°C

Table 3.6. Altitude and azimuth values of critical dates and hour for İzmir, Turkey.

<b>İzmir at 12:30 pm</b>	<b>21<sup>st</sup> of March</b>	<b>21<sup>st</sup> of June</b>	<b>21<sup>st</sup> of September</b>	<b>21<sup>st</sup> of December</b>
<b>Altitude</b>	44.42°	63.42°	46.45°	23.89°
<b>Azimuth</b>	140.26°	116.8°	144.4°	155.05°

### **3.3. Daylighting Performance Simulation Models in RELUX**

The four different material alternative combinations of reference rooms are analyzing according to daylighting criteria of BREEAM by modeling phase in RELUX.

#### **3.3.1. BREEAM Criteria**

The daylighting issue of BREEAM is for university, colleges and higher education-occupied spaces building type. It has to provide 60% of the minimum area (m<sup>2</sup>) to comply with at least 300 lux for 2000 hours per year or more for average daylight illuminance of entire space. According to BREAM, the reflectance value of the indoor environment is changing with the room depth, room width, and the window head height. For the maximum 3 meter room width, 5.4 meter room depth, and 2.5 meter window head height need to create 0.5 reflectance value for the indoor environment. These dimensions of the room are using for the reference room A and B in this study. However, the reflectance values are changing with the material alternatives. If the room depth is increasing to 6.8 meter which has 3 meter room width and 2.5 meter window head height at the same time, the reflectance value is calculated 0.6 for the interior. In other situation, if the room depth is decreasing to 4.5 meters and the room has 3 meter width and 2.5 meter window head height, the reflectance value is calculated 0.4 for the interior (BINC16 2017b).

#### **3.3.2. Material Alternatives**

The daylight, that comes from the window to the interior, is reflected between different indoor surfaces. The reflectance ability of surfaces provides this movement.

Table 3.7. Reflectance value for maximum room depths (m) and head heights (m).

<b>Reflectance(RB)</b>	<b>0.4</b>		<b>0.5</b>		<b>0.6</b>	
<b>Room width (m)</b>	<b>3</b>	10	<b>3</b>	10	<b>3</b>	10
<b>Window head height (m)</b>	<b>Room depth (m)</b>					
<b>2.5</b>	<b>4.5</b>	6.7	<b>5.4</b>	8.0	<b>6.8</b>	10.0
3.0	5.0	7.7	6.0	9.2	7.5	11.5
3.5	5.4	8.6	6.5	10.4	8.1	13.0

The daylight and the reflectance feature of different materials are working together in the indoor environment. The interior surfaces of reference rooms are floor, ceiling, and walls. Different materials and colors can apply to each of these surfaces. The important point is the reflectance value of them. Every material and color have a specific reflectance value. In addition, every surface of the interior has a reflectance value and they create an average reflectance value of the indoor environment.

$$r_{average} = \frac{(\text{floor m}^2 \times r_{\text{floor}}) + (\text{ceiling m}^2 \times r_{\text{ceiling}}) + (\text{wall m}^2 \times r_{\text{wall}})}{\text{m}^2 \text{ of total interior surfaces}}$$

The amount of reflection is directly related to the amount of light in the interior. The reflectance value of the interior affects the illuminance value of the interior. The value of the average reflectance can increase or decrease the amount of illuminance. If one of the interior surface material's reflectance value is low, the other materials can choose from higher reflectance values. By this way, the average value of reflectance is balanced.

In this study, there are four different material combinations. Each material combination alternative has its own average value of reflectance. The material combination of indoor environment shows the illuminance of interior changes.

The material alternative I (Table 3.2) was prepared with four different materials and colors. Mahogany wood parquet was applied for floor surface which has 0.147 reflectance value. Grey white color plaster (RAL 9002) was applied for the ceiling which has 0.66 reflectance value. Pure white color plaster (RAL 9010) was applied for a front wall which has a window and it has 0.84 reflectance value. Dark blue color plaster (RAL 5021) was applied for left and right walls which has 0.21 reflectance value. Grey

white color plaster (RAL 9002) was applied for the back wall which has 0.66 reflectance value. According to these material selections, the reference room has 0.3762 as an average reflectance value.

Table 3.8. The material alternative I for reference room A and B.

<b>Material Alternative I</b>				
<b>Surface</b>	<b>Material</b>	<b>Reflectance</b>	<b>Average Reflectance A</b>	<b>Average Reflectance B</b>
<b>Floor</b>	Mahogany Wood Parquet	0.147	0.3762	0.3901
<b>Ceiling</b>	Plaster Grey White - RAL 9002	0.66		
<b>Front Wall (Window Wall)</b>	Plaster Pure White - RAL 9010	0.84		
<b>Left Wall</b>	Plaster Dark Blue - RAL 5021	0.21		
<b>Right Wall</b>	Plaster Dark Blue - RAL 5021	0.21		
<b>Back Wall</b>	Plaster Grey White - RAL 9002	0.66		

Material alternative II (Table 3.3) was prepared with four different materials and colors. Pinewood parquet was applied for floor surface which has 0.453 reflectance value. Dark blue color plaster (RAL 5021) was applied for the ceiling which has 0.21 reflectance value. Pure white color plaster (RAL 9010) was applied for a front wall which has a window and it has 0.84 reflectance value. Grey white color plaster (RAL 9002) was applied for left and right walls which has 0.66 reflectance value. Dark blue

color plaster (RAL 5021) was applied for the back wall which has 0.21 reflectance value. According to these material selections, the reference room has 0.4738 as an average reflectance value.

Table 3.9. Material alternative II for reference room A and B.

<b>Material Alternative II</b>				
<b>Surface</b>	<b>Material</b>	<b>Reflectance</b>	<b>Average Reflectance A</b>	<b>Average Reflectance B</b>
<b>Floor</b>	Pine Wood Parquet	0.453	0.4738	0.4847
<b>Ceiling</b>	Plaster Dark Blue - RAL 5021	0.21		
<b>Front Wall (Window Wall)</b>	Plaster Pure White - RAL 9010	0.84		
<b>Left Wall</b>	Plaster Grey White - RAL 9002	0.66		
<b>Right Wall</b>	Plaster Grey White - RAL 9002	0.66		
<b>Back Wall</b>	Plaster Dark Blue - RAL 5021	0.21		

Material alternative III (Table 3.4) was prepared with four different materials and colors. The marble slab was applied for floor surface which has 0.715 reflectance value. Grey white color plaster (RAL 9002) was applied for the ceiling which has 0.66 reflectance value. Pure white color plaster (RAL 9010) was applied for a front wall which has a window and it has 0.84 reflectance value. Yellow color plaster (RAL 9002) was applied for left and right walls which has 0.53 reflectance value. Grey white color

plaster (RAL 9002) was applied for the back wall which has 0.66 reflectance value. According to these material selections, the reference room has 0.6005 as an average reflectance value.

Table 3.10. Material alternative III for reference room A and B.

<b>Material Alternative III</b>				
<b>Surface</b>	<b>Material</b>	<b>Reflectance</b>	<b>Average Reflectance A</b>	<b>Average Reflectance B</b>
<b>Floor</b>	Marble Slab	0.715	0.6005	0.6355
<b>Ceiling</b>	Plaster Grey White - RAL 9002	0.66		
<b>Front Wall (Window Wall)</b>	Plaster Pure White - RAL 9010	0.84		
<b>Left Wall</b>	Plaster Yellow - RAL 1023	0.53		
<b>Right Wall</b>	Plaster Yellow - RAL 1023	0.53		
<b>Back Wall</b>	Plaster Grey White - RAL 9002	0.66		

Material alternative IV (Table 3.5) was prepared with four different materials and colors. The marble slab was applied for floor surface which has 0.59 reflectance value. Pure white color plaster (RAL 9010) was applied for the ceiling which has 0.84 reflectance value. Pure white color plaster (RAL 9010) was applied for a front wall which has a window and it has 0.84 reflectance value. Pure white color plaster (RAL 9010) was applied for left and right walls which has 0.84 reflectance value. Pure white

color plaster (RAL 9010) was applied for the back wall which has 0.84 reflectance value. According to these material selections, the reference room has 0.7581 as an average reflectance value.

Table 3.11. Material alternative IV for reference room A and B.

<b>Material Alternative IV</b>				
<b>Surface</b>	<b>Material</b>	<b>Reflectance</b>	<b>Average Reflectance A</b>	<b>Average Reflectance B</b>
<b>Floor</b>	Marble Slab	0.59	0.7581	0.7606
<b>Ceiling</b>	Plaster Pure White - RAL 9010	0.84		
<b>Front Wall (Window Wall)</b>	Plaster Pure White - RAL 9010	0.84		
<b>Left Wall</b>	Plaster Pure White - RAL 9010	0.84		
<b>Right Wall</b>	Plaster Pure White - RAL 9010	0.84		
<b>Back Wall</b>	Plaster Pure White - RAL 9010	0.84		

### 3.3.3.RELUX Modeling

RELUX Desktop is a freeware lighting simulation tool which is developed by RELUX Informatik AG in Switzerland. It is possible to simulate daylight and artificial light (RELUX 2019). In addition, it provides to simulate architectural elements of

building, materials, colors, and furnishings with their light diffusions (Yu, Su, and Chen 2014).

RELUX models were developed for the reference university, colleges and higher education-occupied spaces building type in the dimensions of reference room A and B in order to make daylight analysis (Table 3.1). Two of the reference rooms have the same dimensions except for the window sizes. The virtual model of reference room A has a 3 meter width and 1.5 meter height glazing. The virtual model of reference room B has a 1.5 meter width and 1.5 meter height glazing. The purpose of changing the dimension of the window is creating a difference in the amount of daylight that comes from window to the indoor environment.

The interior surface materials of reference rooms have four different alternative combinations by using specific RAL colors and floor materials (Table 3.2, Table 3.3, Table 3.4, Table 3.5). The materials and colors are located in the raytracer material library. The real reflectance value of every material is applied in the simulation tool. Because of this, the surfaces reflect the real daylight illuminance in the indoor environment. The aim of this is to generate different average reflectance value of the indoor environment.

The geographical locations and time zonings for London and İzmir are applied in the RELUX. The coordinates of the cities are uploaded to the simulation tool. London is in the time zone UTC+0 and it is located in 0.1 longitudes and 51.5 latitudes. In addition, İzmir is in the time zone UTC+3 and it is located in 27.1 longitudes and 38.4 latitudes. Each version of the reference room is prepared and calculated once for London and once for İzmir. In order to calculate an average level of the interior illuminance value four different days are selected which are 21<sup>st</sup> March, 21<sup>st</sup> June, 21<sup>st</sup> September, and 21<sup>st</sup> December. The simulation tool is activated for these four dates in the same hour which is 12:30 pm. The sun position of these dates and locations are calculated automatically in the simulation tool. Moreover, each day is calculated in CIE clear sky (CLR) condition and CIE overcast sky (OVC) condition separately.

In the final, the reference room A has 64 different simulation results that give information about the illuminance value of the indoor environment (Table 3.6). The reference room B has also the same number of simulation outcomes (Table 3.7). These 128 simulation results evaluate the visual performance of the reference rooms which

Table 3.12. The number of a simulation model for reference room A.

12:30		Reference Room A							
		I		II		III		IV	
		Lon don	İzmir	Lon don	İzmir	Lon don	İzmir	Lon don	İzmir
21 <sup>st</sup> March	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
21 <sup>st</sup> June	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
21 <sup>st</sup> September	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
21 <sup>st</sup> December	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
<b>Total</b>		<b>64 simulations</b>							

Table 3.13. The number of a simulation model for reference room B.

12:30		Reference Room B							
		I		II		III		IV	
		Lon don	İzmir	Lon don	İzmir	Lon don	İzmir	Lon don	İzmir
21 March	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
21 June	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
21 September	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
21 December	CLR	1	1	1	1	1	1	1	1
	OVC	1	1	1	1	1	1	1	1
<b>Total</b>		<b>64 simulations</b>							

depend on the illuminance based analysis. They are applied to find out how room and window design parameters change could make a difference in the daylight performance.

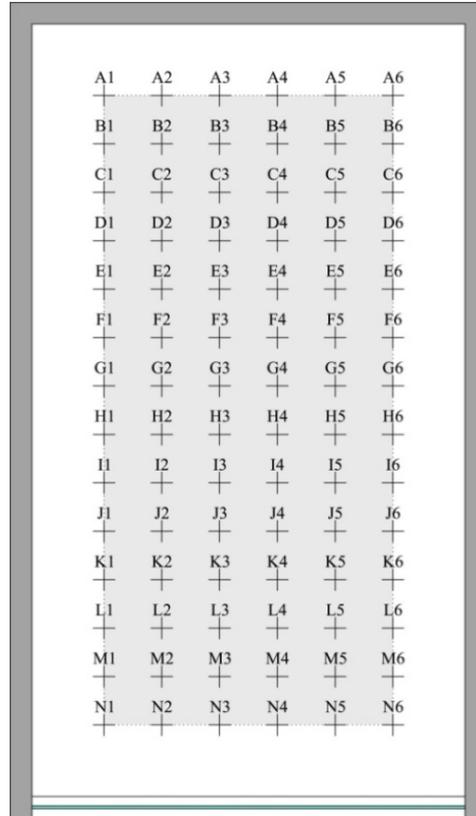


Figure 3.3. Horizontal reference plane and the calculation (84 calculation points) points of the reference room A and B.

In the simulation of the reference rooms, there is a horizontal reference plane which has points on it. This reference plane height is 0.75 meter from floor level and it has 84 calculation points on it (Figure 3.3). The simulation tool measures horizontal illuminance value (lux) of these reference points. Each point has a specific illuminance value. According to the BREEAM criteria, 60% of these points have to be measured equal to or higher than 300 lux. As a result of this, the reference room can take 1 credit from daylighting section of BREEAM (BINC16 2017b).

## CHAPTER 4

### RESEARCH FINDINGS

This chapter involves four subsections which are four different indoor environment material alternatives. They have different average reflectance value. RELUX simulation results show how the reference rooms provide daylight criteria of BREEAM. The simulations are evaluating according to BREEAM criteria because of this, the simulations are run in every season at 12:30 pm.

#### 4.1. Material Alternative I

Results according to reference room A and B and material alternative I is explained in this section. The average reflectance value of material alternative I is 0.3762 for reference room A. Geometrical properties of the reference room A is given in Table 3.1. Also, the material selections and reflectance values are shown in Table 3.8.

In spring, 21<sup>st</sup> March is selected for analysis (Table 4.1). 97.6% of the indoor area has at least 300 lux illuminance value in clear sky condition and 54.7% of the indoor area has at least 300 lux illuminance value in overcast sky condition for London. 66.6% of the indoor area has at least 300 lux illuminance value in clear sky condition and 57.1% of the indoor area has at least 300 lux illuminance value in overcast sky condition for İzmir. Clear sky condition of London and İzmir are providing BREEAM's daylight criteria with 300 lux over 60% of the indoor environment. However, in the overcast sky condition, London and İzmir are not provide BREEAM's daylight criteria.

According to simulation results in summer, 21<sup>st</sup> June is selected for analysis (Table 4.1). 63% of the indoor area in clear sky condition and 69% of the indoor area in overcast sky condition for London have at least 300 lux illuminance value. Two of the sky conditions are providing BREEAM's daylight criteria. In addition, 48.8% of the indoor area in clear sky condition and 70.2% of the indoor area in overcast sky condition for İzmir have at least 300 lux illuminance value. However, only overcast sky condition is provided BREEAM's daylight criteria.

In autumn 21<sup>st</sup> September is selected for analysis. 98.8% of the indoor area in clear sky condition and 55.9% of the indoor area in overcast sky condition have at least 300 lux illuminance value for London (Table 4.2). 69% of the indoor area in clear sky condition and 61.9% of the indoor area in overcast sky condition have at least 300 lux illuminance value for İzmir (Table 4.2). All the simulations in autumn are providing BREEAM's daylight criteria except overcast sky condition in London. The material alternative I's average reflectance value is 0.3762. However, for this size room, BREEAM specifies 0.5 reflectance value in order to provide daylight criteria. Because of this, it is a normal result for London in the overcast sky condition.

In Table 4.2, 21<sup>st</sup> December is selected for the winter season. In London, 100% of the indoor area clear sky condition and 26.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value. In İzmir, 100% of the indoor area in clear sky condition and 42.8% of the indoor area in overcast sky condition have at least 300 lux illuminance value. Both of the locations, only clear sky condition is providing BREEAM's daylight criteria.

Regarding reference room B, all the geometrical properties are same with reference room A except window width. The window head height is stable but the window width decreasing from 3 meters to 1.5 meters (Table 3.1). BREEAM does not have any criteria about window width. However, the window width affects the amount of daylight that comes into the interior. The aim of this to see the effect of window width to illuminance value of the interior.

Findings according to reference room B and material alternative I is clarified. 0.3901 is the average reflectance value of material alternative I for reference room B, it is explained in Table 3.8. The simulations are run in every season at 12:30 pm same as reference room A.

According to simulation findings in spring, 58.3% of the indoor in clear sky condition and 32.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. In addition, 40.4% of the indoor area in clear sky condition and 35.7% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. None of the simulation results in spring are above 60%. These results are expected because the geometrical properties and the reflectance value of the room are shown in Table 3.7. According to Table 3.7, the room has to have 0.5

Table 4.1. Reference room A, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> March and 21<sup>st</sup> June at 12:00 pm.

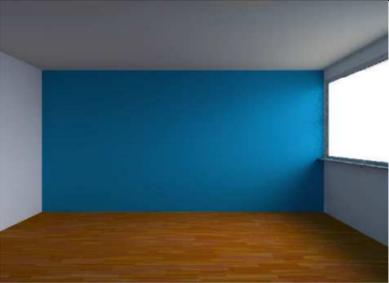
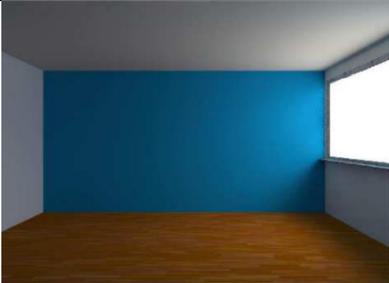
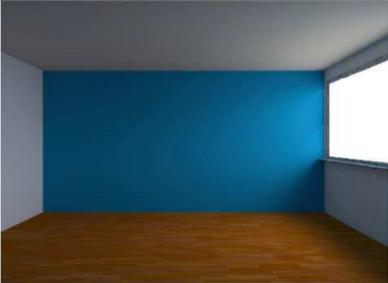
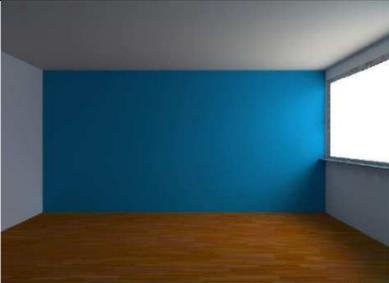
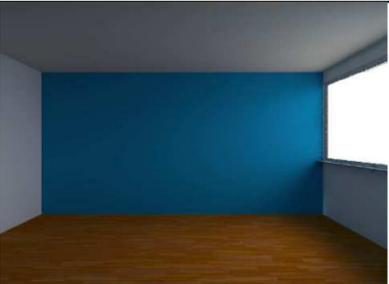
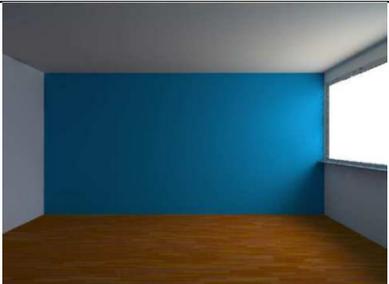
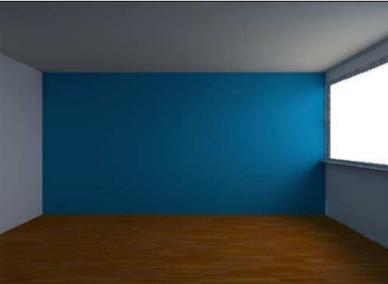
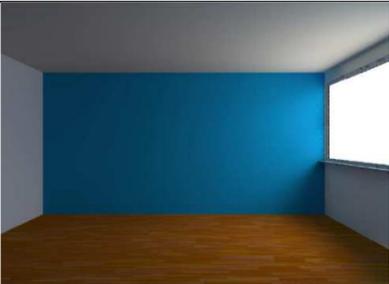
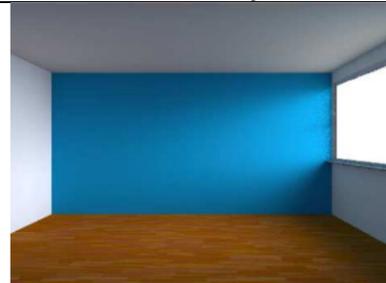
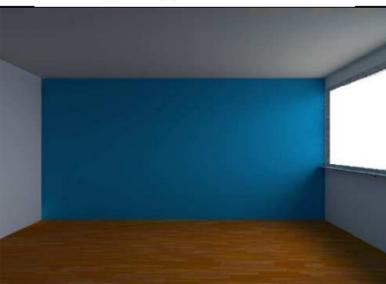
Room A- Material Alternative I at 12:00 pm	21 <sup>st</sup> March		21 <sup>st</sup> June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
London																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>327</td><td>335</td><td>335</td><td>327</td><td>313</td><td>(289)</td></tr> <tr><td>4.0</td><td>337</td><td>345</td><td>346</td><td>338</td><td>320</td><td>296</td></tr> <tr><td></td><td>363</td><td>372</td><td>374</td><td>366</td><td>349</td><td>317</td></tr> <tr><td>3.5</td><td>405</td><td>413</td><td>420</td><td>411</td><td>392</td><td>350</td></tr> <tr><td></td><td>461</td><td>473</td><td>485</td><td>477</td><td>451</td><td>398</td></tr> <tr><td>3.0</td><td>537</td><td>559</td><td>584</td><td>565</td><td>523</td><td>458</td></tr> <tr><td></td><td>639</td><td>671</td><td>693</td><td>682</td><td>635</td><td>538</td></tr> <tr><td>2.5</td><td>750</td><td>798</td><td>832</td><td>818</td><td>769</td><td>642</td></tr> <tr><td></td><td>867</td><td>910</td><td>968</td><td>969</td><td>874</td><td>758</td></tr> <tr><td>2.0</td><td>1050</td><td>1110</td><td>1160</td><td>1130</td><td>1020</td><td>921</td></tr> <tr><td></td><td>1230</td><td>1340</td><td>1390</td><td>1380</td><td>1280</td><td>1090</td></tr> <tr><td>1.5</td><td>1430</td><td>1570</td><td>1600</td><td>1560</td><td>1530</td><td>1320</td></tr> <tr><td></td><td>1710</td><td>1830</td><td>1850</td><td>1840</td><td>1750</td><td>1550</td></tr> <tr><td>1.0</td><td>1900</td><td>1960</td><td>1900</td><td>1880</td><td>1820</td><td>1690</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	327	335	335	327	313	(289)	4.0	337	345	346	338	320	296		363	372	374	366	349	317	3.5	405	413	420	411	392	350		461	473	485	477	451	398	3.0	537	559	584	565	523	458		639	671	693	682	635	538	2.5	750	798	832	818	769	642		867	910	968	969	874	758	2.0	1050	1110	1160	1130	1020	921		1230	1340	1390	1380	1280	1090	1.5	1430	1570	1600	1560	1530	1320		1710	1830	1850	1840	1750	1550	1.0	1900	1960	1900	1880	1820	1690	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>138</td><td>144</td><td>147</td><td>147</td><td>143</td><td>(136)</td></tr> <tr><td>4.0</td><td>146</td><td>152</td><td>155</td><td>155</td><td>151</td><td>143</td></tr> <tr><td></td><td>160</td><td>166</td><td>170</td><td>169</td><td>165</td><td>156</td></tr> <tr><td>3.5</td><td>181</td><td>188</td><td>191</td><td>191</td><td>186</td><td>176</td></tr> <tr><td></td><td>211</td><td>218</td><td>224</td><td>222</td><td>216</td><td>204</td></tr> <tr><td>3.0</td><td>252</td><td>258</td><td>266</td><td>266</td><td>257</td><td>239</td></tr> <tr><td></td><td>299</td><td>313</td><td>321</td><td>322</td><td>306</td><td>288</td></tr> <tr><td>2.5</td><td>366</td><td>379</td><td>397</td><td>397</td><td>389</td><td>356</td></tr> <tr><td></td><td>447</td><td>465</td><td>485</td><td>482</td><td>469</td><td>417</td></tr> <tr><td>2.0</td><td>536</td><td>588</td><td>606</td><td>584</td><td>584</td><td>522</td></tr> <tr><td></td><td>649</td><td>724</td><td>763</td><td>755</td><td>741</td><td>669</td></tr> <tr><td>1.5</td><td>806</td><td>902</td><td>949</td><td>944</td><td>906</td><td>826</td></tr> <tr><td></td><td>1000</td><td>1140</td><td>1170</td><td>1190</td><td>1140</td><td>1030</td></tr> <tr><td>1.0</td><td>1270</td><td>1440</td><td>1450</td><td>1480</td><td>1420</td><td>1280</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	138	144	147	147	143	(136)	4.0	146	152	155	155	151	143		160	166	170	169	165	156	3.5	181	188	191	191	186	176		211	218	224	222	216	204	3.0	252	258	266	266	257	239		299	313	321	322	306	288	2.5	366	379	397	397	389	356		447	465	485	482	469	417	2.0	536	588	606	584	584	522		649	724	763	755	741	669	1.5	806	902	949	944	906	826		1000	1140	1170	1190	1140	1030	1.0	1270	1440	1450	1480	1420	1280	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>189</td><td>196</td><td>198</td><td>196</td><td>190</td><td>(180)</td></tr> <tr><td>4.0</td><td>196</td><td>200</td><td>204</td><td>200</td><td>196</td><td>185</td></tr> <tr><td></td><td>211</td><td>217</td><td>219</td><td>217</td><td>210</td><td>198</td></tr> <tr><td>3.5</td><td>235</td><td>239</td><td>244</td><td>240</td><td>234</td><td>219</td></tr> <tr><td></td><td>269</td><td>276</td><td>277</td><td>273</td><td>268</td><td>249</td></tr> <tr><td>3.0</td><td>319</td><td>317</td><td>327</td><td>320</td><td>312</td><td>291</td></tr> <tr><td></td><td>370</td><td>374</td><td>390</td><td>379</td><td>373</td><td>334</td></tr> <tr><td>2.5</td><td>445</td><td>444</td><td>477</td><td>461</td><td>437</td><td>398</td></tr> <tr><td></td><td>523</td><td>541</td><td>556</td><td>542</td><td>535</td><td>482</td></tr> <tr><td>2.0</td><td>612</td><td>639</td><td>677</td><td>675</td><td>658</td><td>574</td></tr> <tr><td></td><td>753</td><td>796</td><td>824</td><td>824</td><td>788</td><td>696</td></tr> <tr><td>1.5</td><td>914</td><td>958</td><td>995</td><td>1020</td><td>970</td><td>850</td></tr> <tr><td></td><td>1110</td><td>1200</td><td>1230</td><td>1230</td><td>1180</td><td>1040</td></tr> <tr><td>1.0</td><td>1430</td><td>1470</td><td>1480</td><td>1420</td><td>1450</td><td>1310</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	189	196	198	196	190	(180)	4.0	196	200	204	200	196	185		211	217	219	217	210	198	3.5	235	239	244	240	234	219		269	276	277	273	268	249	3.0	319	317	327	320	312	291		370	374	390	379	373	334	2.5	445	444	477	461	437	398		523	541	556	542	535	482	2.0	612	639	677	675	658	574		753	796	824	824	788	696	1.5	914	958	995	1020	970	850		1110	1200	1230	1230	1180	1040	1.0	1430	1470	1480	1420	1450	1310	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>196</td><td>204</td><td>208</td><td>208</td><td>203</td><td>(193)</td></tr> <tr><td>4.0</td><td>208</td><td>215</td><td>220</td><td>218</td><td>214</td><td>203</td></tr> <tr><td></td><td>227</td><td>236</td><td>240</td><td>239</td><td>234</td><td>221</td></tr> <tr><td>3.5</td><td>256</td><td>266</td><td>270</td><td>268</td><td>264</td><td>249</td></tr> <tr><td></td><td>298</td><td>310</td><td>316</td><td>313</td><td>305</td><td>287</td></tr> <tr><td>3.0</td><td>354</td><td>370</td><td>369</td><td>376</td><td>365</td><td>336</td></tr> <tr><td></td><td>421</td><td>442</td><td>464</td><td>453</td><td>436</td><td>412</td></tr> <tr><td>2.5</td><td>521</td><td>532</td><td>563</td><td>564</td><td>541</td><td>504</td></tr> <tr><td></td><td>610</td><td>671</td><td>679</td><td>696</td><td>670</td><td>604</td></tr> <tr><td>2.0</td><td>757</td><td>821</td><td>824</td><td>851</td><td>819</td><td>772</td></tr> <tr><td></td><td>952</td><td>1010</td><td>1070</td><td>1060</td><td>1050</td><td>925</td></tr> <tr><td>1.5</td><td>1150</td><td>1270</td><td>1350</td><td>1330</td><td>1300</td><td>1190</td></tr> <tr><td></td><td>1460</td><td>1600</td><td>1670</td><td>1700</td><td>1610</td><td>1450</td></tr> <tr><td>1.0</td><td>1870</td><td>2000</td><td>2090</td><td>2060</td><td>2000</td><td>1810</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	196	204	208	208	203	(193)	4.0	208	215	220	218	214	203		227	236	240	239	234	221	3.5	256	266	270	268	264	249		298	310	316	313	305	287	3.0	354	370	369	376	365	336		421	442	464	453	436	412	2.5	521	532	563	564	541	504		610	671	679	696	670	604	2.0	757	821	824	851	819	772		952	1010	1070	1060	1050	925	1.5	1150	1270	1350	1330	1300	1190		1460	1600	1670	1700	1610	1450	1.0	1870	2000	2090	2060	2000	1810	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	327	335	335	327	313	(289)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	337	345	346	338	320	296																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	363	372	374	366	349	317																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	405	413	420	411	392	350																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	461	473	485	477	451	398																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	537	559	584	565	523	458																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	639	671	693	682	635	538																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	750	798	832	818	769	642																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	867	910	968	969	874	758																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	1050	1110	1160	1130	1020	921																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1230	1340	1390	1380	1280	1090																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1430	1570	1600	1560	1530	1320																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1710	1830	1850	1840	1750	1550																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1900	1960	1900	1880	1820	1690																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	138	144	147	147	143	(136)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	146	152	155	155	151	143																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	160	166	170	169	165	156																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	181	188	191	191	186	176																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	211	218	224	222	216	204																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	252	258	266	266	257	239																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	299	313	321	322	306	288																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	366	379	397	397	389	356																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	447	465	485	482	469	417																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	536	588	606	584	584	522																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	649	724	763	755	741	669																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	806	902	949	944	906	826																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1000	1140	1170	1190	1140	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1270	1440	1450	1480	1420	1280																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	189	196	198	196	190	(180)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	196	200	204	200	196	185																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	211	217	219	217	210	198																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	235	239	244	240	234	219																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	269	276	277	273	268	249																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	319	317	327	320	312	291																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	370	374	390	379	373	334																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	445	444	477	461	437	398																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	523	541	556	542	535	482																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	612	639	677	675	658	574																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	753	796	824	824	788	696																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	914	958	995	1020	970	850																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1110	1200	1230	1230	1180	1040																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1430	1470	1480	1420	1450	1310																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	196	204	208	208	203	(193)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	208	215	220	218	214	203																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	227	236	240	239	234	221																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	256	266	270	268	264	249																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	298	310	316	313	305	287																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	354	370	369	376	365	336																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	421	442	464	453	436	412																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	521	532	563	564	541	504																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	610	671	679	696	670	604																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	757	821	824	851	819	772																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	952	1010	1070	1060	1050	925																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1150	1270	1350	1330	1300	1190																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1460	1600	1670	1700	1610	1450																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1870	2000	2090	2060	2000	1810																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
İzmir																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>227</td><td>227</td><td>223</td><td>216</td><td>205</td><td>(190)</td></tr> <tr><td>4.0</td><td>235</td><td>234</td><td>230</td><td>222</td><td>210</td><td>194</td></tr> <tr><td></td><td>255</td><td>253</td><td>248</td><td>238</td><td>224</td><td>206</td></tr> <tr><td>3.5</td><td>287</td><td>282</td><td>277</td><td>261</td><td>247</td><td>227</td></tr> <tr><td></td><td>333</td><td>326</td><td>317</td><td>298</td><td>280</td><td>253</td></tr> <tr><td>3.0</td><td>389</td><td>383</td><td>373</td><td>349</td><td>320</td><td>287</td></tr> <tr><td></td><td>457</td><td>454</td><td>445</td><td>410</td><td>385</td><td>344</td></tr> <tr><td>2.5</td><td>552</td><td>548</td><td>543</td><td>502</td><td>460</td><td>396</td></tr> <tr><td></td><td>650</td><td>656</td><td>652</td><td>603</td><td>550</td><td>472</td></tr> <tr><td>2.0</td><td>798</td><td>799</td><td>811</td><td>741</td><td>677</td><td>561</td></tr> <tr><td></td><td>978</td><td>991</td><td>965</td><td>933</td><td>807</td><td>687</td></tr> <tr><td>1.5</td><td>1190</td><td>1210</td><td>1200</td><td>1160</td><td>1020</td><td>819</td></tr> <tr><td></td><td>1380</td><td>1470</td><td>1450</td><td>1380</td><td>1280</td><td>1030</td></tr> <tr><td>1.0</td><td>1680</td><td>1700</td><td>1610</td><td>1680</td><td>1520</td><td>1290</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	227	227	223	216	205	(190)	4.0	235	234	230	222	210	194		255	253	248	238	224	206	3.5	287	282	277	261	247	227		333	326	317	298	280	253	3.0	389	383	373	349	320	287		457	454	445	410	385	344	2.5	552	548	543	502	460	396		650	656	652	603	550	472	2.0	798	799	811	741	677	561		978	991	965	933	807	687	1.5	1190	1210	1200	1160	1020	819		1380	1470	1450	1380	1280	1030	1.0	1680	1700	1610	1680	1520	1290	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>157</td><td>163</td><td>166</td><td>166</td><td>162</td><td>(154)</td></tr> <tr><td>4.0</td><td>165</td><td>172</td><td>175</td><td>175</td><td>171</td><td>162</td></tr> <tr><td></td><td>181</td><td>188</td><td>192</td><td>190</td><td>186</td><td>176</td></tr> <tr><td>3.5</td><td>204</td><td>212</td><td>215</td><td>215</td><td>210</td><td>199</td></tr> <tr><td></td><td>238</td><td>248</td><td>251</td><td>253</td><td>243</td><td>229</td></tr> <tr><td>3.0</td><td>277</td><td>292</td><td>303</td><td>298</td><td>286</td><td>268</td></tr> <tr><td></td><td>339</td><td>351</td><td>367</td><td>367</td><td>348</td><td>330</td></tr> <tr><td>2.5</td><td>409</td><td>434</td><td>454</td><td>451</td><td>432</td><td>405</td></tr> <tr><td></td><td>487</td><td>513</td><td>557</td><td>544</td><td>537</td><td>476</td></tr> <tr><td>2.0</td><td>617</td><td>643</td><td>688</td><td>683</td><td>651</td><td>599</td></tr> <tr><td></td><td>765</td><td>809</td><td>850</td><td>863</td><td>821</td><td>759</td></tr> <tr><td>1.5</td><td>925</td><td>1030</td><td>1060</td><td>1100</td><td>1050</td><td>937</td></tr> <tr><td></td><td>1150</td><td>1280</td><td>1330</td><td>1340</td><td>1290</td><td>1150</td></tr> <tr><td>1.0</td><td>1470</td><td>1630</td><td>1670</td><td>1680</td><td>1610</td><td>1440</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	157	163	166	166	162	(154)	4.0	165	172	175	175	171	162		181	188	192	190	186	176	3.5	204	212	215	215	210	199		238	248	251	253	243	229	3.0	277	292	303	298	286	268		339	351	367	367	348	330	2.5	409	434	454	451	432	405		487	513	557	544	537	476	2.0	617	643	688	683	651	599		765	809	850	863	821	759	1.5	925	1030	1060	1100	1050	937		1150	1280	1330	1340	1290	1150	1.0	1470	1630	1670	1680	1610	1440	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>153</td><td>157</td><td>158</td><td>156</td><td>150</td><td>(142)</td></tr> <tr><td>4.0</td><td>158</td><td>161</td><td>162</td><td>160</td><td>154</td><td>145</td></tr> <tr><td></td><td>169</td><td>172</td><td>173</td><td>170</td><td>164</td><td>155</td></tr> <tr><td>3.5</td><td>188</td><td>189</td><td>190</td><td>187</td><td>182</td><td>170</td></tr> <tr><td></td><td>213</td><td>217</td><td>216</td><td>211</td><td>206</td><td>191</td></tr> <tr><td>3.0</td><td>247</td><td>251</td><td>252</td><td>244</td><td>236</td><td>218</td></tr> <tr><td></td><td>289</td><td>296</td><td>295</td><td>292</td><td>274</td><td>255</td></tr> <tr><td>2.5</td><td>347</td><td>354</td><td>358</td><td>350</td><td>323</td><td>294</td></tr> <tr><td></td><td>399</td><td>417</td><td>419</td><td>411</td><td>387</td><td>353</td></tr> <tr><td>2.0</td><td>486</td><td>507</td><td>510</td><td>502</td><td>465</td><td>417</td></tr> <tr><td></td><td>584</td><td>607</td><td>608</td><td>601</td><td>568</td><td>497</td></tr> <tr><td>1.5</td><td>721</td><td>731</td><td>767</td><td>740</td><td>680</td><td>605</td></tr> <tr><td></td><td>857</td><td>906</td><td>928</td><td>900</td><td>840</td><td>725</td></tr> <tr><td>1.0</td><td>1010</td><td>1100</td><td>1070</td><td>1040</td><td>1030</td><td>876</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	153	157	158	156	150	(142)	4.0	158	161	162	160	154	145		169	172	173	170	164	155	3.5	188	189	190	187	182	170		213	217	216	211	206	191	3.0	247	251	252	244	236	218		289	296	295	292	274	255	2.5	347	354	358	350	323	294		399	417	419	411	387	353	2.0	486	507	510	502	465	417		584	607	608	601	568	497	1.5	721	731	767	740	680	605		857	906	928	900	840	725	1.0	1010	1100	1070	1040	1030	876	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>200</td><td>208</td><td>212</td><td>211</td><td>206</td><td>(196)</td></tr> <tr><td>4.0</td><td>211</td><td>219</td><td>224</td><td>223</td><td>217</td><td>206</td></tr> <tr><td></td><td>231</td><td>240</td><td>245</td><td>243</td><td>238</td><td>225</td></tr> <tr><td>3.5</td><td>261</td><td>271</td><td>276</td><td>274</td><td>268</td><td>253</td></tr> <tr><td></td><td>303</td><td>315</td><td>323</td><td>318</td><td>313</td><td>293</td></tr> <tr><td>3.0</td><td>356</td><td>377</td><td>383</td><td>377</td><td>369</td><td>343</td></tr> <tr><td></td><td>434</td><td>453</td><td>468</td><td>465</td><td>455</td><td>417</td></tr> <tr><td>2.5</td><td>526</td><td>551</td><td>580</td><td>578</td><td>548</td><td>506</td></tr> <tr><td></td><td>616</td><td>676</td><td>705</td><td>704</td><td>681</td><td>623</td></tr> <tr><td>2.0</td><td>769</td><td>842</td><td>865</td><td>864</td><td>815</td><td>764</td></tr> <tr><td></td><td>951</td><td>1070</td><td>1070</td><td>1110</td><td>1060</td><td>962</td></tr> <tr><td>1.5</td><td>1180</td><td>1320</td><td>1370</td><td>1370</td><td>1340</td><td>1170</td></tr> <tr><td></td><td>1510</td><td>1650</td><td>1710</td><td>1730</td><td>1610</td><td>1460</td></tr> <tr><td>1.0</td><td>1940</td><td>2050</td><td>2070</td><td>2070</td><td>2080</td><td>1780</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	200	208	212	211	206	(196)	4.0	211	219	224	223	217	206		231	240	245	243	238	225	3.5	261	271	276	274	268	253		303	315	323	318	313	293	3.0	356	377	383	377	369	343		434	453	468	465	455	417	2.5	526	551	580	578	548	506		616	676	705	704	681	623	2.0	769	842	865	864	815	764		951	1070	1070	1110	1060	962	1.5	1180	1320	1370	1370	1340	1170		1510	1650	1710	1730	1610	1460	1.0	1940	2050	2070	2070	2080	1780	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	227	227	223	216	205	(190)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	235	234	230	222	210	194																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	255	253	248	238	224	206																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	287	282	277	261	247	227																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	333	326	317	298	280	253																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	389	383	373	349	320	287																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	457	454	445	410	385	344																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	552	548	543	502	460	396																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	650	656	652	603	550	472																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	798	799	811	741	677	561																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	978	991	965	933	807	687																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1190	1210	1200	1160	1020	819																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1380	1470	1450	1380	1280	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1680	1700	1610	1680	1520	1290																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	157	163	166	166	162	(154)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	165	172	175	175	171	162																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	181	188	192	190	186	176																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	204	212	215	215	210	199																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	238	248	251	253	243	229																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	277	292	303	298	286	268																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	339	351	367	367	348	330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	409	434	454	451	432	405																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	487	513	557	544	537	476																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	617	643	688	683	651	599																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	765	809	850	863	821	759																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	925	1030	1060	1100	1050	937																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1150	1280	1330	1340	1290	1150																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1470	1630	1670	1680	1610	1440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	153	157	158	156	150	(142)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	158	161	162	160	154	145																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	169	172	173	170	164	155																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	188	189	190	187	182	170																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	213	217	216	211	206	191																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	247	251	252	244	236	218																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	289	296	295	292	274	255																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	347	354	358	350	323	294																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	399	417	419	411	387	353																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	486	507	510	502	465	417																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	584	607	608	601	568	497																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	721	731	767	740	680	605																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	857	906	928	900	840	725																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1010	1100	1070	1040	1030	876																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	200	208	212	211	206	(196)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	211	219	224	223	217	206																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	231	240	245	243	238	225																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	261	271	276	274	268	253																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	303	315	323	318	313	293																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	356	377	383	377	369	343																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	434	453	468	465	455	417																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	526	551	580	578	548	506																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	616	676	705	704	681	623																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	769	842	865	864	815	764																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	951	1070	1070	1110	1060	962																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1180	1320	1370	1370	1340	1170																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1510	1650	1710	1730	1610	1460																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1940	2050	2070	2070	2080	1780																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Table 4.2. Reference room A, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> September and 21<sup>st</sup> December at 12:00 pm.

