

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 1 of 16

**Applicant :** Mid Ocean Brands B.V.**Address:** 7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong

The following sample(s) and sample information was/were submitted and identified by client as:

**Sample Name:** Glass bauble with stiff jute support base and string leds**Model:** CX1514**Vendor code:** 107978**Receiving Date:** Apr 15,2025**Test Period:** From Apr 15,2025 to Apr 23,2025**Add Information:** -

## Test Summary:

| # | Test Item(s)   | Conclusion |
|---|--|------------|
| 1 | IEC 62471:2006: PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS | PASS       |

\*\*\*\*\*Please refer to the following page for detailed results\*\*\*\*\*

Authorized Signatory

Mark Mai  
(Technical Director)

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25, 2025

Page 2 of 16

## Result:

### 1. PHOTOBIOLOGICAL SAFETY OF LAMPS AND LAMP SYSTEMS

IEC 62471:2006

#### IEC 62471

| Clause   | Requirement + Test   | Result – Remark | Verdict |
|----------|--|-----------------|---------|
| <b>4</b> | <b>EXPOSURE LIMITS</b>   |                 | P       |
| 4.1      | General  |                 | P       |
|          | The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure  |                 | P       |
|          | Detailed spectral data of a light source are generally required only if the luminance of the source exceeds $10^4 \text{ cd.m}^{-2}$   | See clause 4.3  | N/A     |
| 4.3      | Hazard exposure limits   |                 | P       |
| 4.3.1    | Actinic UV hazard exposure limit for the skin and eye  |                 | P       |
|          | The exposure limit for effective radiant exposure is $30 \text{ J.m}^{-2}$ within any 8-hour period  |                 | P       |
|          | To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broadband source, the effective integrated spectral irradiance, $E_s$ , of the light source shall not exceed the levels defined by:   |                 | P       |
|          | $E_s \cdot t = \sum_{200}^{400} \sum_t E_\lambda(\lambda, t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta \lambda \leq 30 \text{ J.m}^{-2}$   |                 | P       |
|          | The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:   |                 | P       |
|          | $t_{\max} = \frac{30}{E_s} \text{ s}$  |                 | P       |
| 4.3.2    | Near-UV hazard exposure limit for eye  |                 | P       |
|          | For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed $10000 \text{ J.m}^{-2}$ for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, $E_{UVA}$ , shall not exceed $10 \text{ W.m}^{-2}$ . |                 | P       |
|          | The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:  |                 | P       |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 3 of 16

## IEC 62471

| Clause | Requirement + Test   | Result – Remark   | Verdict |
|--------|--|---|---------|
|        | $t_{\max} \leq \frac{10\,000}{E_{\text{UVA}}} \text{ s}$   |   | P       |
| 4.3.3  | Retinal blue light hazard exposure limit   |   | P       |
|        | To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, $B(\lambda)$ , i.e., the blue-light weighted radiance, $L_B$ , shall not exceed the levels defined by: |   | P       |
|        | $L_B \cdot t = \sum_{300}^{700} \sum L_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \cdot \Delta t \leq 10^6 \text{ J} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$   | for $t \leq 10^4 \text{ s}$ $t_{\max} = \frac{10^6}{L_B}$ | N/A     |
|        | $L_B = \sum_{300}^{700} L_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 100 \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$  | for $t > 10^4 \text{ s}$                                  | P       |
| 4.3.4  | Retinal blue light hazard exposure limit - small source  |   | N/A     |
|        | Thus the spectral irradiance at the eye $E_{\lambda}$ , weighted against the blue-light hazard function $B(\lambda)$ shall not exceed the levels defined by:   | See table 4.2   | N/A     |
|        | $E_B \cdot t = \sum_{300}^{700} \sum E_{\lambda}(\lambda, t) \cdot B(\lambda) \cdot \Delta\lambda \cdot \Delta t \leq 100 \text{ J} \cdot \text{m}^{-2}$   | for $t \leq 100 \text{ s}$                                | N/A     |
|        | $E_B = \sum_{300}^{700} E_{\lambda} \cdot B(\lambda) \cdot \Delta\lambda \leq 1 \text{ W} \cdot \text{m}^{-2}$   | for $t > 100 \text{ s}$                                   | N/A     |
| 4.3.5  | Retinal thermal hazard exposure limit  |   | P       |
|        | To protect against retinal thermal injury, the integrated spectral radiance of the light source, $L_{\lambda}$ , weighted by the burn hazard weighting function $R(\lambda)$ (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by: |   | P       |
|        | $L_R = \sum_{380}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{50\,000}{\alpha \cdot t^{0.25}} \text{ W} \cdot \text{m}^{-2} \cdot \text{sr}^{-1}$   | $(10 \mu\text{s} \leq t \leq 10 \text{ s})$               | N/A     |
| 4.3.6  | Retinal thermal hazard exposure limit – weak visual stimulus   |   | P       |
|        | For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, $L_{\text{IR}}$ , as viewed by the eye for exposure times greater than 10 s shall be limited to:           |   | P       |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 4 of 16

