



# CGS TEST HİZMETLERİ TEKNİK KONTROL VE BELGELENDİRME ANONİM ŞİRKETİ

Kayışdağı Mahallesi Gülçin Sk. No: 2/2 Ataşehir  
İstanbul/TÜRKİYE  
Deney Raporu  
Test Report



LVD-448-01

12-2019

**Müşterinin adı /adres:**  
Customer name/address

**BSİ AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş.** / Konutkent Mah. 3029 Cad. No:3/91 06810  
Çankaya Ankara/TÜRKİYE

**Üreticinin adı /adres:**  
Manufacture's name/address

**BSİ AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş.** / Konutkent Mah. 3029 Cad. No:3/91 06810  
Çankaya Ankara/TÜRKİYE

**İstek Numarası:**  
Order no.

**01122019nkk1**

**Numunenin Adı ve Tarifi:**  
Name and identity of test item

**AYDINLATMA ARMATÜRÜ / LIGHTING FIXTURE**

**Numunenin Kabul tarihi:**  
The date of receipt of test item

**03-12-2019**

**Açıklamalar:**  
Remarks

**DGC'ye , UL 1598 standardı uyarınca "In Situ Temperature Measurement Test(ISTMT)" ölçümleri yapılmıştır. IESNA TM-21-11 standardına göre hesaplama yapılmıştır.**

ISTMT test has been applied to EUT according to UL 1598 standart. The calculation made according to IESNA TM-21-11 standart.

**Deneyin yapıldığı tarih:**  
Date of Test

**26-12-2019**

**Deney Standartı**  
Test Standard

**ANSI / UL1598  
IES TM-21-11**

**Raporun Sayfa Sayısı:**  
Number of pages of the Report

**11 sayfa/pages**

**Tarih**  
Date

**27-12-2019**

**Deney Sorumlusu**  
Person in charge of test

**Yüksel YILDIZ**

**Laboratuvar Müdürü**  
Head of Testing Laboratory

**Timur GÜSER**



**Bu rapor laboratuvarın izni olmadan kısmen kopyalanıp çoğaltılamaz.**

**İmzasız ve mühürlü raporlar geçersizdir.**

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**Testing reports without signature and seal are not valid.**

Rapor No / Report No: LVD-448-01

Format No: F510\_39\_R1.0

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Kayışdağı Mahallesi Gülçin Sk. No: 2/2 Ataşehir İstanbul/TÜRKİYE

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|          |                                      |
|----------|--------------------------------------|
| <b>1</b> | <b>Dokümantasyon</b> (Documentation) |
|----------|--------------------------------------|

|                                                                                                                                                                        |                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>1.1</b>                                                                                                                                                             | <b>DGC, Çevre Şartları ve Sembollerin Tanımları</b> (Description of the EUT, Environmental Conditions and Symbol Definitions) |
| <b>Markası / Brand</b>                                                                                                                                                 |                                           |
| <b>Modeli / Model</b>                                                                                                                                                  | İAXIS(L=1035mm)                                                                                                               |
| <b>Seri Numarası / Serial Number</b>                                                                                                                                   | Test numunesi/Test sample                                                                                                     |
| <b>Tanımı / Description</b>                                                                                                                                            | AYDINLATMA ARMATÜRÜ / LIGHTING FIXTURE                                                                                        |
| <b>Beyan Gücü / Rated Power</b>                                                                                                                                        | 23,5W                                                                                                                         |
| <b>Beyan Gerilimi / Rated Voltage</b>                                                                                                                                  | 220-240V AC                                                                                                                   |
| <b>Çevre Şartları / Environmental Conditions</b>                                                                                                                       | 25,1°C, %51 Rh                                                                                                                |
| Deneyler sırasında ölçülen çevre şartları ilgili sayfalarda belirtilmiştir.<br>(The environmental conditions are measured during tests, are determined related pages.) |                                                                                                                               |
| <b>Sembollerin Tanımı / Definations of Symbols</b>                                                                                                                     | DGC= Deneyden Geçen Cihaz<br>EUT=Equipment Under Test                                                                         |