Room A- Material Alternative I at 12:00 pm	21stSeptember		21 <sup>st</sup> December																																																																																																																																																																																																																																																																																																																																																	
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																
London																																																																																																																																																																																																																																																																																																																																																				
	<table border="1"> <tr><td>(293)</td><td>311</td><td>323</td><td>328</td><td>326</td><td>313</td></tr> <tr><td>300</td><td>319</td><td>330</td><td>339</td><td>337</td><td>324</td></tr> <tr><td>322</td><td>343</td><td>358</td><td>366</td><td>366</td><td>350</td></tr> <tr><td>358</td><td>381</td><td>401</td><td>408</td><td>411</td><td>392</td></tr> <tr><td>411</td><td>439</td><td>459</td><td>476</td><td>475</td><td>450</td></tr> <tr><td>472</td><td>520</td><td>540</td><td>571</td><td>560</td><td>530</td></tr> <tr><td>560</td><td>615</td><td>651</td><td>679</td><td>654</td><td>625</td></tr> <tr><td>675</td><td>743</td><td>793</td><td>838</td><td>780</td><td>754</td></tr> <tr><td>766</td><td>861</td><td>934</td><td>957</td><td>942</td><td>900</td></tr> <tr><td>948</td><td>1050</td><td>1130</td><td>1130</td><td>1140</td><td>1050</td></tr> <tr><td>1150</td><td>1300</td><td>1370</td><td>1380</td><td>1360</td><td>1320</td></tr> <tr><td>1350</td><td>1530</td><td>1590</td><td>1700</td><td>1600</td><td>1520</td></tr> <tr><td>1660</td><td>1810</td><td>1830</td><td>1880</td><td>1850</td><td>1770</td></tr> <tr><td>2020</td><td>2000</td><td>2010</td><td>1960</td><td>1960</td><td>1750</td></tr> </table>	(293)	311	323	328	326	313	300	319	330	339	337	324	322	343	358	366	366	350	358	381	401	408	411	392	411	439	459	476	475	450	472	520	540	571	560	530	560	615	651	679	654	625	675	743	793	838	780	754	766	861	934	957	942	900	948	1050	1130	1130	1140	1050	1150	1300	1370	1380	1360	1320	1350	1530	1590	1700	1600	1520	1660	1810	1830	1880	1850	1770	2020	2000	2010	1960	1960	1750	<table border="1"> <tr><td>143</td><td>148</td><td>151</td><td>150</td><td>147</td><td>(139)</td></tr> <tr><td>150</td><td>155</td><td>159</td><td>158</td><td>154</td><td>146</td></tr> <tr><td>164</td><td>170</td><td>173</td><td>173</td><td>169</td><td>159</td></tr> <tr><td>185</td><td>192</td><td>195</td><td>194</td><td>190</td><td>180</td></tr> <tr><td>215</td><td>223</td><td>227</td><td>228</td><td>222</td><td>207</td></tr> <tr><td>255</td><td>262</td><td>271</td><td>271</td><td>266</td><td>251</td></tr> <tr><td>311</td><td>314</td><td>323</td><td>332</td><td>318</td><td>293</td></tr> <tr><td>369</td><td>388</td><td>414</td><td>406</td><td>388</td><td>361</td></tr> <tr><td>455</td><td>480</td><td>494</td><td>488</td><td>477</td><td>441</td></tr> <tr><td>532</td><td>603</td><td>625</td><td>615</td><td>589</td><td>537</td></tr> <tr><td>669</td><td>733</td><td>777</td><td>780</td><td>745</td><td>673</td></tr> <tr><td>851</td><td>927</td><td>963</td><td>986</td><td>929</td><td>856</td></tr> <tr><td>1050</td><td>1160</td><td>1200</td><td>1220</td><td>1150</td><td>1040</td></tr> <tr><td>1360</td><td>1490</td><td>1440</td><td>1490</td><td>1460</td><td>1320</td></tr> </table>	143	148	151	150	147	(139)	150	155	159	158	154	146	164	170	173	173	169	159	185	192	195	194	190	180	215	223	227	228	222	207	255	262	271	271	266	251	311	314	323	332	318	293	369	388	414	406	388	361	455	480	494	488	477	441	532	603	625	615	589	537	669	733	777	780	745	673	851	927	963	986	929	856	1050	1160	1200	1220	1150	1040	1360	1490	1440	1490	1460	1320	<table border="1"> <tr><td>(400)</td><td>436</td><td>462</td><td>476</td><td>477</td><td>461</td></tr> <tr><td>(400)</td><td>438</td><td>466</td><td>481</td><td>481</td><td>465</td></tr> <tr><td>420</td><td>459</td><td>489</td><td>507</td><td>507</td><td>490</td></tr> <tr><td>454</td><td>495</td><td>530</td><td>549</td><td>552</td><td>534</td></tr> <tr><td>508</td><td>550</td><td>590</td><td>615</td><td>617</td><td>592</td></tr> <tr><td>552</td><td>614</td><td>658</td><td>686</td><td>686</td><td>673</td></tr> <tr><td>646</td><td>671</td><td>750</td><td>769</td><td>795</td><td>726</td></tr> <tr><td>699</td><td>759</td><td>865</td><td>880</td><td>849</td><td>833</td></tr> <tr><td>794</td><td>869</td><td>909</td><td>974</td><td>1000</td><td>925</td></tr> <tr><td>920</td><td>998</td><td>1090</td><td>1070</td><td>1070</td><td>1040</td></tr> <tr><td>998</td><td>1110</td><td>1180</td><td>1170</td><td>1180</td><td>1110</td></tr> <tr><td>1120</td><td>1180</td><td>1290</td><td>1310</td><td>1280</td><td>1210</td></tr> <tr><td>1190</td><td>1240</td><td>1300</td><td>1330</td><td>1260</td><td>1240</td></tr> <tr><td>1090</td><td>1100</td><td>1130</td><td>1160</td><td>1160</td><td>1100</td></tr> </table>	(400)	436	462	476	477	461	(400)	438	466	481	481	465	420	459	489	507	507	490	454	495	530	549	552	534	508	550	590	615	617	592	552	614	658	686	686	673	646	671	750	769	795	726	699	759	865	880	849	833	794	869	909	974	1000	925	920	998	1090	1070	1070	1040	998	1110	1180	1170	1180	1110	1120	1180	1290	1310	1280	1210	1190	1240	1300	1330	1260	1240	1090	1100	1130	1160	1160	1100	<table border="1"> <tr><td>59</td><td>62</td><td>63</td><td>63</td><td>61</td><td>(58)</td></tr> <tr><td>63</td><td>65</td><td>66</td><td>66</td><td>64</td><td>61</td></tr> <tr><td>69</td><td>71</td><td>73</td><td>72</td><td>71</td><td>67</td></tr> <tr><td>78</td><td>80</td><td>82</td><td>82</td><td>80</td><td>75</td></tr> <tr><td>90</td><td>93</td><td>95</td><td>95</td><td>93</td><td>87</td></tr> <tr><td>107</td><td>109</td><td>113</td><td>114</td><td>109</td><td>102</td></tr> <tr><td>127</td><td>131</td><td>134</td><td>138</td><td>133</td><td>123</td></tr> <tr><td>157</td><td>164</td><td>170</td><td>170</td><td>163</td><td>151</td></tr> <tr><td>189</td><td>198</td><td>207</td><td>204</td><td>199</td><td>182</td></tr> <tr><td>229</td><td>251</td><td>257</td><td>264</td><td>254</td><td>227</td></tr> <tr><td>280</td><td>311</td><td>320</td><td>323</td><td>304</td><td>282</td></tr> <tr><td>350</td><td>390</td><td>403</td><td>414</td><td>387</td><td>356</td></tr> <tr><td>437</td><td>491</td><td>507</td><td>506</td><td>489</td><td>446</td></tr> <tr><td>576</td><td>599</td><td>648</td><td>606</td><td>589</td><td>538</td></tr> </table>	59	62	63	63	61	(58)	63	65	66	66	64	61	69	71	73	72	71	67	78	80	82	82	80	75	90	93	95	95	93	87	107	109	113	114	109	102	127	131	134	138	133	123	157	164	170	170	163	151	189	198	207	204	199	182	229	251	257	264	254	227	280	311	320	323	304	282	350	390	403	414	387	356	437	491	507	506	489	446	576	599	648	606	589	538
	(293)	311	323	328	326	313																																																																																																																																																																																																																																																																																																																																														
	300	319	330	339	337	324																																																																																																																																																																																																																																																																																																																																														
322	343	358	366	366	350																																																																																																																																																																																																																																																																																																																																															
358	381	401	408	411	392																																																																																																																																																																																																																																																																																																																																															
411	439	459	476	475	450																																																																																																																																																																																																																																																																																																																																															
472	520	540	571	560	530																																																																																																																																																																																																																																																																																																																																															
560	615	651	679	654	625																																																																																																																																																																																																																																																																																																																																															
675	743	793	838	780	754																																																																																																																																																																																																																																																																																																																																															
766	861	934	957	942	900																																																																																																																																																																																																																																																																																																																																															
948	1050	1130	1130	1140	1050																																																																																																																																																																																																																																																																																																																																															
1150	1300	1370	1380	1360	1320																																																																																																																																																																																																																																																																																																																																															
1350	1530	1590	1700	1600	1520																																																																																																																																																																																																																																																																																																																																															
1660	1810	1830	1880	1850	1770																																																																																																																																																																																																																																																																																																																																															
2020	2000	2010	1960	1960	1750																																																																																																																																																																																																																																																																																																																																															
143	148	151	150	147	(139)																																																																																																																																																																																																																																																																																																																																															
150	155	159	158	154	146																																																																																																																																																																																																																																																																																																																																															
164	170	173	173	169	159																																																																																																																																																																																																																																																																																																																																															
185	192	195	194	190	180																																																																																																																																																																																																																																																																																																																																															
215	223	227	228	222	207																																																																																																																																																																																																																																																																																																																																															
255	262	271	271	266	251																																																																																																																																																																																																																																																																																																																																															
311	314	323	332	318	293																																																																																																																																																																																																																																																																																																																																															
369	388	414	406	388	361																																																																																																																																																																																																																																																																																																																																															
455	480	494	488	477	441																																																																																																																																																																																																																																																																																																																																															
532	603	625	615	589	537																																																																																																																																																																																																																																																																																																																																															
669	733	777	780	745	673																																																																																																																																																																																																																																																																																																																																															
851	927	963	986	929	856																																																																																																																																																																																																																																																																																																																																															
1050	1160	1200	1220	1150	1040																																																																																																																																																																																																																																																																																																																																															
1360	1490	1440	1490	1460	1320																																																																																																																																																																																																																																																																																																																																															
(400)	436	462	476	477	461																																																																																																																																																																																																																																																																																																																																															
(400)	438	466	481	481	465																																																																																																																																																																																																																																																																																																																																															
420	459	489	507	507	490																																																																																																																																																																																																																																																																																																																																															
454	495	530	549	552	534																																																																																																																																																																																																																																																																																																																																															
508	550	590	615	617	592																																																																																																																																																																																																																																																																																																																																															
552	614	658	686	686	673																																																																																																																																																																																																																																																																																																																																															
646	671	750	769	795	726																																																																																																																																																																																																																																																																																																																																															
699	759	865	880	849	833																																																																																																																																																																																																																																																																																																																																															
794	869	909	974	1000	925																																																																																																																																																																																																																																																																																																																																															
920	998	1090	1070	1070	1040																																																																																																																																																																																																																																																																																																																																															
998	1110	1180	1170	1180	1110																																																																																																																																																																																																																																																																																																																																															
1120	1180	1290	1310	1280	1210																																																																																																																																																																																																																																																																																																																																															
1190	1240	1300	1330	1260	1240																																																																																																																																																																																																																																																																																																																																															
1090	1100	1130	1160	1160	1100																																																																																																																																																																																																																																																																																																																																															
59	62	63	63	61	(58)																																																																																																																																																																																																																																																																																																																																															
63	65	66	66	64	61																																																																																																																																																																																																																																																																																																																																															
69	71	73	72	71	67																																																																																																																																																																																																																																																																																																																																															
78	80	82	82	80	75																																																																																																																																																																																																																																																																																																																																															
90	93	95	95	93	87																																																																																																																																																																																																																																																																																																																																															
107	109	113	114	109	102																																																																																																																																																																																																																																																																																																																																															
127	131	134	138	133	123																																																																																																																																																																																																																																																																																																																																															
157	164	170	170	163	151																																																																																																																																																																																																																																																																																																																																															
189	198	207	204	199	182																																																																																																																																																																																																																																																																																																																																															
229	251	257	264	254	227																																																																																																																																																																																																																																																																																																																																															
280	311	320	323	304	282																																																																																																																																																																																																																																																																																																																																															
350	390	403	414	387	356																																																																																																																																																																																																																																																																																																																																															
437	491	507	506	489	446																																																																																																																																																																																																																																																																																																																																															
576	599	648	606	589	538																																																																																																																																																																																																																																																																																																																																															
İzmir																																																																																																																																																																																																																																																																																																																																																				
	<table border="1"> <tr><td>228</td><td>229</td><td>226</td><td>219</td><td>209</td><td>(194)</td></tr> <tr><td>236</td><td>234</td><td>233</td><td>224</td><td>214</td><td>198</td></tr> <tr><td>255</td><td>255</td><td>251</td><td>242</td><td>229</td><td>211</td></tr> <tr><td>287</td><td>284</td><td>281</td><td>266</td><td>253</td><td>232</td></tr> <tr><td>333</td><td>328</td><td>324</td><td>305</td><td>289</td><td>263</td></tr> <tr><td>385</td><td>385</td><td>382</td><td>354</td><td>340</td><td>302</td></tr> <tr><td>468</td><td>468</td><td>450</td><td>427</td><td>393</td><td>349</td></tr> <tr><td>556</td><td>546</td><td>551</td><td>506</td><td>470</td><td>415</td></tr> <tr><td>667</td><td>671</td><td>655</td><td>617</td><td>554</td><td>477</td></tr> <tr><td>787</td><td>806</td><td>796</td><td>766</td><td>690</td><td>582</td></tr> <tr><td>973</td><td>1000</td><td>993</td><td>944</td><td>866</td><td>722</td></tr> <tr><td>1160</td><td>1200</td><td>1240</td><td>1150</td><td>1080</td><td>870</td></tr> <tr><td>1430</td><td>1440</td><td>1470</td><td>1430</td><td>1290</td><td>1070</td></tr> <tr><td>1610</td><td>1720</td><td>1680</td><td>1630</td><td>1540</td><td>1380</td></tr> </table>	228	229	226	219	209	(194)	236	234	233	224	214	198	255	255	251	242	229	211	287	284	281	266	253	232	333	328	324	305	289	263	385	385	382	354	340	302	468	468	450	427	393	349	556	546	551	506	470	415	667	671	655	617	554	477	787	806	796	766	690	582	973	1000	993	944	866	722	1160	1200	1240	1150	1080	870	1430	1440	1470	1430	1290	1070	1610	1720	1680	1630	1540	1380	<table border="1"> <tr><td>163</td><td>170</td><td>173</td><td>173</td><td>169</td><td>(160)</td></tr> <tr><td>172</td><td>179</td><td>183</td><td>182</td><td>178</td><td>168</td></tr> <tr><td>188</td><td>196</td><td>200</td><td>199</td><td>194</td><td>184</td></tr> <tr><td>214</td><td>221</td><td>228</td><td>225</td><td>219</td><td>207</td></tr> <tr><td>248</td><td>257</td><td>265</td><td>262</td><td>255</td><td>239</td></tr> <tr><td>295</td><td>308</td><td>314</td><td>309</td><td>302</td><td>284</td></tr> <tr><td>353</td><td>367</td><td>381</td><td>376</td><td>372</td><td>339</td></tr> <tr><td>426</td><td>457</td><td>480</td><td>460</td><td>444</td><td>417</td></tr> <tr><td>521</td><td>546</td><td>578</td><td>572</td><td>542</td><td>497</td></tr> <tr><td>634</td><td>682</td><td>720</td><td>719</td><td>683</td><td>628</td></tr> <tr><td>780</td><td>865</td><td>889</td><td>902</td><td>862</td><td>808</td></tr> <tr><td>956</td><td>1050</td><td>1120</td><td>1100</td><td>1100</td><td>976</td></tr> <tr><td>1210</td><td>1320</td><td>1410</td><td>1400</td><td>1360</td><td>1200</td></tr> <tr><td>1580</td><td>1640</td><td>1740</td><td>1760</td><td>1700</td><td>1500</td></tr> </table>	163	170	173	173	169	(160)	172	179	183	182	178	168	188	196	200	199	194	184	214	221	228	225	219	207	248	257	265	262	255	239	295	308	314	309	302	284	353	367	381	376	372	339	426	457	480	460	444	417	521	546	578	572	542	497	634	682	720	719	683	628	780	865	889	902	862	808	956	1050	1120	1100	1100	976	1210	1320	1410	1400	1360	1200	1580	1640	1740	1760	1700	1500	<table border="1"> <tr><td>412</td><td>418</td><td>416</td><td>402</td><td>381</td><td>(349)</td></tr> <tr><td>426</td><td>430</td><td>427</td><td>413</td><td>392</td><td>355</td></tr> <tr><td>460</td><td>463</td><td>458</td><td>444</td><td>419</td><td>380</td></tr> <tr><td>516</td><td>515</td><td>516</td><td>494</td><td>470</td><td>419</td></tr> <tr><td>591</td><td>596</td><td>593</td><td>572</td><td>538</td><td>473</td></tr> <tr><td>700</td><td>697</td><td>682</td><td>653</td><td>625</td><td>554</td></tr> <tr><td>841</td><td>812</td><td>826</td><td>810</td><td>753</td><td>645</td></tr> <tr><td>967</td><td>947</td><td>967</td><td>942</td><td>868</td><td>767</td></tr> <tr><td>1060</td><td>1070</td><td>1150</td><td>1130</td><td>1060</td><td>881</td></tr> <tr><td>1190</td><td>1320</td><td>1280</td><td>1250</td><td>1190</td><td>1030</td></tr> <tr><td>1360</td><td>1410</td><td>1480</td><td>1480</td><td>1330</td><td>1170</td></tr> <tr><td>1560</td><td>1670</td><td>1640</td><td>1660</td><td>1580</td><td>1390</td></tr> <tr><td>1730</td><td>1770</td><td>1760</td><td>1770</td><td>1660</td><td>1540</td></tr> <tr><td>1770</td><td>1620</td><td>1650</td><td>1720</td><td>1670</td><td>1590</td></tr> </table>	412	418	416	402	381	(349)	426	430	427	413	392	355	460	463	458	444	419	380	516	515	516	494	470	419	591	596	593	572	538	473	700	697	682	653	625	554	841	812	826	810	753	645	967	947	967	942	868	767	1060	1070	1150	1130	1060	881	1190	1320	1280	1250	1190	1030	1360	1410	1480	1480	1330	1170	1560	1670	1640	1660	1580	1390	1730	1770	1760	1770	1660	1540	1770	1620	1650	1720	1670	1590	<table border="1"> <tr><td>104</td><td>109</td><td>111</td><td>111</td><td>108</td><td>(103)</td></tr> <tr><td>111</td><td>115</td><td>117</td><td>117</td><td>114</td><td>108</td></tr> <tr><td>121</td><td>126</td><td>128</td><td>127</td><td>124</td><td>118</td></tr> <tr><td>137</td><td>142</td><td>145</td><td>144</td><td>140</td><td>133</td></tr> <tr><td>159</td><td>165</td><td>168</td><td>166</td><td>162</td><td>154</td></tr> <tr><td>186</td><td>196</td><td>203</td><td>200</td><td>193</td><td>182</td></tr> <tr><td>226</td><td>234</td><td>245</td><td>245</td><td>235</td><td>222</td></tr> <tr><td>269</td><td>284</td><td>303</td><td>299</td><td>285</td><td>265</td></tr> <tr><td>327</td><td>350</td><td>369</td><td>366</td><td>348</td><td>319</td></tr> <tr><td>398</td><td>425</td><td>458</td><td>464</td><td>445</td><td>401</td></tr> <tr><td>494</td><td>538</td><td>575</td><td>567</td><td>549</td><td>501</td></tr> <tr><td>618</td><td>670</td><td>713</td><td>713</td><td>691</td><td>633</td></tr> <tr><td>789</td><td>849</td><td>902</td><td>901</td><td>866</td><td>781</td></tr> <tr><td>1000</td><td>1090</td><td>1110</td><td>1100</td><td>1050</td><td>926</td></tr> </table>	104	109	111	111	108	(103)	111	115	117	117	114	108	121	126	128	127	124	118	137	142	145	144	140	133	159	165	168	166	162	154	186	196	203	200	193	182	226	234	245	245	235	222	269	284	303	299	285	265	327	350	369	366	348	319	398	425	458	464	445	401	494	538	575	567	549	501	618	670	713	713	691	633	789	849	902	901	866	781	1000	1090	1110	1100	1050	926
	228	229	226	219	209	(194)																																																																																																																																																																																																																																																																																																																																														
	236	234	233	224	214	198																																																																																																																																																																																																																																																																																																																																														
255	255	251	242	229	211																																																																																																																																																																																																																																																																																																																																															
287	284	281	266	253	232																																																																																																																																																																																																																																																																																																																																															
333	328	324	305	289	263																																																																																																																																																																																																																																																																																																																																															
385	385	382	354	340	302																																																																																																																																																																																																																																																																																																																																															
468	468	450	427	393	349																																																																																																																																																																																																																																																																																																																																															
556	546	551	506	470	415																																																																																																																																																																																																																																																																																																																																															
667	671	655	617	554	477																																																																																																																																																																																																																																																																																																																																															
787	806	796	766	690	582																																																																																																																																																																																																																																																																																																																																															
973	1000	993	944	866	722																																																																																																																																																																																																																																																																																																																																															
1160	1200	1240	1150	1080	870																																																																																																																																																																																																																																																																																																																																															
1430	1440	1470	1430	1290	1070																																																																																																																																																																																																																																																																																																																																															
1610	1720	1680	1630	1540	1380																																																																																																																																																																																																																																																																																																																																															
163	170	173	173	169	(160)																																																																																																																																																																																																																																																																																																																																															
172	179	183	182	178	168																																																																																																																																																																																																																																																																																																																																															
188	196	200	199	194	184																																																																																																																																																																																																																																																																																																																																															
214	221	228	225	219	207																																																																																																																																																																																																																																																																																																																																															
248	257	265	262	255	239																																																																																																																																																																																																																																																																																																																																															
295	308	314	309	302	284																																																																																																																																																																																																																																																																																																																																															
353	367	381	376	372	339																																																																																																																																																																																																																																																																																																																																															
426	457	480	460	444	417																																																																																																																																																																																																																																																																																																																																															
521	546	578	572	542	497																																																																																																																																																																																																																																																																																																																																															
634	682	720	719	683	628																																																																																																																																																																																																																																																																																																																																															
780	865	889	902	862	808																																																																																																																																																																																																																																																																																																																																															
956	1050	1120	1100	1100	976																																																																																																																																																																																																																																																																																																																																															
1210	1320	1410	1400	1360	1200																																																																																																																																																																																																																																																																																																																																															
1580	1640	1740	1760	1700	1500																																																																																																																																																																																																																																																																																																																																															
412	418	416	402	381	(349)																																																																																																																																																																																																																																																																																																																																															
426	430	427	413	392	355																																																																																																																																																																																																																																																																																																																																															
460	463	458	444	419	380																																																																																																																																																																																																																																																																																																																																															
516	515	516	494	470	419																																																																																																																																																																																																																																																																																																																																															
591	596	593	572	538	473																																																																																																																																																																																																																																																																																																																																															
700	697	682	653	625	554																																																																																																																																																																																																																																																																																																																																															
841	812	826	810	753	645																																																																																																																																																																																																																																																																																																																																															
967	947	967	942	868	767																																																																																																																																																																																																																																																																																																																																															
1060	1070	1150	1130	1060	881																																																																																																																																																																																																																																																																																																																																															
1190	1320	1280	1250	1190	1030																																																																																																																																																																																																																																																																																																																																															
1360	1410	1480	1480	1330	1170																																																																																																																																																																																																																																																																																																																																															
1560	1670	1640	1660	1580	1390																																																																																																																																																																																																																																																																																																																																															
1730	1770	1760	1770	1660	1540																																																																																																																																																																																																																																																																																																																																															
1770	1620	1650	1720	1670	1590																																																																																																																																																																																																																																																																																																																																															
104	109	111	111	108	(103)																																																																																																																																																																																																																																																																																																																																															
111	115	117	117	114	108																																																																																																																																																																																																																																																																																																																																															
121	126	128	127	124	118																																																																																																																																																																																																																																																																																																																																															
137	142	145	144	140	133																																																																																																																																																																																																																																																																																																																																															
159	165	168	166	162	154																																																																																																																																																																																																																																																																																																																																															
186	196	203	200	193	182																																																																																																																																																																																																																																																																																																																																															
226	234	245	245	235	222																																																																																																																																																																																																																																																																																																																																															
269	284	303	299	285	265																																																																																																																																																																																																																																																																																																																																															
327	350	369	366	348	319																																																																																																																																																																																																																																																																																																																																															
398	425	458	464	445	401																																																																																																																																																																																																																																																																																																																																															
494	538	575	567	549	501																																																																																																																																																																																																																																																																																																																																															
618	670	713	713	691	633																																																																																																																																																																																																																																																																																																																																															
789	849	902	901	866	781																																																																																																																																																																																																																																																																																																																																															
1000	1090	1110	1100	1050	926																																																																																																																																																																																																																																																																																																																																															

reflectance value however, in this situation reference room B has 0.3901 reflectance value. This is the main reason that is not providing BREEAM's daylight criteria.

In Table 4.3, the simulation results of reference room B are shown for the summer season.38% of the indoor area in clear sky condition and 45.2% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London.25% of the indoor area in clear sky condition and 46,4% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. These conditions do not provide BREEAM's daylight criteria. Geographical location differences between London and İzmir do not affect the results, both of them have resulted under 60% value.

In autumn, 55.9% of the indoor area in clear sky condition and 33.3% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London.41.6% of the indoor area in clear sky condition and 39.2% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir.

Regarding findings in winter, 67.8% of the indoor area in clear sky condition and 7.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. In addition, 64.2% of the indoor area in clear sky condition and 25% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. In winter, the clear sky condition is providing BREEAM's daylight criteria for different locations which are London and İzmir.

Table 4.3.Reference room A and B, the material alternative I, yearly daylight illuminance comparison under clear and overcast sky conditions for London and İzmir.

Alternative I		21 <sup>st</sup> March		21 <sup>st</sup> June		21 <sup>st</sup> September		21 <sup>st</sup> December	
		CLR	OVC	CLR	OVC	CLR	OVC	CLR	OVC
Room A	London	97.6%	54.7%	63.0%	69.0%	98.8%	55.9%	100.0%	26.1%
	İzmir	66.6%	57.1%	48.8%	70.2%	69.0%	61.9%	100.0%	42.8%
Room B	London	58.3%	32.1%	38.0%	45.2%	55.9%	33.3%	67.8%	7.1%
	İzmir	40.4%	35.7%	25.0%	46.4%	41.6%	39.2%	64.2%	25.0%

The general view of simulation results for reference room A and B in the material alternative I condition are shown in Table 4.3. Geometrical properties of the

reference rooms are matching with 0.5 reflectance value according to BREEAM's criteria (Table 3.7). However, the rooms have the average reflectance values which are under 0.5 reflectance value. In the view of this criteria, the reference rooms should not provide BREEAM's daylight criteria. In the view of simulations, according to reference room A, clear sky condition is provided at least 300 lux illuminance in 60% of the interior in London. This is the expected result because BREEAM is an assessment tool which was launched in the UK, it is about geographical location similarities. Despite the fact that London has 1460 hours and İzmir has 3008 hours average sunlight per year (Table 3.4), İzmir does not have at least 300 lux illuminance in 60% of the interior in the summer season. According to reference room B, only the winter season provides at least 300 lux illuminance in 60% of the interior in both cities. The reason for this can be the altitude angles of these two locations that are shown in Table 3.3 and Table 3.6. They are the lowest angles and the most horizontal angles that sunlight reaches into the interior. In the view of these findings, reference room A provides BREEAM's daylight criteria in summer season in London and in autumn season in İzmir in both sky conditions.

## **4.2. Material Alternative II**

Material alternative II is explained in this section according to reference room A and B simulation results. Reference room A has 0.4738 the average reflectance value, it is shown in Table 3.9 which is under 0.5 similar to a material alternative I.

According to simulation findings in spring, the illuminance values of results are shown in Table 4.4 for London and İzmir. 92.8% of the indoor area clear sky condition and 57.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 72.6% of the indoor area in clear sky condition and 60.7% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. Only overcast sky condition in London does not provide the BREEAM's daylight criteria.

In the summer season, 64.2% of the indoor area in clear sky condition and 71.4% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. In both sky conditions, London provides BREEAM's daylight criteria. In İzmir, 54.7% of the indoor area in clear sky condition and 71.4% of the indoor area

in overcast sky condition have at least 300 lux illuminance value. The clear sky condition is not provided proper indoor illuminance value in İzmir, in the summer season.

In Table 4.5, the simulation results of reference room A are shown for the autumn season. 92.8% of the indoor area in clear sky condition and 57.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. Only the clear sky condition provide at least 300 lux illuminance value for London. However, İzmir provides condition in both sky situations. 72.6% of the indoor area in clear sky condition and 64.2% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir.

In winter, 100% of the indoor area in clear sky condition and 28.5% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. In addition, 100% of the indoor area in clear sky condition and 47.6% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. The clear sky condition provides BREEAM's daylight criteria in both locations.

According to reference room B and material alternative II, the average reflectance value is shown in Table 3.9 as 0.4847 reflectance value.

In the spring season, London has 59.5% of the indoor area in clear sky condition and 33.3% of the indoor area in overcast sky condition have at least 300 lux illuminance value. In both sky conditions, London does not provide enough illuminance for BREEAM's daylight criteria. Moreover, İzmir has 42.8% of the indoor area in clear sky condition and 38% of the indoor area have at least 300 lux illuminance value. These simulation findings are normal because according to Table 3.7 the reflectance value of the room should be 0.5 in order to have enough illuminance for BREEAM.

According to simulation results in summer, 40.4% of the indoor area in clear sky condition and 45.2% of the indoor in overcast sky condition area have at least 300 lux illuminance value in London. Also, 27.3% of the indoor area value in clear sky condition and 46.4% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. The results are similar to the spring season, none of the simulation findings provide BREEAM's daylight criteria.

In Table 4.5, the simulation results of reference room B are shown for the autumn season. 63% of the indoor area in clear sky condition and 33.3% of the indoor





area have at least 300 lux illuminance value in London. 42.8% of the indoor area in clear sky condition and 40.4% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. In these different locations and sky conditions, only London provide BREEAM's daylight criteria in clear sky condition.

Regarding findings in the winter season, 72.6% of the indoor area in clear sky condition and 7.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 70.2% of the indoor area in clear sky condition and 26.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. In both of the locations provide BREEAM's minimum illuminance value in clear sky conditions.

Table 4.6. Reference room A and B, material alternative II, yearly daylight illuminance comparison under clear and overcast sky conditions for London and İzmir.

Alternative II		21 <sup>st</sup> March		21 <sup>st</sup> June		21 <sup>st</sup> September		21 <sup>st</sup> December	
		CLR	OVC	CLR	OVC	CLR	OVC	CLR	OVC
<b>At least 300 Lux</b>									
<b>Room A</b>	<b>London</b>	92.8%	57.1%	64.2%	71.4%	92.8%	57.1%	100.0%	28.5%
	<b>İzmir</b>	72.6%	60.7%	54.7%	71.4%	72.6%	64.2%	100.0%	47,6%
<b>Room B</b>	<b>London</b>	59.5%	33.3%	40.4%	45.2%	63.0%	33.3%	72.6%	7.1%
	<b>İzmir</b>	42.8%	38.0%	27.3%	46.4%	42.8%	40.4%	70.2%	26.1%

The general view of simulation findings for both reference rooms and locations are shown in Table 4.6. According to the dimensions of the reference rooms, the reflectance value should be 0.5 that is shown in Table 3.7. However, the average reflectance values of reference rooms are under 0.5 (Table 3.9). Because of this situation, it is acceptable, if the simulations do not provide 60% of the room at least 300 lux illuminance. However, according to reference room A results, all of the seasons provide BREEAM's daylight criteria in clear sky conditions except summer season in İzmir. But there is a contrast between this situation and İzmir's sunny weather in summer. İzmir has approximately two times more average sunlight per year than London that is shown in Table 3.4. According to reference room B, London and İzmir provide 60% illuminance criteria in clear sky condition, in winter. In winter, sunrays come from the sky more horizontally in reference to altitude angles that are shown in

Table 3.3 and Table 3.6. In clear sky condition, more sunray reaches the interior. Also, London has enough illuminance percentage in autumn, in clear sky condition.

### **4.3. Material Alternative III**

Results according to reference room A and B and material alternative III is explained in this section. The average reflectance value of material alternative III is 0.6005 for reference room A. It is explained in Table 3.10. According to the dimensions of the room, it should have 0.5 reflectance (Table 3.7). However, it has an average reflectance value above 0.5 (Table 3.10).

According to simulation findings in spring, The illuminance values of results are shown in Table 4.7 for London and İzmir. 100% of the indoor area in clear sky condition and 84.5% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. All the locations and sky conditions provide BREEAM's daylight criteria. It is an expected situation because the average reflection value is above 0.5.

In Table 4.7, in the summer season, 100% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 78.5% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. In the autumn season, 100% of the indoor area in clear sky condition and 85.7% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. In both seasons provide BREEAM's daylight conditions in each location and sky conditions.

Regarding findings in winter (Table 4.8), 100% of the indoor area in clear sky condition and 35.7% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 63% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. BREEAM was launched in the UK but in this situation, overcast sky condition in London does not provide daylight criteria.

Table 4.7. Reference room A, material alternative III, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> March and 21<sup>st</sup> June at 12:00 pm.

Room A - Material Alternative III at 12:00 pm	21 <sup>st</sup> March		21 <sup>st</sup> June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
London																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>558</td><td>561</td><td>558</td><td>549</td><td>532</td><td>(514)</td></tr> <tr><td>4.0</td><td>576</td><td>577</td><td>574</td><td>565</td><td>550</td><td>528</td></tr> <tr><td></td><td>612</td><td>612</td><td>608</td><td>596</td><td>582</td><td>555</td></tr> <tr><td>3.5</td><td>665</td><td>661</td><td>661</td><td>643</td><td>630</td><td>595</td></tr> <tr><td></td><td>740</td><td>732</td><td>736</td><td>715</td><td>692</td><td>653</td></tr> <tr><td>3.0</td><td>831</td><td>831</td><td>814</td><td>790</td><td>780</td><td>721</td></tr> <tr><td></td><td>954</td><td>948</td><td>945</td><td>920</td><td>877</td><td>819</td></tr> <tr><td>2.5</td><td>1090</td><td>1090</td><td>1080</td><td>1080</td><td>1010</td><td>902</td></tr> <tr><td></td><td>1210</td><td>1230</td><td>1220</td><td>1240</td><td>1140</td><td>1030</td></tr> <tr><td>2.0</td><td>1370</td><td>1430</td><td>1430</td><td>1420</td><td>1340</td><td>1220</td></tr> <tr><td></td><td>1580</td><td>1600</td><td>1610</td><td>1650</td><td>1550</td><td>1400</td></tr> <tr><td>1.5</td><td>1780</td><td>1830</td><td>1890</td><td>1830</td><td>1760</td><td>1620</td></tr> <tr><td></td><td>2020</td><td>2070</td><td>2120</td><td>2050</td><td>2000</td><td>1830</td></tr> <tr><td>1.0</td><td>2260</td><td>2250</td><td>2210</td><td>2150</td><td>1960</td><td>1920</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	558	561	558	549	532	(514)	4.0	576	577	574	565	550	528		612	612	608	596	582	555	3.5	665	661	661	643	630	595		740	732	736	715	692	653	3.0	831	831	814	790	780	721		954	948	945	920	877	819	2.5	1090	1090	1080	1080	1010	902		1210	1230	1220	1240	1140	1030	2.0	1370	1430	1430	1420	1340	1220		1580	1600	1610	1650	1550	1400	1.5	1780	1830	1890	1830	1760	1620		2020	2070	2120	2050	2000	1830	1.0	2260	2250	2210	2150	1960	1920	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>270</td><td>274</td><td>274</td><td>277</td><td>271</td><td>(265)</td></tr> <tr><td>4.0</td><td>282</td><td>284</td><td>289</td><td>288</td><td>285</td><td>277</td></tr> <tr><td></td><td>301</td><td>305</td><td>309</td><td>309</td><td>306</td><td>296</td></tr> <tr><td>3.5</td><td>328</td><td>331</td><td>336</td><td>336</td><td>333</td><td>322</td></tr> <tr><td></td><td>363</td><td>368</td><td>374</td><td>375</td><td>367</td><td>357</td></tr> <tr><td>3.0</td><td>410</td><td>414</td><td>417</td><td>424</td><td>420</td><td>401</td></tr> <tr><td></td><td>464</td><td>472</td><td>482</td><td>487</td><td>472</td><td>458</td></tr> <tr><td>2.5</td><td>536</td><td>541</td><td>563</td><td>570</td><td>562</td><td>532</td></tr> <tr><td></td><td>615</td><td>636</td><td>655</td><td>666</td><td>646</td><td>618</td></tr> <tr><td>2.0</td><td>715</td><td>750</td><td>788</td><td>788</td><td>773</td><td>745</td></tr> <tr><td></td><td>858</td><td>909</td><td>927</td><td>945</td><td>938</td><td>877</td></tr> <tr><td>1.5</td><td>1020</td><td>1090</td><td>1120</td><td>1150</td><td>1130</td><td>1040</td></tr> <tr><td></td><td>1230</td><td>1330</td><td>1390</td><td>1420</td><td>1360</td><td>1250</td></tr> <tr><td>1.0</td><td>1510</td><td>1620</td><td>1720</td><td>1690</td><td>1600</td><td>1410</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	270	274	274	277	271	(265)	4.0	282	284	289	288	285	277		301	305	309	309	306	296	3.5	328	331	336	336	333	322		363	368	374	375	367	357	3.0	410	414	417	424	420	401		464	472	482	487	472	458	2.5	536	541	563	570	562	532		615	636	655	666	646	618	2.0	715	750	788	788	773	745		858	909	927	945	938	877	1.5	1020	1090	1120	1150	1130	1040		1230	1330	1390	1420	1360	1250	1.0	1510	1620	1720	1690	1600	1410	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>337</td><td>342</td><td>344</td><td>341</td><td>335</td><td>(326)</td></tr> <tr><td>4.0</td><td>349</td><td>350</td><td>354</td><td>351</td><td>346</td><td>335</td></tr> <tr><td></td><td>370</td><td>373</td><td>375</td><td>372</td><td>366</td><td>354</td></tr> <tr><td>3.5</td><td>400</td><td>402</td><td>405</td><td>400</td><td>394</td><td>380</td></tr> <tr><td></td><td>442</td><td>446</td><td>446</td><td>443</td><td>434</td><td>418</td></tr> <tr><td>3.0</td><td>491</td><td>498</td><td>495</td><td>494</td><td>482</td><td>456</td></tr> <tr><td></td><td>561</td><td>566</td><td>571</td><td>556</td><td>544</td><td>527</td></tr> <tr><td>2.5</td><td>644</td><td>650</td><td>655</td><td>646</td><td>633</td><td>590</td></tr> <tr><td></td><td>732</td><td>740</td><td>746</td><td>736</td><td>705</td><td>676</td></tr> <tr><td>2.0</td><td>825</td><td>872</td><td>880</td><td>872</td><td>839</td><td>773</td></tr> <tr><td></td><td>958</td><td>998</td><td>1030</td><td>1030</td><td>994</td><td>921</td></tr> <tr><td>1.5</td><td>1120</td><td>1180</td><td>1210</td><td>1190</td><td>1180</td><td>1060</td></tr> <tr><td></td><td>1320</td><td>1380</td><td>1420</td><td>1410</td><td>1370</td><td>1250</td></tr> <tr><td>1.0</td><td>1640</td><td>1660</td><td>1660</td><td>1640</td><td>1590</td><td>1470</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	337	342	344	341	335	(326)	4.0	349	350	354	351	346	335		370	373	375	372	366	354	3.5	400	402	405	400	394	380		442	446	446	443	434	418	3.0	491	498	495	494	482	456		561	566	571	556	544	527	2.5	644	650	655	646	633	590		732	740	746	736	705	676	2.0	825	872	880	872	839	773		958	998	1030	1030	994	921	1.5	1120	1180	1210	1190	1180	1060		1320	1380	1420	1410	1370	1250	1.0	1640	1660	1660	1640	1590	1470	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>383</td><td>390</td><td>393</td><td>394</td><td>390</td><td>(378)</td></tr> <tr><td>4.0</td><td>400</td><td>405</td><td>411</td><td>408</td><td>406</td><td>391</td></tr> <tr><td></td><td>427</td><td>435</td><td>441</td><td>438</td><td>434</td><td>421</td></tr> <tr><td>3.5</td><td>466</td><td>472</td><td>479</td><td>477</td><td>472</td><td>460</td></tr> <tr><td></td><td>519</td><td>526</td><td>532</td><td>530</td><td>524</td><td>507</td></tr> <tr><td>3.0</td><td>581</td><td>596</td><td>604</td><td>601</td><td>590</td><td>565</td></tr> <tr><td></td><td>672</td><td>675</td><td>693</td><td>690</td><td>673</td><td>649</td></tr> <tr><td>2.5</td><td>765</td><td>794</td><td>816</td><td>812</td><td>790</td><td>759</td></tr> <tr><td></td><td>884</td><td>917</td><td>943</td><td>933</td><td>908</td><td>870</td></tr> <tr><td>2.0</td><td>1050</td><td>1090</td><td>1110</td><td>1120</td><td>1090</td><td>1030</td></tr> <tr><td></td><td>1220</td><td>1280</td><td>1340</td><td>1330</td><td>1290</td><td>1240</td></tr> <tr><td>1.5</td><td>1440</td><td>1530</td><td>1620</td><td>1590</td><td>1580</td><td>1470</td></tr> <tr><td></td><td>1740</td><td>1890</td><td>1960</td><td>1950</td><td>1870</td><td>1730</td></tr> <tr><td>1.0</td><td>2160</td><td>2300</td><td>2310</td><td>2320</td><td>2260</td><td>2010</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	383	390	393	394	390	(378)	4.0	400	405	411	408	406	391		427	435	441	438	434	421	3.5	466	472	479	477	472	460		519	526	532	530	524	507	3.0	581	596	604	601	590	565		672	675	693	690	673	649	2.5	765	794	816	812	790	759		884	917	943	933	908	870	2.0	1050	1090	1110	1120	1090	1030		1220	1280	1340	1330	1290	1240	1.5	1440	1530	1620	1590	1580	1470		1740	1890	1960	1950	1870	1730	1.0	2160	2300	2310	2320	2260	2010	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	558	561	558	549	532	(514)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	576	577	574	565	550	528																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	612	612	608	596	582	555																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	665	661	661	643	630	595																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	740	732	736	715	692	653																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	831	831	814	790	780	721																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	954	948	945	920	877	819																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	1090	1090	1080	1080	1010	902																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1210	1230	1220	1240	1140	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	1370	1430	1430	1420	1340	1220																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1580	1600	1610	1650	1550	1400																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1780	1830	1890	1830	1760	1620																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	2020	2070	2120	2050	2000	1830																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	2260	2250	2210	2150	1960	1920																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	270	274	274	277	271	(265)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	282	284	289	288	285	277																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	301	305	309	309	306	296																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	328	331	336	336	333	322																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	363	368	374	375	367	357																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	410	414	417	424	420	401																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	464	472	482	487	472	458																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	536	541	563	570	562	532																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	615	636	655	666	646	618																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	715	750	788	788	773	745																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	858	909	927	945	938	877																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1020	1090	1120	1150	1130	1040																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1230	1330	1390	1420	1360	1250																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1510	1620	1720	1690	1600	1410																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	337	342	344	341	335	(326)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	349	350	354	351	346	335																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	370	373	375	372	366	354																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	400	402	405	400	394	380																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	442	446	446	443	434	418																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	491	498	495	494	482	456																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	561	566	571	556	544	527																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	644	650	655	646	633	590																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	732	740	746	736	705	676																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	825	872	880	872	839	773																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	958	998	1030	1030	994	921																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1120	1180	1210	1190	1180	1060																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1320	1380	1420	1410	1370	1250																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1640	1660	1660	1640	1590	1470																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	383	390	393	394	390	(378)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	400	405	411	408	406	391																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	427	435	441	438	434	421																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	466	472	479	477	472	460																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	519	526	532	530	524	507																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	581	596	604	601	590	565																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	672	675	693	690	673	649																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	765	794	816	812	790	759																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	884	917	943	933	908	870																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	1050	1090	1110	1120	1090	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1220	1280	1340	1330	1290	1240																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1440	1530	1620	1590	1580	1470																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1740	1890	1960	1950	1870	1730																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	2160	2300	2310	2320	2260	2010																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
İzmir																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>396</td><td>394</td><td>390</td><td>381</td><td>369</td><td>(355)</td></tr> <tr><td>4.0</td><td>410</td><td>405</td><td>401</td><td>389</td><td>379</td><td>365</td></tr> <tr><td></td><td>437</td><td>433</td><td>426</td><td>413</td><td>400</td><td>383</td></tr> <tr><td>3.5</td><td>477</td><td>468</td><td>460</td><td>445</td><td>430</td><td>409</td></tr> <tr><td></td><td>530</td><td>523</td><td>510</td><td>491</td><td>469</td><td>443</td></tr> <tr><td>3.0</td><td>595</td><td>585</td><td>572</td><td>547</td><td>530</td><td>483</td></tr> <tr><td></td><td>692</td><td>667</td><td>649</td><td>625</td><td>584</td><td>548</td></tr> <tr><td>2.5</td><td>792</td><td>769</td><td>766</td><td>708</td><td>663</td><td>606</td></tr> <tr><td></td><td>897</td><td>884</td><td>876</td><td>810</td><td>761</td><td>681</td></tr> <tr><td>2.0</td><td>1030</td><td>1030</td><td>1030</td><td>947</td><td>888</td><td>793</td></tr> <tr><td></td><td>1230</td><td>1220</td><td>1210</td><td>1110</td><td>1030</td><td>906</td></tr> <tr><td>1.5</td><td>1430</td><td>1450</td><td>1440</td><td>1350</td><td>1240</td><td>1050</td></tr> <tr><td></td><td>1670</td><td>1680</td><td>1670</td><td>1600</td><td>1480</td><td>1250</td></tr> <tr><td>1.0</td><td>1880</td><td>1920</td><td>1790</td><td>1780</td><td>1750</td><td>1480</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	396	394	390	381	369	(355)	4.0	410	405	401	389	379	365		437	433	426	413	400	383	3.5	477	468	460	445	430	409		530	523	510	491	469	443	3.0	595	585	572	547	530	483		692	667	649	625	584	548	2.5	792	769	766	708	663	606		897	884	876	810	761	681	2.0	1030	1030	1030	947	888	793		1230	1220	1210	1110	1030	906	1.5	1430	1450	1440	1350	1240	1050		1670	1680	1670	1600	1480	1250	1.0	1880	1920	1790	1780	1750	1480	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>306</td><td>313</td><td>318</td><td>315</td><td>311</td><td>(303)</td></tr> <tr><td>4.0</td><td>320</td><td>324</td><td>329</td><td>325</td><td>321</td><td>315</td></tr> <tr><td></td><td>342</td><td>348</td><td>350</td><td>349</td><td>346</td><td>336</td></tr> <tr><td>3.5</td><td>372</td><td>380</td><td>383</td><td>382</td><td>376</td><td>365</td></tr> <tr><td></td><td>413</td><td>422</td><td>424</td><td>423</td><td>416</td><td>404</td></tr> <tr><td>3.0</td><td>463</td><td>474</td><td>483</td><td>473</td><td>477</td><td>450</td></tr> <tr><td></td><td>531</td><td>546</td><td>559</td><td>549</td><td>540</td><td>519</td></tr> <tr><td>2.5</td><td>615</td><td>631</td><td>641</td><td>643</td><td>633</td><td>604</td></tr> <tr><td></td><td>705</td><td>728</td><td>743</td><td>750</td><td>744</td><td>699</td></tr> <tr><td>2.0</td><td>830</td><td>877</td><td>884</td><td>907</td><td>872</td><td>815</td></tr> <tr><td></td><td>986</td><td>1030</td><td>1060</td><td>1080</td><td>1050</td><td>973</td></tr> <tr><td>1.5</td><td>1190</td><td>1240</td><td>1270</td><td>1290</td><td>1270</td><td>1170</td></tr> <tr><td></td><td>1380</td><td>1500</td><td>1530</td><td>1530</td><td>1460</td><td>1410</td></tr> <tr><td>1.0</td><td>1700</td><td>1820</td><td>1850</td><td>1850</td><td>1730</td><td>1630</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	306	313	318	315	311	(303)	4.0	320	324	329	325	321	315		342	348	350	349	346	336	3.5	372	380	383	382	376	365		413	422	424	423	416	404	3.0	463	474	483	473	477	450		531	546	559	549	540	519	2.5	615	631	641	643	633	604		705	728	743	750	744	699	2.0	830	877	884	907	872	815		986	1030	1060	1080	1050	973	1.5	1190	1240	1270	1290	1270	1170		1380	1500	1530	1530	1460	1410	1.0	1700	1820	1850	1850	1730	1630	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>271</td><td>274</td><td>275</td><td>272</td><td>266</td><td>(258)</td></tr> <tr><td>4.0</td><td>280</td><td>280</td><td>283</td><td>280</td><td>274</td><td>266</td></tr> <tr><td></td><td>296</td><td>298</td><td>299</td><td>293</td><td>289</td><td>280</td></tr> <tr><td>3.5</td><td>321</td><td>320</td><td>322</td><td>317</td><td>311</td><td>301</td></tr> <tr><td></td><td>353</td><td>354</td><td>352</td><td>347</td><td>339</td><td>327</td></tr> <tr><td>3.0</td><td>394</td><td>391</td><td>390</td><td>385</td><td>375</td><td>362</td></tr> <tr><td></td><td>447</td><td>444</td><td>440</td><td>434</td><td>420</td><td>400</td></tr> <tr><td>2.5</td><td>508</td><td>505</td><td>505</td><td>494</td><td>479</td><td>452</td></tr> <tr><td></td><td>574</td><td>574</td><td>572</td><td>558</td><td>547</td><td>503</td></tr> <tr><td>2.0</td><td>667</td><td>681</td><td>671</td><td>648</td><td>629</td><td>584</td></tr> <tr><td></td><td>776</td><td>779</td><td>774</td><td>763</td><td>732</td><td>665</td></tr> <tr><td>1.5</td><td>890</td><td>917</td><td>919</td><td>889</td><td>849</td><td>770</td></tr> <tr><td></td><td>1050</td><td>1070</td><td>1070</td><td>1050</td><td>990</td><td>886</td></tr> <tr><td>1.0</td><td>1210</td><td>1250</td><td>1270</td><td>1260</td><td>1160</td><td>1010</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	271	274	275	272	266	(258)	4.0	280	280	283	280	274	266		296	298	299	293	289	280	3.5	321	320	322	317	311	301		353	354	352	347	339	327	3.0	394	391	390	385	375	362		447	444	440	434	420	400	2.5	508	505	505	494	479	452		574	574	572	558	547	503	2.0	667	681	671	648	629	584		776	779	774	763	732	665	1.5	890	917	919	889	849	770		1050	1070	1070	1050	990	886	1.0	1210	1250	1270	1260	1160	1010	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>387</td><td>395</td><td>399</td><td>398</td><td>390</td><td>(382)</td></tr> <tr><td>4.0</td><td>405</td><td>410</td><td>418</td><td>416</td><td>411</td><td>401</td></tr> <tr><td></td><td>434</td><td>441</td><td>447</td><td>445</td><td>440</td><td>427</td></tr> <tr><td>3.5</td><td>473</td><td>480</td><td>488</td><td>483</td><td>480</td><td>463</td></tr> <tr><td></td><td>527</td><td>539</td><td>544</td><td>539</td><td>531</td><td>517</td></tr> <tr><td>3.0</td><td>594</td><td>607</td><td>613</td><td>605</td><td>596</td><td>581</td></tr> <tr><td></td><td>678</td><td>700</td><td>707</td><td>698</td><td>694</td><td>665</td></tr> <tr><td>2.5</td><td>786</td><td>807</td><td>835</td><td>827</td><td>805</td><td>773</td></tr> <tr><td></td><td>892</td><td>936</td><td>957</td><td>941</td><td>930</td><td>895</td></tr> <tr><td>2.0</td><td>1060</td><td>1100</td><td>1140</td><td>1140</td><td>1100</td><td>1040</td></tr> <tr><td></td><td>1240</td><td>1330</td><td>1360</td><td>1390</td><td>1340</td><td>1270</td></tr> <tr><td>1.5</td><td>1480</td><td>1580</td><td>1630</td><td>1650</td><td>1600</td><td>1500</td></tr> <tr><td></td><td>1780</td><td>1920</td><td>1990</td><td>1960</td><td>1900</td><td>1780</td></tr> <tr><td>1.0</td><td>2240</td><td>2260</td><td>2430</td><td>2350</td><td>2270</td><td>2120</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	387	395	399	398	390	(382)	4.0	405	410	418	416	411	401		434	441	447	445	440	427	3.5	473	480	488	483	480	463		527	539	544	539	531	517	3.0	594	607	613	605	596	581		678	700	707	698	694	665	2.5	786	807	835	827	805	773		892	936	957	941	930	895	2.0	1060	1100	1140	1140	1100	1040		1240	1330	1360	1390	1340	1270	1.5	1480	1580	1630	1650	1600	1500		1780	1920	1990	1960	1900	1780	1.0	2240	2260	2430	2350	2270	2120	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	396	394	390	381	369	(355)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	410	405	401	389	379	365																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	437	433	426	413	400	383																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	477	468	460	445	430	409																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	530	523	510	491	469	443																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	595	585	572	547	530	483																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	692	667	649	625	584	548																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	792	769	766	708	663	606																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	897	884	876	810	761	681																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	1030	1030	1030	947	888	793																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1230	1220	1210	1110	1030	906																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1430	1450	1440	1350	1240	1050																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1670	1680	1670	1600	1480	1250																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1880	1920	1790	1780	1750	1480																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	306	313	318	315	311	(303)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	320	324	329	325	321	315																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	342	348	350	349	346	336																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	372	380	383	382	376	365																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	413	422	424	423	416	404																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	463	474	483	473	477	450																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	531	546	559	549	540	519																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	615	631	641	643	633	604																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	705	728	743	750	744	699																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	830	877	884	907	872	815																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	986	1030	1060	1080	1050	973																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1190	1240	1270	1290	1270	1170																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1380	1500	1530	1530	1460	1410																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1700	1820	1850	1850	1730	1630																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	271	274	275	272	266	(258)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	280	280	283	280	274	266																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	296	298	299	293	289	280																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	321	320	322	317	311	301																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	353	354	352	347	339	327																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	394	391	390	385	375	362																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	447	444	440	434	420	400																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	508	505	505	494	479	452																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	574	574	572	558	547	503																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	667	681	671	648	629	584																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	776	779	774	763	732	665																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	890	917	919	889	849	770																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1050	1070	1070	1050	990	886																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1210	1250	1270	1260	1160	1010																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	387	395	399	398	390	(382)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	405	410	418	416	411	401																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	434	441	447	445	440	427																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	473	480	488	483	480	463																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	527	539	544	539	531	517																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	594	607	613	605	596	581																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	678	700	707	698	694	665																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	786	807	835	827	805	773																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	892	936	957	941	930	895																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	1060	1100	1140	1140	1100	1040																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1240	1330	1360	1390	1340	1270																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1480	1580	1630	1650	1600	1500																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1780	1920	1990	1960	1900	1780																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	2240	2260	2430	2350	2270	2120																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Table 4.8. Reference room A, material alternative III, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> September and 21<sup>st</sup> December at 12:00 pm.

Room A - Material Alternative III at 12:00 pm	21 <sup>st</sup> September		21 <sup>st</sup> December																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
London	 <table border="1"> <tr><td>[m]</td><td>(516)</td><td>532</td><td>543</td><td>548</td><td>546</td><td>537</td></tr> <tr><td>4.0</td><td>529</td><td>543</td><td>555</td><td>563</td><td>559</td><td>553</td></tr> <tr><td>3.5</td><td>558</td><td>577</td><td>590</td><td>598</td><td>598</td><td>587</td></tr> <tr><td>3.0</td><td>601</td><td>621</td><td>636</td><td>647</td><td>648</td><td>638</td></tr> <tr><td>2.5</td><td>663</td><td>686</td><td>707</td><td>721</td><td>718</td><td>710</td></tr> <tr><td>2.0</td><td>736</td><td>765</td><td>804</td><td>812</td><td>803</td><td>788</td></tr> <tr><td>1.5</td><td>844</td><td>872</td><td>906</td><td>941</td><td>930</td><td>907</td></tr> <tr><td>1.0</td><td>961</td><td>995</td><td>1060</td><td>1080</td><td>1070</td><td>1030</td></tr> <tr><td>0.5</td><td>1080</td><td>1120</td><td>1180</td><td>1210</td><td>1220</td><td>1200</td></tr> <tr><td></td><td>1220</td><td>1310</td><td>1410</td><td>1460</td><td>1390</td><td>1340</td></tr> <tr><td></td><td>1420</td><td>1520</td><td>1640</td><td>1640</td><td>1660</td><td>1610</td></tr> <tr><td></td><td>1660</td><td>1790</td><td>1890</td><td>1890</td><td>1890</td><td>1830</td></tr> <tr><td></td><td>1920</td><td>2080</td><td>2140</td><td>2140</td><td>2130</td><td>2030</td></tr> <tr><td></td><td>2250</td><td>2250</td><td>2240</td><td>2220</td><td>[2260]</td><td>2240</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	(516)	532	543	548	546	537	4.0	529	543	555	563	559	553	3.5	558	577	590	598	598	587	3.0	601	621	636	647	648	638	2.5	663	686	707	721	718	710	2.0	736	765	804	812	803	788	1.5	844	872	906	941	930	907	1.0	961	995	1060	1080	1070	1030	0.5	1080	1120	1180	1210	1220	1200		1220	1310	1410	1460	1390	1340		1420	1520	1640	1640	1660	1610		1660	1790	1890	1890	1890	1830		1920	2080	2140	2140	2130	2030		2250	2250	2240	2220	[2260]	2240		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>272</td><td>278</td><td>281</td><td>279</td><td>275</td><td>(269)</td></tr> <tr><td>4.0</td><td>285</td><td>288</td><td>294</td><td>292</td><td>289</td><td>279</td></tr> <tr><td>3.5</td><td>305</td><td>311</td><td>315</td><td>313</td><td>310</td><td>301</td></tr> <tr><td>3.0</td><td>333</td><td>337</td><td>342</td><td>340</td><td>337</td><td>326</td></tr> <tr><td>2.5</td><td>370</td><td>376</td><td>381</td><td>379</td><td>375</td><td>363</td></tr> <tr><td>2.0</td><td>421</td><td>427</td><td>434</td><td>429</td><td>426</td><td>407</td></tr> <tr><td>1.5</td><td>479</td><td>495</td><td>501</td><td>493</td><td>486</td><td>466</td></tr> <tr><td>1.0</td><td>545</td><td>567</td><td>579</td><td>581</td><td>560</td><td>542</td></tr> <tr><td>0.5</td><td>625</td><td>661</td><td>668</td><td>681</td><td>658</td><td>630</td></tr> <tr><td></td><td>755</td><td>782</td><td>796</td><td>798</td><td>781</td><td>734</td></tr> <tr><td></td><td>874</td><td>938</td><td>966</td><td>955</td><td>934</td><td>881</td></tr> <tr><td></td><td>1040</td><td>1130</td><td>1160</td><td>1130</td><td>1120</td><td>1050</td></tr> <tr><td></td><td>1280</td><td>1350</td><td>1400</td><td>1410</td><td>1360</td><td>1260</td></tr> <tr><td></td><td>1560</td><td>1670</td><td>1670</td><td>[1710]</td><td>1630</td><td>1490</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	272	278	281	279	275	(269)	4.0	285	288	294	292	289	279	3.5	305	311	315	313	310	301	3.0	333	337	342	340	337	326	2.5	370	376	381	379	375	363	2.0	421	427	434	429	426	407	1.5	479	495	501	493	486	466	1.0	545	567	579	581	560	542	0.5	625	661	668	681	658	630		755	782	796	798	781	734		874	938	966	955	934	881		1040	1130	1160	1130	1120	1050		1280	1350	1400	1410	1360	1260		1560	1670	1670	[1710]	1630	1490		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>(626)</td><td>659</td><td>683</td><td>699</td><td>700</td><td>693</td></tr> <tr><td>4.0</td><td>631</td><td>661</td><td>691</td><td>706</td><td>704</td><td>701</td></tr> <tr><td>3.5</td><td>656</td><td>690</td><td>718</td><td>733</td><td>740</td><td>730</td></tr> <tr><td>3.0</td><td>695</td><td>732</td><td>763</td><td>784</td><td>789</td><td>780</td></tr> <tr><td>2.5</td><td>743</td><td>788</td><td>826</td><td>852</td><td>858</td><td>845</td></tr> <tr><td>2.0</td><td>808</td><td>867</td><td>898</td><td>906</td><td>928</td><td>905</td></tr> <tr><td>1.5</td><td>899</td><td>943</td><td>999</td><td>1010</td><td>1010</td><td>984</td></tr> <tr><td>1.0</td><td>986</td><td>1020</td><td>1100</td><td>1130</td><td>1130</td><td>1050</td></tr> <tr><td>0.5</td><td>1060</td><td>1110</td><td>1170</td><td>1210</td><td>1220</td><td>1150</td></tr> <tr><td></td><td>1130</td><td>1220</td><td>1280</td><td>1330</td><td>1300</td><td>1310</td></tr> <tr><td></td><td>1210</td><td>1350</td><td>1390</td><td>1450</td><td>1420</td><td>1370</td></tr> <tr><td></td><td>1350</td><td>1450</td><td>1490</td><td>1500</td><td>1490</td><td>1440</td></tr> <tr><td></td><td>1420</td><td>1480</td><td>[1560]</td><td>1540</td><td>1530</td><td>1510</td></tr> <tr><td></td><td>1360</td><td>1420</td><td>1330</td><td>1300</td><td>1300</td><td>1340</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	(626)	659	683	699	700	693	4.0	631	661	691	706	704	701	3.5	656	690	718	733	740	730	3.0	695	732	763	784	789	780	2.5	743	788	826	852	858	845	2.0	808	867	898	906	928	905	1.5	899	943	999	1010	1010	984	1.0	986	1020	1100	1130	1130	1050	0.5	1060	1110	1170	1210	1220	1150		1130	1220	1280	1330	1300	1310		1210	1350	1390	1450	1420	1370		1350	1450	1490	1500	1490	1440		1420	1480	[1560]	1540	1530	1510		1360	1420	1330	1300	1300	1340		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>115</td><td>117</td><td>118</td><td>118</td><td>117</td><td>(113)</td></tr> <tr><td>4.0</td><td>120</td><td>121</td><td>123</td><td>123</td><td>122</td><td>118</td></tr> <tr><td>3.5</td><td>128</td><td>131</td><td>132</td><td>131</td><td>130</td><td>126</td></tr> <tr><td>3.0</td><td>140</td><td>142</td><td>144</td><td>143</td><td>142</td><td>138</td></tr> <tr><td>2.5</td><td>156</td><td>158</td><td>160</td><td>160</td><td>157</td><td>152</td></tr> <tr><td>2.0</td><td>174</td><td>178</td><td>182</td><td>182</td><td>177</td><td>170</td></tr> <tr><td>1.5</td><td>202</td><td>208</td><td>210</td><td>209</td><td>204</td><td>196</td></tr> <tr><td>1.0</td><td>231</td><td>238</td><td>242</td><td>244</td><td>238</td><td>228</td></tr> <tr><td>0.5</td><td>267</td><td>276</td><td>280</td><td>283</td><td>274</td><td>261</td></tr> <tr><td></td><td>311</td><td>326</td><td>336</td><td>335</td><td>324</td><td>309</td></tr> <tr><td></td><td>374</td><td>385</td><td>401</td><td>404</td><td>393</td><td>368</td></tr> <tr><td></td><td>437</td><td>466</td><td>485</td><td>490</td><td>473</td><td>444</td></tr> <tr><td></td><td>522</td><td>561</td><td>590</td><td>580</td><td>564</td><td>528</td></tr> <tr><td></td><td>655</td><td>679</td><td>[702]</td><td>697</td><td>681</td><td>632</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	115	117	118	118	117	(113)	4.0	120	121	123	123	122	118	3.5	128	131	132	131	130	126	3.0	140	142	144	143	142	138	2.5	156	158	160	160	157	152	2.0	174	178	182	182	177	170	1.5	202	208	210	209	204	196	1.0	231	238	242	244	238	228	0.5	267	276	280	283	274	261		311	326	336	335	324	309		374	385	401	404	393	368		437	466	485	490	473	444		522	561	590	580	564	528		655	679	[702]	697	681	632		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	(516)	532	543	548	546	537																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	4.0	529	543	555	563	559	553																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	3.5	558	577	590	598	598	587																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
3.0	601	621	636	647	648	638																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	663	686	707	721	718	710																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	736	765	804	812	803	788																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	844	872	906	941	930	907																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	961	995	1060	1080	1070	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1080	1120	1180	1210	1220	1200																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1220	1310	1410	1460	1390	1340																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1420	1520	1640	1640	1660	1610																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1660	1790	1890	1890	1890	1830																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1920	2080	2140	2140	2130	2030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	2250	2250	2240	2220	[2260]	2240																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	272	278	281	279	275	(269)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	285	288	294	292	289	279																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	305	311	315	313	310	301																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	333	337	342	340	337	326																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	370	376	381	379	375	363																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	421	427	434	429	426	407																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	479	495	501	493	486	466																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	545	567	579	581	560	542																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	625	661	668	681	658	630																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	755	782	796	798	781	734																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	874	938	966	955	934	881																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1040	1130	1160	1130	1120	1050																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1280	1350	1400	1410	1360	1260																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1560	1670	1670	[1710]	1630	1490																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	(626)	659	683	699	700	693																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	631	661	691	706	704	701																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	656	690	718	733	740	730																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	695	732	763	784	789	780																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	743	788	826	852	858	845																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	808	867	898	906	928	905																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	899	943	999	1010	1010	984																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	986	1020	1100	1130	1130	1050																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1060	1110	1170	1210	1220	1150																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1130	1220	1280	1330	1300	1310																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1210	1350	1390	1450	1420	1370																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1350	1450	1490	1500	1490	1440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1420	1480	[1560]	1540	1530	1510																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1360	1420	1330	1300	1300	1340																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	115	117	118	118	117	(113)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	120	121	123	123	122	118																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	128	131	132	131	130	126																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	140	142	144	143	142	138																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	156	158	160	160	157	152																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	174	178	182	182	177	170																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	202	208	210	209	204	196																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	231	238	242	244	238	228																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	267	276	280	283	274	261																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	311	326	336	335	324	309																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	374	385	401	404	393	368																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	437	466	485	490	473	444																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	522	561	590	580	564	528																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	655	679	[702]	697	681	632																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
İzmir	 <table border="1"> <tr><td>[m]</td><td>399</td><td>397</td><td>395</td><td>387</td><td>371</td><td>(360)</td></tr> <tr><td>4.0</td><td>412</td><td>408</td><td>406</td><td>396</td><td>385</td><td>371</td></tr> <tr><td>3.5</td><td>440</td><td>436</td><td>430</td><td>419</td><td>406</td><td>389</td></tr> <tr><td>3.0</td><td>480</td><td>471</td><td>466</td><td>450</td><td>437</td><td>416</td></tr> <tr><td>2.5</td><td>531</td><td>523</td><td>514</td><td>495</td><td>477</td><td>454</td></tr> <tr><td>2.0</td><td>602</td><td>585</td><td>577</td><td>558</td><td>534</td><td>497</td></tr> <tr><td>1.5</td><td>685</td><td>673</td><td>660</td><td>620</td><td>600</td><td>555</td></tr> <tr><td>1.0</td><td>787</td><td>769</td><td>764</td><td>719</td><td>681</td><td>624</td></tr> <tr><td>0.5</td><td>893</td><td>885</td><td>872</td><td>839</td><td>775</td><td>700</td></tr> <tr><td></td><td>1050</td><td>1060</td><td>1030</td><td>983</td><td>900</td><td>805</td></tr> <tr><td></td><td>1220</td><td>1220</td><td>1210</td><td>1170</td><td>1070</td><td>934</td></tr> <tr><td></td><td>1430</td><td>1440</td><td>1420</td><td>1370</td><td>1260</td><td>1090</td></tr> <tr><td></td><td>1670</td><td>1700</td><td>1700</td><td>1620</td><td>1520</td><td>1290</td></tr> <tr><td></td><td>1900</td><td>1900</td><td>[1930]</td><td>1830</td><td>1780</td><td>1530</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	399	397	395	387	371	(360)	4.0	412	408	406	396	385	371	3.5	440	436	430	419	406	389	3.0	480	471	466	450	437	416	2.5	531	523	514	495	477	454	2.0	602	585	577	558	534	497	1.5	685	673	660	620	600	555	1.0	787	769	764	719	681	624	0.5	893	885	872	839	775	700		1050	1060	1030	983	900	805		1220	1220	1210	1170	1070	934		1430	1440	1420	1370	1260	1090		1670	1700	1700	1620	1520	1290		1900	1900	[1930]	1830	1780	1530		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>318</td><td>324</td><td>329</td><td>326</td><td>322</td><td>(313)</td></tr> <tr><td>4.0</td><td>332</td><td>335</td><td>341</td><td>337</td><td>335</td><td>326</td></tr> <tr><td>3.5</td><td>355</td><td>360</td><td>364</td><td>362</td><td>359</td><td>349</td></tr> <tr><td>3.0</td><td>388</td><td>390</td><td>396</td><td>392</td><td>389</td><td>380</td></tr> <tr><td>2.5</td><td>430</td><td>433</td><td>438</td><td>437</td><td>430</td><td>421</td></tr> <tr><td>2.0</td><td>483</td><td>490</td><td>492</td><td>490</td><td>482</td><td>472</td></tr> <tr><td>1.5</td><td>557</td><td>563</td><td>561</td><td>555</td><td>556</td><td>534</td></tr> <tr><td>1.0</td><td>633</td><td>650</td><td>662</td><td>649</td><td>639</td><td>629</td></tr> <tr><td>0.5</td><td>742</td><td>762</td><td>765</td><td>759</td><td>747</td><td>718</td></tr> <tr><td></td><td>860</td><td>916</td><td>915</td><td>909</td><td>873</td><td>842</td></tr> <tr><td></td><td>1030</td><td>1070</td><td>1100</td><td>1100</td><td>1080</td><td>1020</td></tr> <tr><td></td><td>1200</td><td>1280</td><td>1330</td><td>1330</td><td>1280</td><td>1220</td></tr> <tr><td></td><td>1440</td><td>1560</td><td>1610</td><td>1620</td><td>1560</td><td>1450</td></tr> <tr><td></td><td>1720</td><td>1890</td><td>[1990]</td><td>1920</td><td>1880</td><td>1740</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	318	324	329	326	322	(313)	4.0	332	335	341	337	335	326	3.5	355	360	364	362	359	349	3.0	388	390	396	392	389	380	2.5	430	433	438	437	430	421	2.0	483	490	492	490	482	472	1.5	557	563	561	555	556	534	1.0	633	650	662	649	639	629	0.5	742	762	765	759	747	718		860	916	915	909	873	842		1030	1070	1100	1100	1080	1020		1200	1280	1330	1330	1280	1220		1440	1560	1610	1620	1560	1450		1720	1890	[1990]	1920	1880	1740		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>668</td><td>669</td><td>663</td><td>643</td><td>627</td><td>(595)</td></tr> <tr><td>4.0</td><td>686</td><td>681</td><td>680</td><td>661</td><td>642</td><td>609</td></tr> <tr><td>3.5</td><td>729</td><td>725</td><td>719</td><td>701</td><td>679</td><td>640</td></tr> <tr><td>3.0</td><td>793</td><td>793</td><td>781</td><td>756</td><td>733</td><td>684</td></tr> <tr><td>2.5</td><td>877</td><td>867</td><td>863</td><td>836</td><td>811</td><td>752</td></tr> <tr><td>2.0</td><td>988</td><td>989</td><td>964</td><td>943</td><td>901</td><td>830</td></tr> <tr><td>1.5</td><td>1130</td><td>1110</td><td>1110</td><td>1070</td><td>1030</td><td>926</td></tr> <tr><td>1.0</td><td>1280</td><td>1240</td><td>1270</td><td>1240</td><td>1170</td><td>1030</td></tr> <tr><td>0.5</td><td>1320</td><td>1410</td><td>1420</td><td>1410</td><td>1280</td><td>1170</td></tr> <tr><td></td><td>1550</td><td>1610</td><td>1590</td><td>1550</td><td>1440</td><td>1330</td></tr> <tr><td></td><td>1680</td><td>1760</td><td>1760</td><td>1720</td><td>1670</td><td>1470</td></tr> <tr><td></td><td>1910</td><td>1910</td><td>1930</td><td>1920</td><td>1860</td><td>1680</td></tr> <tr><td></td><td>2050</td><td>[2090]</td><td>2050</td><td>2030</td><td>1990</td><td>1840</td></tr> <tr><td></td><td>1970</td><td>2000</td><td>1970</td><td>1990</td><td>2010</td><td>1780</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	668	669	663	643	627	(595)	4.0	686	681	680	661	642	609	3.5	729	725	719	701	679	640	3.0	793	793	781	756	733	684	2.5	877	867	863	836	811	752	2.0	988	989	964	943	901	830	1.5	1130	1110	1110	1070	1030	926	1.0	1280	1240	1270	1240	1170	1030	0.5	1320	1410	1420	1410	1280	1170		1550	1610	1590	1550	1440	1330		1680	1760	1760	1720	1670	1470		1910	1910	1930	1920	1860	1680		2050	[2090]	2050	2030	1990	1840		1970	2000	1970	1990	2010	1780		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>202</td><td>207</td><td>207</td><td>208</td><td>204</td><td>(199)</td></tr> <tr><td>4.0</td><td>212</td><td>214</td><td>218</td><td>217</td><td>214</td><td>207</td></tr> <tr><td>3.5</td><td>226</td><td>231</td><td>234</td><td>231</td><td>229</td><td>222</td></tr> <tr><td>3.0</td><td>248</td><td>251</td><td>254</td><td>251</td><td>248</td><td>241</td></tr> <tr><td>2.5</td><td>275</td><td>280</td><td>283</td><td>280</td><td>276</td><td>265</td></tr> <tr><td>2.0</td><td>313</td><td>317</td><td>319</td><td>316</td><td>308</td><td>298</td></tr> <tr><td>1.5</td><td>357</td><td>364</td><td>369</td><td>361</td><td>354</td><td>341</td></tr> <tr><td>1.0</td><td>405</td><td>421</td><td>429</td><td>426</td><td>403</td><td>387</td></tr> <tr><td>0.5</td><td>472</td><td>487</td><td>494</td><td>497</td><td>470</td><td>444</td></tr> <tr><td></td><td>548</td><td>569</td><td>592</td><td>606</td><td>566</td><td>536</td></tr> <tr><td></td><td>644</td><td>684</td><td>704</td><td>713</td><td>682</td><td>639</td></tr> <tr><td></td><td>763</td><td>830</td><td>860</td><td>842</td><td>831</td><td>760</td></tr> <tr><td></td><td>934</td><td>997</td><td>1030</td><td>1030</td><td>997</td><td>908</td></tr> <tr><td></td><td>1160</td><td>1210</td><td>[1250]</td><td>1210</td><td>1220</td><td>1080</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	202	207	207	208	204	(199)	4.0	212	214	218	217	214	207	3.5	226	231	234	231	229	222	3.0	248	251	254	251	248	241	2.5	275	280	283	280	276	265	2.0	313	317	319	316	308	298	1.5	357	364	369	361	354	341	1.0	405	421	429	426	403	387	0.5	472	487	494	497	470	444		548	569	592	606	566	536		644	684	704	713	682	639		763	830	860	842	831	760		934	997	1030	1030	997	908		1160	1210	[1250]	1210	1220	1080		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	399	397	395	387	371	(360)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	4.0	412	408	406	396	385	371																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	3.5	440	436	430	419	406	389																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
3.0	480	471	466	450	437	416																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	531	523	514	495	477	454																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	602	585	577	558	534	497																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	685	673	660	620	600	555																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	787	769	764	719	681	624																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	893	885	872	839	775	700																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1050	1060	1030	983	900	805																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1220	1220	1210	1170	1070	934																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1430	1440	1420	1370	1260	1090																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1670	1700	1700	1620	1520	1290																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1900	1900	[1930]	1830	1780	1530																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	318	324	329	326	322	(313)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	332	335	341	337	335	326																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	355	360	364	362	359	349																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	388	390	396	392	389	380																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	430	433	438	437	430	421																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	483	490	492	490	482	472																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	557	563	561	555	556	534																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	633	650	662	649	639	629																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	742	762	765	759	747	718																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	860	916	915	909	873	842																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1030	1070	1100	1100	1080	1020																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1200	1280	1330	1330	1280	1220																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1440	1560	1610	1620	1560	1450																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1720	1890	[1990]	1920	1880	1740																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	668	669	663	643	627	(595)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	686	681	680	661	642	609																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	729	725	719	701	679	640																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	793	793	781	756	733	684																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	877	867	863	836	811	752																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	988	989	964	943	901	830																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	1130	1110	1110	1070	1030	926																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	1280	1240	1270	1240	1170	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1320	1410	1420	1410	1280	1170																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1550	1610	1590	1550	1440	1330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1680	1760	1760	1720	1670	1470																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1910	1910	1930	1920	1860	1680																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	2050	[2090]	2050	2030	1990	1840																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1970	2000	1970	1990	2010	1780																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	202	207	207	208	204	(199)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	212	214	218	217	214	207																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	226	231	234	231	229	222																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	248	251	254	251	248	241																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	275	280	283	280	276	265																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	313	317	319	316	308	298																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	357	364	369	361	354	341																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	405	421	429	426	403	387																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	472	487	494	497	470	444																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	548	569	592	606	566	536																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	644	684	704	713	682	639																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	763	830	860	842	831	760																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	934	997	1030	1030	997	908																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	1160	1210	[1250]	1210	1220	1080																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

According to reference room B and material alternative III, the average reflectance value is shown in Table 3.10 as 0.6355 reflectance value. It is above 0.5 reflectance value that specified in Table 3.7.

In the spring season, 83.3% of the indoor area in clear sky condition and 46.4% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. The clear sky condition supply BREEAM's daylight criteria. 57.1% of the indoor area in clear sky condition and 50% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir.

According to simulation findings in summer, 52.3% of the indoor area in clear sky condition and 63% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 38% of the indoor area in clear sky condition and 64.2% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir.

Regarding findings in autumn, 84.5% of the indoor area in clear sky condition and 46.4% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 58.3% of the indoor area in clear sky condition and 50% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. According to the results, only London provide enough percentage of illuminance in clear sky conditions.

In winter season, 100% of the indoor area in clear sky condition and 10.7% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 33.3% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. Clear sky condition is providing enough percentage of illuminance for London and İzmir.

The general view of material alternative III simulation findings is shown in Table 4.9. For the reference room dimension, 0.5 reflectance is given by BREEAM (Table 3.7). However, the average reflectance values of the reference room A and B are above 0.5 which are approximately 0.6 reflectance. This situation is explaining most of the 100% percentage illuminance. Because in Table 3.7, 0.6 reflectance needs 6.8 meter room depth but the reference rooms have 5.4 meter depth. According to reference room B, London has at least 300 lux illuminance in 60% of the room in one of the sky conditions. However, İzmir provides this situation in summer and winter.

Table 4.9. Reference room A and B, material alternative III, yearly daylight illuminance comparison under clear and overcast sky conditions for London and İzmir.

Alternative III		21 <sup>st</sup> March		21 <sup>st</sup> June		21 <sup>st</sup> September		21 <sup>st</sup> December	
At least 300 Lux		CLR	OVC	CLR	OVC	CLR	OVC	CLR	OVC
Room A	London	100.0%	84.5%	100.0%	100.0%	100.0%	85.7%	100.0%	35.7%
	İzmir	100.0%	100.0%	78.5%	100.0%	100.0%	100.0%	100.0%	63.0%
Room B	London	83.3%	46.4%	52.3%	63.0%	84.5%	46.4%	100.0%	10.7%
	İzmir	57.1%	50.0%	38.0%	64.2%	58.3%	50.0%	100.0%	33.3%

#### 4.4. Material Alternative IV

Material alternative IV is explained in this section according to simulation findings of reference room A and B. Material alternative IV has 0.7581 reflectance for reference room A which is shown in

Table 3.11. It is above 0.5 which is specified by BREEAM criteria in Table 3.7.

Results according to spring, summer and autumn seasons, 100% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir.

In winter, 100% of the indoor area in clear sky condition and 54.7% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. BREEAM is a UK based environmental assessment tool but, in these conditions, İzmir provides criteria better than London.



Table 4.11. Reference room A, material alternative IV, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> September and 21<sup>st</sup> December at 12:00 pm.

Room A - Material Alternative IV at 12:00 pm	21 <sup>st</sup> September		21 <sup>st</sup> December																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
London																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	<table border="1"> <tr><td>[m]</td><td>(840)</td><td>854</td><td>865</td><td>868</td><td>866</td><td>864</td></tr> <tr><td>4.0</td><td>854</td><td>864</td><td>877</td><td>878</td><td>884</td><td>878</td></tr> <tr><td>3.5</td><td>883</td><td>898</td><td>908</td><td>916</td><td>918</td><td>909</td></tr> <tr><td>3.0</td><td>928</td><td>945</td><td>958</td><td>968</td><td>970</td><td>965</td></tr> <tr><td>2.5</td><td>992</td><td>1010</td><td>1030</td><td>1050</td><td>1050</td><td>1030</td></tr> <tr><td>2.0</td><td>1070</td><td>1100</td><td>1120</td><td>1130</td><td>1150</td><td>1120</td></tr> <tr><td>1.5</td><td>1170</td><td>1220</td><td>1250</td><td>1270</td><td>1260</td><td>1250</td></tr> <tr><td>1.0</td><td>1290</td><td>1350</td><td>1390</td><td>1430</td><td>1410</td><td>1390</td></tr> <tr><td>0.5</td><td>1410</td><td>1470</td><td>1520</td><td>1570</td><td>1560</td><td>1550</td></tr> <tr><td>0.2</td><td>1560</td><td>1670</td><td>1730</td><td>1760</td><td>1740</td><td>1730</td></tr> <tr><td>0.1</td><td>1750</td><td>1890</td><td>1940</td><td>2010</td><td>2000</td><td>1960</td></tr> <tr><td>0.05</td><td>1980</td><td>2140</td><td>2150</td><td>2270</td><td>2220</td><td>2160</td></tr> <tr><td>0.02</td><td>2280</td><td>2340</td><td>2450</td><td>2480</td><td>2450</td><td>2410</td></tr> <tr><td>0.01</td><td>2440</td><td>2400</td><td>(2550)</td><td>2430</td><td>2520</td><td>2510</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	(840)	854	865	868	866	864	4.0	854	864	877	878	884	878	3.5	883	898	908	916	918	909	3.0	928	945	958	968	970	965	2.5	992	1010	1030	1050	1050	1030	2.0	1070	1100	1120	1130	1150	1120	1.5	1170	1220	1250	1270	1260	1250	1.0	1290	1350	1390	1430	1410	1390	0.5	1410	1470	1520	1570	1560	1550	0.2	1560	1670	1730	1760	1740	1730	0.1	1750	1890	1940	2010	2000	1960	0.05	1980	2140	2150	2270	2220	2160	0.02	2280	2340	2450	2480	2450	2410	0.01	2440	2400	(2550)	2430	2520	2510		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>469</td><td>474</td><td>477</td><td>476</td><td>474</td><td>(466)</td></tr> <tr><td>4.0</td><td>485</td><td>487</td><td>492</td><td>490</td><td>488</td><td>480</td></tr> <tr><td>3.5</td><td>508</td><td>514</td><td>517</td><td>515</td><td>512</td><td>504</td></tr> <tr><td>3.0</td><td>542</td><td>545</td><td>551</td><td>550</td><td>545</td><td>537</td></tr> <tr><td>2.5</td><td>585</td><td>592</td><td>595</td><td>593</td><td>587</td><td>579</td></tr> <tr><td>2.0</td><td>642</td><td>646</td><td>650</td><td>654</td><td>645</td><td>632</td></tr> <tr><td>1.5</td><td>712</td><td>722</td><td>724</td><td>727</td><td>719</td><td>700</td></tr> <tr><td>1.0</td><td>804</td><td>806</td><td>825</td><td>820</td><td>802</td><td>784</td></tr> <tr><td>0.5</td><td>882</td><td>911</td><td>915</td><td>920</td><td>906</td><td>874</td></tr> <tr><td>0.2</td><td>1000</td><td>1040</td><td>1050</td><td>1050</td><td>1030</td><td>999</td></tr> <tr><td>0.1</td><td>1150</td><td>1190</td><td>1210</td><td>1210</td><td>1190</td><td>1160</td></tr> <tr><td>0.05</td><td>1300</td><td>1360</td><td>1390</td><td>1420</td><td>1370</td><td>1330</td></tr> <tr><td>0.02</td><td>1490</td><td>1590</td><td>1640</td><td>1640</td><td>1610</td><td>1530</td></tr> <tr><td>0.01</td><td>1840</td><td>1870</td><td>1880</td><td>(1900)</td><td>(1900)</td><td>1720</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	469	474	477	476	474	(466)	4.0	485	487	492	490	488	480	3.5	508	514	517	515	512	504	3.0	542	545	551	550	545	537	2.5	585	592	595	593	587	579	2.0	642	646	650	654	645	632	1.5	712	722	724	727	719	700	1.0	804	806	825	820	802	784	0.5	882	911	915	920	906	874	0.2	1000	1040	1050	1050	1030	999	0.1	1150	1190	1210	1210	1190	1160	0.05	1300	1360	1390	1420	1370	1330	0.02	1490	1590	1640	1640	1610	1530	0.01	1840	1870	1880	(1900)	(1900)	1720		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>989</td><td>1020</td><td>1030</td><td>1060</td><td>1050</td><td>1060</td></tr> <tr><td>4.0</td><td>(987)</td><td>1010</td><td>1040</td><td>1050</td><td>1060</td><td>1060</td></tr> <tr><td>3.5</td><td>1010</td><td>1040</td><td>1060</td><td>1080</td><td>1090</td><td>1090</td></tr> <tr><td>3.0</td><td>1040</td><td>1070</td><td>1100</td><td>1120</td><td>1130</td><td>1130</td></tr> <tr><td>2.5</td><td>1100</td><td>1130</td><td>1160</td><td>1180</td><td>1200</td><td>1200</td></tr> <tr><td>2.0</td><td>1140</td><td>1190</td><td>1240</td><td>1270</td><td>1260</td><td>1270</td></tr> <tr><td>1.5</td><td>1240</td><td>1280</td><td>1340</td><td>1340</td><td>1350</td><td>1330</td></tr> <tr><td>1.0</td><td>1320</td><td>1360</td><td>1420</td><td>1450</td><td>1440</td><td>1440</td></tr> <tr><td>0.5</td><td>1400</td><td>1450</td><td>1540</td><td>1560</td><td>1530</td><td>1520</td></tr> <tr><td>0.2</td><td>1520</td><td>1550</td><td>1610</td><td>1670</td><td>1680</td><td>1590</td></tr> <tr><td>0.1</td><td>1560</td><td>1650</td><td>1690</td><td>1760</td><td>1770</td><td>1700</td></tr> <tr><td>0.05</td><td>1670</td><td>1750</td><td>(1820)</td><td>1800</td><td>1800</td><td>1770</td></tr> <tr><td>0.02</td><td>1710</td><td>1770</td><td>1780</td><td>1770</td><td>1790</td><td>1800</td></tr> <tr><td>0.01</td><td>1640</td><td>1590</td><td>1610</td><td>1610</td><td>1470</td><td>1610</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	989	1020	1030	1060	1050	1060	4.0	(987)	1010	1040	1050	1060	1060	3.5	1010	1040	1060	1080	1090	1090	3.0	1040	1070	1100	1120	1130	1130	2.5	1100	1130	1160	1180	1200	1200	2.0	1140	1190	1240	1270	1260	1270	1.5	1240	1280	1340	1340	1350	1330	1.0	1320	1360	1420	1450	1440	1440	0.5	1400	1450	1540	1560	1530	1520	0.2	1520	1550	1610	1670	1680	1590	0.1	1560	1650	1690	1760	1770	1700	0.05	1670	1750	(1820)	1800	1800	1770	0.02	1710	1770	1780	1770	1790	1800	0.01	1640	1590	1610	1610	1470	1610		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>198</td><td>200</td><td>202</td><td>201</td><td>200</td><td>(197)</td></tr> <tr><td>4.0</td><td>204</td><td>205</td><td>207</td><td>206</td><td>206</td><td>202</td></tr> <tr><td>3.5</td><td>215</td><td>216</td><td>218</td><td>217</td><td>216</td><td>212</td></tr> <tr><td>3.0</td><td>229</td><td>230</td><td>232</td><td>230</td><td>230</td><td>225</td></tr> <tr><td>2.5</td><td>248</td><td>249</td><td>250</td><td>250</td><td>248</td><td>244</td></tr> <tr><td>2.0</td><td>270</td><td>273</td><td>273</td><td>275</td><td>271</td><td>265</td></tr> <tr><td>1.5</td><td>297</td><td>303</td><td>307</td><td>305</td><td>302</td><td>297</td></tr> <tr><td>1.0</td><td>335</td><td>341</td><td>345</td><td>344</td><td>337</td><td>330</td></tr> <tr><td>0.5</td><td>376</td><td>379</td><td>387</td><td>394</td><td>381</td><td>366</td></tr> <tr><td>0.2</td><td>423</td><td>437</td><td>450</td><td>445</td><td>440</td><td>421</td></tr> <tr><td>0.1</td><td>482</td><td>498</td><td>511</td><td>514</td><td>500</td><td>484</td></tr> <tr><td>0.05</td><td>555</td><td>578</td><td>594</td><td>597</td><td>576</td><td>548</td></tr> <tr><td>0.02</td><td>635</td><td>674</td><td>691</td><td>691</td><td>676</td><td>640</td></tr> <tr><td>0.01</td><td>763</td><td>795</td><td>(799)</td><td>778</td><td>793</td><td>739</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	198	200	202	201	200	(197)	4.0	204	205	207	206	206	202	3.5	215	216	218	217	216	212	3.0	229	230	232	230	230	225	2.5	248	249	250	250	248	244	2.0	270	273	273	275	271	265	1.5	297	303	307	305	302	297	1.0	335	341	345	344	337	330	0.5	376	379	387	394	381	366	0.2	423	437	450	445	440	421	0.1	482	498	511	514	500	484	0.05	555	578	594	597	576	548	0.02	635	674	691	691	676	640	0.01	763	795	(799)	778	793	739		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	(840)	854	865	868	866	864																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	4.0	854	864	877	878	884	878																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
3.5	883	898	908	916	918	909																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	928	945	958	968	970	965																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	992	1010	1030	1050	1050	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	1070	1100	1120	1130	1150	1120																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	1170	1220	1250	1270	1260	1250																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	1290	1350	1390	1430	1410	1390																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1410	1470	1520	1570	1560	1550																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	1560	1670	1730	1760	1740	1730																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	1750	1890	1940	2010	2000	1960																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	1980	2140	2150	2270	2220	2160																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	2280	2340	2450	2480	2450	2410																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	2440	2400	(2550)	2430	2520	2510																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	469	474	477	476	474	(466)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	485	487	492	490	488	480																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	508	514	517	515	512	504																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	542	545	551	550	545	537																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	585	592	595	593	587	579																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	642	646	650	654	645	632																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	712	722	724	727	719	700																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	804	806	825	820	802	784																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	882	911	915	920	906	874																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	1000	1040	1050	1050	1030	999																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	1150	1190	1210	1210	1190	1160																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	1300	1360	1390	1420	1370	1330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	1490	1590	1640	1640	1610	1530																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	1840	1870	1880	(1900)	(1900)	1720																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	989	1020	1030	1060	1050	1060																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	(987)	1010	1040	1050	1060	1060																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	1010	1040	1060	1080	1090	1090																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	1040	1070	1100	1120	1130	1130																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	1100	1130	1160	1180	1200	1200																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	1140	1190	1240	1270	1260	1270																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	1240	1280	1340	1340	1350	1330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	1320	1360	1420	1450	1440	1440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1400	1450	1540	1560	1530	1520																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	1520	1550	1610	1670	1680	1590																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	1560	1650	1690	1760	1770	1700																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	1670	1750	(1820)	1800	1800	1770																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	1710	1770	1780	1770	1790	1800																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	1640	1590	1610	1610	1470	1610																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	198	200	202	201	200	(197)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	204	205	207	206	206	202																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	215	216	218	217	216	212																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	229	230	232	230	230	225																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	248	249	250	250	248	244																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	270	273	273	275	271	265																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	297	303	307	305	302	297																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	335	341	345	344	337	330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	376	379	387	394	381	366																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	423	437	450	445	440	421																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	482	498	511	514	500	484																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	555	578	594	597	576	548																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	635	674	691	691	676	640																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	763	795	(799)	778	793	739																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
İzmir																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	<table border="1"> <tr><td>[m]</td><td>657</td><td>654</td><td>648</td><td>639</td><td>628</td><td>(616)</td></tr> <tr><td>4.0</td><td>671</td><td>662</td><td>655</td><td>646</td><td>638</td><td>623</td></tr> <tr><td>3.5</td><td>699</td><td>693</td><td>684</td><td>673</td><td>660</td><td>647</td></tr> <tr><td>3.0</td><td>744</td><td>730</td><td>723</td><td>708</td><td>692</td><td>677</td></tr> <tr><td>2.5</td><td>802</td><td>787</td><td>776</td><td>756</td><td>737</td><td>717</td></tr> <tr><td>2.0</td><td>874</td><td>858</td><td>841</td><td>818</td><td>784</td><td>770</td></tr> <tr><td>1.5</td><td>968</td><td>951</td><td>922</td><td>900</td><td>865</td><td>830</td></tr> <tr><td>1.0</td><td>1090</td><td>1060</td><td>1050</td><td>1000</td><td>945</td><td>902</td></tr> <tr><td>0.5</td><td>1190</td><td>1190</td><td>1150</td><td>1090</td><td>1050</td><td>980</td></tr> <tr><td>0.2</td><td>1360</td><td>1350</td><td>1340</td><td>1240</td><td>1160</td><td>1080</td></tr> <tr><td>0.1</td><td>1540</td><td>1530</td><td>1480</td><td>1410</td><td>1330</td><td>1220</td></tr> <tr><td>0.05</td><td>1750</td><td>1740</td><td>1690</td><td>1600</td><td>1530</td><td>1360</td></tr> <tr><td>0.02</td><td>1980</td><td>1970</td><td>1960</td><td>1870</td><td>1750</td><td>1540</td></tr> <tr><td>0.01</td><td>(2230)</td><td>2110</td><td>2110</td><td>2130</td><td>2010</td><td>1840</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	657	654	648	639	628	(616)	4.0	671	662	655	646	638	623	3.5	699	693	684	673	660	647	3.0	744	730	723	708	692	677	2.5	802	787	776	756	737	717	2.0	874	858	841	818	784	770	1.5	968	951	922	900	865	830	1.0	1090	1060	1050	1000	945	902	0.5	1190	1190	1150	1090	1050	980	0.2	1360	1350	1340	1240	1160	1080	0.1	1540	1530	1480	1410	1330	1220	0.05	1750	1740	1690	1600	1530	1360	0.02	1980	1970	1960	1870	1750	1540	0.01	(2230)	2110	2110	2130	2010	1840		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>551</td><td>557</td><td>556</td><td>559</td><td>556</td><td>(547)</td></tr> <tr><td>4.0</td><td>569</td><td>571</td><td>577</td><td>575</td><td>572</td><td>560</td></tr> <tr><td>3.5</td><td>597</td><td>602</td><td>606</td><td>604</td><td>601</td><td>590</td></tr> <tr><td>3.0</td><td>636</td><td>640</td><td>644</td><td>640</td><td>638</td><td>625</td></tr> <tr><td>2.5</td><td>687</td><td>693</td><td>697</td><td>694</td><td>688</td><td>679</td></tr> <tr><td>2.0</td><td>751</td><td>758</td><td>766</td><td>755</td><td>756</td><td>739</td></tr> <tr><td>1.5</td><td>832</td><td>838</td><td>846</td><td>838</td><td>838</td><td>813</td></tr> <tr><td>1.0</td><td>928</td><td>942</td><td>953</td><td>958</td><td>952</td><td>918</td></tr> <tr><td>0.5</td><td>1040</td><td>1060</td><td>1080</td><td>1060</td><td>1060</td><td>1030</td></tr> <tr><td>0.2</td><td>1160</td><td>1200</td><td>1210</td><td>1230</td><td>1200</td><td>1160</td></tr> <tr><td>0.1</td><td>1330</td><td>1390</td><td>1430</td><td>1410</td><td>1390</td><td>1350</td></tr> <tr><td>0.05</td><td>1530</td><td>1610</td><td>1620</td><td>1660</td><td>1600</td><td>1530</td></tr> <tr><td>0.02</td><td>1770</td><td>1870</td><td>1890</td><td>1900</td><td>1850</td><td>1760</td></tr> <tr><td>0.01</td><td>2060</td><td>2190</td><td>2190</td><td>(2230)</td><td>2200</td><td>2050</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	551	557	556	559	556	(547)	4.0	569	571	577	575	572	560	3.5	597	602	606	604	601	590	3.0	636	640	644	640	638	625	2.5	687	693	697	694	688	679	2.0	751	758	766	755	756	739	1.5	832	838	846	838	838	813	1.0	928	942	953	958	952	918	0.5	1040	1060	1080	1060	1060	1030	0.2	1160	1200	1210	1230	1200	1160	0.1	1330	1390	1430	1410	1390	1350	0.05	1530	1610	1620	1660	1600	1530	0.02	1770	1870	1890	1900	1850	1760	0.01	2060	2190	2190	(2230)	2200	2050		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>1050</td><td>1040</td><td>1030</td><td>1010</td><td>989</td><td>(965)</td></tr> <tr><td>4.0</td><td>1060</td><td>1050</td><td>1040</td><td>1020</td><td>993</td><td>970</td></tr> <tr><td>3.5</td><td>1100</td><td>1090</td><td>1080</td><td>1060</td><td>1040</td><td>1000</td></tr> <tr><td>3.0</td><td>1170</td><td>1150</td><td>1140</td><td>1110</td><td>1090</td><td>1050</td></tr> <tr><td>2.5</td><td>1260</td><td>1230</td><td>1220</td><td>1190</td><td>1170</td><td>1110</td></tr> <tr><td>2.0</td><td>1370</td><td>1350</td><td>1320</td><td>1290</td><td>1260</td><td>1200</td></tr> <tr><td>1.5</td><td>1510</td><td>1470</td><td>1480</td><td>1430</td><td>1390</td><td>1290</td></tr> <tr><td>1.0</td><td>1630</td><td>1620</td><td>1620</td><td>1600</td><td>1520</td><td>1430</td></tr> <tr><td>0.5</td><td>1770</td><td>1790</td><td>1750</td><td>1700</td><td>1670</td><td>1530</td></tr> <tr><td>0.2</td><td>1940</td><td>1940</td><td>1940</td><td>1890</td><td>1860</td><td>1660</td></tr> <tr><td>0.1</td><td>2100</td><td>2150</td><td>2160</td><td>2080</td><td>2020</td><td>1830</td></tr> <tr><td>0.05</td><td>2270</td><td>2390</td><td>2320</td><td>2250</td><td>2170</td><td>2010</td></tr> <tr><td>0.02</td><td>2390</td><td>2370</td><td>(2400)</td><td>2370</td><td>2300</td><td>2170</td></tr> <tr><td>0.01</td><td>2360</td><td>2360</td><td>2290</td><td>2150</td><td>2240</td><td>2120</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	1050	1040	1030	1010	989	(965)	4.0	1060	1050	1040	1020	993	970	3.5	1100	1090	1080	1060	1040	1000	3.0	1170	1150	1140	1110	1090	1050	2.5	1260	1230	1220	1190	1170	1110	2.0	1370	1350	1320	1290	1260	1200	1.5	1510	1470	1480	1430	1390	1290	1.0	1630	1620	1620	1600	1520	1430	0.5	1770	1790	1750	1700	1670	1530	0.2	1940	1940	1940	1890	1860	1660	0.1	2100	2150	2160	2080	2020	1830	0.05	2270	2390	2320	2250	2170	2010	0.02	2390	2370	(2400)	2370	2300	2170	0.01	2360	2360	2290	2150	2240	2120		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>350</td><td>354</td><td>354</td><td>356</td><td>353</td><td>(348)</td></tr> <tr><td>4.0</td><td>362</td><td>363</td><td>367</td><td>366</td><td>364</td><td>359</td></tr> <tr><td>3.5</td><td>379</td><td>383</td><td>385</td><td>384</td><td>382</td><td>376</td></tr> <tr><td>3.0</td><td>404</td><td>406</td><td>410</td><td>407</td><td>407</td><td>398</td></tr> <tr><td>2.5</td><td>437</td><td>441</td><td>444</td><td>442</td><td>438</td><td>431</td></tr> <tr><td>2.0</td><td>478</td><td>481</td><td>485</td><td>486</td><td>479</td><td>470</td></tr> <tr><td>1.5</td><td>532</td><td>538</td><td>541</td><td>536</td><td>535</td><td>520</td></tr> <tr><td>1.0</td><td>588</td><td>601</td><td>611</td><td>603</td><td>593</td><td>581</td></tr> <tr><td>0.5</td><td>657</td><td>678</td><td>682</td><td>678</td><td>673</td><td>650</td></tr> <tr><td>0.2</td><td>740</td><td>764</td><td>775</td><td>790</td><td>769</td><td>741</td></tr> <tr><td>0.1</td><td>853</td><td>872</td><td>897</td><td>900</td><td>889</td><td>848</td></tr> <tr><td>0.05</td><td>967</td><td>1030</td><td>1030</td><td>1070</td><td>1030</td><td>986</td></tr> <tr><td>0.02</td><td>1130</td><td>1190</td><td>1230</td><td>1220</td><td>1180</td><td>1130</td></tr> <tr><td>0.01</td><td>1340</td><td>1350</td><td>(1420)</td><td>1410</td><td>1400</td><td>1310</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	350	354	354	356	353	(348)	4.0	362	363	367	366	364	359	3.5	379	383	385	384	382	376	3.0	404	406	410	407	407	398	2.5	437	441	444	442	438	431	2.0	478	481	485	486	479	470	1.5	532	538	541	536	535	520	1.0	588	601	611	603	593	581	0.5	657	678	682	678	673	650	0.2	740	764	775	790	769	741	0.1	853	872	897	900	889	848	0.05	967	1030	1030	1070	1030	986	0.02	1130	1190	1230	1220	1180	1130	0.01	1340	1350	(1420)	1410	1400	1310		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	657	654	648	639	628	(616)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	4.0	671	662	655	646	638	623																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
3.5	699	693	684	673	660	647																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	744	730	723	708	692	677																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	802	787	776	756	737	717																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	874	858	841	818	784	770																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	968	951	922	900	865	830																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	1090	1060	1050	1000	945	902																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1190	1190	1150	1090	1050	980																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	1360	1350	1340	1240	1160	1080																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	1540	1530	1480	1410	1330	1220																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	1750	1740	1690	1600	1530	1360																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	1980	1970	1960	1870	1750	1540																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	(2230)	2110	2110	2130	2010	1840																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	551	557	556	559	556	(547)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	569	571	577	575	572	560																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	597	602	606	604	601	590																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	636	640	644	640	638	625																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	687	693	697	694	688	679																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	751	758	766	755	756	739																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	832	838	846	838	838	813																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	928	942	953	958	952	918																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1040	1060	1080	1060	1060	1030																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	1160	1200	1210	1230	1200	1160																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	1330	1390	1430	1410	1390	1350																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	1530	1610	1620	1660	1600	1530																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	1770	1870	1890	1900	1850	1760																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	2060	2190	2190	(2230)	2200	2050																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	1050	1040	1030	1010	989	(965)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	1060	1050	1040	1020	993	970																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	1100	1090	1080	1060	1040	1000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	1170	1150	1140	1110	1090	1050																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	1260	1230	1220	1190	1170	1110																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	1370	1350	1320	1290	1260	1200																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	1510	1470	1480	1430	1390	1290																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	1630	1620	1620	1600	1520	1430																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	1770	1790	1750	1700	1670	1530																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	1940	1940	1940	1890	1860	1660																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	2100	2150	2160	2080	2020	1830																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	2270	2390	2320	2250	2170	2010																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	2390	2370	(2400)	2370	2300	2170																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	2360	2360	2290	2150	2240	2120																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	350	354	354	356	353	(348)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	362	363	367	366	364	359																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	379	383	385	384	382	376																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	404	406	410	407	407	398																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	437	441	444	442	438	431																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	478	481	485	486	479	470																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	532	538	541	536	535	520																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	588	601	611	603	593	581																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	657	678	682	678	673	650																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.2	740	764	775	790	769	741																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.1	853	872	897	900	889	848																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.05	967	1030	1030	1070	1030	986																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.02	1130	1190	1230	1220	1180	1130																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.01	1340	1350	(1420)	1410	1400	1310																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