| 1.2                                                                                                            | Deney Standartları (Test Standards)                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Deneyler aşağıdaki standartlara göre yapılmıştır<br>The tests were performed according to following standards. |                                                                                                                                                                                  |
| Standart / Standard                                                                                            | Açıklama / Description                                                                                                                                                           |
| ANSI / UL1598<br>IES TM-21-11<br>ENERGY STAR                                                                   | In Situ Temperature Measurement Test (ISTMT)<br>Projection Long Term Lumen Maintenance of<br>LED Light Sources<br>TM-21 Calculator for Uneven LM-80 Intervals<br>rev. 14.03.2018 |

| 2 | Deney Sonuçları ve Koşulları (Test Results and Conditions) |
|---|------------------------------------------------------------|
|---|------------------------------------------------------------|

| 2.1 | Deney Sonuçları (Test Results) |
|-----|--------------------------------|
|-----|--------------------------------|

### ISTMT Test Sonuçları

#### ISTMT Test Results

| ISTMT Test Sonuçları / ISTMT Test Results |                                    |                                             |                                        |
|-------------------------------------------|------------------------------------|---------------------------------------------|----------------------------------------|
| Isı Prop Numarası<br>Thermocouple Number  | Ölçüm Noktası<br>Measurement Point | Ölçülen Sıcaklık<br>Measured<br>Temperature | Ortam Sıcaklığı<br>Ambient Temperature |
| Thermocouple – C2/4                       | T <sub>j</sub> for LED             | 60,4 °C                                     | 50 °C                                  |
| Thermocouple – C1/4                       | LED Driver                         | 61,2 °C                                     |                                        |
| Thermocouple – C2/3                       | T <sub>c</sub> of luminaire        | 57,2 °C                                     |                                        |

## 2.1

## Deney Sonuçları (Test Results)

### IES TM-21 Test Sonuçları / IES TM-21 Test Results

### IES TM-21 Girdileri / IES TM-21 Inputs



#### TM-21 Inputs

**Instructions**

Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.

First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature 1". For only two case temperature data sets, complete 1 and 2.

Next, further to the right, in the corresponding box(es) for each tested case temperature, enter the test data along with the time (in hours) at which each measurement was taken. Data entered must be normalized then averaged measured data (per TM-21 sections 5.2.1 and 5.2.2). If case temperatures have different test durations, enter data up to the lowest of the test durations for all of the case temperatures.

Enter drive current, *in-situ* temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".

Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".

**Description of LED Light Source Tested**  
(manufacturer, model, catalog number)

BSI AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş.

**LM-80 Testing Details**

|                                                   |       |
|---------------------------------------------------|-------|
| Total number of units tested per case temperature | 24    |
| Number of failures:                               | 0     |
| Number of units measured:                         | 24    |
| Test duration (hours):                            | 10000 |
| Tested drive current (mA):                        | 700   |
| Tested case temperature 1 (T <sub>c</sub> , °C):  | 85    |
| Tested case temperature 2 (T <sub>c</sub> , °C):  | 105   |
| Tested case temperature 3 (T <sub>c</sub> , °C):  | 120   |

**In-Situ Inputs**

|                                                                                   |     |
|-----------------------------------------------------------------------------------|-----|
| Drive current for each LED package/array/module (mA):                             | 700 |
| In-situ case temperature (T <sub>c</sub> , °C):                                   | 55  |
| Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70): | 70  |

**Results**

|                                                          |        |
|----------------------------------------------------------|--------|
| Time (t) at which to estimate lumen maintenance (hours): | 10,000 |
| Lumen maintenance at time (t) (%):                       | 99.38% |
| Reported L70 (hours):                                    | >60000 |