According to reference room B and material alternative IV, the average reflectance value is shown in

Table 3.11 as 0.7606 reflectance value. It is above 0.5 reflectance value that specified in Table 3.7.

In the spring season, 100% of the indoor area in clear sky condition and 70.2% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 82.1% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. All the simulation findings in spring supply BREEAM's daylight criteria.

Regarding findings in summer, 84.7% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 63% of the indoor area in clear sky condition and 100% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. According to results, London and İzmir provide enough percentage of illuminance in each sky conditions.

In autumn, 100% of the indoor area in clear sky condition and 71.4% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 85.7% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. The autumn season has enough percentage of illuminance in order to BREEAM. However, İzmir has more percentage than London in overcast sky conditions. It can be related to cloudy daylight hours. London has more cloudy weather. In Table 3.4, London has 66.7% of the daylight hours cloudy but İzmir has 31.4% of the daylight hours cloudy.

According to winter season, 100% of the indoor area in clear sky condition and 19% of the indoor area in overcast sky condition have at least 300 lux illuminance value in London. 100% of the indoor area in clear sky condition and 50% of the indoor area in overcast sky condition have at least 300 lux illuminance value in İzmir. The overcast sky conditions do not provide enough illuminance in the interior.

According to the daylight simulation results, they are compared and contrasted with their percentage of illuminance in Table 4.9. The proper reflectance value for the reference room is given as 0.5 in Table 3.7. However, reference room A and B have reflectance value 0.7581 and 0.7606. Material alternative IV has more than enough

reflectance value. Because of this, the illuminance percentage of the interior is 100% in many results. All of the simulation findings in each reference room, location, season,

Table 4.12. Reference room A and B, material alternative IV, yearly daylight

illuminance comparison under clear and overcast sky conditions for London and İzmir.

Alternative IV		21 <sup>st</sup> March		21 <sup>st</sup> June		21 <sup>st</sup> September		21 <sup>st</sup> December	
At least 300 Lux		CLR	OVC	CLR	OVC	CLR	OVC	CLR	OVC
Room A	London	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	54.7%
	İzmir	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Room B	London	100.0%	70.2%	85.7%	100.0%	100.0%	71.4%	100.0%	19.0%
	İzmir	100.0%	82.1%	63.0%	100.0%	100.0%	85.7%	100.0%	50.0%

and sky condition provide BREEAM's daylight criteria except winter season in overcast sky condition. In overcast sky condition, reference room A has at least 300 lux in 60% of the interior only in İzmir location. Table 3.4 shows that İzmir has 31.4% cloudy daylight hours and London has 66.7% cloudy daylight hours. It can be the reason for İzmir that has more illuminance value percentage than London. Reference room B does not provide enough illuminance in overcast sky condition in each location. The only physical difference between reference room A and B is window width. In that point, window width can affect the illuminance percentage in an indoor environment.

## CHAPTER 5

### DISCUSSION

The aim of this thesis was to test daylighting performance in the view of room and window design parameters within the frame of BREEAM assessment criteria for London and İzmir. In addition, the author prepared RELUX models in order to evaluate daylight illuminance for reference rooms in different locations.

BREEAM is an environmental assessment tool that prepared in the United Kingdom. Firstly, the criteria of BREEAM is proper for London as its location. The RELUX simulation findings showed how daylighting criteria of BREEAM is proper or not proper for İzmir. In addition, the simulation results guided to understand the effect of material selection to illuminance value of the interior. Also, the simulations run in every season at noon to see results yearly due to BREEAM. In the view of these simulation findings, differences and similarities due to locations were shown for the same conditions.

Material alternatives and their average reflectance values strongly affect the illuminance percentage of the room. If average reflectance value is increasing at the same time the illuminance percentage of the room is also increasing. With reference to simulation results, the reflectance value of materials had an impact on the illuminance value of the interior.

Window width was not a parameter for BREEAM in daylighting criteria. However, a narrow window was modeled as reference room B. All the simulation findings showed that reference room B illuminance percentage was less than reference room A under the same conditions. They were shown in Table 4.3, Table 4.6, Table 4.9, and Table 4.12. According to daylight simulation findings, window width was a parameter that affects the illuminance of the indoor environment.

In Table 4.3, the adequate illuminance value percentages were shown. Although lower average reflectance value ( $\rho=0.38$ ) than the one for BREEAM reference room with 5,4m depth( $\rho=0.5$ ) was applied in Material Alternative I, a total of 5 different situations satisfies the criteria of at least 300 lux illuminance in 60% of the interior both London and İzmir simultaneously. These five situations were applicable for İzmir as

providing BREEAM criteria. However, the other situations did not provide the terms of BREEAM to practice the assessment tool in İzmir.

In every alternative material conditions, 21<sup>st</sup> December in clear sky condition provided enough illuminance for BREEAM criteria. The lowest sun angles throughout the year can reach inside the room deeper. That's why the illuminance values can be counted in the satisfying condition.

Regarding findings of Material Alternative II which corresponds to the proposed reflectance value in BREEAM, there were two results that İzmir got one step forward from London. Table 4.6, reference room A had enough illuminance percentage for BREEAM in 21<sup>st</sup> March and 21<sup>st</sup> September overcast sky condition in İzmir and not in London. That is also a result of locating close to the equator for İzmir. Indicating the higher cloudy daylight hours in London than İzmir, it satisfies the daylight performance except for the winter season, according to BREEAM when 5.4m depth room with the required WWR was constructed. Even this criterion is more suitable for İzmir since almost 50 % of the floor area can benefit from daylight. Dominating clear sky conditions in İzmir, satisfying but lower illuminance percentages show us the impact of location on daylight benefit.

In material I and II simulation findings, reference room A provided daylight criteria of BREEAM in 21<sup>st</sup> March and 21<sup>st</sup> September in clear sky condition however they did not provide it in overcast sky condition in London. In Table 3.3, the altitude degrees of London were shown for selected dates. London had 38.62° altitude in 21<sup>st</sup> March and 38.52° altitude in 21<sup>st</sup> September. The altitude angles were too near to each other and the daylight simulations were also similar to each other in those two selected dates. That is another quantitative indicator of the strong impact of location and sun angles on daylight performance.

Regarding Material alternatives III and IV, in general, it was obvious to mention that higher reflectance values than the one ( $\rho=0.5$ ) in BREEAM criteria for 5.4 m-depth-room lead to highly and strongly daylight benefit. The significant impact of reflectance makes the room fully daylight. Almost the whole floor area receives adequate daylight, even involving excessive illuminance values (more than 2000 lux) partly. That shows us the significant effect of surface reflectance on illuminance clearly.

## CHAPTER 6

### CONCLUSION

This study aimed to test room and window design parameters for daylight performance according to BREEAM assessment criteria in the cases of London and İzmir. The daylight performance simulation models were prepared in RELUX and the findings were compared and contrasted according to their geographical location, material alternatives, and window size. The simulations were run on four different dates in order to see the changes in yearly. The specifications about the reference room were taken for the educational buildings which are universities, colleges, and higher education-occupied spaces. Moreover, the dimensions of the reference rooms were taken from criteria of BREEAM. Floor, ceiling, and wall materials have their reflectance values and all of them create an average reflectance value of the indoor environment. If the average reflectance value is increasing, the daylight illuminance value of the indoor environment is also increasing respectively. It is once again evaluated in this study that window geometry and geographical location affect the illuminance value, although the window width and altitudes are not separately involved in BREEAM criteria. Findings in Reference room A and B show such differences of illuminance value due to window width.

The window width is not a criterion in BREEAM unlike window height, however, it directly affects the illuminance value of the indoor environment. Also, we observed that the average reflectance of indoor materials show significant impact on the illuminance value of the interior.

In general, we can conclude that BREEAM daylighting criteria which are based on location and weather conditions of London (United Kingdom) can be applied for the cases in İzmir. Though satisfying the required values of BREEAM, even, reflectance value of 0.5 for 5.4 m depth room in İzmir case can be 20% higher, -that is 0.6-, to reach the daylight illuminance percentages in London case.

The significance of this research is based on this experimental approach to expose how the surface covering material variation modifies the daylight distribution over the horizontal work plane according to BREEAM. As it is an environmental

assessment tool, it defines and evaluates the contribution of daylight in sustainable building design. The question in our case was whether it is applicable in a lower latitude location when clear sky conditions are dominant unlike the city of London. Despite of these variations, the regular large window (Room A) satisfied the daylight performance criteria mostly unlike the smaller window case (Room B) when 0.37 reflectance value (lower than BREEAM recommendations) was applied.

The small window width could initially and only provide adequate daylight penetration when reflectance value is 0.76 for both locations. This case is successful in summer under overcast sky and in winter clear sky conditions for both London and İzmir. That corresponds to a rarely observed situation when we have knowledge about days of dominantly having clear skies in summer in İzmir and days of dominantly having overcast skies in winter in London. So, this case cannot be recommended as a design alternative.

Consequently, observing the strong effect of window width on daylight performance, the requirements of BREEAM proposing the room width are suitable to be taken into consideration in architectural designs for the city of İzmir, even when lower reflectance values would be applicable. Findings would provide a wide variation of design alternatives as the feedback information for architects and lighting designers.

## REFERENCES

- Acosta, Ignacio, Miguel Ángel Campano, and Juan Francisco Molina. 2016. "Window Design in Architecture: Analysis of Energy Savings for Lighting and Visual Comfort in Residential Spaces." *Applied Energy* 168 (April): 493–506.
- Acosta, Ignacio, Carmen Munoz, Miguel Angel Campano, and Jaime Navarro. 2015. "Analysis of Daylight Factors and Energy Saving Allowed by Windows under Overcast Sky Conditions." *Renewable Energy* 77: 194–207.
- Al-Khatatbeh, Baraa J, and Shouib Nouh Ma'bdeh. 2017. "Improving Visual Comfort and Energy Efficiency in Existing Classrooms Using Passive Daylighting Techniques." *Energy Procedia* 136: 102–8.
- Altomonte, Sergio, Sara Saadouni, Michael G Kent, and Stefano Schiavon. 2017. "Satisfaction with Indoor Environmental Quality in BREEAM and Non-BREEAM Certified Office Buildings." *Architectural Science Review* 60 (4): 343–55.
- "Average Temperatures in İzmir, Turkey." n.d. Accessed March 31, 2019. <http://www.izmir.climatemps.com/temperatures.php>.
- "Average Temperatures in London, England, UK." n.d. Accessed March 31, 2019. <http://www.london.climatemps.com/temperatures.php>.
- Awadh, Omair. 2017. "Sustainability and Green Building Rating Systems: LEED, BREEAM, GSAS and Estidama Critical Analysis." *Journal of Building Engineering* 11: 25–29.
- BINC16 2017a, "BREEAM International New Construction 2016." 2017a. BREEAM Assessment Issues and Credits. 2017. [https://www.breeam.com/BREEAMInt2016SchemeDocument/#03\\_scoringrating\\_all/ass\\_crds.htm%3FTocPath%3D3.0%2520Scoring%2520and%2520rating%2520BREEAM%2520%2520assessed%2520buildings%7C\\_\\_\\_\\_\\_4](https://www.breeam.com/BREEAMInt2016SchemeDocument/#03_scoringrating_all/ass_crds.htm%3FTocPath%3D3.0%2520Scoring%2520and%2520rating%2520BREEAM%2520%2520assessed%2520buildings%7C_____4).
- BINC16 2017b, "BREEAM International New Construction 2016." 2017b. Health and Wellbeing. 2017. [https://www.breeam.com/BREEAMInt2016SchemeDocument/#05\\_health/health.htm%3FTocPath%3D6.0%2520Health%2520and%2520Wellbeing%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#05_health/health.htm%3FTocPath%3D6.0%2520Health%2520and%2520Wellbeing%7C_____0).
- BINC16, "BREEAM International New Construction 2016." 2017c. Energy. 2017. [https://www.breeam.com/BREEAMInt2016SchemeDocument/#06\\_energy/energy.htm%3FTocPath%3D7.0%2520Energy%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#06_energy/energy.htm%3FTocPath%3D7.0%2520Energy%7C_____0).
- BINC16 2017d, "BREEAM International New Construction 2016." 2017d. Transport. 2017. [https://www.breeam.com/BREEAMInt2016SchemeDocument/#07\\_transport/transport.htm%3FTocPath%3D8.0%2520Transport%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#07_transport/transport.htm%3FTocPath%3D8.0%2520Transport%7C_____0).

- BINC16, “BREEAM International New Construction 2016.” 2017e. Water. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#08\\_water/water.htm%3FTocPath%3D9.0%2520Water%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#08_water/water.htm%3FTocPath%3D9.0%2520Water%7C_____0).
- BINC16 2017f, “BREEAM International New Construction 2016.” 2017f. Materials. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#09\\_material/material.htm%3FTocPath%3D10.0%2520Materials%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#09_material/material.htm%3FTocPath%3D10.0%2520Materials%7C_____0).
- BINC16 2017g, “BREEAM International New Construction 2016.” 2017g. Waste. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#10\\_waste/waste.htm%3FTocPath%3D11.0%2520Waste%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#10_waste/waste.htm%3FTocPath%3D11.0%2520Waste%7C_____0).
- BINC16 2017h, “BREEAM International New Construction 2016.” 2017h. Land Use and Ecology. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#11\\_landuse/landuse.htm%3FTocPath%3D12.0%2520Land%2520Use%2520and%2520Ecology%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#11_landuse/landuse.htm%3FTocPath%3D12.0%2520Land%2520Use%2520and%2520Ecology%7C_____0).
- BINC16 2017i, “BREEAM International New Construction 2016.” 2017i. Pollution. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#12\\_pollution/pollution.htm%3FTocPath%3D13.0%2520Pollution%7C\\_\\_\\_\\_\\_0](https://www.breeam.com/BREEAMInt2016SchemeDocument/#12_pollution/pollution.htm%3FTocPath%3D13.0%2520Pollution%7C_____0).
- BINC16 2017a, “BREEAM International New Construction 2016.” 2017a. BREEAM Rating Benchmarks. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#03\\_scoringrating\\_all/rat\\_benmks\\_all.htm%3FTocPath%3D3.0%2520Scoring%2520and%2520rating%2520BREEAM%2520%2520assessed%2520buildings%7C\\_\\_\\_\\_\\_1](https://www.breeam.com/BREEAMInt2016SchemeDocument/#03_scoringrating_all/rat_benmks_all.htm%3FTocPath%3D3.0%2520Scoring%2520and%2520rating%2520BREEAM%2520%2520assessed%2520buildings%7C_____1).
- BINC16 2017b, “BREEAM International New Construction 2016.” 2017b. Hea 01 Visual Comfort. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#05\\_health/hea\\_01\\_nc.htm%3FTocPath%3D6.0%2520Health%2520and%2520Wellbeing%7C\\_\\_\\_\\_\\_1](https://www.breeam.com/BREEAMInt2016SchemeDocument/#05_health/hea_01_nc.htm%3FTocPath%3D6.0%2520Health%2520and%2520Wellbeing%7C_____1).
- BINC16 2017c, “BREEAM International New Construction 2016.” 2017c. Minimum Standards. 2017.  
[https://www.breeam.com/BREEAMInt2016SchemeDocument/#03\\_scoringrating\\_all/min\\_stdts\\_all.htm%3FTocPath%3D3.0%2520Scoring%2520and%2520rating%2520BREEAM%2520%2520assessed%2520buildings%7C\\_\\_\\_\\_\\_2](https://www.breeam.com/BREEAMInt2016SchemeDocument/#03_scoringrating_all/min_stdts_all.htm%3FTocPath%3D3.0%2520Scoring%2520and%2520rating%2520BREEAM%2520%2520assessed%2520buildings%7C_____2).
- Chergia, Citra. 2012. “International Adoption Framework of Green Building Guidelines in Developing Countries.” Fen Bilimleri Enstitüsü.
- CIBSE. n.d. “1.1.1 Daylight.” In . CIBSE.  
[https://app.knovel.com/hotlink/pdf/id:kt00U1GSG2/lighting-guide-10-daylighting/daylight BT - Lighting Guide 10 - Daylighting and Window Design](https://app.knovel.com/hotlink/pdf/id:kt00U1GSG2/lighting-guide-10-daylighting/daylight%20BT%20-%20Lighting%20Guide%2010%20-%20Daylighting%20and%20Window%20Design).

- Diş, Muhammet Ömer, and Mehmet Canbaz. 2015. "YAŞAM DÖNGÜSÜ ANALİZİ UYGULAMASI: BREEAM MODELİ." *Life Cycle Assessment, BREEAM Model, Eco- Label, Building Product, Natural Resources*. 11 (2): 1–9.
- Doan, Dat Tien, Ali Ghaffarianhoseini, Nicola Naismith, Tongrui Zhang, Amirhosein Ghaffarianhoseini, and John Tookey. 2017. "A Critical Comparison of Green Building Rating Systems." *Building and Environment* 123: 243–60.
- Erlalelitepe, Ilknur, Duygu Aral, and Tuğçe Kazanasmaz. 2011. "Eğitim Yapılarının Doğal Aydınlatma Performansı Açısından İncelenmesi = Investigation of Educational Buildings in Terms of Daylighting Performance." *Megaron* 6 (1): 39–51.
- Fontenelle, Marília Ramalho, and Leopoldo Eurico Gonçalves Bastos. 2014. "The Multicriteria Approach in the Architecture Conception: Defining Windows for an Office Building in Rio de Janeiro." *Building and Environment* 74 (April): 96–105.
- Galatioto, A, and M Beccali. 2016. "Aspects and Issues of Daylighting Assessment: A Review Study." *Renewable and Sustainable Energy Reviews* 66: 852–60.
- Giarna, Christina, Katerina Tsikaloudaki, and Dimitris Aravantinos. 2017. "Daylighting and Visual Comfort in Buildings' Environmental Performance Assessment Tools: A Critical Review." *Procedia Environmental Sciences* 38: 522–29.
- Goia, Francesco. 2016. "Search for the Optimal Window-to-Wall Ratio in Office Buildings in Different European Climates and the Implications on Total Energy Saving Potential." *Solar Energy* 132 (July): 467–92.
- Heschong, Lisa, Ihab Elzeyadi, and Carey Knecht. 2002. "Re-Analysis Report: Daylighting in Schools, Additional Analysis. Tasks 2.2.1 through 2.2.5."
- Heschong, Lisa, Roger L. Wright, and Stacia Okura. 2002. "Daylighting Impacts on Human Performance in School." *Journal of the Illuminating Engineering Society* 31 (2): 101–14.
- Hiyama, Kyosuke, and Liwei Wen. 2015. "Rapid Response Surface Creation Method to Optimize Window Geometry Using Dynamic Daylighting Simulation and Energy Simulation." *Energy and Buildings* 107: 417–23.
- Iyer-Raniga, Usha, and Kendra Wasiluk. 2007. "Sustainability Rating Tools - A Snapshot Study." *Environment Design Guide*, 1–14.
- "İzmir Climate & Temperature." n.d. Accessed March 31, 2019. <http://www.izmir.climatemps.com/>.
- Jafarian, Hoda, Claude M H Demers, Pierre Blanchet, and Veronic Laundry. 2018. "Effects of Interior Wood Finishes on the Lighting Ambiance and Materiality of Architectural Spaces." *Indoor & Built Environment* 27 (6): 786.

- Kazanasmaz, Tuğçe, Lars Oliver Grobe, Carsten Bauer, Marek Krehel, and Stephen Wittkopf. 2016. "Three Approaches to Optimize Optical Properties and Size of a South-Facing Window for Spatial Daylight Autonomy." *Building and Environment* 102: 243–56.
- Konis, Kyle. 2013. "Evaluating Daylighting Effectiveness and Occupant Visual Comfort in a Side-Lit Open-Plan Office Building in San Francisco, California." *Building and Environment* 59 (January): 662–77.
- Lachman, Beth E, Agnes Gereben Schaefer, Nidhi Kalra, Scott Hassell, Kimberly Curry Hall, Aimee E Curtright, and David E Mosher. 2013. "Buildings and Energy Trends." In *Key Trends That Will Shape Army Installations of Tomorrow*, 111–70. RAND Corporation.
- Lee, W L. 2013. "A Comprehensive Review of Metrics of Building Environmental Assessment Schemes." *Energy and Buildings* 62: 403–13.
- Leslie, R P. 2003. "Capturing the Daylight Dividend in Buildings: Why and How?" *Building and Environment* 38 (2): 381–85.
- Li, D H W, S L Wong, C L Tsang, and Gary H W Cheung. 2006. "A Study of the Daylighting Performance and Energy Use in Heavily Obstructed Residential Buildings via Computer Simulation Techniques." *Energy & Buildings* 38 (Energy and Environment of Residential Buildings in China): 1343–48.
- "London, England Climate & Temperature." n.d. Accessed March 31, 2019. <http://www.london.climateps.com/index.php>.
- Mardaljevic, J, and J Christoffersen. 2017. "'Climate Connectivity' in the Daylight Factor Basis of Building Standards." *Building and Environment* VO - 113, 200.
- Nguyen, Binh K, and Hasim Altan. 2011. "Comparative Review of Five Sustainable Rating Systems." *Procedia Engineering* 21: 376–86.
- Ochoa, Carlos E, Myriam B C Aries, Evert J van Loenen, and Jan L M Hensen. 2012. "Considerations on Design Optimization Criteria for Windows Providing Low Energy Consumption and High Visual Comfort." *Applied Energy* 95 (July): 238–45.
- Oral, Gül Koçlar, Alpin Köknel Yener, and Nurgün Tamer Bayazit. 2004. "Building Envelope Design with the Objective to Ensure Thermal, Visual and Acoustic Comfort Conditions." *Building and Environment* 39 (January): 281–87.
- Osterhaus, W K E. 2005. "Discomfort Glare Assessment and Prevention for Daylight Applications in Office Environments." *Solar Energy* 79 (2): 140–58.
- Piasecki, Michal, Mateusz Kozicki, Szymon Firlag, Anna Goljan, and Krystyna Kostyrko. 2018. "The Approach of Including TVOCs Concentration in the Indoor Environmental Quality Model (IEQ)-Case Studies of BREEAM Certified Office Buildings." *SUSTAINABILITY*.

- Plympton, Patricia, Susan Conway, Kyra Epstein, and National Renewable Energy Lab (DOE). 2000. "Daylighting in Schools: Improving Student Performance and Health at a Price Schools Can Afford."
- Reinhart, Christoph F, John Mardaljevic, and Zack Rogers. 2006. "Dynamic Daylight Performance Metrics for Sustainable Building Design." *LEUKOS*.
- Reinhart, Christoph, Alstan Jakubiec, and Diego Ibarra. 2013. "Definition of a Reference Office for Standardized Evaluations of Dynamic Façade and Lighting Technologies." In *13th Conference of International Building Performance Simulation Association*, 3645–52. Chambéry, France.
- Reinhart, Christoph, and Stephen Selkowitz. 2006. "Daylighting—Light, Form, and People." *Energy and Buildings* 38 (7): 715–17.
- "RELUX." 2019. Accessed March 31, 2019.  
<https://relux.com/en/about-us.html>.
- Said, Fatma S, and FACULTY O F ARCHITECTURE CANKAYA UNIVERSITY. 2019. *A Research on Selecting the Green Building Certification System Suitable for Turkey*. Çankaya Üniversitesi.
- Schmid, Aloísio Leoni, and Leticia Karine Seki Uehara. 2017. "Lighting Performance of Multifunctional PV Windows: A Numeric Simulation to Explain Illuminance Distribution and Glare Control in Offices." *Energy & Buildings* 154 (November): 590–605.
- Sinou, Maria, and Stella Kyvelou. 2006. "Present and Future of Building Performance Assessment Tools." *Management of Environmental Quality: An International Journal* 17 (5): 570–86.
- "Sun Position." 2019. Accessed March 31, 2019.  
[https://www.sunearthtools.com/dp/tools/pos\\_sun.php?lang=en](https://www.sunearthtools.com/dp/tools/pos_sun.php?lang=en).
- "Sunshine & Daylight Hours in İzmir, Turkey." n.d. Accessed March 31, 2019.  
<http://www.izmir.climatemps.com/sunlight.php>.
- "Sunshine & Daylight Hours in London, England, UK." n.d. Accessed March 31, 2019.  
<http://www.london.climatemps.com/sunlight.php>.
- Suzer, Ozge. 2019. "Analyzing the Compliance and Correlation of LEED and BREEAM by Conducting a Criteria-Based Comparative Analysis and Evaluating Dual-Certified Projects." *Building and Environment* 147: 158–70.
- Todd, Joel Ann, Drury Crawley, Susanne Geissler, and Gail Lindsey. 2001. "Comparative Assessment of Environmental Performance Tools and the Role of the Green Building Challenge." *Building Research & Information* 29 (5): 324–35.
- Tsikra, P, and E Andreou. 2017. "Investigation of the Energy Saving Potential in

- Existing School Buildings in Greece. The Role of Shading and Daylight Strategies in Visual Comfort and Energy Saving.” *Procedia Environmental Sciences* 38: 204–11.
- Uyan, Faruk. 2010. *Binalarda Aydınlatma Sistemlerinin Sürdürülebilirliklerini Değerlendirme İlkeleri*. Fen Bilimleri Enstitüsü.
- Winterbottom, Mark, and Arnold Wilkins. 2009. “Lighting and Discomfort in the Classroom.” *Journal of Environmental Psychology* 29 (1): 63–75.
- Wu, Wei, and Edward Ng. 2003. “A Review of the Development of Daylighting in Schools.” *Lighting Research & Technology* 35 (2): 111–25.
- Yener, Alpin Köknel. 2002. “Daylight Analysis in Classrooms with Solar Control.” *Architectural Science Review* 45 (4): 311–16.
- Yener, Alpin Köknel, Rana Kutlu Güvenkaya, and Feride Sener. 2009. “İlköğretim Dersliklerinin Görsel Konfor Açısından İncelenmesi ve Değerlendirilmesi.” *Investigation and Evaluation of Primary School Classrooms with Respect to Visual Comfort*. 8 (1): 105–16.
- Yu, X, Y Su, and X Chen. 2014. “Application of RELUX Simulation to Investigate Energy Saving Potential from Daylighting in a New Educational Building in UK.” *Energy and Buildings* 74 (May): 191–202.

## **APPENDIX A**

### **CALCULATION RESULTS OF RELUX SIMULATIONS; RENDERS, CALCULATION POINTS AND THEIR ILLUMINANCE VALUES**

Table A.1. Reference room B, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> March and 21<sup>st</sup> June at 12:00 pm.