**LM-80 Test Inputs**

| Test Data for 85°C Case Temperature |                       | Test Data for 105°C Case Temperature |                       | Test Data for 120°C Case Temperature |                       |
|-------------------------------------|-----------------------|--------------------------------------|-----------------------|--------------------------------------|-----------------------|
| Time (hours)                        | Lumen Maintenance (%) | Time (hours)                         | Lumen Maintenance (%) | Time (hours)                         | Lumen Maintenance (%) |
| 0                                   | 100.00%               | 0                                    | 100.00%               | 0                                    | 100.00%               |
| 500                                 | 100.40%               | 500                                  | 98.01%                | 500                                  | 98.80%                |
| 1000                                | 100.30%               | 1000                                 | 97.50%                | 1000                                 | 97.90%                |
| 2000                                | 100.00%               | 2000                                 | 97.40%                | 2000                                 | 97.00%                |
| 3000                                | 100.10%               | 3000                                 | 97.00%                | 3000                                 | 96.70%                |
| 4000                                | 99.80%                | 4000                                 | 96.40%                | 4000                                 | 96.00%                |
| 5000                                | 100.00%               | 5000                                 | 96.50%                | 5000                                 | 95.90%                |
| 6000                                | 99.80%                | 6000                                 | 95.70%                | 6000                                 | 95.50%                |
| 7000                                | 99.40%                | 7000                                 | 95.50%                | 7000                                 | 94.90%                |
| 8000                                | 99.70%                | 8000                                 | 94.90%                | 8000                                 | 94.90%                |
| 9000                                | 99.50%                | 9000                                 | 94.50%                | 9000                                 | 94.50%                |
| 10000                               | 99.40%                | 10000                                | 94.40%                | 10000                                | 94.40%                |





### TM-21 Inputs

Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.

First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature 1". For only two case temperature data sets, complete 1 and 2.

Next, further to the right, in the corresponding box(es) for each tested case temperature, enter the test data along with the time (in hours) at which each measurement was taken. Data entered must be normalized then averaged measured data (per TM-21 sections 5.2.1 and 5.2.2). If case temperatures have different test durations, enter data up to the lowest of the test durations for all of the case temperatures.

Enter drive current, *in-situ* temperature data and the percentage of initial lumens to project to in the fields labeled "In-Situ Inputs".

Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".

Description of LED Light Source Tested  
(manufacturer, model, catalog number)

BSİ AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş.

BSİ AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş.

### LM-80 Testing Details

|                                                   |       |
|---------------------------------------------------|-------|
| Total number of units tested per case temperature | 24    |
| Number of failures:                               | 0     |
| Number of units measured:                         | 24    |
| Test duration (hours):                            | 10000 |
| Tested drive current (mA):                        | 700   |
| Tested case temperature 1 ( $T_{c_1}$ , °C):      | 85    |
| Tested case temperature 2 ( $T_{c_2}$ , °C):      | 105   |
| Tested case temperature 3 ( $T_{c_3}$ , °C):      | 120   |

### In-Situ Inputs

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| Drive current for each LED package/array/module (mA):                      | 700 |
| <i>In-situ</i> case temperature ( $T_c$ , °C):                             | 55  |
| Percentage of initial lumens to project to (e.g. for $L_{70}$ , enter 70): | 90  |

## Results

|                                                          |        |
|----------------------------------------------------------|--------|
| Time (t) at which to estimate lumen maintenance (hours): | 10.000 |
| Lumen maintenance at time (t) (%):                       | 99,38% |
| Reported L90 (hours):                                    | >60000 |

## LM-80 Test Inputs

[illegible]

## 2.1

## Deney Sonuçları (Test Results)

### IES TM-21 Test Sonuçları / IES TM-21 Test Results

### IES TM-21 Çıktıları / IES TM-21 Outputs

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                       | <h2>TM-21 Report</h2>                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Table 1: Report at each LM-80 Test Condition</b><br><b>Description of LED Light Source Tested (manufacturer, model, catalog number)</b><br><b>Test Condition 1 - 85°C Case Temp</b><br>Sample size: 24<br>Number of failures: 0<br>DUT drive current used in the test (mA): 700<br>Test duration (hours): 10.000<br>Test duration used for projection (hour to hour): 5000,0 - 10000,0<br>Tested case temperature (°C): 85<br>$\alpha$ : 1,032E-06<br>B: 1,004<br>Reported L70(10k) (hours): >60000 | <b>BSİ AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş.</b><br><b>Test Condition 2 - 105°C Case Temp</b><br>Sample size: 24<br>Number of failures: 0<br>DUT drive current used in the test (mA): 700<br>Test duration (hours): 10.000<br>Test duration used for projection (hour to hour): 5000,0 - 10000,0<br>Tested case temperature (°C): 105<br>$\alpha$ : 4,405E-06<br>B: 0,984<br>Reported L70(10k) (hours): >60000 | <b>Table 2: Interpolation Report (projection based on in-situ temperature entered)</b><br>$T_{s,1}$ (°C): 85,00<br>$T_{s,1}$ (K): 358,15<br>$\alpha_1$ : 1,032E-06<br>$B_1$ : 1,004<br>$T_{s,2}$ (°C): -<br>$T_{s,2}$ (K): -<br>$\alpha_2$ : -<br>$B_2$ : -<br>$E_a/k_b$ : -<br>A: -<br>$B_0$ : 1,004<br>$T_{s,i}$ (°C): 55,00<br>$T_{s,i}$ (K): 328,15<br>$\alpha_i$ : 1,032E-06<br>Reported L70(10k) at 55°C: >60000 |