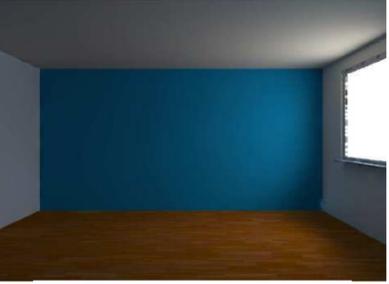
Room B - Material Alternative I at 12:00 pm	21 <sup>st</sup> March		21 <sup>st</sup> June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
London																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>169</td><td>171</td><td>169</td><td>162</td><td>154</td><td>(142)</td></tr> <tr><td>4.0</td><td>176</td><td>179</td><td>176</td><td>168</td><td>159</td><td>146</td></tr> <tr><td></td><td>192</td><td>196</td><td>193</td><td>181</td><td>170</td><td>155</td></tr> <tr><td>3.5</td><td>219</td><td>224</td><td>220</td><td>202</td><td>189</td><td>171</td></tr> <tr><td></td><td>259</td><td>265</td><td>260</td><td>236</td><td>215</td><td>192</td></tr> <tr><td>3.0</td><td>311</td><td>321</td><td>322</td><td>278</td><td>250</td><td>220</td></tr> <tr><td></td><td>372</td><td>391</td><td>385</td><td>352</td><td>304</td><td>245</td></tr> <tr><td>2.5</td><td>447</td><td>489</td><td>499</td><td>430</td><td>369</td><td>284</td></tr> <tr><td></td><td>514</td><td>597</td><td>592</td><td>507</td><td>441</td><td>325</td></tr> <tr><td>2.0</td><td>626</td><td>680</td><td>723</td><td>637</td><td>506</td><td>388</td></tr> <tr><td></td><td>684</td><td>828</td><td>874</td><td>796</td><td>605</td><td>437</td></tr> <tr><td>1.5</td><td>829</td><td>1030</td><td>1080</td><td>991</td><td>722</td><td>490</td></tr> <tr><td></td><td>905</td><td>1220</td><td>1340</td><td>1230</td><td>906</td><td>527</td></tr> <tr><td>1.0</td><td>907</td><td>1380</td><td>1630</td><td>1530</td><td>965</td><td>480</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	169	171	169	162	154	(142)	4.0	176	179	176	168	159	146		192	196	193	181	170	155	3.5	219	224	220	202	189	171		259	265	260	236	215	192	3.0	311	321	322	278	250	220		372	391	385	352	304	245	2.5	447	489	499	430	369	284		514	597	592	507	441	325	2.0	626	680	723	637	506	388		684	828	874	796	605	437	1.5	829	1030	1080	991	722	490		905	1220	1340	1230	906	527	1.0	907	1380	1630	1530	965	480	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>70</td><td>74</td><td>75</td><td>74</td><td>72</td><td>(68)</td></tr> <tr><td>4.0</td><td>74</td><td>78</td><td>79</td><td>78</td><td>76</td><td>72</td></tr> <tr><td></td><td>82</td><td>86</td><td>87</td><td>86</td><td>84</td><td>78</td></tr> <tr><td>3.5</td><td>93</td><td>97</td><td>99</td><td>96</td><td>94</td><td>88</td></tr> <tr><td></td><td>109</td><td>114</td><td>116</td><td>113</td><td>110</td><td>102</td></tr> <tr><td>3.0</td><td>129</td><td>139</td><td>138</td><td>136</td><td>130</td><td>119</td></tr> <tr><td></td><td>152</td><td>170</td><td>175</td><td>169</td><td>161</td><td>139</td></tr> <tr><td>2.5</td><td>188</td><td>214</td><td>215</td><td>206</td><td>195</td><td>174</td></tr> <tr><td></td><td>229</td><td>252</td><td>271</td><td>259</td><td>241</td><td>207</td></tr> <tr><td>2.0</td><td>273</td><td>316</td><td>332</td><td>332</td><td>297</td><td>261</td></tr> <tr><td></td><td>336</td><td>395</td><td>437</td><td>436</td><td>401</td><td>336</td></tr> <tr><td>1.5</td><td>405</td><td>499</td><td>548</td><td>559</td><td>488</td><td>406</td></tr> <tr><td></td><td>494</td><td>662</td><td>739</td><td>734</td><td>634</td><td>496</td></tr> <tr><td>1.0</td><td>593</td><td>898</td><td>1080</td><td>1060</td><td>824</td><td>551</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	70	74	75	74	72	(68)	4.0	74	78	79	78	76	72		82	86	87	86	84	78	3.5	93	97	99	96	94	88		109	114	116	113	110	102	3.0	129	139	138	136	130	119		152	170	175	169	161	139	2.5	188	214	215	206	195	174		229	252	271	259	241	207	2.0	273	316	332	332	297	261		336	395	437	436	401	336	1.5	405	499	548	559	488	406		494	662	739	734	634	496	1.0	593	898	1080	1060	824	551	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>97</td><td>99</td><td>99</td><td>97</td><td>95</td><td>(90)</td></tr> <tr><td>4.0</td><td>100</td><td>103</td><td>103</td><td>101</td><td>98</td><td>92</td></tr> <tr><td></td><td>108</td><td>111</td><td>112</td><td>108</td><td>105</td><td>99</td></tr> <tr><td>3.5</td><td>122</td><td>125</td><td>126</td><td>120</td><td>116</td><td>109</td></tr> <tr><td></td><td>141</td><td>145</td><td>146</td><td>139</td><td>132</td><td>123</td></tr> <tr><td>3.0</td><td>167</td><td>173</td><td>174</td><td>164</td><td>155</td><td>142</td></tr> <tr><td></td><td>199</td><td>209</td><td>211</td><td>194</td><td>181</td><td>165</td></tr> <tr><td>2.5</td><td>230</td><td>258</td><td>263</td><td>245</td><td>224</td><td>187</td></tr> <tr><td></td><td>274</td><td>311</td><td>309</td><td>308</td><td>258</td><td>227</td></tr> <tr><td>2.0</td><td>331</td><td>381</td><td>390</td><td>381</td><td>330</td><td>271</td></tr> <tr><td></td><td>402</td><td>471</td><td>476</td><td>484</td><td>414</td><td>320</td></tr> <tr><td>1.5</td><td>480</td><td>571</td><td>633</td><td>593</td><td>525</td><td>386</td></tr> <tr><td></td><td>573</td><td>749</td><td>806</td><td>789</td><td>626</td><td>448</td></tr> <tr><td>1.0</td><td>657</td><td>1020</td><td>1180</td><td>1090</td><td>775</td><td>426</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	97	99	99	97	95	(90)	4.0	100	103	103	101	98	92		108	111	112	108	105	99	3.5	122	125	126	120	116	109		141	145	146	139	132	123	3.0	167	173	174	164	155	142		199	209	211	194	181	165	2.5	230	258	263	245	224	187		274	311	309	308	258	227	2.0	331	381	390	381	330	271		402	471	476	484	414	320	1.5	480	571	633	593	525	386		573	749	806	789	626	448	1.0	657	1020	1180	1090	775	426	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>99</td><td>104</td><td>106</td><td>105</td><td>103</td><td>(96)</td></tr> <tr><td>4.0</td><td>105</td><td>110</td><td>112</td><td>111</td><td>108</td><td>101</td></tr> <tr><td></td><td>116</td><td>121</td><td>123</td><td>121</td><td>118</td><td>111</td></tr> <tr><td>3.5</td><td>132</td><td>138</td><td>139</td><td>137</td><td>134</td><td>125</td></tr> <tr><td></td><td>155</td><td>162</td><td>165</td><td>161</td><td>154</td><td>144</td></tr> <tr><td>3.0</td><td>184</td><td>196</td><td>196</td><td>191</td><td>185</td><td>169</td></tr> <tr><td></td><td>219</td><td>240</td><td>242</td><td>231</td><td>222</td><td>199</td></tr> <tr><td>2.5</td><td>268</td><td>304</td><td>307</td><td>295</td><td>280</td><td>246</td></tr> <tr><td></td><td>321</td><td>366</td><td>375</td><td>376</td><td>349</td><td>302</td></tr> <tr><td>2.0</td><td>377</td><td>446</td><td>481</td><td>477</td><td>428</td><td>370</td></tr> <tr><td></td><td>467</td><td>564</td><td>597</td><td>612</td><td>559</td><td>472</td></tr> <tr><td>1.5</td><td>584</td><td>713</td><td>766</td><td>786</td><td>707</td><td>565</td></tr> <tr><td></td><td>727</td><td>924</td><td>1030</td><td>1040</td><td>895</td><td>679</td></tr> <tr><td>1.0</td><td>811</td><td>1260</td><td>1510</td><td>1460</td><td>1140</td><td>788</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	99	104	106	105	103	(96)	4.0	105	110	112	111	108	101		116	121	123	121	118	111	3.5	132	138	139	137	134	125		155	162	165	161	154	144	3.0	184	196	196	191	185	169		219	240	242	231	222	199	2.5	268	304	307	295	280	246		321	366	375	376	349	302	2.0	377	446	481	477	428	370		467	564	597	612	559	472	1.5	584	713	766	786	707	565		727	924	1030	1040	895	679	1.0	811	1260	1510	1460	1140	788	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	169	171	169	162	154	(142)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	176	179	176	168	159	146																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	192	196	193	181	170	155																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	219	224	220	202	189	171																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	259	265	260	236	215	192																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	311	321	322	278	250	220																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	372	391	385	352	304	245																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	447	489	499	430	369	284																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	514	597	592	507	441	325																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	626	680	723	637	506	388																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	684	828	874	796	605	437																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	829	1030	1080	991	722	490																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	905	1220	1340	1230	906	527																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	907	1380	1630	1530	965	480																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	70	74	75	74	72	(68)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	74	78	79	78	76	72																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	82	86	87	86	84	78																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	93	97	99	96	94	88																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	109	114	116	113	110	102																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	129	139	138	136	130	119																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	152	170	175	169	161	139																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	188	214	215	206	195	174																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	229	252	271	259	241	207																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	273	316	332	332	297	261																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	336	395	437	436	401	336																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	405	499	548	559	488	406																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	494	662	739	734	634	496																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	593	898	1080	1060	824	551																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	97	99	99	97	95	(90)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	100	103	103	101	98	92																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	108	111	112	108	105	99																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	122	125	126	120	116	109																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	141	145	146	139	132	123																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	167	173	174	164	155	142																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	199	209	211	194	181	165																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	230	258	263	245	224	187																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	274	311	309	308	258	227																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	331	381	390	381	330	271																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	402	471	476	484	414	320																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	480	571	633	593	525	386																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	573	749	806	789	626	448																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	657	1020	1180	1090	775	426																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	99	104	106	105	103	(96)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	105	110	112	111	108	101																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	116	121	123	121	118	111																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	132	138	139	137	134	125																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	155	162	165	161	154	144																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	184	196	196	191	185	169																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	219	240	242	231	222	199																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	268	304	307	295	280	246																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	321	366	375	376	349	302																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	377	446	481	477	428	370																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	467	564	597	612	559	472																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	584	713	766	786	707	565																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	727	924	1030	1040	895	679																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	811	1260	1510	1460	1140	788																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
İzmir																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>115</td><td>114</td><td>111</td><td>106</td><td>101</td><td>(95)</td></tr> <tr><td>4.0</td><td>120</td><td>119</td><td>115</td><td>109</td><td>103</td><td>96</td></tr> <tr><td></td><td>131</td><td>129</td><td>124</td><td>117</td><td>110</td><td>102</td></tr> <tr><td>3.5</td><td>150</td><td>145</td><td>140</td><td>129</td><td>121</td><td>111</td></tr> <tr><td></td><td>176</td><td>171</td><td>163</td><td>148</td><td>135</td><td>123</td></tr> <tr><td>3.0</td><td>209</td><td>204</td><td>195</td><td>173</td><td>156</td><td>138</td></tr> <tr><td></td><td>256</td><td>253</td><td>239</td><td>209</td><td>182</td><td>161</td></tr> <tr><td>2.5</td><td>308</td><td>316</td><td>295</td><td>250</td><td>223</td><td>185</td></tr> <tr><td></td><td>373</td><td>373</td><td>343</td><td>307</td><td>250</td><td>207</td></tr> <tr><td>2.0</td><td>449</td><td>454</td><td>446</td><td>380</td><td>307</td><td>243</td></tr> <tr><td></td><td>565</td><td>571</td><td>547</td><td>461</td><td>369</td><td>278</td></tr> <tr><td>1.5</td><td>696</td><td>725</td><td>720</td><td>594</td><td>443</td><td>319</td></tr> <tr><td></td><td>863</td><td>943</td><td>933</td><td>767</td><td>521</td><td>354</td></tr> <tr><td>1.0</td><td>1010</td><td>1190</td><td>1280</td><td>1020</td><td>658</td><td>330</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	115	114	111	106	101	(95)	4.0	120	119	115	109	103	96		131	129	124	117	110	102	3.5	150	145	140	129	121	111		176	171	163	148	135	123	3.0	209	204	195	173	156	138		256	253	239	209	182	161	2.5	308	316	295	250	223	185		373	373	343	307	250	207	2.0	449	454	446	380	307	243		565	571	547	461	369	278	1.5	696	725	720	594	443	319		863	943	933	767	521	354	1.0	1010	1190	1280	1020	658	330	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>79</td><td>83</td><td>84</td><td>84</td><td>82</td><td>(77)</td></tr> <tr><td>4.0</td><td>83</td><td>88</td><td>89</td><td>88</td><td>86</td><td>81</td></tr> <tr><td></td><td>92</td><td>97</td><td>98</td><td>97</td><td>94</td><td>88</td></tr> <tr><td>3.5</td><td>105</td><td>109</td><td>112</td><td>109</td><td>106</td><td>100</td></tr> <tr><td></td><td>123</td><td>129</td><td>132</td><td>128</td><td>125</td><td>115</td></tr> <tr><td>3.0</td><td>147</td><td>157</td><td>156</td><td>151</td><td>148</td><td>135</td></tr> <tr><td></td><td>178</td><td>189</td><td>195</td><td>187</td><td>176</td><td>160</td></tr> <tr><td>2.5</td><td>219</td><td>231</td><td>248</td><td>234</td><td>225</td><td>196</td></tr> <tr><td></td><td>255</td><td>282</td><td>300</td><td>296</td><td>278</td><td>237</td></tr> <tr><td>2.0</td><td>316</td><td>356</td><td>379</td><td>367</td><td>354</td><td>288</td></tr> <tr><td></td><td>380</td><td>443</td><td>469</td><td>487</td><td>440</td><td>368</td></tr> <tr><td>1.5</td><td>467</td><td>565</td><td>623</td><td>606</td><td>556</td><td>456</td></tr> <tr><td></td><td>548</td><td>730</td><td>832</td><td>821</td><td>730</td><td>541</td></tr> <tr><td>1.0</td><td>655</td><td>984</td><td>1180</td><td>1150</td><td>947</td><td>589</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	79	83	84	84	82	(77)	4.0	83	88	89	88	86	81		92	97	98	97	94	88	3.5	105	109	112	109	106	100		123	129	132	128	125	115	3.0	147	157	156	151	148	135		178	189	195	187	176	160	2.5	219	231	248	234	225	196		255	282	300	296	278	237	2.0	316	356	379	367	354	288		380	443	469	487	440	368	1.5	467	565	623	606	556	456		548	730	832	821	730	541	1.0	655	984	1180	1150	947	589	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>78</td><td>79</td><td>79</td><td>77</td><td>75</td><td>(71)</td></tr> <tr><td>4.0</td><td>80</td><td>82</td><td>81</td><td>80</td><td>77</td><td>73</td></tr> <tr><td></td><td>87</td><td>88</td><td>88</td><td>85</td><td>82</td><td>78</td></tr> <tr><td>3.5</td><td>97</td><td>98</td><td>97</td><td>93</td><td>90</td><td>85</td></tr> <tr><td></td><td>112</td><td>114</td><td>112</td><td>107</td><td>102</td><td>95</td></tr> <tr><td>3.0</td><td>130</td><td>133</td><td>132</td><td>121</td><td>115</td><td>107</td></tr> <tr><td></td><td>153</td><td>162</td><td>156</td><td>146</td><td>137</td><td>118</td></tr> <tr><td>2.5</td><td>185</td><td>194</td><td>193</td><td>179</td><td>164</td><td>145</td></tr> <tr><td></td><td>210</td><td>227</td><td>235</td><td>215</td><td>197</td><td>167</td></tr> <tr><td>2.0</td><td>253</td><td>294</td><td>281</td><td>258</td><td>232</td><td>196</td></tr> <tr><td></td><td>312</td><td>341</td><td>355</td><td>321</td><td>286</td><td>239</td></tr> <tr><td>1.5</td><td>381</td><td>428</td><td>438</td><td>406</td><td>338</td><td>278</td></tr> <tr><td></td><td>460</td><td>547</td><td>569</td><td>520</td><td>420</td><td>312</td></tr> <tr><td>1.0</td><td>539</td><td>702</td><td>758</td><td>695</td><td>475</td><td>311</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	78	79	79	77	75	(71)	4.0	80	82	81	80	77	73		87	88	88	85	82	78	3.5	97	98	97	93	90	85		112	114	112	107	102	95	3.0	130	133	132	121	115	107		153	162	156	146	137	118	2.5	185	194	193	179	164	145		210	227	235	215	197	167	2.0	253	294	281	258	232	196		312	341	355	321	286	239	1.5	381	428	438	406	338	278		460	547	569	520	420	312	1.0	539	702	758	695	475	311	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>101</td><td>107</td><td>109</td><td>108</td><td>105</td><td>(99)</td></tr> <tr><td>4.0</td><td>108</td><td>113</td><td>115</td><td>113</td><td>111</td><td>104</td></tr> <tr><td></td><td>118</td><td>124</td><td>126</td><td>124</td><td>121</td><td>113</td></tr> <tr><td>3.5</td><td>134</td><td>140</td><td>143</td><td>139</td><td>136</td><td>127</td></tr> <tr><td></td><td>158</td><td>166</td><td>168</td><td>163</td><td>159</td><td>148</td></tr> <tr><td>3.0</td><td>186</td><td>198</td><td>205</td><td>191</td><td>189</td><td>174</td></tr> <tr><td></td><td>230</td><td>241</td><td>253</td><td>241</td><td>232</td><td>210</td></tr> <tr><td>2.5</td><td>275</td><td>307</td><td>308</td><td>305</td><td>283</td><td>252</td></tr> <tr><td></td><td>336</td><td>365</td><td>379</td><td>371</td><td>344</td><td>304</td></tr> <tr><td>2.0</td><td>388</td><td>446</td><td>472</td><td>494</td><td>451</td><td>376</td></tr> <tr><td></td><td>498</td><td>575</td><td>622</td><td>635</td><td>563</td><td>468</td></tr> <tr><td>1.5</td><td>590</td><td>720</td><td>777</td><td>823</td><td>718</td><td>561</td></tr> <tr><td></td><td>720</td><td>935</td><td>1070</td><td>1040</td><td>906</td><td>689</td></tr> <tr><td>1.0</td><td>867</td><td>1300</td><td>1540</td><td>1490</td><td>1190</td><td>761</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	101	107	109	108	105	(99)	4.0	108	113	115	113	111	104		118	124	126	124	121	113	3.5	134	140	143	139	136	127		158	166	168	163	159	148	3.0	186	198	205	191	189	174		230	241	253	241	232	210	2.5	275	307	308	305	283	252		336	365	379	371	344	304	2.0	388	446	472	494	451	376		498	575	622	635	563	468	1.5	590	720	777	823	718	561		720	935	1070	1040	906	689	1.0	867	1300	1540	1490	1190	761	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	115	114	111	106	101	(95)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	120	119	115	109	103	96																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	131	129	124	117	110	102																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	150	145	140	129	121	111																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	176	171	163	148	135	123																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	209	204	195	173	156	138																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	256	253	239	209	182	161																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	308	316	295	250	223	185																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	373	373	343	307	250	207																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	449	454	446	380	307	243																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	565	571	547	461	369	278																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	696	725	720	594	443	319																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	863	943	933	767	521	354																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1010	1190	1280	1020	658	330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	79	83	84	84	82	(77)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	83	88	89	88	86	81																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	92	97	98	97	94	88																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	105	109	112	109	106	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	123	129	132	128	125	115																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	147	157	156	151	148	135																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	178	189	195	187	176	160																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	219	231	248	234	225	196																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	255	282	300	296	278	237																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	316	356	379	367	354	288																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	380	443	469	487	440	368																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	467	565	623	606	556	456																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	548	730	832	821	730	541																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	655	984	1180	1150	947	589																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	78	79	79	77	75	(71)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	80	82	81	80	77	73																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	87	88	88	85	82	78																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	97	98	97	93	90	85																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	112	114	112	107	102	95																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	130	133	132	121	115	107																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	153	162	156	146	137	118																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	185	194	193	179	164	145																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	210	227	235	215	197	167																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	253	294	281	258	232	196																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	312	341	355	321	286	239																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	381	428	438	406	338	278																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	460	547	569	520	420	312																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	539	702	758	695	475	311																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	101	107	109	108	105	(99)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	108	113	115	113	111	104																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	118	124	126	124	121	113																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	134	140	143	139	136	127																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	158	166	168	163	159	148																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	186	198	205	191	189	174																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	230	241	253	241	232	210																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	275	307	308	305	283	252																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	336	365	379	371	344	304																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	388	446	472	494	451	376																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	498	575	622	635	563	468																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	590	720	777	823	718	561																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	720	935	1070	1040	906	689																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	867	1300	1540	1490	1190	761																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Table A.2. Reference room B, material alternative I, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> September and 21<sup>st</sup> December at 12:00 pm.

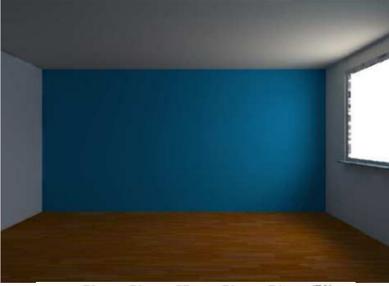
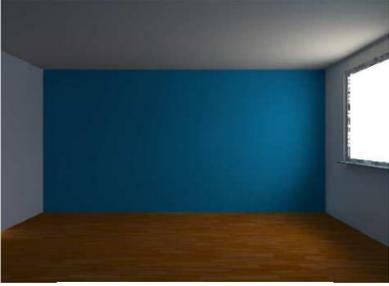
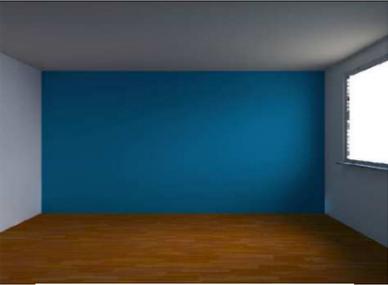
Room B - Material Alternative I at 12:00 pm	21 <sup>st</sup> September		21 <sup>st</sup> December																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
London	 <table border="1"> <tr><td>[m]</td><td>(147)</td><td>158</td><td>163</td><td>166</td><td>165</td><td>160</td></tr> <tr><td>4.0</td><td>152</td><td>164</td><td>170</td><td>172</td><td>172</td><td>165</td></tr> <tr><td>3.5</td><td>163</td><td>178</td><td>185</td><td>186</td><td>187</td><td>179</td></tr> <tr><td>3.0</td><td>182</td><td>200</td><td>211</td><td>212</td><td>211</td><td>202</td></tr> <tr><td>2.5</td><td>208</td><td>232</td><td>248</td><td>249</td><td>245</td><td>233</td></tr> <tr><td>2.0</td><td>241</td><td>278</td><td>298</td><td>302</td><td>294</td><td>275</td></tr> <tr><td>1.5</td><td>281</td><td>335</td><td>366</td><td>371</td><td>360</td><td>328</td></tr> <tr><td>1.0</td><td>335</td><td>403</td><td>464</td><td>463</td><td>448</td><td>378</td></tr> <tr><td>0.5</td><td>359</td><td>465</td><td>563</td><td>578</td><td>537</td><td>462</td></tr> <tr><td>0.2</td><td>429</td><td>581</td><td>677</td><td>719</td><td>653</td><td>560</td></tr> <tr><td>0.1</td><td>519</td><td>694</td><td>835</td><td>898</td><td>843</td><td>639</td></tr> <tr><td>0.05</td><td>556</td><td>857</td><td>1060</td><td>1200</td><td>989</td><td>790</td></tr> <tr><td>0.02</td><td>596</td><td>1050</td><td>1370</td><td>1420</td><td>1250</td><td>848</td></tr> <tr><td>0.01</td><td>624</td><td>1220</td><td>1790</td><td>1690</td><td>1430</td><td>776</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	(147)	158	163	166	165	160	4.0	152	164	170	172	172	165	3.5	163	178	185	186	187	179	3.0	182	200	211	212	211	202	2.5	208	232	248	249	245	233	2.0	241	278	298	302	294	275	1.5	281	335	366	371	360	328	1.0	335	403	464	463	448	378	0.5	359	465	563	578	537	462	0.2	429	581	677	719	653	560	0.1	519	694	835	898	843	639	0.05	556	857	1060	1200	989	790	0.02	596	1050	1370	1420	1250	848	0.01	624	1220	1790	1690	1430	776	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]							 <table border="1"> <tr><td>[m]</td><td>72</td><td>76</td><td>77</td><td>76</td><td>74</td><td>(70)</td></tr> <tr><td>4.0</td><td>76</td><td>80</td><td>81</td><td>80</td><td>78</td><td>74</td></tr> <tr><td>3.5</td><td>84</td><td>88</td><td>89</td><td>88</td><td>86</td><td>80</td></tr> <tr><td>3.0</td><td>96</td><td>99</td><td>101</td><td>99</td><td>96</td><td>90</td></tr> <tr><td>2.5</td><td>112</td><td>117</td><td>120</td><td>115</td><td>112</td><td>105</td></tr> <tr><td>2.0</td><td>134</td><td>141</td><td>143</td><td>139</td><td>135</td><td>125</td></tr> <tr><td>1.5</td><td>158</td><td>172</td><td>175</td><td>172</td><td>164</td><td>148</td></tr> <tr><td>1.0</td><td>196</td><td>215</td><td>220</td><td>214</td><td>202</td><td>178</td></tr> <tr><td>0.5</td><td>230</td><td>258</td><td>273</td><td>261</td><td>250</td><td>220</td></tr> <tr><td>0.2</td><td>275</td><td>324</td><td>337</td><td>342</td><td>305</td><td>274</td></tr> <tr><td>0.1</td><td>341</td><td>417</td><td>434</td><td>439</td><td>379</td><td>330</td></tr> <tr><td>0.05</td><td>417</td><td>516</td><td>564</td><td>564</td><td>509</td><td>417</td></tr> <tr><td>0.02</td><td>500</td><td>670</td><td>747</td><td>736</td><td>656</td><td>487</td></tr> <tr><td>0.01</td><td>589</td><td>880</td><td>1080</td><td>1020</td><td>847</td><td>528</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	72	76	77	76	74	(70)	4.0	76	80	81	80	78	74	3.5	84	88	89	88	86	80	3.0	96	99	101	99	96	90	2.5	112	117	120	115	112	105	2.0	134	141	143	139	135	125	1.5	158	172	175	172	164	148	1.0	196	215	220	214	202	178	0.5	230	258	273	261	250	220	0.2	275	324	337	342	305	274	0.1	341	417	434	439	379	330	0.05	417	516	564	564	509	417	0.02	500	670	747	736	656	487	0.01	589	880	1080	1020	847	528	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]							 <table border="1"> <tr><td>[m]</td><td>(198)</td><td>216</td><td>234</td><td>247</td><td>250</td><td>246</td></tr> <tr><td>4.0</td><td>(198)</td><td>219</td><td>239</td><td>252</td><td>254</td><td>248</td></tr> <tr><td>3.5</td><td>207</td><td>232</td><td>255</td><td>268</td><td>271</td><td>262</td></tr> <tr><td>3.0</td><td>224</td><td>253</td><td>283</td><td>296</td><td>296</td><td>284</td></tr> <tr><td>2.5</td><td>247</td><td>288</td><td>323</td><td>337</td><td>331</td><td>316</td></tr> <tr><td>2.0</td><td>273</td><td>323</td><td>379</td><td>377</td><td>376</td><td>345</td></tr> <tr><td>1.5</td><td>302</td><td>392</td><td>448</td><td>443</td><td>436</td><td>374</td></tr> <tr><td>1.0</td><td>333</td><td>451</td><td>518</td><td>512</td><td>497</td><td>418</td></tr> <tr><td>0.5</td><td>376</td><td>501</td><td>587</td><td>588</td><td>547</td><td>458</td></tr> <tr><td>0.2</td><td>411</td><td>554</td><td>666</td><td>687</td><td>658</td><td>478</td></tr> <tr><td>0.1</td><td>440</td><td>608</td><td>744</td><td>798</td><td>716</td><td>527</td></tr> <tr><td>0.05</td><td>450</td><td>688</td><td>875</td><td>879</td><td>814</td><td>578</td></tr> <tr><td>0.02</td><td>427</td><td>757</td><td>978</td><td>968</td><td>853</td><td>573</td></tr> <tr><td>0.01</td><td>361</td><td>752</td><td>992</td><td>959</td><td>793</td><td>418</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	(198)	216	234	247	250	246	4.0	(198)	219	239	252	254	248	3.5	207	232	255	268	271	262	3.0	224	253	283	296	296	284	2.5	247	288	323	337	331	316	2.0	273	323	379	377	376	345	1.5	302	392	448	443	436	374	1.0	333	451	518	512	497	418	0.5	376	501	587	588	547	458	0.2	411	554	666	687	658	478	0.1	440	608	744	798	716	527	0.05	450	688	875	879	814	578	0.02	427	757	978	968	853	573	0.01	361	752	992	959	793	418	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]							 <table border="1"> <tr><td>[m]</td><td>30</td><td>31</td><td>32</td><td>32</td><td>31</td><td>(29)</td></tr> <tr><td>4.0</td><td>32</td><td>33</td><td>34</td><td>33</td><td>33</td><td>31</td></tr> <tr><td>3.5</td><td>35</td><td>37</td><td>37</td><td>37</td><td>36</td><td>34</td></tr> <tr><td>3.0</td><td>40</td><td>42</td><td>42</td><td>42</td><td>40</td><td>38</td></tr> <tr><td>2.5</td><td>47</td><td>49</td><td>50</td><td>49</td><td>47</td><td>44</td></tr> <tr><td>2.0</td><td>56</td><td>59</td><td>59</td><td>58</td><td>56</td><td>52</td></tr> <tr><td>1.5</td><td>66</td><td>72</td><td>75</td><td>73</td><td>69</td><td>62</td></tr> <tr><td>1.0</td><td>82</td><td>89</td><td>94</td><td>90</td><td>85</td><td>74</td></tr> <tr><td>0.5</td><td>96</td><td>112</td><td>117</td><td>113</td><td>103</td><td>91</td></tr> <tr><td>0.2</td><td>115</td><td>134</td><td>142</td><td>144</td><td>130</td><td>112</td></tr> <tr><td>0.1</td><td>142</td><td>173</td><td>180</td><td>187</td><td>164</td><td>137</td></tr> <tr><td>0.05</td><td>179</td><td>214</td><td>239</td><td>231</td><td>211</td><td>175</td></tr> <tr><td>0.02</td><td>215</td><td>281</td><td>312</td><td>310</td><td>270</td><td>202</td></tr> <tr><td>0.01</td><td>247</td><td>367</td><td>451</td><td>441</td><td>344</td><td>230</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	30	31	32	32	31	(29)	4.0	32	33	34	33	33	31	3.5	35	37	37	37	36	34	3.0	40	42	42	42	40	38	2.5	47	49	50	49	47	44	2.0	56	59	59	58	56	52	1.5	66	72	75	73	69	62	1.0	82	89	94	90	85	74	0.5	96	112	117	113	103	91	0.2	115	134	142	144	130	112	0.1	142	173	180	187	164	137	0.05	179	214	239	231	211	175	0.02	215	281	312	310	270	202	0.01	247	367	451	441	344	230	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]						
	[m]	(147)	158	163	166	165	160																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	152	164	170	172	172	165																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	3.5	163	178	185	186	187	179																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
3.0	182	200	211	212	211	202																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	208	232	248	249	245	233																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	241	278	298	302	294	275																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	281	335	366	371	360	328																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	335	403	464	463	448	378																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	359	465	563	578	537	462																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	429	581	677	719	653	560																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	519	694	835	898	843	639																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	556	857	1060	1200	989	790																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	596	1050	1370	1420	1250	848																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	624	1220	1790	1690	1430	776																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	72	76	77	76	74	(70)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	76	80	81	80	78	74																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	84	88	89	88	86	80																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	96	99	101	99	96	90																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	112	117	120	115	112	105																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	134	141	143	139	135	125																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	158	172	175	172	164	148																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	196	215	220	214	202	178																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	230	258	273	261	250	220																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	275	324	337	342	305	274																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	341	417	434	439	379	330																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	417	516	564	564	509	417																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	500	670	747	736	656	487																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	589	880	1080	1020	847	528																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	(198)	216	234	247	250	246																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	(198)	219	239	252	254	248																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	207	232	255	268	271	262																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	224	253	283	296	296	284																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	247	288	323	337	331	316																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	273	323	379	377	376	345																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	302	392	448	443	436	374																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	333	451	518	512	497	418																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	376	501	587	588	547	458																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	411	554	666	687	658	478																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	440	608	744	798	716	527																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	450	688	875	879	814	578																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	427	757	978	968	853	573																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	361	752	992	959	793	418																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	30	31	32	32	31	(29)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	32	33	34	33	33	31																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	35	37	37	37	36	34																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	40	42	42	42	40	38																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	47	49	50	49	47	44																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	56	59	59	58	56	52																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	66	72	75	73	69	62																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	82	89	94	90	85	74																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	96	112	117	113	103	91																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	115	134	142	144	130	112																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	142	173	180	187	164	137																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	179	214	239	231	211	175																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	215	281	312	310	270	202																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	247	367	451	441	344	230																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
İzmir	 <table border="1"> <tr><td>[m]</td><td>115</td><td>115</td><td>112</td><td>108</td><td>103</td><td>(96)</td></tr> <tr><td>4.0</td><td>120</td><td>120</td><td>115</td><td>111</td><td>105</td><td>98</td></tr> <tr><td>3.5</td><td>132</td><td>130</td><td>126</td><td>119</td><td>112</td><td>104</td></tr> <tr><td>3.0</td><td>150</td><td>146</td><td>141</td><td>132</td><td>123</td><td>114</td></tr> <tr><td>2.5</td><td>176</td><td>173</td><td>164</td><td>151</td><td>139</td><td>127</td></tr> <tr><td>2.0</td><td>212</td><td>208</td><td>195</td><td>175</td><td>159</td><td>145</td></tr> <tr><td>1.5</td><td>246</td><td>250</td><td>235</td><td>213</td><td>182</td><td>163</td></tr> <tr><td>1.0</td><td>307</td><td>310</td><td>302</td><td>260</td><td>223</td><td>185</td></tr> <tr><td>0.5</td><td>361</td><td>384</td><td>370</td><td>315</td><td>274</td><td>214</td></tr> <tr><td>0.2</td><td>430</td><td>461</td><td>438</td><td>394</td><td>323</td><td>257</td></tr> <tr><td>0.1</td><td>543</td><td>591</td><td>580</td><td>487</td><td>389</td><td>287</td></tr> <tr><td>0.05</td><td>670</td><td>745</td><td>713</td><td>636</td><td>461</td><td>332</td></tr> <tr><td>0.02</td><td>817</td><td>952</td><td>941</td><td>807</td><td>556</td><td>373</td></tr> <tr><td>0.01</td><td>960</td><td>1150</td><td>1340</td><td>1100</td><td>661</td><td>362</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	115	115	112	108	103	(96)	4.0	120	120	115	111	105	98	3.5	132	130	126	119	112	104	3.0	150	146	141	132	123	114	2.5	176	173	164	151	139	127	2.0	212	208	195	175	159	145	1.5	246	250	235	213	182	163	1.0	307	310	302	260	223	185	0.5	361	384	370	315	274	214	0.2	430	461	438	394	323	257	0.1	543	591	580	487	389	287	0.05	670	745	713	636	461	332	0.02	817	952	941	807	556	373	0.01	960	1150	1340	1100	661	362	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]							 <table border="1"> <tr><td>[m]</td><td>84</td><td>87</td><td>89</td><td>88</td><td>86</td><td>(81)</td></tr> <tr><td>4.0</td><td>88</td><td>92</td><td>94</td><td>93</td><td>91</td><td>85</td></tr> <tr><td>3.5</td><td>97</td><td>102</td><td>103</td><td>101</td><td>99</td><td>93</td></tr> <tr><td>3.0</td><td>110</td><td>116</td><td>117</td><td>115</td><td>112</td><td>105</td></tr> <tr><td>2.5</td><td>129</td><td>135</td><td>136</td><td>133</td><td>130</td><td>121</td></tr> <tr><td>2.0</td><td>154</td><td>161</td><td>165</td><td>160</td><td>155</td><td>142</td></tr> <tr><td>1.5</td><td>183</td><td>202</td><td>205</td><td>197</td><td>189</td><td>166</td></tr> <tr><td>1.0</td><td>226</td><td>245</td><td>258</td><td>244</td><td>231</td><td>209</td></tr> <tr><td>0.5</td><td>264</td><td>304</td><td>318</td><td>319</td><td>283</td><td>255</td></tr> <tr><td>0.2</td><td>332</td><td>368</td><td>392</td><td>391</td><td>362</td><td>300</td></tr> <tr><td>0.1</td><td>393</td><td>465</td><td>516</td><td>500</td><td>464</td><td>388</td></tr> <tr><td>0.05</td><td>483</td><td>594</td><td>635</td><td>642</td><td>589</td><td>472</td></tr> <tr><td>0.02</td><td>592</td><td>767</td><td>868</td><td>854</td><td>763</td><td>570</td></tr> <tr><td>0.01</td><td>698</td><td>1010</td><td>1220</td><td>1240</td><td>932</td><td>647</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	84	87	89	88	86	(81)	4.0	88	92	94	93	91	85	3.5	97	102	103	101	99	93	3.0	110	116	117	115	112	105	2.5	129	135	136	133	130	121	2.0	154	161	165	160	155	142	1.5	183	202	205	197	189	166	1.0	226	245	258	244	231	209	0.5	264	304	318	319	283	255	0.2	332	368	392	391	362	300	0.1	393	465	516	500	464	388	0.05	483	594	635	642	589	472	0.02	592	767	868	854	763	570	0.01	698	1010	1220	1240	932	647	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]							 <table border="1"> <tr><td>[m]</td><td>214</td><td>217</td><td>213</td><td>200</td><td>185</td><td>(171)</td></tr> <tr><td>4.0</td><td>224</td><td>227</td><td>220</td><td>206</td><td>191</td><td>173</td></tr> <tr><td>3.5</td><td>245</td><td>250</td><td>243</td><td>222</td><td>204</td><td>183</td></tr> <tr><td>3.0</td><td>280</td><td>285</td><td>278</td><td>247</td><td>224</td><td>199</td></tr> <tr><td>2.5</td><td>330</td><td>335</td><td>330</td><td>288</td><td>254</td><td>221</td></tr> <tr><td>2.0</td><td>387</td><td>398</td><td>399</td><td>333</td><td>292</td><td>242</td></tr> <tr><td>1.5</td><td>468</td><td>492</td><td>479</td><td>423</td><td>350</td><td>282</td></tr> <tr><td>1.0</td><td>565</td><td>615</td><td>611</td><td>516</td><td>414</td><td>317</td></tr> <tr><td>0.5</td><td>638</td><td>688</td><td>727</td><td>590</td><td>498</td><td>345</td></tr> <tr><td>0.2</td><td>678</td><td>803</td><td>835</td><td>750</td><td>556</td><td>412</td></tr> <tr><td>0.1</td><td>845</td><td>988</td><td>993</td><td>865</td><td>651</td><td>463</td></tr> <tr><td>0.05</td><td>885</td><td>1070</td><td>1160</td><td>1070</td><td>790</td><td>486</td></tr> <tr><td>0.02</td><td>882</td><td>1250</td><td>1390</td><td>1250</td><td>893</td><td>518</td></tr> <tr><td>0.01</td><td>713</td><td>1290</td><td>1400</td><td>1380</td><td>910</td><td>454</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	214	217	213	200	185	(171)	4.0	224	227	220	206	191	173	3.5	245	250	243	222	204	183	3.0	280	285	278	247	224	199	2.5	330	335	330	288	254	221	2.0	387	398	399	333	292	242	1.5	468	492	479	423	350	282	1.0	565	615	611	516	414	317	0.5	638	688	727	590	498	345	0.2	678	803	835	750	556	412	0.1	845	988	993	865	651	463	0.05	885	1070	1160	1070	790	486	0.02	882	1250	1390	1250	893	518	0.01	713	1290	1400	1380	910	454	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]							 <table border="1"> <tr><td>[m]</td><td>53</td><td>56</td><td>57</td><td>56</td><td>55</td><td>(52)</td></tr> <tr><td>4.0</td><td>56</td><td>59</td><td>60</td><td>59</td><td>58</td><td>54</td></tr> <tr><td>3.5</td><td>62</td><td>65</td><td>66</td><td>64</td><td>63</td><td>59</td></tr> <tr><td>3.0</td><td>70</td><td>74</td><td>74</td><td>73</td><td>71</td><td>67</td></tr> <tr><td>2.5</td><td>83</td><td>86</td><td>88</td><td>85</td><td>83</td><td>77</td></tr> <tr><td>2.0</td><td>97</td><td>104</td><td>106</td><td>102</td><td>99</td><td>90</td></tr> <tr><td>1.5</td><td>120</td><td>128</td><td>128</td><td>130</td><td>124</td><td>109</td></tr> <tr><td>1.0</td><td>147</td><td>160</td><td>164</td><td>161</td><td>151</td><td>130</td></tr> <tr><td>0.5</td><td>178</td><td>191</td><td>205</td><td>197</td><td>184</td><td>163</td></tr> <tr><td>0.2</td><td>206</td><td>236</td><td>250</td><td>250</td><td>238</td><td>197</td></tr> <tr><td>0.1</td><td>260</td><td>303</td><td>319</td><td>325</td><td>289</td><td>245</td></tr> <tr><td>0.05</td><td>306</td><td>384</td><td>416</td><td>419</td><td>370</td><td>311</td></tr> <tr><td>0.02</td><td>378</td><td>479</td><td>563</td><td>560</td><td>487</td><td>355</td></tr> <tr><td>0.01</td><td>450</td><td>683</td><td>816</td><td>747</td><td>599</td><td>416</td></tr> <tr><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> <tr><td></td><td colspan="7">Illuminance [lx]</td></tr> </table>	[m]	53	56	57	56	55	(52)	4.0	56	59	60	59	58	54	3.5	62	65	66	64	63	59	3.0	70	74	74	73	71	67	2.5	83	86	88	85	83	77	2.0	97	104	106	102	99	90	1.5	120	128	128	130	124	109	1.0	147	160	164	161	151	130	0.5	178	191	205	197	184	163	0.2	206	236	250	250	238	197	0.1	260	303	319	325	289	245	0.05	306	384	416	419	370	311	0.02	378	479	563	560	487	355	0.01	450	683	816	747	599	416	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8		Illuminance [lx]						
	[m]	115	115	112	108	103	(96)																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	120	120	115	111	105	98																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	3.5	132	130	126	119	112	104																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
3.0	150	146	141	132	123	114																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	176	173	164	151	139	127																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	212	208	195	175	159	145																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	246	250	235	213	182	163																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	307	310	302	260	223	185																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	361	384	370	315	274	214																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	430	461	438	394	323	257																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	543	591	580	487	389	287																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	670	745	713	636	461	332																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	817	952	941	807	556	373																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	960	1150	1340	1100	661	362																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	84	87	89	88	86	(81)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	88	92	94	93	91	85																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	97	102	103	101	99	93																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	110	116	117	115	112	105																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	129	135	136	133	130	121																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	154	161	165	160	155	142																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	183	202	205	197	189	166																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	226	245	258	244	231	209																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	264	304	318	319	283	255																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	332	368	392	391	362	300																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	393	465	516	500	464	388																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	483	594	635	642	589	472																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	592	767	868	854	763	570																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	698	1010	1220	1240	932	647																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	214	217	213	200	185	(171)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	224	227	220	206	191	173																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	245	250	243	222	204	183																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	280	285	278	247	224	199																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	330	335	330	288	254	221																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	387	398	399	333	292	242																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	468	492	479	423	350	282																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	565	615	611	516	414	317																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	638	688	727	590	498	345																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	678	803	835	750	556	412																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	845	988	993	865	651	463																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	885	1070	1160	1070	790	486																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	882	1250	1390	1250	893	518																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	713	1290	1400	1380	910	454																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	53	56	57	56	55	(52)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	56	59	60	59	58	54																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	62	65	66	64	63	59																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	70	74	74	73	71	67																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	83	86	88	85	83	77																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	97	104	106	102	99	90																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	120	128	128	130	124	109																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	147	160	164	161	151	130																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5	178	191	205	197	184	163																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	206	236	250	250	238	197																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.1	260	303	319	325	289	245																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.05	306	384	416	419	370	311																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.02	378	479	563	560	487	355																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.01	450	683	816	747	599	416																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Table A.3. Reference room B, material alternative II, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> March and 21<sup>st</sup> June at 12:00 pm.