|                      |        |
|----------------------|--------|
| Report Generated By: | Notes: |
| Company:             |        |
| Date:                |        |



## TM-21 Report

| Table 1: Report at each LM-80 Test Condition                                 |                  |                                                   |                  |                                                  |                  | Table 2: Interpolation Report<br>(projection based on <i>in-situ</i> temperature entered) |           |
|------------------------------------------------------------------------------|------------------|---------------------------------------------------|------------------|--------------------------------------------------|------------------|-------------------------------------------------------------------------------------------|-----------|
| Description of LED Light Source Tested (manufacturer, model, catalog number) |                  | BSI AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş. |                  |                                                  |                  | $T_{s,1}$ (°C)                                                                            | 85,00     |
| Test Condition 1 - 85°C Case Temp                                            |                  | Test Condition 2 - 105°C Case Temp                |                  | Test Condition 3 - 120°C Case Temp               |                  | $T_{s,1}$ (K)                                                                             | 358,15    |
| Sample size                                                                  | 24               | Sample size                                       | 24               | Sample size                                      | 24               | $\alpha_1$                                                                                | 1,032E-06 |
| Number of failures                                                           | 0                | Number of failures                                | 0                | Number of failures                               | 0                | $B_1$                                                                                     | 1,004     |
| DUT drive current used in the test (mA)                                      | 700              | DUT drive current used in the test (mA)           | 700              | DUT drive current used in the test (mA)          | 700              | $T_{s,2}$ (°C)                                                                            | -         |
| Test duration (hours)                                                        | 10.000           | Test duration (hours)                             | 10.000           | Test duration (hours)                            | 10.000           | $T_{s,2}$ (K)                                                                             | -         |
| Test duration used for projection (hour to hour)                             | 5000,0 - 10000,0 | Test duration used for projection (hour to hour)  | 5000,0 - 10000,0 | Test duration used for projection (hour to hour) | 5000,0 - 10000,0 | $\alpha_2$                                                                                | -         |
| Tested case temperature (°C)                                                 | 85               | Tested case temperature (°C)                      | 105              | Tested case temperature (°C)                     | 120              | $B_2$                                                                                     | -         |
| $\alpha$                                                                     | 1,032E-06        | $\alpha$                                          | 4,405E-06        | $\alpha$                                         | 3,064E-06        | $E_s/k_b$                                                                                 | -         |
| B                                                                            | 1,004            | B                                                 | 0,984            | B                                                | 0,972            | A                                                                                         | -         |
| Reported L80(10k) (hours)                                                    | >60000           | Reported L80(10k) (hours)                         | 47.000           | Reported L80(10k) (hours)                        | >60000           | $B_0$                                                                                     | 1,004     |
|                                                                              |                  |                                                   |                  |                                                  |                  | $T_{s,i}$ (°C)                                                                            | 55,00     |
|                                                                              |                  |                                                   |                  |                                                  |                  | $T_{s,i}$ (K)                                                                             | 328,15    |
|                                                                              |                  |                                                   |                  |                                                  |                  | $\alpha_i$                                                                                | 1,032E-06 |
|                                                                              |                  |                                                   |                  |                                                  |                  | Reported L80(10k) at 55°C                                                                 | >60000    |

|                      |        |
|----------------------|--------|
| Report Generated By: | Notes: |
| Company:             |        |
| Date:                |        |