Room B - Material Alternative II at 12:00 pm	21 <sup>st</sup> March		21 <sup>st</sup> June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
London																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>158</td><td>154</td><td>149</td><td>142</td><td>138</td><td>(135)</td></tr> <tr><td>4.0</td><td>179</td><td>175</td><td>168</td><td>160</td><td>154</td><td>150</td></tr> <tr><td></td><td>206</td><td>202</td><td>195</td><td>182</td><td>175</td><td>168</td></tr> <tr><td>3.5</td><td>243</td><td>238</td><td>230</td><td>212</td><td>201</td><td>191</td></tr> <tr><td></td><td>289</td><td>286</td><td>277</td><td>251</td><td>233</td><td>218</td></tr> <tr><td>3.0</td><td>351</td><td>345</td><td>331</td><td>298</td><td>273</td><td>249</td></tr> <tr><td></td><td>416</td><td>427</td><td>411</td><td>363</td><td>329</td><td>285</td></tr> <tr><td>2.5</td><td>504</td><td>522</td><td>514</td><td>466</td><td>397</td><td>324</td></tr> <tr><td></td><td>567</td><td>627</td><td>616</td><td>539</td><td>453</td><td>375</td></tr> <tr><td>2.0</td><td>655</td><td>724</td><td>748</td><td>653</td><td>546</td><td>432</td></tr> <tr><td></td><td>787</td><td>898</td><td>919</td><td>823</td><td>640</td><td>480</td></tr> <tr><td>1.5</td><td>894</td><td>1070</td><td>1120</td><td>1010</td><td>764</td><td>524</td></tr> <tr><td></td><td>936</td><td>1300</td><td>1390</td><td>1260</td><td>900</td><td>576</td></tr> <tr><td>1.0</td><td>939</td><td>1510</td><td>1630</td><td>1470</td><td>969</td><td>535</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	158	154	149	142	138	(135)	4.0	179	175	168	160	154	150		206	202	195	182	175	168	3.5	243	238	230	212	201	191		289	286	277	251	233	218	3.0	351	345	331	298	273	249		416	427	411	363	329	285	2.5	504	522	514	466	397	324		567	627	616	539	453	375	2.0	655	724	748	653	546	432		787	898	919	823	640	480	1.5	894	1070	1120	1010	764	524		936	1300	1390	1260	900	576	1.0	939	1510	1630	1470	969	535	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>64</td><td>65</td><td>64</td><td>64</td><td>63</td><td>(62)</td></tr> <tr><td>4.0</td><td>73</td><td>73</td><td>73</td><td>72</td><td>72</td><td>71</td></tr> <tr><td></td><td>84</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td></tr> <tr><td>3.5</td><td>98</td><td>100</td><td>98</td><td>96</td><td>96</td><td>94</td></tr> <tr><td></td><td>117</td><td>119</td><td>118</td><td>115</td><td>114</td><td>110</td></tr> <tr><td>3.0</td><td>140</td><td>144</td><td>145</td><td>138</td><td>134</td><td>130</td></tr> <tr><td></td><td>167</td><td>176</td><td>176</td><td>174</td><td>168</td><td>154</td></tr> <tr><td>2.5</td><td>207</td><td>217</td><td>219</td><td>215</td><td>206</td><td>189</td></tr> <tr><td></td><td>240</td><td>258</td><td>269</td><td>264</td><td>250</td><td>231</td></tr> <tr><td>2.0</td><td>293</td><td>323</td><td>330</td><td>335</td><td>320</td><td>275</td></tr> <tr><td></td><td>354</td><td>410</td><td>424</td><td>429</td><td>396</td><td>343</td></tr> <tr><td>1.5</td><td>423</td><td>505</td><td>555</td><td>561</td><td>501</td><td>419</td></tr> <tr><td></td><td>518</td><td>654</td><td>727</td><td>726</td><td>645</td><td>500</td></tr> <tr><td>1.0</td><td>603</td><td>888</td><td>1050</td><td>1030</td><td>788</td><td>542</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	64	65	64	64	63	(62)	4.0	73	73	73	72	72	71		84	85	84	83	82	81	3.5	98	100	98	96	96	94		117	119	118	115	114	110	3.0	140	144	145	138	134	130		167	176	176	174	168	154	2.5	207	217	219	215	206	189		240	258	269	264	250	231	2.0	293	323	330	335	320	275		354	410	424	429	396	343	1.5	423	505	555	561	501	419		518	654	727	726	645	500	1.0	603	888	1050	1030	788	542	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>89</td><td>88</td><td>87</td><td>85</td><td>(84)</td><td>(84)</td></tr> <tr><td>4.0</td><td>101</td><td>99</td><td>97</td><td>95</td><td>94</td><td>94</td></tr> <tr><td></td><td>115</td><td>114</td><td>112</td><td>108</td><td>107</td><td>106</td></tr> <tr><td>3.5</td><td>135</td><td>133</td><td>130</td><td>125</td><td>123</td><td>121</td></tr> <tr><td></td><td>159</td><td>157</td><td>155</td><td>147</td><td>143</td><td>139</td></tr> <tr><td>3.0</td><td>188</td><td>190</td><td>185</td><td>176</td><td>170</td><td>160</td></tr> <tr><td></td><td>224</td><td>227</td><td>230</td><td>214</td><td>199</td><td>189</td></tr> <tr><td>2.5</td><td>266</td><td>286</td><td>275</td><td>257</td><td>240</td><td>215</td></tr> <tr><td></td><td>309</td><td>330</td><td>327</td><td>326</td><td>282</td><td>254</td></tr> <tr><td>2.0</td><td>366</td><td>397</td><td>404</td><td>388</td><td>360</td><td>306</td></tr> <tr><td></td><td>427</td><td>487</td><td>519</td><td>482</td><td>428</td><td>357</td></tr> <tr><td>1.5</td><td>507</td><td>607</td><td>643</td><td>588</td><td>523</td><td>422</td></tr> <tr><td></td><td>621</td><td>771</td><td>821</td><td>777</td><td>661</td><td>478</td></tr> <tr><td>1.0</td><td>726</td><td>1100</td><td>1160</td><td>1100</td><td>810</td><td>463</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	89	88	87	85	(84)	(84)	4.0	101	99	97	95	94	94		115	114	112	108	107	106	3.5	135	133	130	125	123	121		159	157	155	147	143	139	3.0	188	190	185	176	170	160		224	227	230	214	199	189	2.5	266	286	275	257	240	215		309	330	327	326	282	254	2.0	366	397	404	388	360	306		427	487	519	482	428	357	1.5	507	607	643	588	523	422		621	771	821	777	661	478	1.0	726	1100	1160	1100	810	463	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>91</td><td>92</td><td>91</td><td>90</td><td>90</td><td>(88)</td></tr> <tr><td>4.0</td><td>103</td><td>104</td><td>103</td><td>101</td><td>102</td><td>100</td></tr> <tr><td></td><td>119</td><td>120</td><td>119</td><td>117</td><td>117</td><td>114</td></tr> <tr><td>3.5</td><td>140</td><td>141</td><td>140</td><td>137</td><td>136</td><td>133</td></tr> <tr><td></td><td>166</td><td>169</td><td>167</td><td>164</td><td>161</td><td>156</td></tr> <tr><td>3.0</td><td>200</td><td>202</td><td>203</td><td>198</td><td>193</td><td>184</td></tr> <tr><td></td><td>239</td><td>251</td><td>248</td><td>240</td><td>230</td><td>216</td></tr> <tr><td>2.5</td><td>289</td><td>307</td><td>307</td><td>299</td><td>291</td><td>264</td></tr> <tr><td></td><td>340</td><td>373</td><td>374</td><td>376</td><td>362</td><td>316</td></tr> <tr><td>2.0</td><td>414</td><td>463</td><td>478</td><td>480</td><td>447</td><td>397</td></tr> <tr><td></td><td>494</td><td>570</td><td>608</td><td>606</td><td>565</td><td>484</td></tr> <tr><td>1.5</td><td>608</td><td>696</td><td>784</td><td>783</td><td>706</td><td>605</td></tr> <tr><td></td><td>731</td><td>935</td><td>1030</td><td>1020</td><td>896</td><td>676</td></tr> <tr><td>1.0</td><td>877</td><td>1250</td><td>1480</td><td>1410</td><td>1150</td><td>741</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	91	92	91	90	90	(88)	4.0	103	104	103	101	102	100		119	120	119	117	117	114	3.5	140	141	140	137	136	133		166	169	167	164	161	156	3.0	200	202	203	198	193	184		239	251	248	240	230	216	2.5	289	307	307	299	291	264		340	373	374	376	362	316	2.0	414	463	478	480	447	397		494	570	608	606	565	484	1.5	608	696	784	783	706	605		731	935	1030	1020	896	676	1.0	877	1250	1480	1410	1150	741	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	158	154	149	142	138	(135)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	179	175	168	160	154	150																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	206	202	195	182	175	168																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	243	238	230	212	201	191																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	289	286	277	251	233	218																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	351	345	331	298	273	249																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	416	427	411	363	329	285																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	504	522	514	466	397	324																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	567	627	616	539	453	375																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	655	724	748	653	546	432																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	787	898	919	823	640	480																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	894	1070	1120	1010	764	524																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	936	1300	1390	1260	900	576																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	939	1510	1630	1470	969	535																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	64	65	64	64	63	(62)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	73	73	73	72	72	71																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	84	85	84	83	82	81																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	98	100	98	96	96	94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	117	119	118	115	114	110																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	140	144	145	138	134	130																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	167	176	176	174	168	154																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	207	217	219	215	206	189																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	240	258	269	264	250	231																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	293	323	330	335	320	275																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	354	410	424	429	396	343																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	423	505	555	561	501	419																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	518	654	727	726	645	500																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	603	888	1050	1030	788	542																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	89	88	87	85	(84)	(84)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	101	99	97	95	94	94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	115	114	112	108	107	106																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	135	133	130	125	123	121																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	159	157	155	147	143	139																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	188	190	185	176	170	160																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	224	227	230	214	199	189																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	266	286	275	257	240	215																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	309	330	327	326	282	254																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	366	397	404	388	360	306																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	427	487	519	482	428	357																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	507	607	643	588	523	422																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	621	771	821	777	661	478																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	726	1100	1160	1100	810	463																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	91	92	91	90	90	(88)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	103	104	103	101	102	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	119	120	119	117	117	114																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	140	141	140	137	136	133																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	166	169	167	164	161	156																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	200	202	203	198	193	184																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	239	251	248	240	230	216																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	289	307	307	299	291	264																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	340	373	374	376	362	316																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	414	463	478	480	447	397																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	494	570	608	606	565	484																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	608	696	784	783	706	605																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	731	935	1030	1020	896	676																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	877	1250	1480	1410	1150	741																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
İzmir																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td>[m]</td><td>109</td><td>103</td><td>98</td><td>94</td><td>92</td><td>(90)</td></tr> <tr><td>4.0</td><td>123</td><td>117</td><td>111</td><td>105</td><td>102</td><td>100</td></tr> <tr><td></td><td>143</td><td>135</td><td>127</td><td>119</td><td>115</td><td>112</td></tr> <tr><td>3.5</td><td>169</td><td>158</td><td>148</td><td>138</td><td>131</td><td>127</td></tr> <tr><td></td><td>201</td><td>188</td><td>176</td><td>160</td><td>150</td><td>144</td></tr> <tr><td>3.0</td><td>239</td><td>227</td><td>211</td><td>189</td><td>176</td><td>164</td></tr> <tr><td></td><td>288</td><td>281</td><td>258</td><td>220</td><td>206</td><td>186</td></tr> <tr><td>2.5</td><td>351</td><td>339</td><td>310</td><td>279</td><td>240</td><td>214</td></tr> <tr><td></td><td>425</td><td>411</td><td>381</td><td>326</td><td>279</td><td>240</td></tr> <tr><td>2.0</td><td>513</td><td>486</td><td>477</td><td>404</td><td>341</td><td>281</td></tr> <tr><td></td><td>643</td><td>619</td><td>561</td><td>488</td><td>398</td><td>317</td></tr> <tr><td>1.5</td><td>768</td><td>771</td><td>740</td><td>592</td><td>488</td><td>344</td></tr> <tr><td></td><td>903</td><td>987</td><td>959</td><td>792</td><td>561</td><td>387</td></tr> <tr><td>1.0</td><td>1010</td><td>1250</td><td>1310</td><td>1070</td><td>662</td><td>379</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	109	103	98	94	92	(90)	4.0	123	117	111	105	102	100		143	135	127	119	115	112	3.5	169	158	148	138	131	127		201	188	176	160	150	144	3.0	239	227	211	189	176	164		288	281	258	220	206	186	2.5	351	339	310	279	240	214		425	411	381	326	279	240	2.0	513	486	477	404	341	281		643	619	561	488	398	317	1.5	768	771	740	592	488	344		903	987	959	792	561	387	1.0	1010	1250	1310	1070	662	379	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>72</td><td>73</td><td>73</td><td>72</td><td>72</td><td>(70)</td></tr> <tr><td>4.0</td><td>82</td><td>83</td><td>82</td><td>81</td><td>81</td><td>80</td></tr> <tr><td></td><td>95</td><td>96</td><td>95</td><td>93</td><td>93</td><td>91</td></tr> <tr><td>3.5</td><td>111</td><td>113</td><td>111</td><td>109</td><td>108</td><td>106</td></tr> <tr><td></td><td>133</td><td>134</td><td>133</td><td>129</td><td>128</td><td>125</td></tr> <tr><td>3.0</td><td>161</td><td>164</td><td>164</td><td>154</td><td>155</td><td>149</td></tr> <tr><td></td><td>190</td><td>201</td><td>198</td><td>192</td><td>188</td><td>178</td></tr> <tr><td>2.5</td><td>230</td><td>249</td><td>249</td><td>240</td><td>230</td><td>210</td></tr> <tr><td></td><td>276</td><td>301</td><td>303</td><td>299</td><td>271</td><td>253</td></tr> <tr><td>2.0</td><td>330</td><td>370</td><td>377</td><td>372</td><td>367</td><td>319</td></tr> <tr><td></td><td>401</td><td>450</td><td>487</td><td>488</td><td>433</td><td>398</td></tr> <tr><td>1.5</td><td>488</td><td>572</td><td>613</td><td>633</td><td>567</td><td>469</td></tr> <tr><td></td><td>576</td><td>748</td><td>801</td><td>822</td><td>723</td><td>555</td></tr> <tr><td>1.0</td><td>694</td><td>1030</td><td>1130</td><td>1180</td><td>959</td><td>646</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	72	73	73	72	72	(70)	4.0	82	83	82	81	81	80		95	96	95	93	93	91	3.5	111	113	111	109	108	106		133	134	133	129	128	125	3.0	161	164	164	154	155	149		190	201	198	192	188	178	2.5	230	249	249	240	230	210		276	301	303	299	271	253	2.0	330	370	377	372	367	319		401	450	487	488	433	398	1.5	488	572	613	633	567	469		576	748	801	822	723	555	1.0	694	1030	1130	1180	959	646	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>71</td><td>70</td><td>68</td><td>67</td><td>(66)</td><td>(66)</td></tr> <tr><td>4.0</td><td>81</td><td>78</td><td>76</td><td>74</td><td>74</td><td>74</td></tr> <tr><td></td><td>92</td><td>90</td><td>87</td><td>84</td><td>83</td><td>83</td></tr> <tr><td>3.5</td><td>106</td><td>104</td><td>101</td><td>97</td><td>95</td><td>94</td></tr> <tr><td></td><td>125</td><td>122</td><td>118</td><td>113</td><td>109</td><td>107</td></tr> <tr><td>3.0</td><td>148</td><td>145</td><td>141</td><td>133</td><td>126</td><td>122</td></tr> <tr><td></td><td>174</td><td>171</td><td>171</td><td>156</td><td>150</td><td>141</td></tr> <tr><td>2.5</td><td>209</td><td>209</td><td>205</td><td>191</td><td>177</td><td>162</td></tr> <tr><td></td><td>245</td><td>246</td><td>247</td><td>224</td><td>208</td><td>190</td></tr> <tr><td>2.0</td><td>295</td><td>305</td><td>298</td><td>277</td><td>250</td><td>223</td></tr> <tr><td></td><td>347</td><td>370</td><td>371</td><td>339</td><td>300</td><td>260</td></tr> <tr><td>1.5</td><td>424</td><td>447</td><td>448</td><td>423</td><td>364</td><td>296</td></tr> <tr><td></td><td>505</td><td>558</td><td>573</td><td>531</td><td>430</td><td>330</td></tr> <tr><td>1.0</td><td>579</td><td>736</td><td>790</td><td>692</td><td>502</td><td>343</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	71	70	68	67	(66)	(66)	4.0	81	78	76	74	74	74		92	90	87	84	83	83	3.5	106	104	101	97	95	94		125	122	118	113	109	107	3.0	148	145	141	133	126	122		174	171	171	156	150	141	2.5	209	209	205	191	177	162		245	246	247	224	208	190	2.0	295	305	298	277	250	223		347	370	371	339	300	260	1.5	424	447	448	423	364	296		505	558	573	531	430	330	1.0	579	736	790	692	502	343	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										<table border="1"> <tr><td>[m]</td><td>92</td><td>93</td><td>93</td><td>92</td><td>92</td><td>(90)</td></tr> <tr><td>4.0</td><td>105</td><td>106</td><td>105</td><td>104</td><td>104</td><td>102</td></tr> <tr><td></td><td>121</td><td>122</td><td>121</td><td>120</td><td>119</td><td>117</td></tr> <tr><td>3.5</td><td>142</td><td>144</td><td>143</td><td>140</td><td>139</td><td>135</td></tr> <tr><td></td><td>169</td><td>172</td><td>170</td><td>166</td><td>164</td><td>159</td></tr> <tr><td>3.0</td><td>201</td><td>211</td><td>206</td><td>202</td><td>196</td><td>188</td></tr> <tr><td></td><td>245</td><td>255</td><td>257</td><td>250</td><td>237</td><td>222</td></tr> <tr><td>2.5</td><td>297</td><td>312</td><td>321</td><td>313</td><td>298</td><td>266</td></tr> <tr><td></td><td>348</td><td>376</td><td>395</td><td>376</td><td>363</td><td>333</td></tr> <tr><td>2.0</td><td>425</td><td>466</td><td>496</td><td>486</td><td>440</td><td>412</td></tr> <tr><td></td><td>505</td><td>576</td><td>614</td><td>627</td><td>570</td><td>497</td></tr> <tr><td>1.5</td><td>621</td><td>738</td><td>783</td><td>785</td><td>747</td><td>603</td></tr> <tr><td></td><td>739</td><td>947</td><td>1040</td><td>1040</td><td>930</td><td>725</td></tr> <tr><td>1.0</td><td>908</td><td>1270</td><td>1520</td><td>1430</td><td>1200</td><td>792</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	92	93	93	92	92	(90)	4.0	105	106	105	104	104	102		121	122	121	120	119	117	3.5	142	144	143	140	139	135		169	172	170	166	164	159	3.0	201	211	206	202	196	188		245	255	257	250	237	222	2.5	297	312	321	313	298	266		348	376	395	376	363	333	2.0	425	466	496	486	440	412		505	576	614	627	570	497	1.5	621	738	783	785	747	603		739	947	1040	1040	930	725	1.0	908	1270	1520	1430	1200	792	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	109	103	98	94	92	(90)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	123	117	111	105	102	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	143	135	127	119	115	112																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	169	158	148	138	131	127																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	201	188	176	160	150	144																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	239	227	211	189	176	164																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	288	281	258	220	206	186																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	351	339	310	279	240	214																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	425	411	381	326	279	240																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	513	486	477	404	341	281																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	643	619	561	488	398	317																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	768	771	740	592	488	344																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	903	987	959	792	561	387																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1010	1250	1310	1070	662	379																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	72	73	73	72	72	(70)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	82	83	82	81	81	80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	95	96	95	93	93	91																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	111	113	111	109	108	106																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	133	134	133	129	128	125																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	161	164	164	154	155	149																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	190	201	198	192	188	178																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	230	249	249	240	230	210																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	276	301	303	299	271	253																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	330	370	377	372	367	319																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	401	450	487	488	433	398																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	488	572	613	633	567	469																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	576	748	801	822	723	555																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	694	1030	1130	1180	959	646																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	71	70	68	67	(66)	(66)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	81	78	76	74	74	74																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	92	90	87	84	83	83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	106	104	101	97	95	94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	125	122	118	113	109	107																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	148	145	141	133	126	122																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	174	171	171	156	150	141																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	209	209	205	191	177	162																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	245	246	247	224	208	190																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	295	305	298	277	250	223																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	347	370	371	339	300	260																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	424	447	448	423	364	296																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	505	558	573	531	430	330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	579	736	790	692	502	343																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	92	93	93	92	92	(90)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	105	106	105	104	104	102																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	121	122	121	120	119	117																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	142	144	143	140	139	135																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	169	172	170	166	164	159																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	201	211	206	202	196	188																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	245	255	257	250	237	222																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	297	312	321	313	298	266																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	348	376	395	376	363	333																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	425	466	496	486	440	412																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	505	576	614	627	570	497																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	621	738	783	785	747	603																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	739	947	1040	1040	930	725																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	908	1270	1520	1430	1200	792																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Table A.4. Reference room B, material alternative II, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> September and 21<sup>st</sup> December at 12:00 pm.

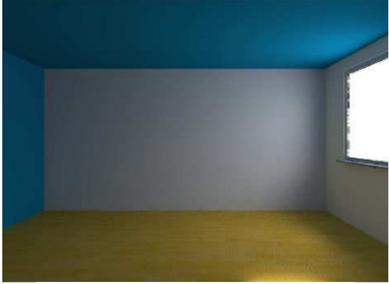
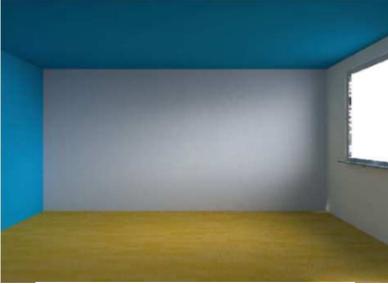
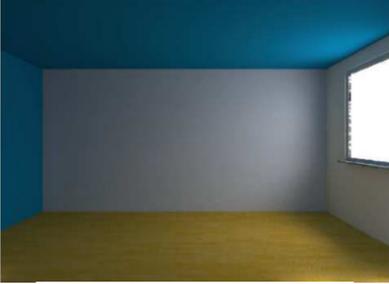
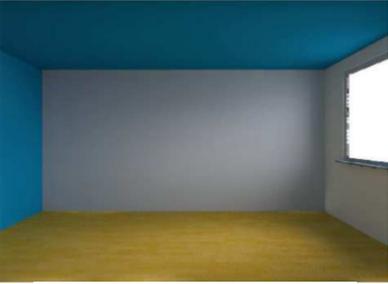
Room B - Material Alternative II at 12:00 pm	21 <sup>st</sup> September		21 <sup>st</sup> December																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
London	 <table border="1"> <tr><td>[m]</td><td>(138)</td><td>141</td><td>143</td><td>145</td><td>148</td><td>150</td></tr> <tr><td>4.0</td><td>154</td><td>159</td><td>161</td><td>163</td><td>167</td><td>168</td></tr> <tr><td>3.5</td><td>175</td><td>182</td><td>186</td><td>188</td><td>192</td><td>192</td></tr> <tr><td>3.0</td><td>201</td><td>212</td><td>218</td><td>220</td><td>223</td><td>222</td></tr> <tr><td>2.5</td><td>236</td><td>252</td><td>261</td><td>264</td><td>264</td><td>261</td></tr> <tr><td>2.0</td><td>276</td><td>302</td><td>316</td><td>321</td><td>315</td><td>304</td></tr> <tr><td>1.5</td><td>322</td><td>367</td><td>391</td><td>384</td><td>385</td><td>361</td></tr> <tr><td>1.0</td><td>371</td><td>442</td><td>486</td><td>499</td><td>483</td><td>432</td></tr> <tr><td>0.5</td><td>435</td><td>515</td><td>589</td><td>606</td><td>553</td><td>495</td></tr> <tr><td>0.0</td><td>486</td><td>601</td><td>684</td><td>759</td><td>720</td><td>597</td></tr> <tr><td>0.0</td><td>549</td><td>729</td><td>890</td><td>897</td><td>864</td><td>702</td></tr> <tr><td>0.0</td><td>608</td><td>852</td><td>1110</td><td>1140</td><td>1040</td><td>840</td></tr> <tr><td>0.0</td><td>639</td><td>1090</td><td>1370</td><td>1450</td><td>1270</td><td>914</td></tr> <tr><td>0.0</td><td>614</td><td>1270</td><td>1750</td><td>1700</td><td>1390</td><td>889</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	(138)	141	143	145	148	150	4.0	154	159	161	163	167	168	3.5	175	182	186	188	192	192	3.0	201	212	218	220	223	222	2.5	236	252	261	264	264	261	2.0	276	302	316	321	315	304	1.5	322	367	391	384	385	361	1.0	371	442	486	499	483	432	0.5	435	515	589	606	553	495	0.0	486	601	684	759	720	597	0.0	549	729	890	897	864	702	0.0	608	852	1110	1140	1040	840	0.0	639	1090	1370	1450	1270	914	0.0	614	1270	1750	1700	1390	889		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>65</td><td>66</td><td>66</td><td>65</td><td>65</td><td>(64)</td></tr> <tr><td>4.0</td><td>74</td><td>75</td><td>74</td><td>73</td><td>73</td><td>72</td></tr> <tr><td>3.5</td><td>86</td><td>87</td><td>86</td><td>84</td><td>84</td><td>82</td></tr> <tr><td>3.0</td><td>100</td><td>101</td><td>100</td><td>99</td><td>98</td><td>96</td></tr> <tr><td>2.5</td><td>120</td><td>121</td><td>120</td><td>117</td><td>116</td><td>113</td></tr> <tr><td>2.0</td><td>143</td><td>148</td><td>146</td><td>137</td><td>138</td><td>134</td></tr> <tr><td>1.5</td><td>173</td><td>183</td><td>184</td><td>175</td><td>166</td><td>156</td></tr> <tr><td>1.0</td><td>212</td><td>227</td><td>223</td><td>218</td><td>207</td><td>193</td></tr> <tr><td>0.5</td><td>246</td><td>273</td><td>275</td><td>264</td><td>255</td><td>229</td></tr> <tr><td>0.0</td><td>294</td><td>330</td><td>336</td><td>339</td><td>327</td><td>282</td></tr> <tr><td>0.0</td><td>367</td><td>402</td><td>426</td><td>431</td><td>405</td><td>351</td></tr> <tr><td>0.0</td><td>431</td><td>511</td><td>547</td><td>562</td><td>497</td><td>428</td></tr> <tr><td>0.0</td><td>524</td><td>670</td><td>752</td><td>730</td><td>649</td><td>511</td></tr> <tr><td>0.0</td><td>630</td><td>906</td><td>1100</td><td>1020</td><td>859</td><td>578</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	65	66	66	65	65	(64)	4.0	74	75	74	73	73	72	3.5	86	87	86	84	84	82	3.0	100	101	100	99	98	96	2.5	120	121	120	117	116	113	2.0	143	148	146	137	138	134	1.5	173	183	184	175	166	156	1.0	212	227	223	218	207	193	0.5	246	273	275	264	255	229	0.0	294	330	336	339	327	282	0.0	367	402	426	431	405	351	0.0	431	511	547	562	497	428	0.0	524	670	752	730	649	511	0.0	630	906	1100	1020	859	578		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>(175)</td><td>183</td><td>195</td><td>207</td><td>213</td><td>220</td></tr> <tr><td>4.0</td><td>192</td><td>203</td><td>217</td><td>229</td><td>237</td><td>241</td></tr> <tr><td>3.5</td><td>212</td><td>228</td><td>246</td><td>259</td><td>266</td><td>269</td></tr> <tr><td>3.0</td><td>239</td><td>260</td><td>284</td><td>298</td><td>302</td><td>303</td></tr> <tr><td>2.5</td><td>270</td><td>302</td><td>331</td><td>347</td><td>345</td><td>341</td></tr> <tr><td>2.0</td><td>303</td><td>354</td><td>393</td><td>398</td><td>392</td><td>383</td></tr> <tr><td>1.5</td><td>359</td><td>410</td><td>459</td><td>466</td><td>457</td><td>427</td></tr> <tr><td>1.0</td><td>377</td><td>492</td><td>523</td><td>548</td><td>534</td><td>471</td></tr> <tr><td>0.5</td><td>414</td><td>523</td><td>627</td><td>601</td><td>574</td><td>503</td></tr> <tr><td>0.0</td><td>447</td><td>583</td><td>714</td><td>732</td><td>665</td><td>567</td></tr> <tr><td>0.0</td><td>463</td><td>652</td><td>782</td><td>809</td><td>749</td><td>620</td></tr> <tr><td>0.0</td><td>472</td><td>734</td><td>894</td><td>925</td><td>851</td><td>605</td></tr> <tr><td>0.0</td><td>473</td><td>759</td><td>996</td><td>963</td><td>912</td><td>613</td></tr> <tr><td>0.0</td><td>403</td><td>784</td><td>1080</td><td>992</td><td>777</td><td>494</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	(175)	183	195	207	213	220	4.0	192	203	217	229	237	241	3.5	212	228	246	259	266	269	3.0	239	260	284	298	302	303	2.5	270	302	331	347	345	341	2.0	303	354	393	398	392	383	1.5	359	410	459	466	457	427	1.0	377	492	523	548	534	471	0.5	414	523	627	601	574	503	0.0	447	583	714	732	665	567	0.0	463	652	782	809	749	620	0.0	472	734	894	925	851	605	0.0	473	759	996	963	912	613	0.0	403	784	1080	992	777	494		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>(27)</td><td>28</td><td>(27)</td><td>(27)</td><td>(27)</td><td>(27)</td></tr> <tr><td>4.0</td><td>31</td><td>31</td><td>31</td><td>31</td><td>31</td><td>30</td></tr> <tr><td>3.5</td><td>36</td><td>36</td><td>36</td><td>35</td><td>35</td><td>35</td></tr> <tr><td>3.0</td><td>42</td><td>43</td><td>42</td><td>41</td><td>41</td><td>40</td></tr> <tr><td>2.5</td><td>50</td><td>51</td><td>50</td><td>49</td><td>48</td><td>47</td></tr> <tr><td>2.0</td><td>60</td><td>61</td><td>62</td><td>59</td><td>58</td><td>56</td></tr> <tr><td>1.5</td><td>74</td><td>76</td><td>75</td><td>72</td><td>70</td><td>66</td></tr> <tr><td>1.0</td><td>87</td><td>93</td><td>97</td><td>91</td><td>88</td><td>82</td></tr> <tr><td>0.5</td><td>103</td><td>112</td><td>117</td><td>114</td><td>106</td><td>95</td></tr> <tr><td>0.0</td><td>122</td><td>139</td><td>143</td><td>141</td><td>133</td><td>121</td></tr> <tr><td>0.0</td><td>154</td><td>169</td><td>182</td><td>182</td><td>169</td><td>149</td></tr> <tr><td>0.0</td><td>184</td><td>208</td><td>236</td><td>240</td><td>216</td><td>181</td></tr> <tr><td>0.0</td><td>221</td><td>277</td><td>313</td><td>310</td><td>274</td><td>208</td></tr> <tr><td>0.0</td><td>265</td><td>390</td><td>448</td><td>449</td><td>324</td><td>240</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	(27)	28	(27)	(27)	(27)	(27)	4.0	31	31	31	31	31	30	3.5	36	36	36	35	35	35	3.0	42	43	42	41	41	40	2.5	50	51	50	49	48	47	2.0	60	61	62	59	58	56	1.5	74	76	75	72	70	66	1.0	87	93	97	91	88	82	0.5	103	112	117	114	106	95	0.0	122	139	143	141	133	121	0.0	154	169	182	182	169	149	0.0	184	208	236	240	216	181	0.0	221	277	313	310	274	208	0.0	265	390	448	449	324	240		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	(138)	141	143	145	148	150																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	4.0	154	159	161	163	167	168																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	3.5	175	182	186	188	192	192																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
3.0	201	212	218	220	223	222																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	236	252	261	264	264	261																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	276	302	316	321	315	304																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	322	367	391	384	385	361																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	371	442	486	499	483	432																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	435	515	589	606	553	495																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	486	601	684	759	720	597																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	549	729	890	897	864	702																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	608	852	1110	1140	1040	840																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	639	1090	1370	1450	1270	914																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	614	1270	1750	1700	1390	889																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	65	66	66	65	65	(64)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	74	75	74	73	73	72																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	86	87	86	84	84	82																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	100	101	100	99	98	96																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	120	121	120	117	116	113																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	143	148	146	137	138	134																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	173	183	184	175	166	156																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	212	227	223	218	207	193																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	246	273	275	264	255	229																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	294	330	336	339	327	282																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	367	402	426	431	405	351																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	431	511	547	562	497	428																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	524	670	752	730	649	511																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	630	906	1100	1020	859	578																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	(175)	183	195	207	213	220																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	192	203	217	229	237	241																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	212	228	246	259	266	269																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	239	260	284	298	302	303																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	270	302	331	347	345	341																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	303	354	393	398	392	383																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	359	410	459	466	457	427																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	377	492	523	548	534	471																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	414	523	627	601	574	503																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	447	583	714	732	665	567																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	463	652	782	809	749	620																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	472	734	894	925	851	605																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	473	759	996	963	912	613																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	403	784	1080	992	777	494																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	(27)	28	(27)	(27)	(27)	(27)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	31	31	31	31	31	30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	36	36	36	35	35	35																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	42	43	42	41	41	40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	50	51	50	49	48	47																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	60	61	62	59	58	56																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	74	76	75	72	70	66																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	87	93	97	91	88	82																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	103	112	117	114	106	95																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	122	139	143	141	133	121																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	154	169	182	182	169	149																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	184	208	236	240	216	181																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	221	277	313	310	274	208																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	265	390	448	449	324	240																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
İzmir	 <table border="1"> <tr><td>[m]</td><td>109</td><td>104</td><td>100</td><td>96</td><td>93</td><td>(92)</td></tr> <tr><td>4.0</td><td>124</td><td>118</td><td>112</td><td>107</td><td>104</td><td>102</td></tr> <tr><td>3.5</td><td>143</td><td>136</td><td>129</td><td>122</td><td>117</td><td>115</td></tr> <tr><td>3.0</td><td>169</td><td>160</td><td>151</td><td>140</td><td>134</td><td>130</td></tr> <tr><td>2.5</td><td>201</td><td>190</td><td>179</td><td>164</td><td>155</td><td>147</td></tr> <tr><td>2.0</td><td>243</td><td>234</td><td>218</td><td>192</td><td>179</td><td>169</td></tr> <tr><td>1.5</td><td>290</td><td>286</td><td>263</td><td>238</td><td>212</td><td>192</td></tr> <tr><td>1.0</td><td>354</td><td>346</td><td>322</td><td>280</td><td>254</td><td>218</td></tr> <tr><td>0.5</td><td>418</td><td>409</td><td>386</td><td>337</td><td>289</td><td>257</td></tr> <tr><td>0.0</td><td>506</td><td>518</td><td>478</td><td>415</td><td>352</td><td>294</td></tr> <tr><td>0.0</td><td>629</td><td>619</td><td>595</td><td>503</td><td>411</td><td>330</td></tr> <tr><td>0.0</td><td>745</td><td>782</td><td>759</td><td>643</td><td>497</td><td>386</td></tr> <tr><td>0.0</td><td>895</td><td>993</td><td>990</td><td>815</td><td>587</td><td>409</td></tr> <tr><td>0.0</td><td>1000</td><td>1250</td><td>1360</td><td>1090</td><td>698</td><td>402</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	109	104	100	96	93	(92)	4.0	124	118	112	107	104	102	3.5	143	136	129	122	117	115	3.0	169	160	151	140	134	130	2.5	201	190	179	164	155	147	2.0	243	234	218	192	179	169	1.5	290	286	263	238	212	192	1.0	354	346	322	280	254	218	0.5	418	409	386	337	289	257	0.0	506	518	478	415	352	294	0.0	629	619	595	503	411	330	0.0	745	782	759	643	497	386	0.0	895	993	990	815	587	409	0.0	1000	1250	1360	1090	698	402		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>76</td><td>76</td><td>76</td><td>75</td><td>75</td><td>(74)</td></tr> <tr><td>4.0</td><td>86</td><td>87</td><td>86</td><td>85</td><td>85</td><td>83</td></tr> <tr><td>3.5</td><td>99</td><td>100</td><td>99</td><td>98</td><td>97</td><td>95</td></tr> <tr><td>3.0</td><td>116</td><td>117</td><td>117</td><td>114</td><td>113</td><td>111</td></tr> <tr><td>2.5</td><td>139</td><td>140</td><td>139</td><td>135</td><td>134</td><td>130</td></tr> <tr><td>2.0</td><td>166</td><td>171</td><td>171</td><td>161</td><td>161</td><td>154</td></tr> <tr><td>1.5</td><td>201</td><td>208</td><td>207</td><td>198</td><td>196</td><td>187</td></tr> <tr><td>1.0</td><td>238</td><td>259</td><td>261</td><td>251</td><td>245</td><td>221</td></tr> <tr><td>0.5</td><td>288</td><td>304</td><td>328</td><td>307</td><td>306</td><td>270</td></tr> <tr><td>0.0</td><td>341</td><td>383</td><td>407</td><td>389</td><td>363</td><td>328</td></tr> <tr><td>0.0</td><td>400</td><td>480</td><td>510</td><td>504</td><td>459</td><td>400</td></tr> <tr><td>0.0</td><td>504</td><td>595</td><td>653</td><td>647</td><td>586</td><td>492</td></tr> <tr><td>0.0</td><td>618</td><td>780</td><td>856</td><td>849</td><td>757</td><td>586</td></tr> <tr><td>0.0</td><td>714</td><td>1030</td><td>1250</td><td>1230</td><td>964</td><td>632</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	76	76	76	75	75	(74)	4.0	86	87	86	85	85	83	3.5	99	100	99	98	97	95	3.0	116	117	117	114	113	111	2.5	139	140	139	135	134	130	2.0	166	171	171	161	161	154	1.5	201	208	207	198	196	187	1.0	238	259	261	251	245	221	0.5	288	304	328	307	306	270	0.0	341	383	407	389	363	328	0.0	400	480	510	504	459	400	0.0	504	595	653	647	586	492	0.0	618	780	856	849	757	586	0.0	714	1030	1250	1230	964	632		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>199</td><td>193</td><td>185</td><td>173</td><td>165</td><td>(158)</td></tr> <tr><td>4.0</td><td>225</td><td>220</td><td>209</td><td>194</td><td>183</td><td>174</td></tr> <tr><td>3.5</td><td>260</td><td>255</td><td>243</td><td>221</td><td>207</td><td>195</td></tr> <tr><td>3.0</td><td>307</td><td>300</td><td>287</td><td>257</td><td>236</td><td>219</td></tr> <tr><td>2.5</td><td>366</td><td>361</td><td>348</td><td>304</td><td>272</td><td>248</td></tr> <tr><td>2.0</td><td>437</td><td>442</td><td>425</td><td>361</td><td>322</td><td>282</td></tr> <tr><td>1.5</td><td>519</td><td>547</td><td>517</td><td>447</td><td>371</td><td>322</td></tr> <tr><td>1.0</td><td>624</td><td>654</td><td>660</td><td>546</td><td>440</td><td>362</td></tr> <tr><td>0.5</td><td>687</td><td>774</td><td>757</td><td>626</td><td>522</td><td>396</td></tr> <tr><td>0.0</td><td>761</td><td>902</td><td>837</td><td>771</td><td>582</td><td>476</td></tr> <tr><td>0.0</td><td>874</td><td>1020</td><td>1030</td><td>912</td><td>692</td><td>508</td></tr> <tr><td>0.0</td><td>947</td><td>1140</td><td>1180</td><td>1100</td><td>783</td><td>542</td></tr> <tr><td>0.0</td><td>972</td><td>1290</td><td>1320</td><td>1240</td><td>900</td><td>551</td></tr> <tr><td>0.0</td><td>835</td><td>1250</td><td>1330</td><td>1360</td><td>977</td><td>464</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	199	193	185	173	165	(158)	4.0	225	220	209	194	183	174	3.5	260	255	243	221	207	195	3.0	307	300	287	257	236	219	2.5	366	361	348	304	272	248	2.0	437	442	425	361	322	282	1.5	519	547	517	447	371	322	1.0	624	654	660	546	440	362	0.5	687	774	757	626	522	396	0.0	761	902	837	771	582	476	0.0	874	1020	1030	912	692	508	0.0	947	1140	1180	1100	783	542	0.0	972	1290	1320	1240	900	551	0.0	835	1250	1330	1360	977	464		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>48</td><td>49</td><td>49</td><td>48</td><td>48</td><td>(47)</td></tr> <tr><td>4.0</td><td>55</td><td>55</td><td>55</td><td>54</td><td>54</td><td>53</td></tr> <tr><td>3.5</td><td>63</td><td>64</td><td>63</td><td>62</td><td>62</td><td>61</td></tr> <tr><td>3.0</td><td>74</td><td>75</td><td>74</td><td>73</td><td>73</td><td>71</td></tr> <tr><td>2.5</td><td>88</td><td>90</td><td>89</td><td>86</td><td>86</td><td>83</td></tr> <tr><td>2.0</td><td>106</td><td>108</td><td>107</td><td>104</td><td>103</td><td>99</td></tr> <tr><td>1.5</td><td>128</td><td>136</td><td>132</td><td>131</td><td>126</td><td>118</td></tr> <tr><td>1.0</td><td>156</td><td>165</td><td>166</td><td>160</td><td>154</td><td>142</td></tr> <tr><td>0.5</td><td>179</td><td>197</td><td>204</td><td>202</td><td>194</td><td>174</td></tr> <tr><td>0.0</td><td>220</td><td>242</td><td>254</td><td>257</td><td>237</td><td>215</td></tr> <tr><td>0.0</td><td>272</td><td>304</td><td>325</td><td>326</td><td>304</td><td>262</td></tr> <tr><td>0.0</td><td>333</td><td>369</td><td>423</td><td>414</td><td>377</td><td>321</td></tr> <tr><td>0.0</td><td>399</td><td>482</td><td>549</td><td>539</td><td>491</td><td>376</td></tr> <tr><td>0.0</td><td>472</td><td>664</td><td>807</td><td>743</td><td>625</td><td>423</td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	48	49	49	48	48	(47)	4.0	55	55	55	54	54	53	3.5	63	64	63	62	62	61	3.0	74	75	74	73	73	71	2.5	88	90	89	86	86	83	2.0	106	108	107	104	103	99	1.5	128	136	132	131	126	118	1.0	156	165	166	160	154	142	0.5	179	197	204	202	194	174	0.0	220	242	254	257	237	215	0.0	272	304	325	326	304	262	0.0	333	369	423	414	377	321	0.0	399	482	549	539	491	376	0.0	472	664	807	743	625	423		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	109	104	100	96	93	(92)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	4.0	124	118	112	107	104	102																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	3.5	143	136	129	122	117	115																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
3.0	169	160	151	140	134	130																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	201	190	179	164	155	147																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	243	234	218	192	179	169																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	290	286	263	238	212	192																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	354	346	322	280	254	218																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	418	409	386	337	289	257																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	506	518	478	415	352	294																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	629	619	595	503	411	330																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	745	782	759	643	497	386																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	895	993	990	815	587	409																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	1000	1250	1360	1090	698	402																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	76	76	76	75	75	(74)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	86	87	86	85	85	83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	99	100	99	98	97	95																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	116	117	117	114	113	111																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	139	140	139	135	134	130																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	166	171	171	161	161	154																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	201	208	207	198	196	187																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	238	259	261	251	245	221																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	288	304	328	307	306	270																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	341	383	407	389	363	328																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	400	480	510	504	459	400																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	504	595	653	647	586	492																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	618	780	856	849	757	586																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	714	1030	1250	1230	964	632																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	199	193	185	173	165	(158)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	225	220	209	194	183	174																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	260	255	243	221	207	195																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	307	300	287	257	236	219																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	366	361	348	304	272	248																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	437	442	425	361	322	282																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	519	547	517	447	371	322																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	624	654	660	546	440	362																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	687	774	757	626	522	396																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	761	902	837	771	582	476																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	874	1020	1030	912	692	508																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	947	1140	1180	1100	783	542																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	972	1290	1320	1240	900	551																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	835	1250	1330	1360	977	464																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
[m]	48	49	49	48	48	(47)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
4.0	55	55	55	54	54	53																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.5	63	64	63	62	62	61																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
3.0	74	75	74	73	73	71																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.5	88	90	89	86	86	83																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
2.0	106	108	107	104	103	99																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.5	128	136	132	131	126	118																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
1.0	156	165	166	160	154	142																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.5	179	197	204	202	194	174																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	220	242	254	257	237	215																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	272	304	325	326	304	262																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	333	369	423	414	377	321																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	399	482	549	539	491	376																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
0.0	472	664	807	743	625	423																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

Table A.5. Reference room B, material alternative III, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> March and 21<sup>st</sup> June at 12:00 pm.

Room B - Material Alternative III at 12:00 pm	21 <sup>st</sup> March		21 <sup>st</sup> June																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
London	 <table border="1"> <tr><td>[m]</td><td>289</td><td>289</td><td>287</td><td>278</td><td>271</td><td>(261)</td></tr> <tr><td>4.0</td><td>299</td><td>299</td><td>297</td><td>286</td><td>279</td><td>266</td></tr> <tr><td></td><td>321</td><td>323</td><td>317</td><td>305</td><td>295</td><td>281</td></tr> <tr><td>3.5</td><td>354</td><td>354</td><td>349</td><td>330</td><td>317</td><td>300</td></tr> <tr><td></td><td>399</td><td>400</td><td>394</td><td>368</td><td>347</td><td>326</td></tr> <tr><td>3.0</td><td>453</td><td>456</td><td>450</td><td>413</td><td>386</td><td>357</td></tr> <tr><td></td><td>515</td><td>546</td><td>530</td><td>478</td><td>439</td><td>374</td></tr> <tr><td>2.5</td><td>612</td><td>631</td><td>626</td><td>577</td><td>500</td><td>428</td></tr> <tr><td></td><td>676</td><td>732</td><td>729</td><td>650</td><td>559</td><td>467</td></tr> <tr><td>2.0</td><td>782</td><td>851</td><td>876</td><td>780</td><td>668</td><td>531</td></tr> <tr><td></td><td>853</td><td>973</td><td>1000</td><td>908</td><td>753</td><td>616</td></tr> <tr><td>1.5</td><td>966</td><td>1190</td><td>1220</td><td>1120</td><td>879</td><td>658</td></tr> <tr><td></td><td>1050</td><td>1380</td><td>1490</td><td>1370</td><td>1050</td><td>693</td></tr> <tr><td>1.0</td><td>1060</td><td>1590</td><td>1750</td><td>1620</td><td>1030</td><td>626</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	289	289	287	278	271	(261)	4.0	299	299	297	286	279	266		321	323	317	305	295	281	3.5	354	354	349	330	317	300		399	400	394	368	347	326	3.0	453	456	450	413	386	357		515	546	530	478	439	374	2.5	612	631	626	577	500	428		676	732	729	650	559	467	2.0	782	851	876	780	668	531		853	973	1000	908	753	616	1.5	966	1190	1220	1120	879	658		1050	1380	1490	1370	1050	693	1.0	1060	1590	1750	1620	1030	626	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>138</td><td>141</td><td>143</td><td>142</td><td>140</td><td>(136)</td></tr> <tr><td>4.0</td><td>145</td><td>147</td><td>150</td><td>148</td><td>145</td><td>141</td></tr> <tr><td></td><td>156</td><td>159</td><td>161</td><td>159</td><td>157</td><td>152</td></tr> <tr><td>3.5</td><td>171</td><td>174</td><td>176</td><td>173</td><td>171</td><td>166</td></tr> <tr><td></td><td>192</td><td>196</td><td>197</td><td>194</td><td>190</td><td>184</td></tr> <tr><td>3.0</td><td>217</td><td>224</td><td>224</td><td>220</td><td>215</td><td>207</td></tr> <tr><td></td><td>250</td><td>262</td><td>261</td><td>255</td><td>249</td><td>232</td></tr> <tr><td>2.5</td><td>285</td><td>301</td><td>311</td><td>302</td><td>291</td><td>272</td></tr> <tr><td></td><td>325</td><td>354</td><td>365</td><td>353</td><td>337</td><td>310</td></tr> <tr><td>2.0</td><td>375</td><td>416</td><td>431</td><td>427</td><td>412</td><td>371</td></tr> <tr><td></td><td>440</td><td>490</td><td>522</td><td>532</td><td>495</td><td>440</td></tr> <tr><td>1.5</td><td>515</td><td>606</td><td>669</td><td>657</td><td>602</td><td>494</td></tr> <tr><td></td><td>599</td><td>743</td><td>842</td><td>824</td><td>744</td><td>580</td></tr> <tr><td>1.0</td><td>699</td><td>954</td><td>1130</td><td>1130</td><td>942</td><td>625</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	138	141	143	142	140	(136)	4.0	145	147	150	148	145	141		156	159	161	159	157	152	3.5	171	174	176	173	171	166		192	196	197	194	190	184	3.0	217	224	224	220	215	207		250	262	261	255	249	232	2.5	285	301	311	302	291	272		325	354	365	353	337	310	2.0	375	416	431	427	412	371		440	490	522	532	495	440	1.5	515	606	669	657	602	494		599	743	842	824	744	580	1.0	699	954	1130	1130	942	625	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>175</td><td>177</td><td>177</td><td>175</td><td>172</td><td>(169)</td></tr> <tr><td>4.0</td><td>182</td><td>182</td><td>181</td><td>179</td><td>178</td><td>173</td></tr> <tr><td></td><td>194</td><td>196</td><td>195</td><td>192</td><td>189</td><td>183</td></tr> <tr><td>3.5</td><td>211</td><td>212</td><td>212</td><td>207</td><td>203</td><td>196</td></tr> <tr><td></td><td>235</td><td>238</td><td>237</td><td>229</td><td>223</td><td>216</td></tr> <tr><td>3.0</td><td>265</td><td>270</td><td>270</td><td>260</td><td>248</td><td>236</td></tr> <tr><td></td><td>300</td><td>311</td><td>316</td><td>294</td><td>281</td><td>263</td></tr> <tr><td>2.5</td><td>346</td><td>365</td><td>363</td><td>346</td><td>326</td><td>292</td></tr> <tr><td></td><td>392</td><td>416</td><td>424</td><td>396</td><td>368</td><td>328</td></tr> <tr><td>2.0</td><td>442</td><td>487</td><td>503</td><td>466</td><td>440</td><td>389</td></tr> <tr><td></td><td>503</td><td>585</td><td>613</td><td>570</td><td>511</td><td>438</td></tr> <tr><td>1.5</td><td>589</td><td>686</td><td>743</td><td>717</td><td>618</td><td>505</td></tr> <tr><td></td><td>701</td><td>858</td><td>902</td><td>880</td><td>726</td><td>540</td></tr> <tr><td>1.0</td><td>835</td><td>1160</td><td>1300</td><td>1150</td><td>851</td><td>569</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	175	177	177	175	172	(169)	4.0	182	182	181	179	178	173		194	196	195	192	189	183	3.5	211	212	212	207	203	196		235	238	237	229	223	216	3.0	265	270	270	260	248	236		300	311	316	294	281	263	2.5	346	365	363	346	326	292		392	416	424	396	368	328	2.0	442	487	503	466	440	389		503	585	613	570	511	438	1.5	589	686	743	717	618	505		701	858	902	880	726	540	1.0	835	1160	1300	1150	851	569	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>197</td><td>202</td><td>202</td><td>202</td><td>200</td><td>(193)</td></tr> <tr><td>4.0</td><td>207</td><td>210</td><td>214</td><td>212</td><td>209</td><td>203</td></tr> <tr><td></td><td>222</td><td>227</td><td>230</td><td>227</td><td>225</td><td>217</td></tr> <tr><td>3.5</td><td>244</td><td>248</td><td>251</td><td>247</td><td>244</td><td>235</td></tr> <tr><td></td><td>273</td><td>279</td><td>280</td><td>277</td><td>271</td><td>262</td></tr> <tr><td>3.0</td><td>307</td><td>318</td><td>320</td><td>313</td><td>307</td><td>293</td></tr> <tr><td></td><td>352</td><td>373</td><td>373</td><td>364</td><td>358</td><td>336</td></tr> <tr><td>2.5</td><td>409</td><td>430</td><td>440</td><td>430</td><td>422</td><td>382</td></tr> <tr><td></td><td>466</td><td>492</td><td>513</td><td>508</td><td>479</td><td>443</td></tr> <tr><td>2.0</td><td>529</td><td>586</td><td>604</td><td>619</td><td>564</td><td>515</td></tr> <tr><td></td><td>607</td><td>703</td><td>759</td><td>755</td><td>704</td><td>632</td></tr> <tr><td>1.5</td><td>729</td><td>846</td><td>929</td><td>930</td><td>847</td><td>736</td></tr> <tr><td></td><td>859</td><td>1040</td><td>1160</td><td>1160</td><td>1040</td><td>823</td></tr> <tr><td>1.0</td><td>994</td><td>1370</td><td>1640</td><td>1530</td><td>1270</td><td>894</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	197	202	202	202	200	(193)	4.0	207	210	214	212	209	203		222	227	230	227	225	217	3.5	244	248	251	247	244	235		273	279	280	277	271	262	3.0	307	318	320	313	307	293		352	373	373	364	358	336	2.5	409	430	440	430	422	382		466	492	513	508	479	443	2.0	529	586	604	619	564	515		607	703	759	755	704	632	1.5	729	846	929	930	847	736		859	1040	1160	1160	1040	823	1.0	994	1370	1640	1530	1270	894	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	289	289	287	278	271	(261)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	299	299	297	286	279	266																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		321	323	317	305	295	281																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
3.5	354	354	349	330	317	300																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	399	400	394	368	347	326																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	453	456	450	413	386	357																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	515	546	530	478	439	374																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	612	631	626	577	500	428																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	676	732	729	650	559	467																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	782	851	876	780	668	531																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	853	973	1000	908	753	616																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	966	1190	1220	1120	879	658																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1050	1380	1490	1370	1050	693																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1060	1590	1750	1620	1030	626																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	138	141	143	142	140	(136)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	145	147	150	148	145	141																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	156	159	161	159	157	152																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	171	174	176	173	171	166																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	192	196	197	194	190	184																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	217	224	224	220	215	207																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	250	262	261	255	249	232																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	285	301	311	302	291	272																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	325	354	365	353	337	310																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	375	416	431	427	412	371																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	440	490	522	532	495	440																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	515	606	669	657	602	494																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	599	743	842	824	744	580																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	699	954	1130	1130	942	625																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	175	177	177	175	172	(169)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	182	182	181	179	178	173																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	194	196	195	192	189	183																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	211	212	212	207	203	196																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	235	238	237	229	223	216																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	265	270	270	260	248	236																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	300	311	316	294	281	263																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	346	365	363	346	326	292																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	392	416	424	396	368	328																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	442	487	503	466	440	389																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	503	585	613	570	511	438																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	589	686	743	717	618	505																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	701	858	902	880	726	540																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	835	1160	1300	1150	851	569																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	197	202	202	202	200	(193)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	207	210	214	212	209	203																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	222	227	230	227	225	217																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	244	248	251	247	244	235																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	273	279	280	277	271	262																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	307	318	320	313	307	293																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	352	373	373	364	358	336																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	409	430	440	430	422	382																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	466	492	513	508	479	443																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	529	586	604	619	564	515																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	607	703	759	755	704	632																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	729	846	929	930	847	736																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	859	1040	1160	1160	1040	823																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	994	1370	1640	1530	1270	894																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
İzmir	 <table border="1"> <tr><td>[m]</td><td>204</td><td>202</td><td>198</td><td>193</td><td>188</td><td>(182)</td></tr> <tr><td>4.0</td><td>212</td><td>208</td><td>205</td><td>198</td><td>193</td><td>187</td></tr> <tr><td></td><td>228</td><td>224</td><td>218</td><td>210</td><td>203</td><td>196</td></tr> <tr><td>3.5</td><td>252</td><td>245</td><td>238</td><td>226</td><td>217</td><td>209</td></tr> <tr><td></td><td>284</td><td>275</td><td>265</td><td>249</td><td>237</td><td>226</td></tr> <tr><td>3.0</td><td>323</td><td>318</td><td>301</td><td>280</td><td>260</td><td>246</td></tr> <tr><td></td><td>364</td><td>363</td><td>350</td><td>317</td><td>295</td><td>270</td></tr> <tr><td>2.5</td><td>431</td><td>430</td><td>409</td><td>367</td><td>330</td><td>297</td></tr> <tr><td></td><td>506</td><td>493</td><td>484</td><td>421</td><td>374</td><td>325</td></tr> <tr><td>2.0</td><td>586</td><td>579</td><td>558</td><td>485</td><td>422</td><td>361</td></tr> <tr><td></td><td>697</td><td>717</td><td>671</td><td>576</td><td>485</td><td>403</td></tr> <tr><td>1.5</td><td>840</td><td>864</td><td>812</td><td>701</td><td>565</td><td>445</td></tr> <tr><td></td><td>997</td><td>1070</td><td>1050</td><td>861</td><td>643</td><td>470</td></tr> <tr><td>1.0</td><td>1050</td><td>1360</td><td>1360</td><td>1140</td><td>700</td><td>453</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	204	202	198	193	188	(182)	4.0	212	208	205	198	193	187		228	224	218	210	203	196	3.5	252	245	238	226	217	209		284	275	265	249	237	226	3.0	323	318	301	280	260	246		364	363	350	317	295	270	2.5	431	430	409	367	330	297		506	493	484	421	374	325	2.0	586	579	558	485	422	361		697	717	671	576	485	403	1.5	840	864	812	701	565	445		997	1070	1050	861	643	470	1.0	1050	1360	1360	1140	700	453	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>156</td><td>160</td><td>160</td><td>161</td><td>158</td><td>(153)</td></tr> <tr><td>4.0</td><td>164</td><td>167</td><td>169</td><td>168</td><td>166</td><td>160</td></tr> <tr><td></td><td>176</td><td>180</td><td>182</td><td>180</td><td>178</td><td>172</td></tr> <tr><td>3.5</td><td>194</td><td>197</td><td>199</td><td>196</td><td>194</td><td>187</td></tr> <tr><td></td><td>216</td><td>222</td><td>223</td><td>220</td><td>216</td><td>209</td></tr> <tr><td>3.0</td><td>245</td><td>255</td><td>252</td><td>250</td><td>242</td><td>234</td></tr> <tr><td></td><td>281</td><td>294</td><td>294</td><td>288</td><td>280</td><td>263</td></tr> <tr><td>2.5</td><td>321</td><td>344</td><td>351</td><td>344</td><td>336</td><td>308</td></tr> <tr><td></td><td>370</td><td>398</td><td>403</td><td>403</td><td>383</td><td>352</td></tr> <tr><td>2.0</td><td>431</td><td>479</td><td>490</td><td>473</td><td>456</td><td>409</td></tr> <tr><td></td><td>492</td><td>555</td><td>592</td><td>594</td><td>561</td><td>490</td></tr> <tr><td>1.5</td><td>599</td><td>672</td><td>745</td><td>740</td><td>682</td><td>584</td></tr> <tr><td></td><td>677</td><td>847</td><td>932</td><td>936</td><td>825</td><td>658</td></tr> <tr><td>1.0</td><td>803</td><td>1100</td><td>1290</td><td>1210</td><td>1060</td><td>737</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	156	160	160	161	158	(153)	4.0	164	167	169	168	166	160		176	180	182	180	178	172	3.5	194	197	199	196	194	187		216	222	223	220	216	209	3.0	245	255	252	250	242	234		281	294	294	288	280	263	2.5	321	344	351	344	336	308		370	398	403	403	383	352	2.0	431	479	490	473	456	409		492	555	592	594	561	490	1.5	599	672	745	740	682	584		677	847	932	936	825	658	1.0	803	1100	1290	1210	1060	737	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>140</td><td>141</td><td>139</td><td>139</td><td>136</td><td>(133)</td></tr> <tr><td>4.0</td><td>145</td><td>145</td><td>145</td><td>143</td><td>140</td><td>136</td></tr> <tr><td></td><td>154</td><td>155</td><td>154</td><td>151</td><td>149</td><td>145</td></tr> <tr><td>3.5</td><td>168</td><td>168</td><td>167</td><td>162</td><td>159</td><td>154</td></tr> <tr><td></td><td>187</td><td>187</td><td>185</td><td>179</td><td>174</td><td>169</td></tr> <tr><td>3.0</td><td>208</td><td>210</td><td>207</td><td>198</td><td>191</td><td>184</td></tr> <tr><td></td><td>238</td><td>241</td><td>239</td><td>225</td><td>212</td><td>204</td></tr> <tr><td>2.5</td><td>271</td><td>278</td><td>272</td><td>261</td><td>244</td><td>228</td></tr> <tr><td></td><td>309</td><td>322</td><td>304</td><td>298</td><td>278</td><td>257</td></tr> <tr><td>2.0</td><td>350</td><td>372</td><td>370</td><td>349</td><td>320</td><td>287</td></tr> <tr><td></td><td>408</td><td>427</td><td>438</td><td>419</td><td>372</td><td>328</td></tr> <tr><td>1.5</td><td>488</td><td>520</td><td>529</td><td>483</td><td>435</td><td>366</td></tr> <tr><td></td><td>565</td><td>625</td><td>647</td><td>607</td><td>508</td><td>401</td></tr> <tr><td>1.0</td><td>632</td><td>818</td><td>838</td><td>741</td><td>567</td><td>407</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	140	141	139	139	136	(133)	4.0	145	145	145	143	140	136		154	155	154	151	149	145	3.5	168	168	167	162	159	154		187	187	185	179	174	169	3.0	208	210	207	198	191	184		238	241	239	225	212	204	2.5	271	278	272	261	244	228		309	322	304	298	278	257	2.0	350	372	370	349	320	287		408	427	438	419	372	328	1.5	488	520	529	483	435	366		565	625	647	607	508	401	1.0	632	818	838	741	567	407	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]										 <table border="1"> <tr><td>[m]</td><td>200</td><td>204</td><td>206</td><td>207</td><td>203</td><td>(197)</td></tr> <tr><td>4.0</td><td>209</td><td>213</td><td>214</td><td>214</td><td>212</td><td>206</td></tr> <tr><td></td><td>226</td><td>231</td><td>233</td><td>231</td><td>228</td><td>221</td></tr> <tr><td>3.5</td><td>248</td><td>252</td><td>255</td><td>251</td><td>248</td><td>240</td></tr> <tr><td></td><td>277</td><td>284</td><td>285</td><td>281</td><td>276</td><td>267</td></tr> <tr><td>3.0</td><td>314</td><td>324</td><td>321</td><td>320</td><td>314</td><td>300</td></tr> <tr><td></td><td>355</td><td>375</td><td>380</td><td>364</td><td>361</td><td>334</td></tr> <tr><td>2.5</td><td>415</td><td>439</td><td>442</td><td>438</td><td>421</td><td>393</td></tr> <tr><td></td><td>472</td><td>509</td><td>532</td><td>507</td><td>490</td><td>456</td></tr> <tr><td>2.0</td><td>538</td><td>603</td><td>625</td><td>626</td><td>587</td><td>540</td></tr> <tr><td></td><td>640</td><td>734</td><td>752</td><td>796</td><td>715</td><td>620</td></tr> <tr><td>1.5</td><td>747</td><td>859</td><td>940</td><td>950</td><td>879</td><td>744</td></tr> <tr><td></td><td>880</td><td>1070</td><td>1180</td><td>1210</td><td>1040</td><td>841</td></tr> <tr><td>1.0</td><td>1030</td><td>1420</td><td>1670</td><td>1610</td><td>1360</td><td>954</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td><td>[m]</td></tr> <tr><td></td><td colspan="10">Illuminance [lx]</td></tr> </table>	[m]	200	204	206	207	203	(197)	4.0	209	213	214	214	212	206		226	231	233	231	228	221	3.5	248	252	255	251	248	240		277	284	285	281	276	267	3.0	314	324	321	320	314	300		355	375	380	364	361	334	2.5	415	439	442	438	421	393		472	509	532	507	490	456	2.0	538	603	625	626	587	540		640	734	752	796	715	620	1.5	747	859	940	950	879	744		880	1070	1180	1210	1040	841	1.0	1030	1420	1670	1610	1360	954	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]		Illuminance [lx]									
	[m]	204	202	198	193	188	(182)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	212	208	205	198	193	187																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		228	224	218	210	203	196																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
3.5	252	245	238	226	217	209																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	284	275	265	249	237	226																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	323	318	301	280	260	246																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	364	363	350	317	295	270																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	431	430	409	367	330	297																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	506	493	484	421	374	325																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	586	579	558	485	422	361																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	697	717	671	576	485	403																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	840	864	812	701	565	445																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	997	1070	1050	861	643	470																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1050	1360	1360	1140	700	453																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	156	160	160	161	158	(153)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	164	167	169	168	166	160																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	176	180	182	180	178	172																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	194	197	199	196	194	187																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	216	222	223	220	216	209																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	245	255	252	250	242	234																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	281	294	294	288	280	263																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	321	344	351	344	336	308																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	370	398	403	403	383	352																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	431	479	490	473	456	409																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	492	555	592	594	561	490																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	599	672	745	740	682	584																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	677	847	932	936	825	658																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	803	1100	1290	1210	1060	737																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	140	141	139	139	136	(133)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	145	145	145	143	140	136																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	154	155	154	151	149	145																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	168	168	167	162	159	154																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	187	187	185	179	174	169																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	208	210	207	198	191	184																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	238	241	239	225	212	204																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	271	278	272	261	244	228																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	309	322	304	298	278	257																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	350	372	370	349	320	287																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	408	427	438	419	372	328																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	488	520	529	483	435	366																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	565	625	647	607	508	401																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	632	818	838	741	567	407																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
[m]	200	204	206	207	203	(197)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	209	213	214	214	212	206																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	226	231	233	231	228	221																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	248	252	255	251	248	240																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	277	284	285	281	276	267																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	314	324	321	320	314	300																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	355	375	380	364	361	334																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	415	439	442	438	421	393																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	472	509	532	507	490	456																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	538	603	625	626	587	540																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	640	734	752	796	715	620																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	747	859	940	950	879	744																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	880	1070	1180	1210	1040	841																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1030	1420	1670	1610	1360	954																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	[m]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	Illuminance [lx]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															



Table A.7. Reference room B, material alternative IV, clear sky and overcast sky RELUX simulation results for London and İzmir in 21<sup>st</sup> March and 21<sup>st</sup> June at 12:00 pm.

Room B - Material Alternative IV at 12:00 pm	21 <sup>st</sup> March		21 <sup>st</sup> June																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Clear Sky	Overcast Sky	Clear Sky	Overcast Sky																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
London																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td></td><td>464</td><td>462</td><td>456</td><td>447</td><td>441</td><td>(431)</td></tr> <tr><td>4.0</td><td>474</td><td>470</td><td>462</td><td>454</td><td>444</td><td>436</td></tr> <tr><td></td><td>495</td><td>494</td><td>486</td><td>473</td><td>463</td><td>452</td></tr> <tr><td>3.5</td><td>529</td><td>525</td><td>519</td><td>499</td><td>486</td><td>471</td></tr> <tr><td></td><td>575</td><td>573</td><td>563</td><td>540</td><td>518</td><td>499</td></tr> <tr><td>3.0</td><td>632</td><td>633</td><td>629</td><td>581</td><td>554</td><td>528</td></tr> <tr><td></td><td>699</td><td>720</td><td>696</td><td>648</td><td>610</td><td>564</td></tr> <tr><td>2.5</td><td>781</td><td>816</td><td>802</td><td>740</td><td>687</td><td>608</td></tr> <tr><td></td><td>860</td><td>933</td><td>914</td><td>825</td><td>735</td><td>664</td></tr> <tr><td>2.0</td><td>977</td><td>1050</td><td>1040</td><td>934</td><td>858</td><td>716</td></tr> <tr><td></td><td>1030</td><td>1160</td><td>1220</td><td>1070</td><td>919</td><td>778</td></tr> <tr><td>1.5</td><td>1160</td><td>1330</td><td>1400</td><td>1280</td><td>1040</td><td>807</td></tr> <tr><td></td><td>1240</td><td>1530</td><td>1640</td><td>1530</td><td>1170</td><td>835</td></tr> <tr><td>1.0</td><td>1230</td><td>1680</td><td>1950</td><td>1790</td><td>1280</td><td>797</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		464	462	456	447	441	(431)	4.0	474	470	462	454	444	436		495	494	486	473	463	452	3.5	529	525	519	499	486	471		575	573	563	540	518	499	3.0	632	633	629	581	554	528		699	720	696	648	610	564	2.5	781	816	802	740	687	608		860	933	914	825	735	664	2.0	977	1050	1040	934	858	716		1030	1160	1220	1070	919	778	1.5	1160	1330	1400	1280	1040	807		1240	1530	1640	1530	1170	835	1.0	1230	1680	1950	1790	1280	797	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	<table border="1"> <tr><td></td><td>240</td><td>242</td><td>244</td><td>243</td><td>242</td><td>(238)</td></tr> <tr><td>4.0</td><td>248</td><td>249</td><td>252</td><td>249</td><td>249</td><td>244</td></tr> <tr><td></td><td>261</td><td>264</td><td>265</td><td>263</td><td>262</td><td>257</td></tr> <tr><td>3.5</td><td>279</td><td>281</td><td>283</td><td>280</td><td>279</td><td>274</td></tr> <tr><td></td><td>303</td><td>307</td><td>307</td><td>305</td><td>301</td><td>296</td></tr> <tr><td>3.0</td><td>332</td><td>339</td><td>342</td><td>334</td><td>331</td><td>322</td></tr> <tr><td></td><td>368</td><td>381</td><td>382</td><td>370</td><td>365</td><td>349</td></tr> <tr><td>2.5</td><td>413</td><td>427</td><td>432</td><td>422</td><td>418</td><td>394</td></tr> <tr><td></td><td>460</td><td>478</td><td>483</td><td>483</td><td>474</td><td>446</td></tr> <tr><td>2.0</td><td>512</td><td>555</td><td>569</td><td>555</td><td>533</td><td>510</td></tr> <tr><td></td><td>585</td><td>632</td><td>649</td><td>661</td><td>636</td><td>568</td></tr> <tr><td>1.5</td><td>657</td><td>741</td><td>788</td><td>804</td><td>748</td><td>663</td></tr> <tr><td></td><td>739</td><td>879</td><td>954</td><td>948</td><td>857</td><td>721</td></tr> <tr><td>1.0</td><td>834</td><td>1100</td><td>1290</td><td>1250</td><td>1050</td><td>780</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		240	242	244	243	242	(238)	4.0	248	249	252	249	249	244		261	264	265	263	262	257	3.5	279	281	283	280	279	274		303	307	307	305	301	296	3.0	332	339	342	334	331	322		368	381	382	370	365	349	2.5	413	427	432	422	418	394		460	478	483	483	474	446	2.0	512	555	569	555	533	510		585	632	649	661	636	568	1.5	657	741	788	804	748	663		739	879	954	948	857	721	1.0	834	1100	1290	1250	1050	780	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	<table border="1"> <tr><td></td><td>293</td><td>294</td><td>293</td><td>291</td><td>287</td><td>(285)</td></tr> <tr><td>4.0</td><td>299</td><td>299</td><td>299</td><td>296</td><td>294</td><td>290</td></tr> <tr><td></td><td>312</td><td>313</td><td>312</td><td>309</td><td>306</td><td>301</td></tr> <tr><td>3.5</td><td>332</td><td>331</td><td>331</td><td>325</td><td>320</td><td>316</td></tr> <tr><td></td><td>394</td><td>393</td><td>394</td><td>379</td><td>369</td><td>362</td></tr> <tr><td>3.0</td><td>430</td><td>439</td><td>436</td><td>421</td><td>406</td><td>394</td></tr> <tr><td></td><td>479</td><td>492</td><td>489</td><td>477</td><td>454</td><td>425</td></tr> <tr><td>2.5</td><td>529</td><td>552</td><td>546</td><td>537</td><td>499</td><td>468</td></tr> <tr><td></td><td>578</td><td>621</td><td>634</td><td>616</td><td>582</td><td>513</td></tr> <tr><td>2.0</td><td>665</td><td>715</td><td>732</td><td>717</td><td>655</td><td>579</td></tr> <tr><td></td><td>737</td><td>811</td><td>848</td><td>830</td><td>740</td><td>644</td></tr> <tr><td>1.5</td><td>843</td><td>974</td><td>1040</td><td>1000</td><td>852</td><td>683</td></tr> <tr><td></td><td>902</td><td>1260</td><td>1400</td><td>1310</td><td>933</td><td>691</td></tr> <tr><td>1.0</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		293	294	293	291	287	(285)	4.0	299	299	299	296	294	290		312	313	312	309	306	301	3.5	332	331	331	325	320	316		394	393	394	379	369	362	3.0	430	439	436	421	406	394		479	492	489	477	454	425	2.5	529	552	546	537	499	468		578	621	634	616	582	513	2.0	665	715	732	717	655	579		737	811	848	830	740	644	1.5	843	974	1040	1000	852	683		902	1260	1400	1310	933	691	1.0							0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	<table border="1"> <tr><td></td><td>342</td><td>346</td><td>346</td><td>347</td><td>342</td><td>(339)</td></tr> <tr><td>4.0</td><td>353</td><td>356</td><td>359</td><td>357</td><td>355</td><td>349</td></tr> <tr><td></td><td>372</td><td>377</td><td>379</td><td>376</td><td>374</td><td>367</td></tr> <tr><td>3.5</td><td>398</td><td>401</td><td>404</td><td>400</td><td>398</td><td>388</td></tr> <tr><td></td><td>432</td><td>438</td><td>437</td><td>433</td><td>429</td><td>420</td></tr> <tr><td>3.0</td><td>475</td><td>486</td><td>485</td><td>474</td><td>471</td><td>459</td></tr> <tr><td></td><td>525</td><td>541</td><td>537</td><td>531</td><td>527</td><td>503</td></tr> <tr><td>2.5</td><td>588</td><td>611</td><td>616</td><td>608</td><td>586</td><td>559</td></tr> <tr><td></td><td>646</td><td>692</td><td>693</td><td>685</td><td>660</td><td>637</td></tr> <tr><td>2.0</td><td>727</td><td>781</td><td>824</td><td>787</td><td>752</td><td>699</td></tr> <tr><td></td><td>821</td><td>889</td><td>929</td><td>925</td><td>884</td><td>810</td></tr> <tr><td>1.5</td><td>946</td><td>1050</td><td>1090</td><td>1120</td><td>1050</td><td>924</td></tr> <tr><td></td><td>1070</td><td>1250</td><td>1350</td><td>1350</td><td>1240</td><td>1020</td></tr> <tr><td>1.0</td><td>1140</td><td>1550</td><td>1740</td><td>1780</td><td>1470</td><td>1110</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		342	346	346	347	342	(339)	4.0	353	356	359	357	355	349		372	377	379	376	374	367	3.5	398	401	404	400	398	388		432	438	437	433	429	420	3.0	475	486	485	474	471	459		525	541	537	531	527	503	2.5	588	611	616	608	586	559		646	692	693	685	660	637	2.0	727	781	824	787	752	699		821	889	929	925	884	810	1.5	946	1050	1090	1120	1050	924		1070	1250	1350	1350	1240	1020	1.0	1140	1550	1740	1780	1470	1110	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
		464	462	456	447	441	(431)																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	474	470	462	454	444	436																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	495	494	486	473	463	452																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	529	525	519	499	486	471																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	575	573	563	540	518	499																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	632	633	629	581	554	528																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	699	720	696	648	610	564																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	781	816	802	740	687	608																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	860	933	914	825	735	664																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	977	1050	1040	934	858	716																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1030	1160	1220	1070	919	778																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1160	1330	1400	1280	1040	807																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1240	1530	1640	1530	1170	835																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1230	1680	1950	1790	1280	797																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	240	242	244	243	242	(238)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	248	249	252	249	249	244																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	261	264	265	263	262	257																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	279	281	283	280	279	274																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	303	307	307	305	301	296																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	332	339	342	334	331	322																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	368	381	382	370	365	349																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	413	427	432	422	418	394																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	460	478	483	483	474	446																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	512	555	569	555	533	510																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	585	632	649	661	636	568																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	657	741	788	804	748	663																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	739	879	954	948	857	721																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	834	1100	1290	1250	1050	780																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	293	294	293	291	287	(285)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	299	299	299	296	294	290																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	312	313	312	309	306	301																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	332	331	331	325	320	316																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	394	393	394	379	369	362																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	430	439	436	421	406	394																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	479	492	489	477	454	425																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	529	552	546	537	499	468																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	578	621	634	616	582	513																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	665	715	732	717	655	579																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	737	811	848	830	740	644																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	843	974	1040	1000	852	683																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	902	1260	1400	1310	933	691																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	342	346	346	347	342	(339)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	353	356	359	357	355	349																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	372	377	379	376	374	367																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	398	401	404	400	398	388																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	432	438	437	433	429	420																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	475	486	485	474	471	459																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	525	541	537	531	527	503																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	588	611	616	608	586	559																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	646	692	693	685	660	637																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	727	781	824	787	752	699																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	821	889	929	925	884	810																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	946	1050	1090	1120	1050	924																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1070	1250	1350	1350	1240	1020																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1140	1550	1740	1780	1470	1110																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
İzmir																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	<table border="1"> <tr><td></td><td>339</td><td>335</td><td>331</td><td>325</td><td>320</td><td>(315)</td></tr> <tr><td>4.0</td><td>348</td><td>341</td><td>338</td><td>331</td><td>326</td><td>319</td></tr> <tr><td></td><td>366</td><td>360</td><td>352</td><td>344</td><td>337</td><td>331</td></tr> <tr><td>3.5</td><td>392</td><td>392</td><td>375</td><td>361</td><td>352</td><td>347</td></tr> <tr><td></td><td>428</td><td>417</td><td>403</td><td>388</td><td>375</td><td>367</td></tr> <tr><td>3.0</td><td>476</td><td>459</td><td>442</td><td>418</td><td>403</td><td>388</td></tr> <tr><td></td><td>529</td><td>515</td><td>496</td><td>465</td><td>435</td><td>411</td></tr> <tr><td>2.5</td><td>593</td><td>581</td><td>556</td><td>515</td><td>481</td><td>445</td></tr> <tr><td></td><td>659</td><td>661</td><td>620</td><td>565</td><td>524</td><td>485</td></tr> <tr><td>2.0</td><td>742</td><td>757</td><td>716</td><td>646</td><td>562</td><td>524</td></tr> <tr><td></td><td>858</td><td>859</td><td>834</td><td>733</td><td>643</td><td>559</td></tr> <tr><td>1.5</td><td>1010</td><td>1040</td><td>964</td><td>843</td><td>698</td><td>598</td></tr> <tr><td></td><td>1160</td><td>1230</td><td>1170</td><td>1030</td><td>796</td><td>621</td></tr> <tr><td>1.0</td><td>1260</td><td>1500</td><td>1480</td><td>1280</td><td>859</td><td>585</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		339	335	331	325	320	(315)	4.0	348	341	338	331	326	319		366	360	352	344	337	331	3.5	392	392	375	361	352	347		428	417	403	388	375	367	3.0	476	459	442	418	403	388		529	515	496	465	435	411	2.5	593	581	556	515	481	445		659	661	620	565	524	485	2.0	742	757	716	646	562	524		858	859	834	733	643	559	1.5	1010	1040	964	843	698	598		1160	1230	1170	1030	796	621	1.0	1260	1500	1480	1280	859	585	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	<table border="1"> <tr><td></td><td>273</td><td>277</td><td>279</td><td>277</td><td>276</td><td>(271)</td></tr> <tr><td>4.0</td><td>282</td><td>284</td><td>287</td><td>286</td><td>284</td><td>279</td></tr> <tr><td></td><td>297</td><td>301</td><td>302</td><td>300</td><td>298</td><td>293</td></tr> <tr><td>3.5</td><td>318</td><td>321</td><td>322</td><td>318</td><td>318</td><td>311</td></tr> <tr><td></td><td>344</td><td>349</td><td>349</td><td>346</td><td>342</td><td>336</td></tr> <tr><td>3.0</td><td>378</td><td>384</td><td>385</td><td>380</td><td>373</td><td>364</td></tr> <tr><td></td><td>419</td><td>429</td><td>433</td><td>423</td><td>418</td><td>399</td></tr> <tr><td>2.5</td><td>471</td><td>492</td><td>492</td><td>489</td><td>469</td><td>447</td></tr> <tr><td></td><td>518</td><td>544</td><td>557</td><td>543</td><td>530</td><td>509</td></tr> <tr><td>2.0</td><td>582</td><td>619</td><td>635</td><td>637</td><td>608</td><td>573</td></tr> <tr><td></td><td>665</td><td>713</td><td>734</td><td>742</td><td>704</td><td>650</td></tr> <tr><td>1.5</td><td>742</td><td>826</td><td>878</td><td>881</td><td>814</td><td>732</td></tr> <tr><td></td><td>840</td><td>980</td><td>1080</td><td>1100</td><td>974</td><td>831</td></tr> <tr><td>1.0</td><td>916</td><td>1260</td><td>1410</td><td>1420</td><td>1180</td><td>881</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		273	277	279	277	276	(271)	4.0	282	284	287	286	284	279		297	301	302	300	298	293	3.5	318	321	322	318	318	311		344	349	349	346	342	336	3.0	378	384	385	380	373	364		419	429	433	423	418	399	2.5	471	492	492	489	469	447		518	544	557	543	530	509	2.0	582	619	635	637	608	573		665	713	734	742	704	650	1.5	742	826	878	881	814	732		840	980	1080	1100	974	831	1.0	916	1260	1410	1420	1180	881	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	<table border="1"> <tr><td></td><td>239</td><td>240</td><td>239</td><td>237</td><td>234</td><td>(232)</td></tr> <tr><td>4.0</td><td>245</td><td>245</td><td>244</td><td>241</td><td>240</td><td>237</td></tr> <tr><td></td><td>256</td><td>256</td><td>254</td><td>252</td><td>249</td><td>246</td></tr> <tr><td>3.5</td><td>272</td><td>270</td><td>269</td><td>264</td><td>262</td><td>257</td></tr> <tr><td></td><td>294</td><td>292</td><td>289</td><td>283</td><td>278</td><td>274</td></tr> <tr><td>3.0</td><td>319</td><td>318</td><td>314</td><td>304</td><td>301</td><td>293</td></tr> <tr><td></td><td>393</td><td>397</td><td>390</td><td>372</td><td>360</td><td>338</td></tr> <tr><td>2.5</td><td>429</td><td>436</td><td>432</td><td>415</td><td>394</td><td>371</td></tr> <tr><td></td><td>475</td><td>499</td><td>496</td><td>465</td><td>434</td><td>408</td></tr> <tr><td>2.0</td><td>534</td><td>562</td><td>552</td><td>530</td><td>490</td><td>443</td></tr> <tr><td></td><td>618</td><td>643</td><td>644</td><td>603</td><td>546</td><td>486</td></tr> <tr><td>1.5</td><td>690</td><td>765</td><td>769</td><td>714</td><td>621</td><td>521</td></tr> <tr><td></td><td>762</td><td>899</td><td>933</td><td>870</td><td>663</td><td>490</td></tr> <tr><td>1.0</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		239	240	239	237	234	(232)	4.0	245	245	244	241	240	237		256	256	254	252	249	246	3.5	272	270	269	264	262	257		294	292	289	283	278	274	3.0	319	318	314	304	301	293		393	397	390	372	360	338	2.5	429	436	432	415	394	371		475	499	496	465	434	408	2.0	534	562	552	530	490	443		618	643	644	603	546	486	1.5	690	765	769	714	621	521		762	899	933	870	663	490	1.0							0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	<table border="1"> <tr><td></td><td>348</td><td>353</td><td>355</td><td>354</td><td>352</td><td>(346)</td></tr> <tr><td>4.0</td><td>361</td><td>363</td><td>366</td><td>366</td><td>364</td><td>357</td></tr> <tr><td></td><td>379</td><td>384</td><td>386</td><td>381</td><td>381</td><td>375</td></tr> <tr><td>3.5</td><td>405</td><td>411</td><td>412</td><td>409</td><td>405</td><td>399</td></tr> <tr><td></td><td>440</td><td>446</td><td>446</td><td>442</td><td>438</td><td>430</td></tr> <tr><td>3.0</td><td>482</td><td>489</td><td>493</td><td>487</td><td>481</td><td>468</td></tr> <tr><td></td><td>534</td><td>547</td><td>551</td><td>543</td><td>532</td><td>520</td></tr> <tr><td>2.5</td><td>595</td><td>623</td><td>629</td><td>619</td><td>599</td><td>568</td></tr> <tr><td></td><td>659</td><td>693</td><td>705</td><td>699</td><td>674</td><td>637</td></tr> <tr><td>2.0</td><td>743</td><td>801</td><td>810</td><td>813</td><td>781</td><td>739</td></tr> <tr><td></td><td>848</td><td>923</td><td>960</td><td>949</td><td>916</td><td>836</td></tr> <tr><td>1.5</td><td>979</td><td>1070</td><td>1120</td><td>1120</td><td>1070</td><td>936</td></tr> <tr><td></td><td>1080</td><td>1260</td><td>1380</td><td>1380</td><td>1260</td><td>1040</td></tr> <tr><td>1.0</td><td>1210</td><td>1600</td><td>1820</td><td>1760</td><td>1440</td><td>1130</td></tr> <tr><td>0.5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>0.2</td><td>0.4</td><td>0.6</td><td>0.8</td><td>1.0</td><td>1.2</td><td>1.4</td><td>1.6</td><td>1.8</td></tr> </table>		348	353	355	354	352	(346)	4.0	361	363	366	366	364	357		379	384	386	381	381	375	3.5	405	411	412	409	405	399		440	446	446	442	438	430	3.0	482	489	493	487	481	468		534	547	551	543	532	520	2.5	595	623	629	619	599	568		659	693	705	699	674	637	2.0	743	801	810	813	781	739		848	923	960	949	916	836	1.5	979	1070	1120	1120	1070	936		1080	1260	1380	1380	1260	1040	1.0	1210	1600	1820	1760	1440	1130	0.5								0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
		339	335	331	325	320	(315)																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	4.0	348	341	338	331	326	319																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	366	360	352	344	337	331																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	392	392	375	361	352	347																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	428	417	403	388	375	367																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	476	459	442	418	403	388																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	529	515	496	465	435	411																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	593	581	556	515	481	445																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	659	661	620	565	524	485																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	742	757	716	646	562	524																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	858	859	834	733	643	559																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	1010	1040	964	843	698	598																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1160	1230	1170	1030	796	621																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1260	1500	1480	1280	859	585																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	273	277	279	277	276	(271)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	282	284	287	286	284	279																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	297	301	302	300	298	293																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	318	321	322	318	318	311																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	344	349	349	346	342	336																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	378	384	385	380	373	364																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	419	429	433	423	418	399																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	471	492	492	489	469	447																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	518	544	557	543	530	509																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	582	619	635	637	608	573																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	665	713	734	742	704	650																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	742	826	878	881	814	732																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	840	980	1080	1100	974	831																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	916	1260	1410	1420	1180	881																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	239	240	239	237	234	(232)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	245	245	244	241	240	237																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	256	256	254	252	249	246																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	272	270	269	264	262	257																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	294	292	289	283	278	274																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	319	318	314	304	301	293																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	393	397	390	372	360	338																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	429	436	432	415	394	371																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	475	499	496	465	434	408																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	534	562	552	530	490	443																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	618	643	644	603	546	486																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	690	765	769	714	621	521																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	762	899	933	870	663	490																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	348	353	355	354	352	(346)																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
4.0	361	363	366	366	364	357																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	379	384	386	381	381	375																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.5	405	411	412	409	405	399																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	440	446	446	442	438	430																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3.0	482	489	493	487	481	468																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	534	547	551	543	532	520																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.5	595	623	629	619	599	568																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	659	693	705	699	674	637																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
2.0	743	801	810	813	781	739																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	848	923	960	949	916	836																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.5	979	1070	1120	1120	1070	936																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	1080	1260	1380	1380	1260	1040																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1.0	1210	1600	1820	1760	1440	1130																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
0.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																							



## APPENDIX B

### CALCULATION RESULTS OF RELUX SIMULATIONS; AVERAGE, MINIMUM, AND MAXIMUM ILLUMINANCE VALUES

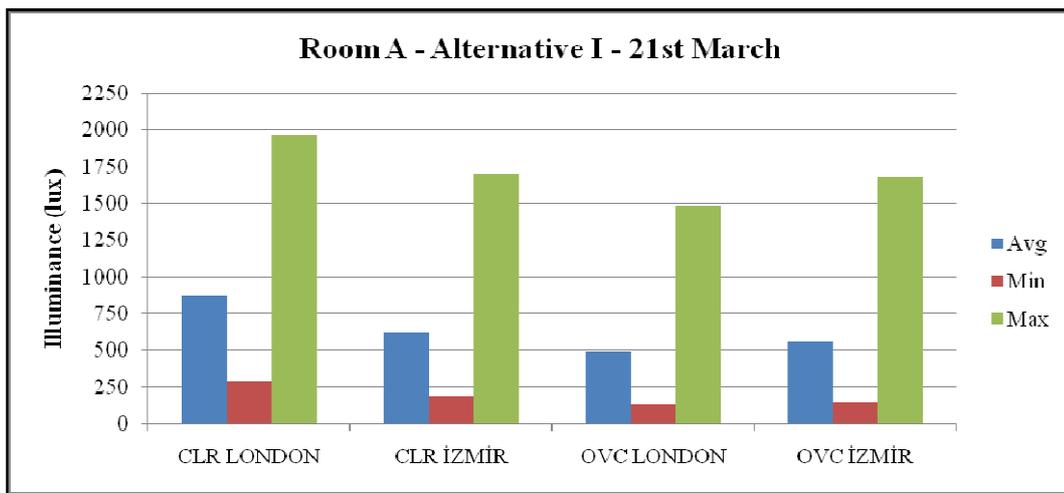


Figure B.1. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

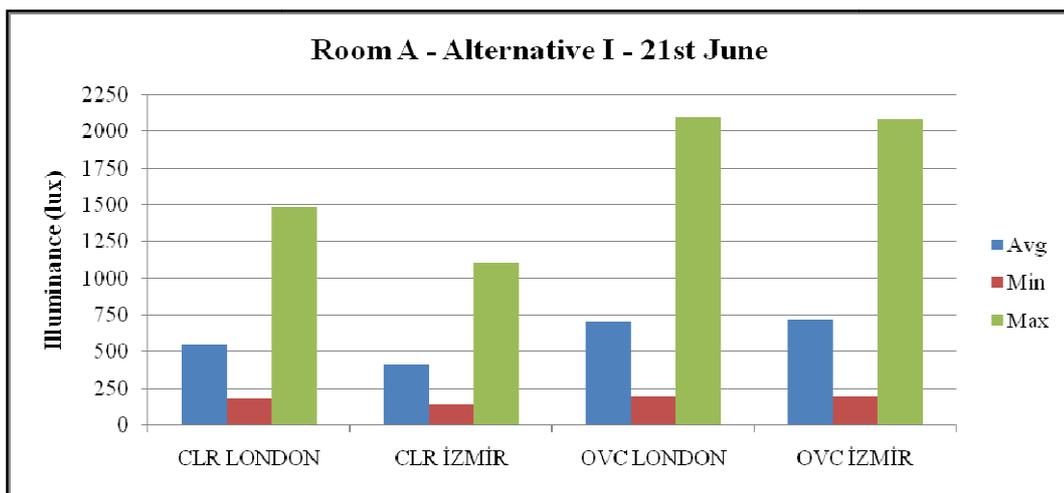


Figure B.2. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

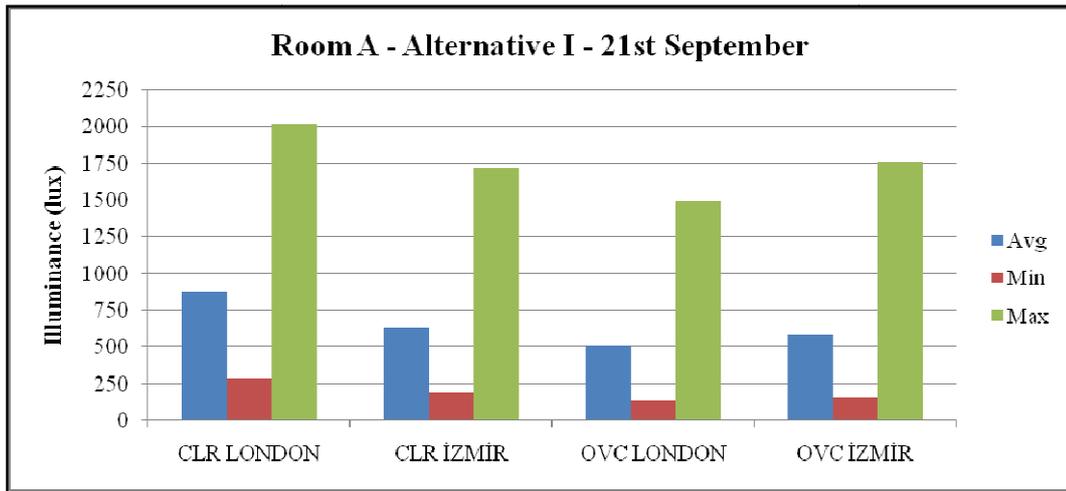


Figure B.3. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

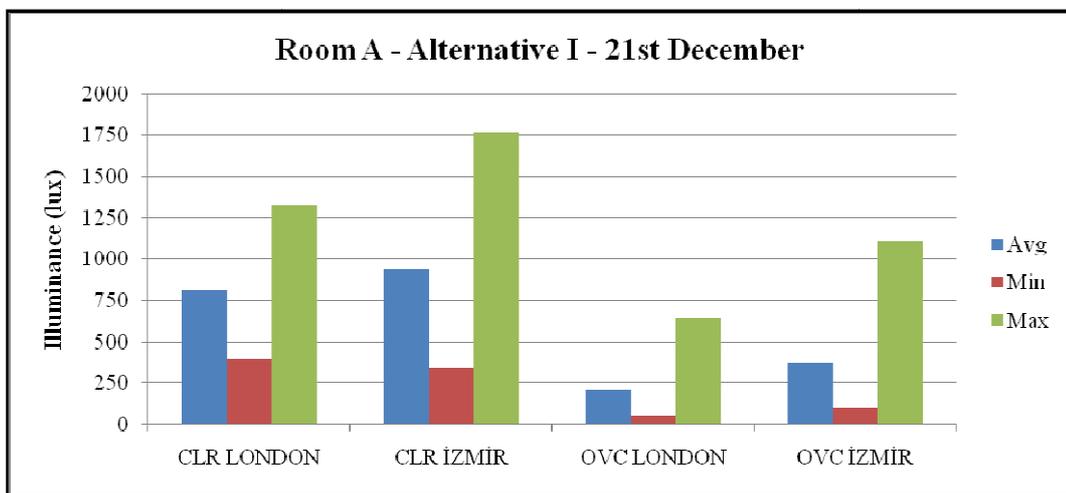


Figure B.4. Reference room A, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.

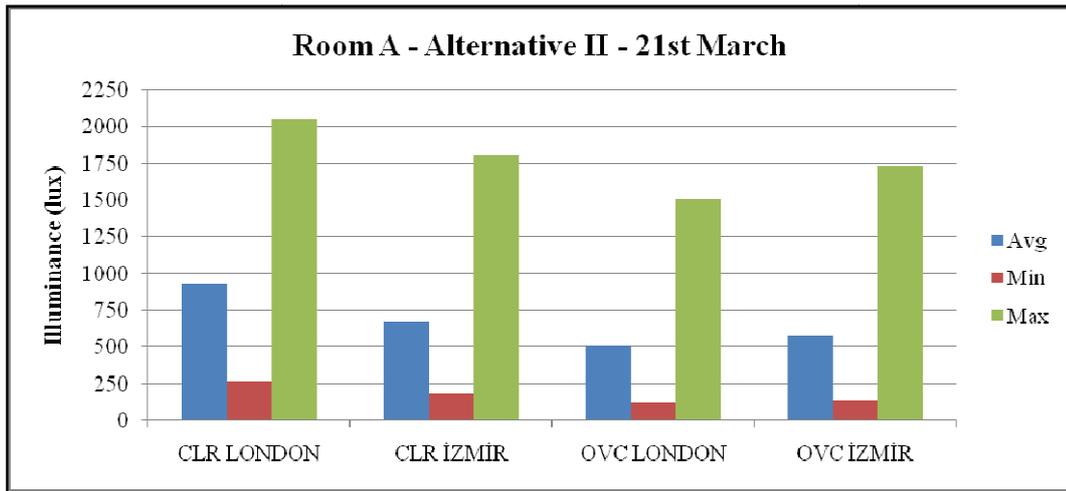


Figure B.5. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

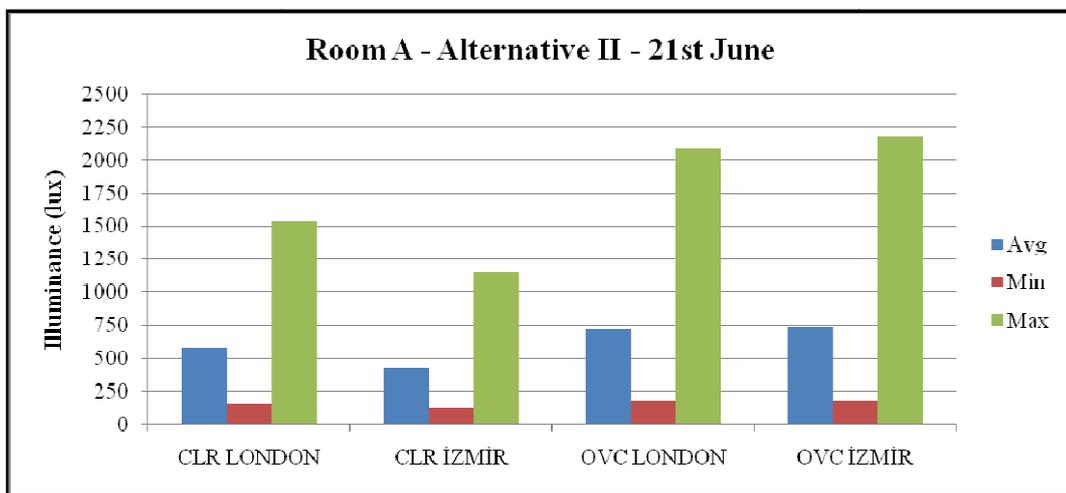


Figure B.6. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

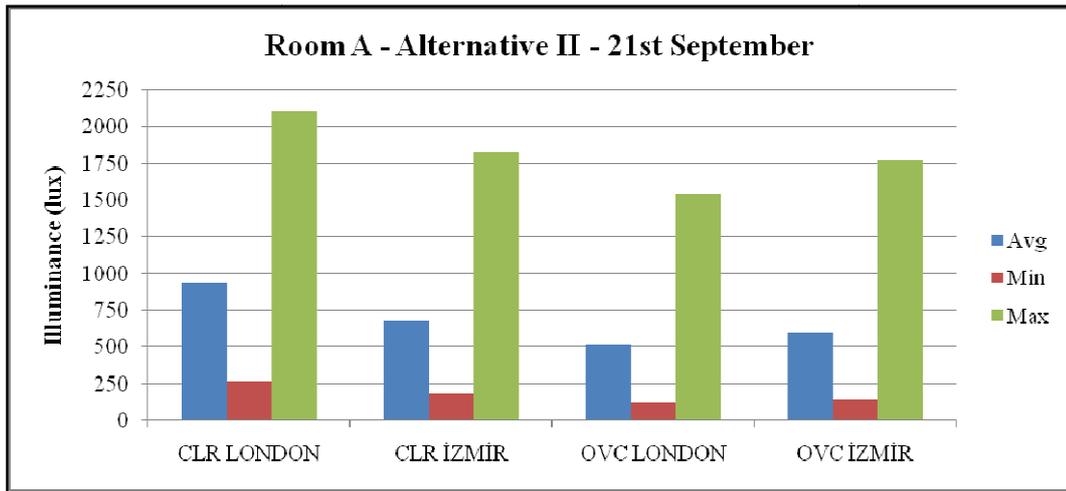


Figure B.7. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

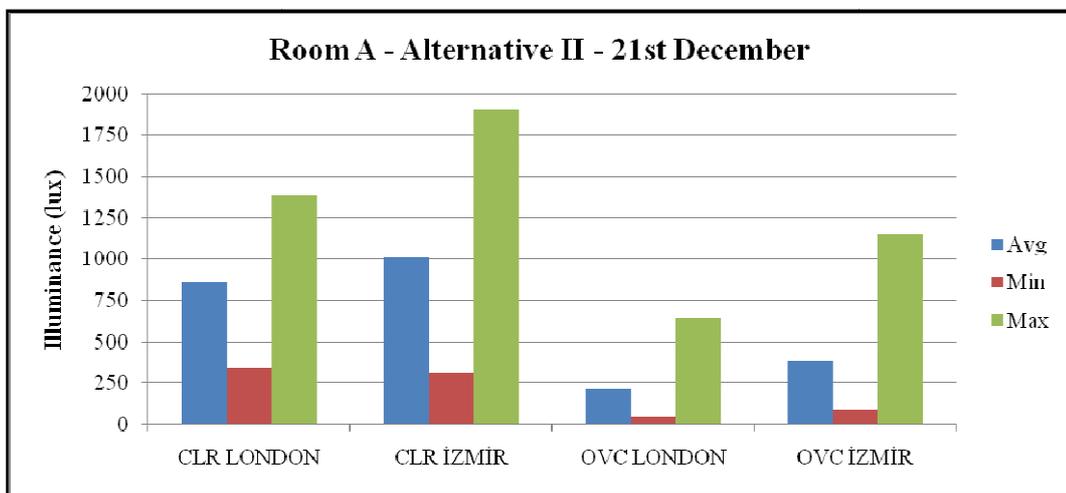


Figure B.8. Reference room A, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.