## TM-21 Report

| Table 1: Report at each LM-80 Test Condition                                 |                  |                                                   |                  |                                                  |                  | Table 2: Interpolation Report<br>(projection based on <i>in-situ</i> temperature entered) |           |
|------------------------------------------------------------------------------|------------------|---------------------------------------------------|------------------|--------------------------------------------------|------------------|-------------------------------------------------------------------------------------------|-----------|
| Description of LED Light Source Tested (manufacturer, model, catalog number) |                  | BSI AYDINLATMA ELEKTRİK ELEKTRONİK SAN. TİC. A.Ş. |                  |                                                  |                  | $T_{s,1}$ (°C)                                                                            | 85,00     |
| Test Condition 1 - 85°C Case Temp                                            |                  | Test Condition 2 - 105°C Case Temp                |                  | Test Condition 3 - 120°C Case Temp               |                  | $T_{s,1}$ (K)                                                                             | 358,15    |
| Sample size                                                                  | 24               | Sample size                                       | 24               | Sample size                                      | 24               | $\alpha_1$                                                                                | 1,032E-06 |
| Number of failures                                                           | 0                | Number of failures                                | 0                | Number of failures                               | 0                | $B_1$                                                                                     | 1,004     |
| DUT drive current used in the test (mA)                                      | 700              | DUT drive current used in the test (mA)           | 700              | DUT drive current used in the test (mA)          | 700              | $T_{s,2}$ (°C)                                                                            | -         |
| Test duration (hours)                                                        | 10.000           | Test duration (hours)                             | 10.000           | Test duration (hours)                            | 10.000           | $T_{s,2}$ (K)                                                                             | -         |
| Test duration used for projection (hour to hour)                             | 5000,0 - 10000,0 | Test duration used for projection (hour to hour)  | 5000,0 - 10000,0 | Test duration used for projection (hour to hour) | 5000,0 - 10000,0 | $\alpha_2$                                                                                | -         |
| Tested case temperature (°C)                                                 | 85               | Tested case temperature (°C)                      | 105              | Tested case temperature (°C)                     | 120              | $B_2$                                                                                     | -         |
| $\alpha$                                                                     | 1,032E-06        | $\alpha$                                          | 4,405E-06        | $\alpha$                                         | 3,064E-06        | $E_s/k_b$                                                                                 | -         |
| B                                                                            | 1,004            | B                                                 | 0,984            | B                                                | 0,972            | A                                                                                         | -         |
| Reported L90(10k) (hours)                                                    | >60000           | Reported L90(10k) (hours)                         | 20.000           | Reported L90(10k) (hours)                        | 25.000           | $B_0$                                                                                     | 1,004     |
|                                                                              |                  |                                                   |                  |                                                  |                  | $T_{s,i}$ (°C)                                                                            | 55,00     |
|                                                                              |                  |                                                   |                  |                                                  |                  | $T_{s,i}$ (K)                                                                             | 328,15    |
|                                                                              |                  |                                                   |                  |                                                  |                  | $\alpha_i$                                                                                | 1,032E-06 |
|                                                                              |                  |                                                   |                  |                                                  |                  | Reported L90(10k) at 55°C                                                                 | >60000    |

|                      |        |
|----------------------|--------|
| Report Generated By: | Notes: |
| Company:             |        |
| Date:                |        |

Lifetime = L70(10k) >60.000 hr

L80(10k) >60.000 hr

L90(10k) >60.000 hr

| 3           | Ekler Listesi (List Of Annexes) |                                          |
|-------------|---------------------------------|------------------------------------------|
| Ek<br>Annex | Sayfa Sayısı<br>Number of Pages | Konu<br>Subject                          |
| 1           | 1                               | DGC'nin Fotoğrafları (Photos of EUT)     |
| 2           | 1                               | Komponent Beyanı (Component declaration) |

**3.1****DGC'nin Fotoğrafları (Photos of EUT)**

**3.2****Kompenent Beyanı** (*Compenent declaration*)

| Object / part No. | Manufacturer/ trademark | Type / model                   | Technical data                                                        | Standard                     | Mark(s) of conformity <sup>1)</sup> |
|-------------------|-------------------------|--------------------------------|-----------------------------------------------------------------------|------------------------------|-------------------------------------|
| Drivers           | Tridonic                | LC 35W<br>350mA fixC IP<br>SNC | Input:<br>220-240 V AC;<br>50/60 Hz<br>Output:<br>350V; 350mA;<br>35W | EN 61347-1,<br>EN 61347-2-13 | ENEC; EAC;<br>CE                    |
|                   |                         |                                |                                                                       |                              |                                     |