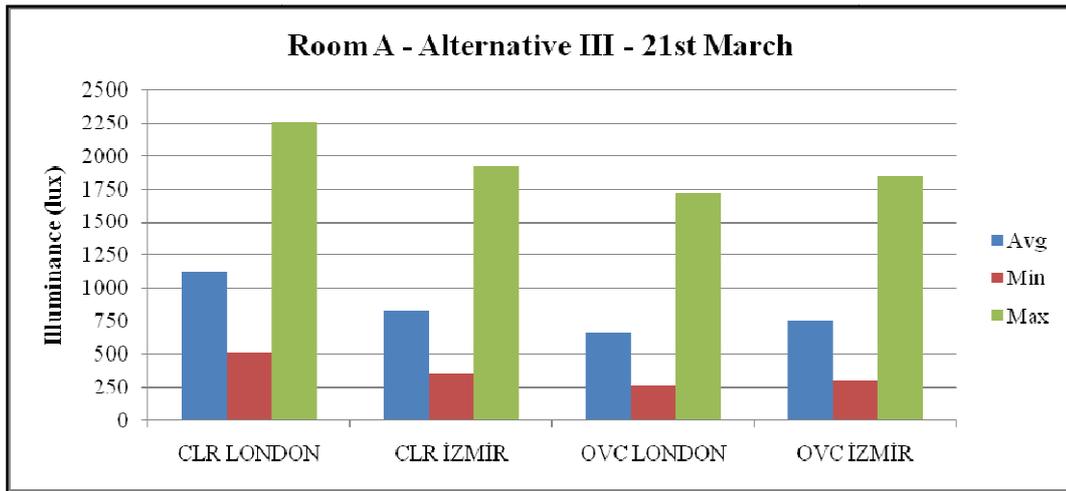


Figure B.9. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

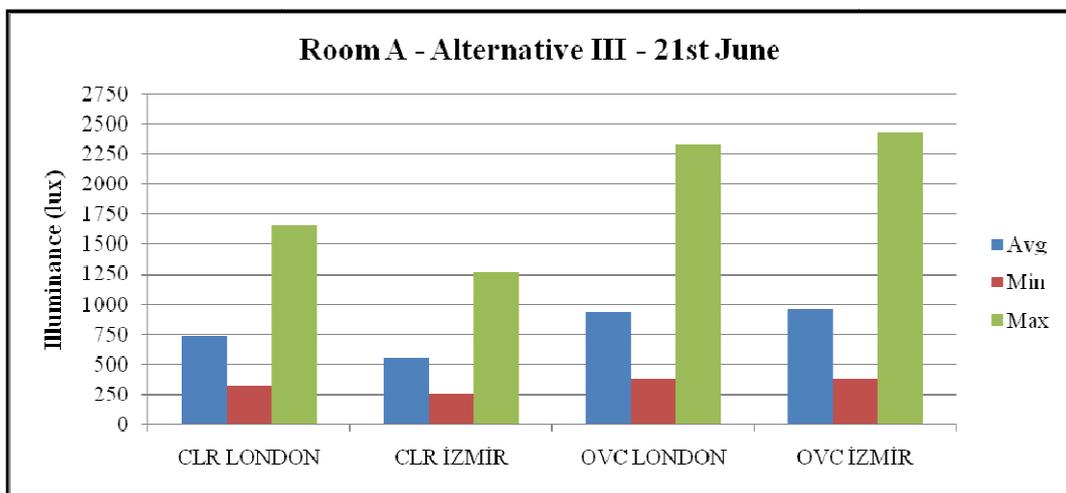


Figure B.10. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

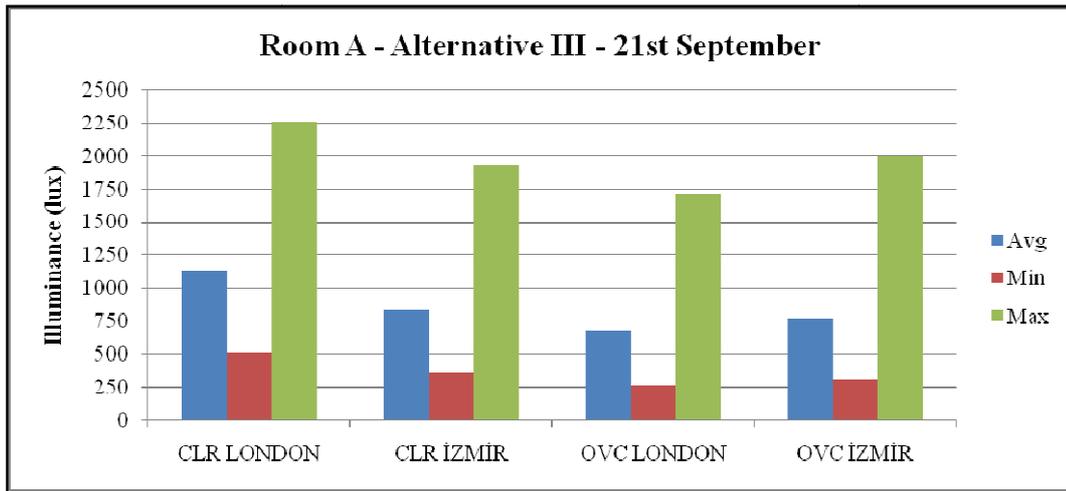


Figure B.11. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

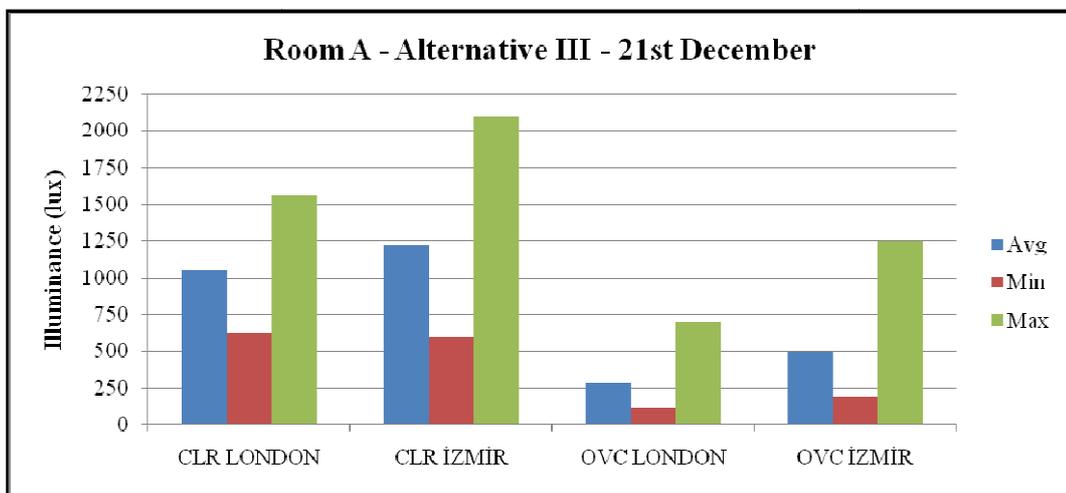


Figure B.12. Reference room A, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.

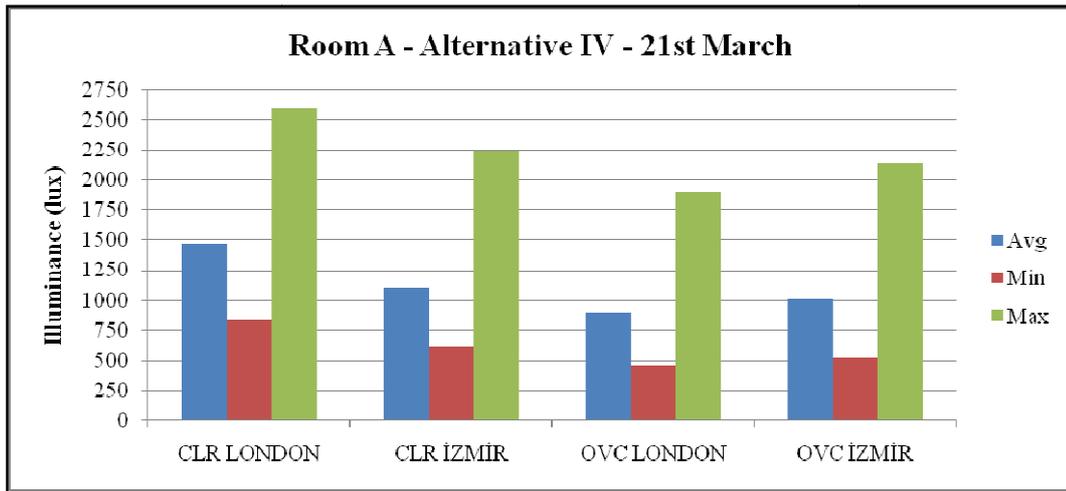


Figure B.13. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

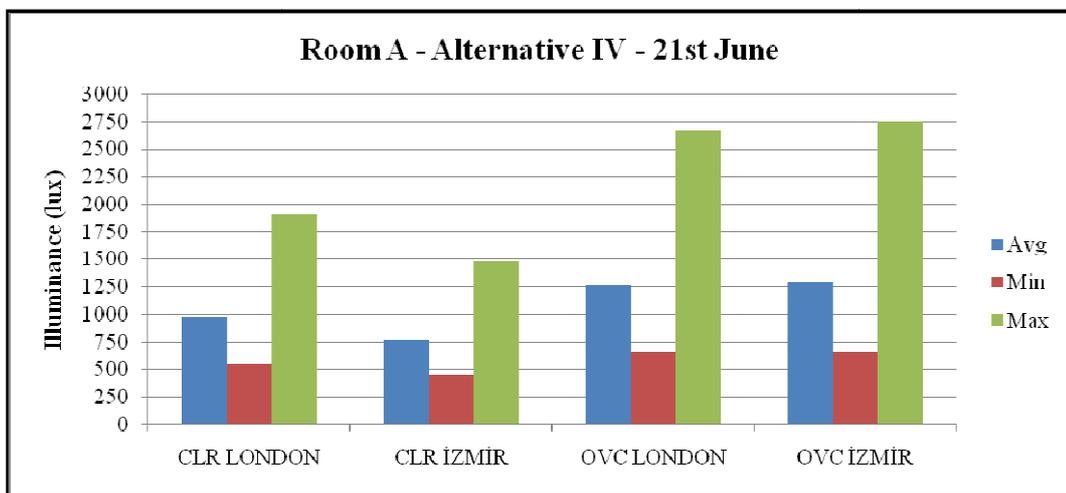


Figure B.14. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

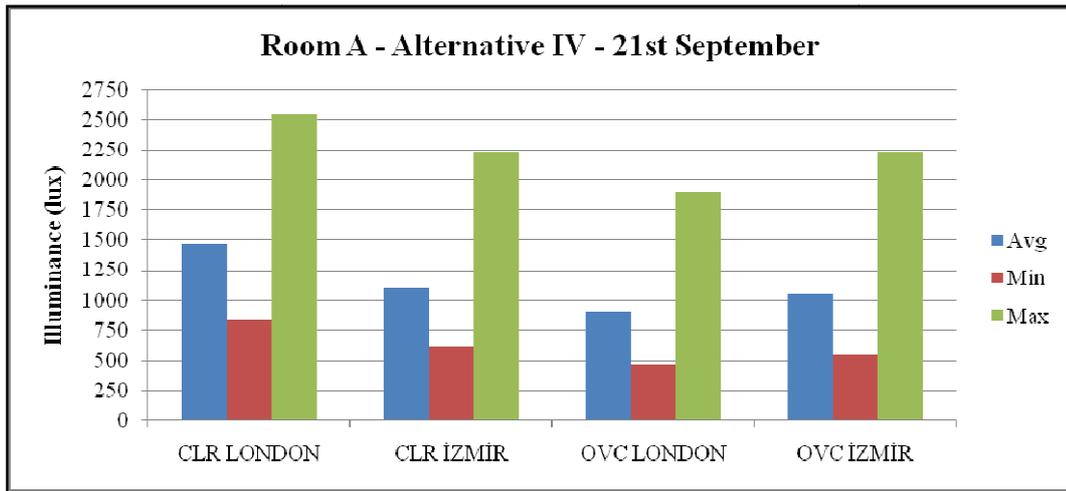


Figure B.15. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

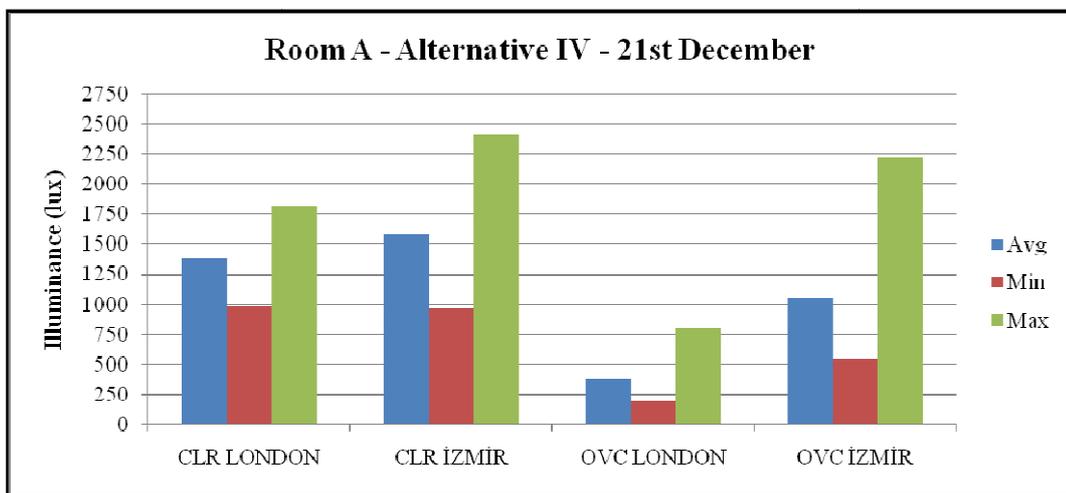


Figure B.16. Reference room A, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.

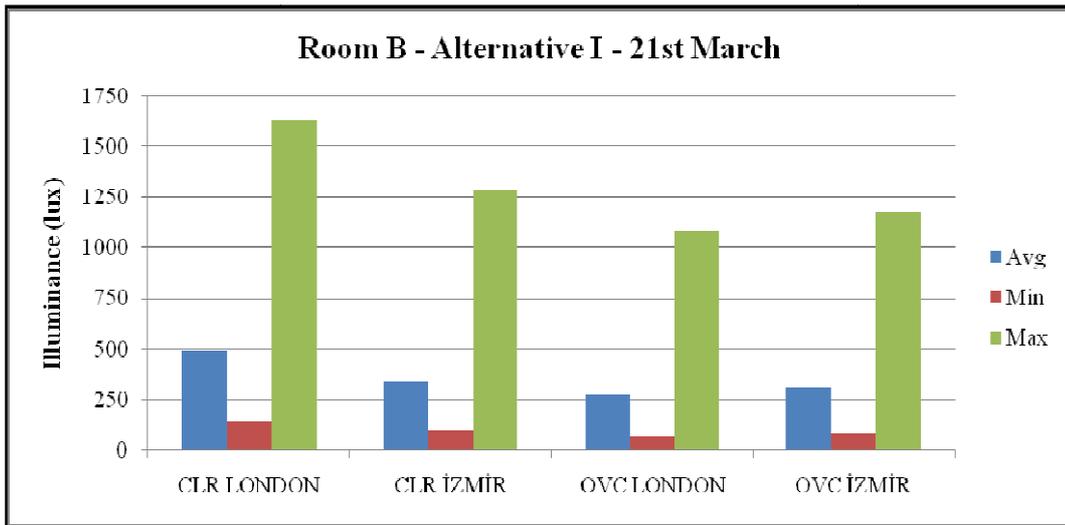


Figure B.17. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

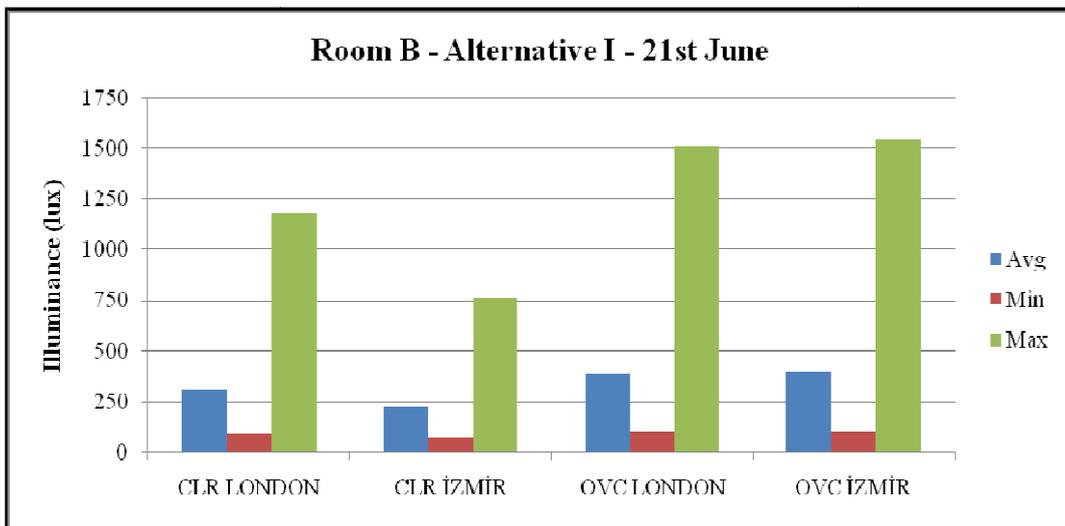


Figure B.18. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

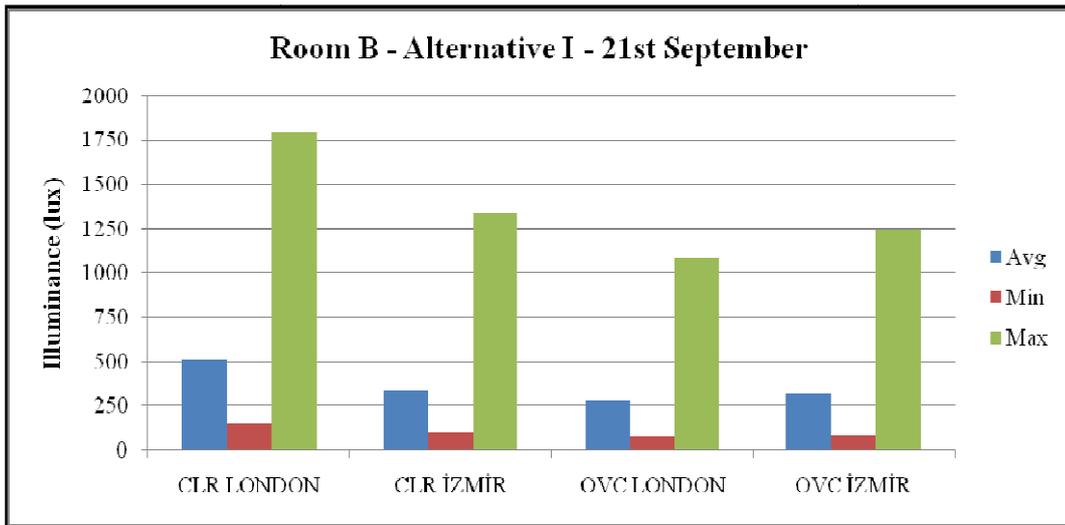


Figure B.19. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

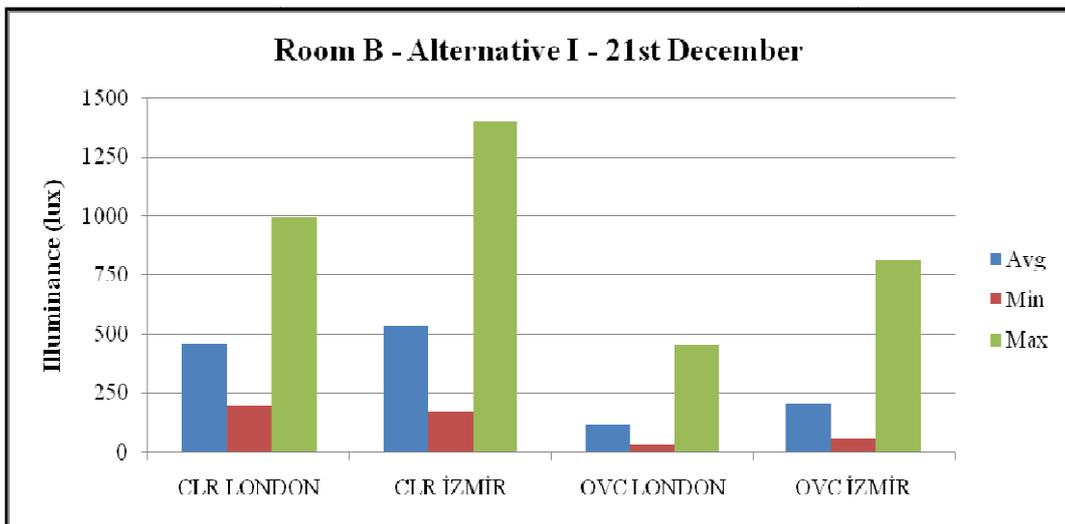


Figure B.20. Reference room B, material alternative I, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.

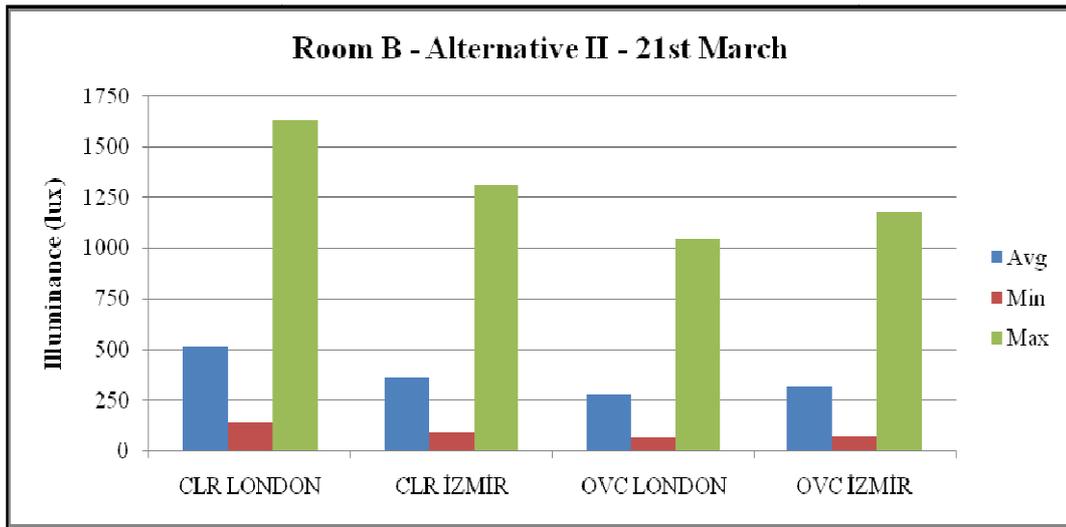


Figure B.21. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

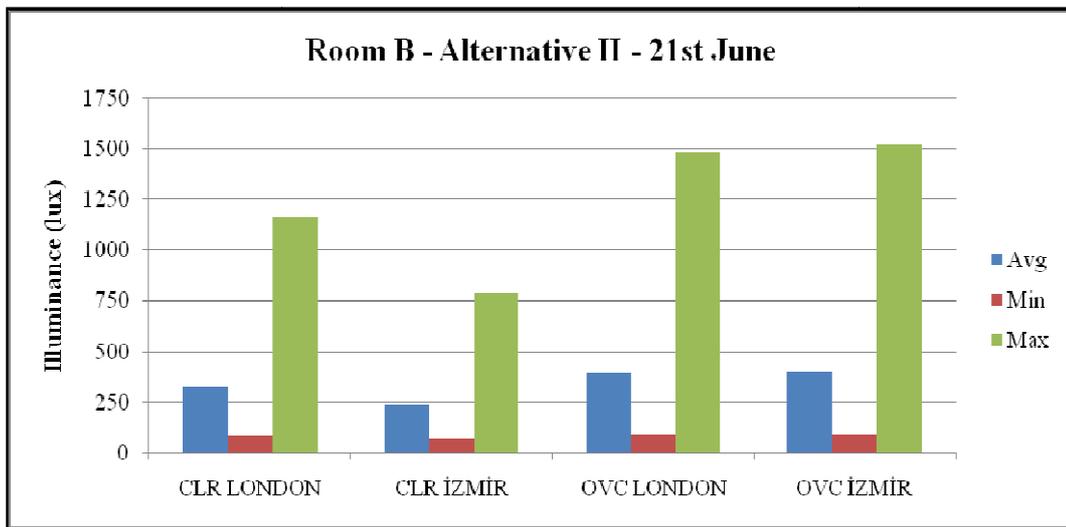


Figure B.22. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

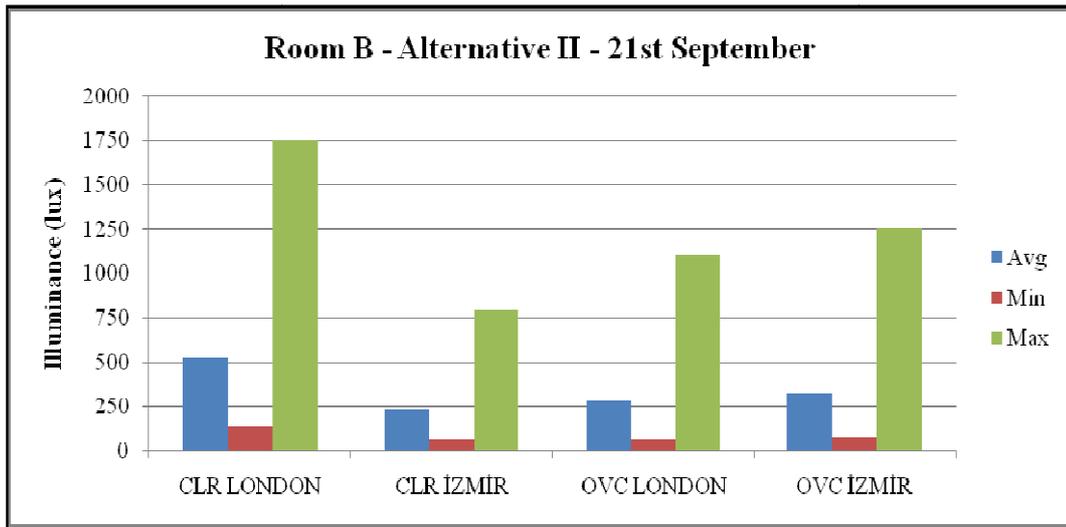


Figure B.23. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

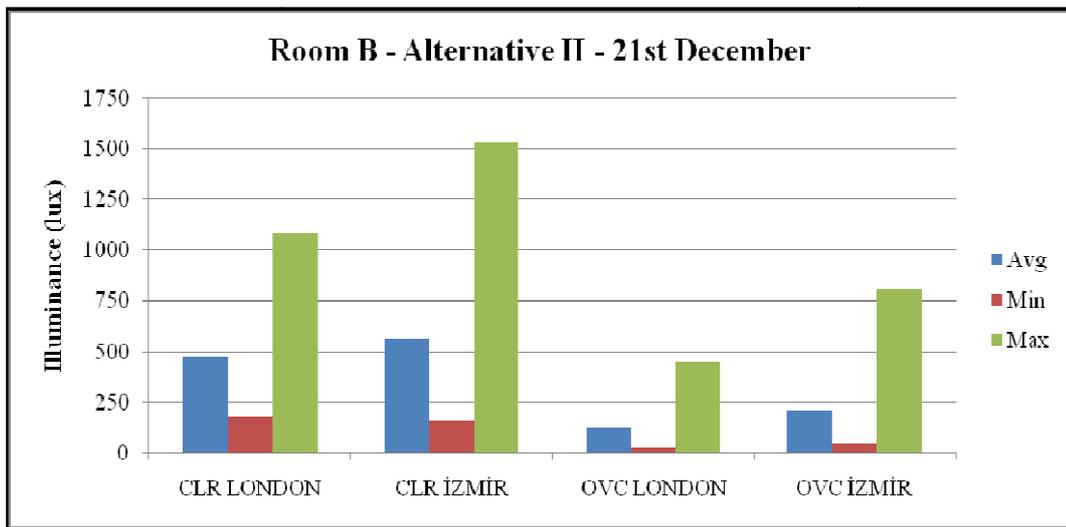


Figure B.24. Reference room B, material alternative II, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.

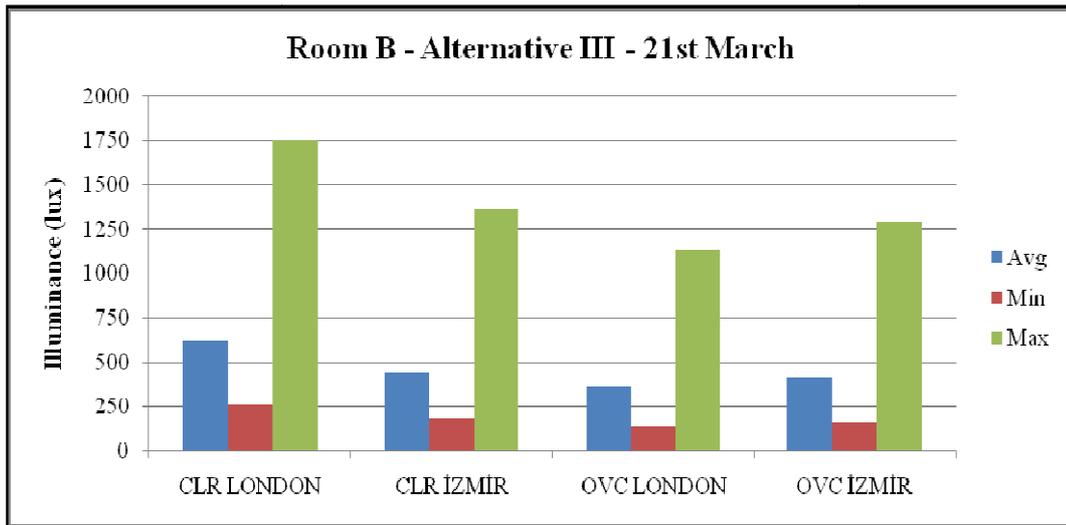


Figure B.25. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

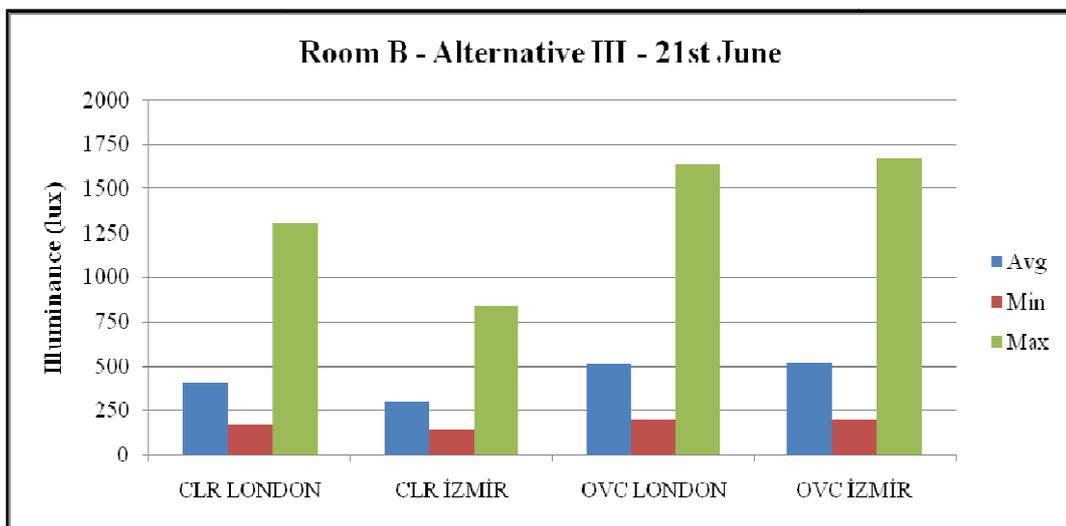


Figure B.26. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

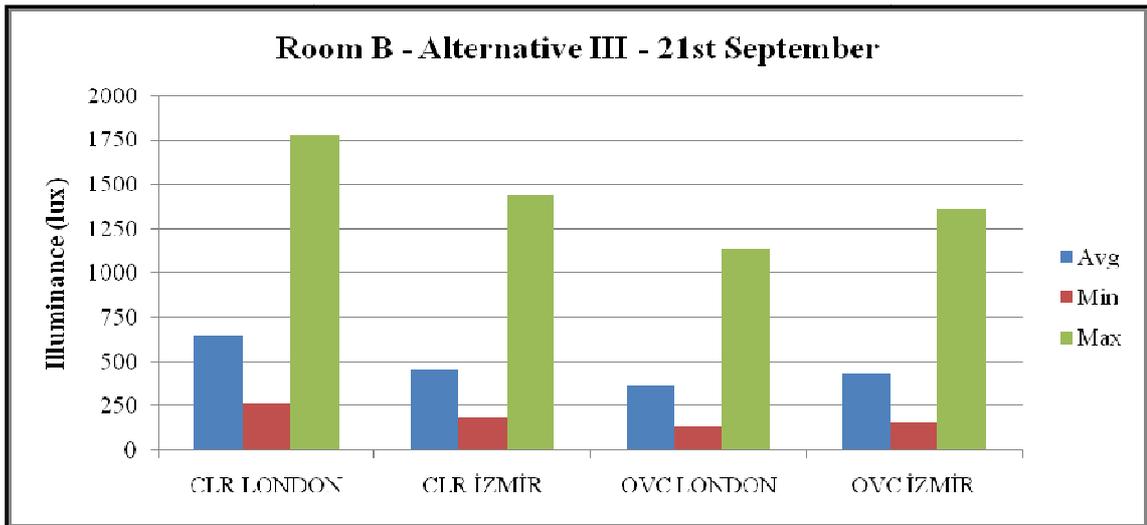


Figure B.27. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

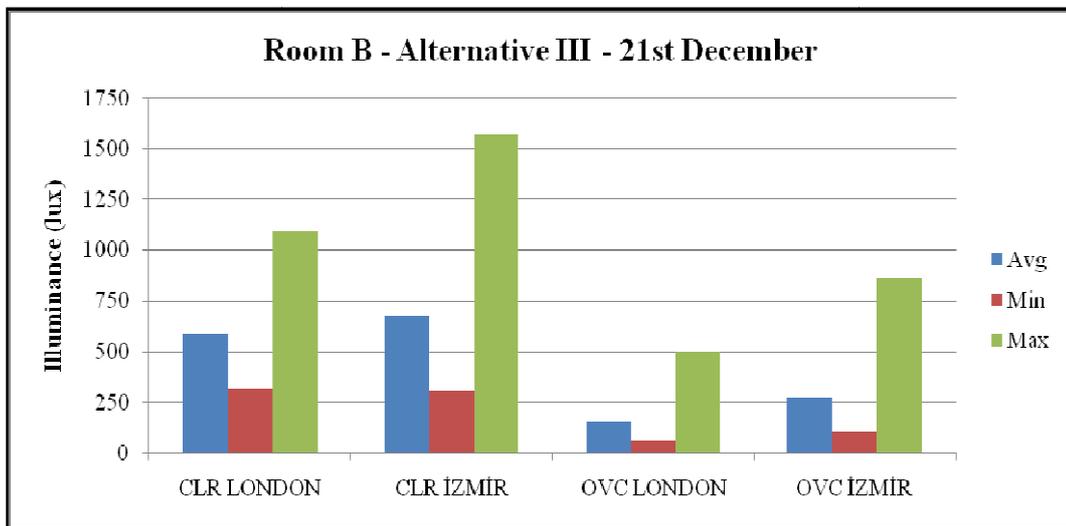


Figure B.28. Reference room B, material alternative III, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.

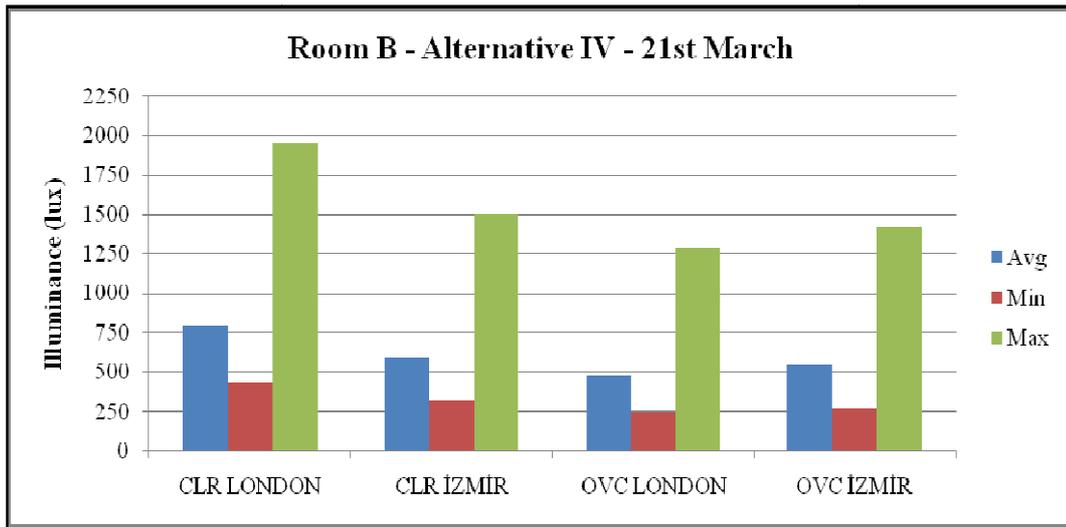


Figure B.29. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> March.

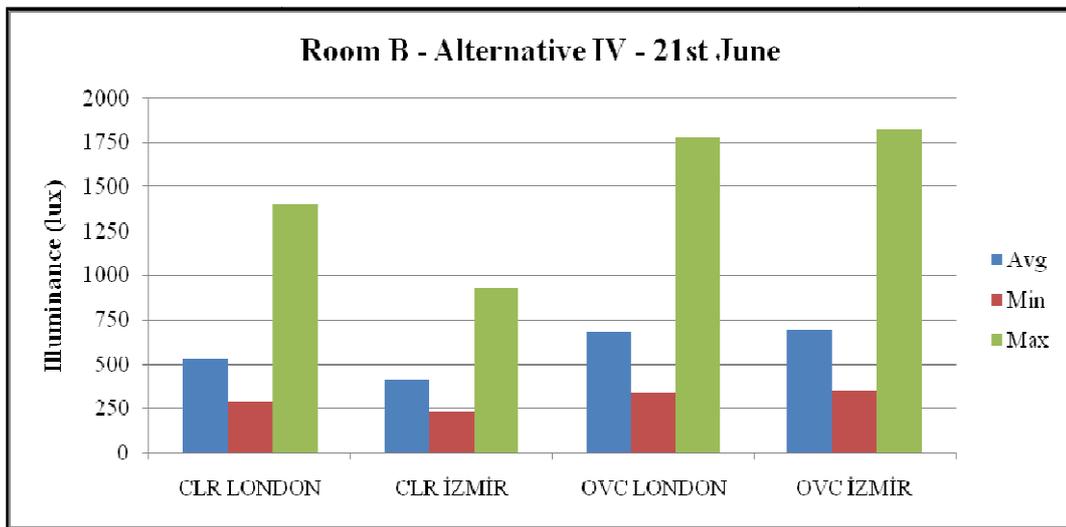


Figure B.30. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> June.

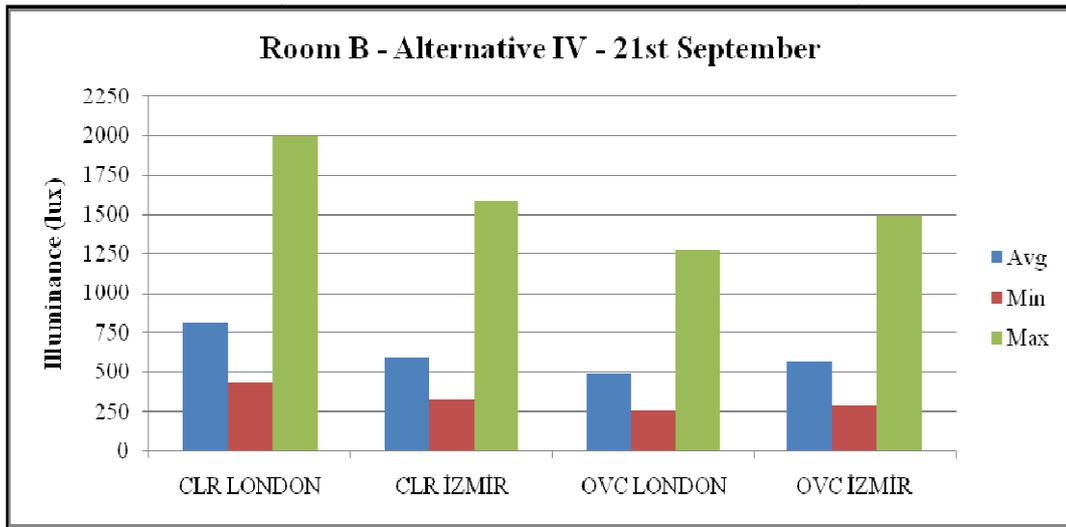


Figure B.31. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> September.

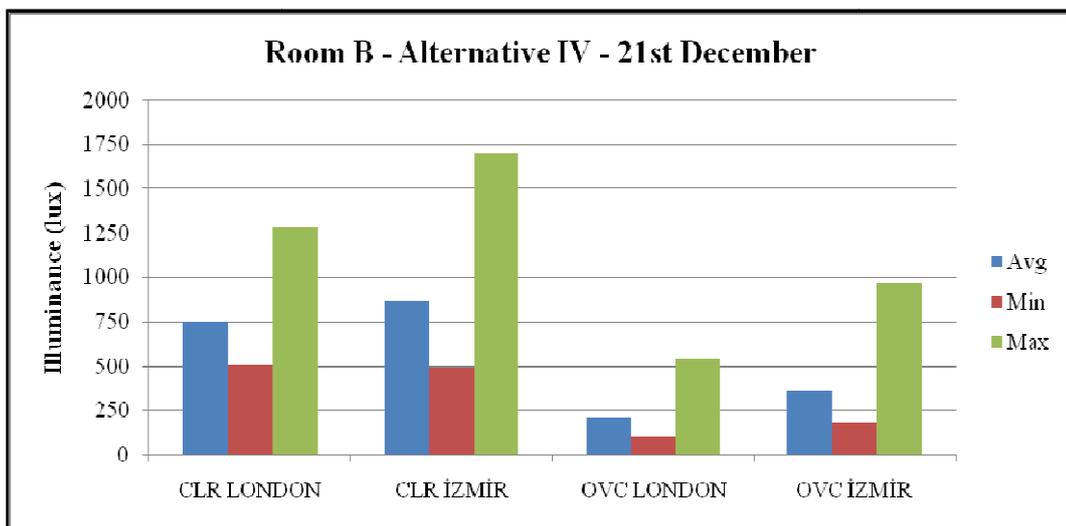


Figure B.32. Reference room B, material alternative IV, clear sky and overcast sky conditions for London and İzmir, average, minimum and maximum illuminance values in 21<sup>st</sup> December.