## IEC 62471

| Clause   | Requirement + Test  | Result – Remark         | Verdict |
|----------|---|-------------------------|---------|
|          | $L_{IR} = \sum_{780}^{1400} L_{\lambda} \cdot R(\lambda) \cdot \Delta\lambda \leq \frac{6000}{\alpha} \quad W \cdot m^{-2} \cdot sr^{-1}$   |                         | P       |
| 4.3.7    | Infrared radiation hazard exposure limits for the eye   |                         | P       |
|          | The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, $E_{IR}$ , over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed: |                         | P       |
|          | $E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 18000 \cdot t^{-0.75} \quad W \cdot m^{-2}$  | $t \leq 1000 \text{ s}$ | N/A     |
|          | For times greater than 1000 s the limit becomes:  |                         | P       |
|          | $E_{IR} = \sum_{780}^{3000} E_{\lambda} \cdot \Delta\lambda \leq 100 \quad W \cdot m^{-2}$  | $t > 1000 \text{ s}$    | P       |
| 4.3.8    | Thermal hazard exposure limit for the skin  |                         | P       |
|          | Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:  |                         | P       |
|          | $E_H \cdot t = \sum_{380}^{3000} \sum_t E_{\lambda}(\lambda, t) \cdot \Delta t \cdot \Delta\lambda \leq 20000 \cdot t^{0.25} \quad J \cdot m^{-2}$  |                         | P       |
| <b>5</b> | <b>MEASUREMENT OF LAMPS AND LAMP SYSTEMS</b>  |                         | P       |
| 5.1      | Measurement conditions  |                         | P       |
|          | Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.   |                         | P       |
| 5.1.1    | Lamp ageing (seasoning)   | Not lamps               | N/A     |
|          | Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.  |                         | N/A     |
| 5.1.2    | Test environment  |                         | P       |
|          | For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.  |                         | P       |
| 5.1.3    | Extraneous radiation  |                         | P       |
|          | Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.   |                         | P       |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 5 of 16

| IEC 62471 |  |                 |         |
|-----------|--|-----------------|---------|
| Clause    | Requirement + Test   | Result – Remark | Verdict |
| 5.1.4     | Lamp operation   |                 | N/A     |
|           | Operation of the test lamp shall be provided in accordance with:   |                 | N/A     |
|           | – the appropriate IEC lamp standard, or  |                 | N/A     |
|           | – the manufacturer's recommendation  |                 | N/A     |
| 5.1.5     | Lamp system operation  |                 | P       |
|           | The power source for operation of the test lamp shall be provided in accordance with:  |                 | P       |
|           | – the appropriate IEC standard, or   |                 | N/A     |
|           | – the manufacturer's recommendation  |                 | P       |
| 5.2       | Measurement procedure  |                 | P       |
| 5.2.1     | Irradiance measurements  |                 | P       |
|           | Minimum aperture diameter 7 mm.  |                 | P       |
|           | Maximum aperture diameter 50 mm.   |                 | P       |
|           | The measurement shall be made in that position of the beam giving the maximum reading.   |                 | P       |
|           | The measurement instrument is adequate calibrated.   |                 | P       |
| 5.2.2     | Radiance measurements  |                 | P       |
| 5.2.2.1   | Standard method  |                 | N/A     |
|           | The measurements made with an optical system.  |                 | N/A     |
|           | The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the field of view of the instrument. |                 | N/A     |
| 5.2.2.2   | Alternative method   |                 | N/A     |
|           | Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.            |                 | N/A     |
| 5.2.3     | Measurement of source size   |                 | P       |
|           | The determination of $\alpha$ , the angle subtended by a source, requires the determination of the 50% emission points of the source.  |                 | P       |
| 5.2.4     | Pulse width measurement for pulsed sources   |                 | N/A     |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 6 of 16

| IEC 62471 |   |                         |         |
|-----------|---|-------------------------|---------|
| Clause    | Requirement + Test  | Result – Remark         | Verdict |
|           | The determination of $\Delta t$ , the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.  |                         | N/A     |
| 5.3       | Analysis methods  |                         | P       |
| 5.3.1     | Weighting curve interpolations  |                         | P       |
|           | To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.  | See table 4.1           | P       |
| 5.3.2     | Calculations  |                         | P       |
|           | The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.  |                         | P       |
| 5.3.3     | Measurement uncertainty   |                         | P       |
|           | The quality of all measurement results must be quantified by an analysis of the uncertainty.  | See Annex C in the norm | P       |
| <b>6</b>  | <b>LAMP CLASSIFICATION</b>  |                         | P       |
|           | For the purposes of this standard it was decided that the values shall be reported as follows:  | See table 6.1           | P       |
|           | – for lamps intended for general lighting service, the hazard values shall be reported as either $i_r$ - radiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm |                         | P       |
|           | – for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm   |                         | N/A     |
| 6.1       | Continuous wave lamps   |                         | P       |
| 6.1.1     | Exempt Group  |                         | P       |
|           | In the exempt group are lamps, which don't pose any photobiological hazard. The requirement is met by any lamp that does not pose:  |                         | P       |
|           | – an actinic ultraviolet hazard ( $E_s$ ) within 8-hours exposure (30000 s), nor  |                         | P       |
|           | – a near-UV hazard ( $E_{UVA}$ ) within 1000 s, (about 16 min), nor   |                         | P       |
|           | – a retinal blue-light hazard ( $L_B$ ) within 10000 s (about 2,8 h), nor   |                         | P       |



# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 7 of 16

| IEC 62471 |  |                 |         |
|-----------|--|-----------------|---------|
| Clause    | Requirement + Test   | Result – Remark | Verdict |
|           | – a retinal thermal hazard ( $L_R$ ) within 10 s, nor  |                 | P       |
|           | – an infrared radiation hazard for the eye ( $E_{IR}$ ) within 1000 s  |                 | P       |
| 6.1.2     | Risk Group 1 (Low-Risk)  |                 | N/A     |
|           | In this group are lamps, which exceeds the limits for the except group but that does not pose:   |                 | N/A     |
|           | – an actinic ultraviolet hazard ( $E_s$ ) within 10000 s, nor  |                 | N/A     |
|           | – a near ultraviolet hazard ( $E_{UVA}$ ) within 300 s, nor  |                 | N/A     |
|           | – a retinal blue-light hazard ( $L_B$ ) within 100 s, nor  |                 | N/A     |
|           | – a retinal thermal hazard ( $L_R$ ) within 10 s, nor  |                 | N/A     |
|           | – an infrared radiation hazard for the eye ( $E_{IR}$ ) within 100 s   |                 | N/A     |
|           | Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard ( $L_{IR}$ ), within 100 s are in Risk Group 1. |                 | N/A     |
| 6.1.3     | Risk Group 2 (Moderate-Risk)   |                 | N/A     |
|           | This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:  |                 | N/A     |
|           | – an actinic ultraviolet hazard ( $E_s$ ) within 1000 s exposure, nor  |                 | N/A     |
|           | – a near ultraviolet hazard ( $E_{UVA}$ ) within 100 s, nor  |                 | N/A     |
|           | – a retinal blue-light hazard ( $L_B$ ) within 0,25 s (aversion response), nor   |                 | N/A     |
|           | – a retinal thermal hazard ( $L_R$ ) within 0,25 s (aversion response), nor  |                 | N/A     |
|           | – an infrared radiation hazard for the eye ( $E_{IR}$ ) within 10 s  |                 | N/A     |
|           | Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard ( $L_{IR}$ ), within 10 s are in Risk Group 2.  |                 | N/A     |
| 6.1.4     | Risk Group 3 (High-Risk)   |                 | N/A     |
|           | Lamps which exceed the limits for Risk Group 2 are in Group 3.   |                 | N/A     |
| 6.2       | Pulsed lamps   |                 | N/A     |
|           | Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.  |                 | N/A     |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 8 of 16

| IEC 62471 |  |                 |         |
|-----------|--|-----------------|---------|
| Clause    | Requirement + Test   | Result – Remark | Verdict |
|           | A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.   |                 | N/A     |
|           | The risk group determination of the lamp being tested shall be made as follows:  |                 | N/A     |
|           | – a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)  |                 | N/A     |
|           | – for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group   |                 | N/A     |
|           | – for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission |                 | N/A     |



# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 9 of 16

| IEC 62471                 |  |                           |                                      |
|---------------------------|--|---------------------------|--------------------------------------|
| Clause                    | Requirement + Test   | Result – Remark           | Verdict                              |
| <b>Table 4.1</b>          | Spectral weighting function for assessing ultraviolet hazards for skin and eye |                           | P                                    |
| Wavelength $\lambda$ , nm | UV hazard function $S_{uv}(\lambda)$   | Wavelength $\lambda$ , nm | UV hazard function $S_{uv}(\lambda)$ |
| 200                       | 0,030  | 313*                      | 0,006                                |
| 205                       | 0,051  | 315                       | 0,003                                |
| 210                       | 0,075  | 316                       | 0,0024                               |
| 215                       | 0,095  | 317                       | 0,0020                               |
| 220                       | 0,120  | 318                       | 0,0016                               |
| 225                       | 0,150  | 319                       | 0,0012                               |
| 230                       | 0,190  | 320                       | 0,0010                               |
| 235                       | 0,240  | 322                       | 0,00067                              |
| 240                       | 0,300  | 323                       | 0,00054                              |
| 245                       | 0,360  | 325                       | 0,00050                              |
| 250                       | 0,430  | 328                       | 0,00044                              |
| 254*                      | 0,500  | 330                       | 0,00041                              |
| 255                       | 0,520  | 333*                      | 0,00037                              |
| 260                       | 0,650  | 335                       | 0,00034                              |
| 265                       | 0,810  | 340                       | 0,00028                              |
| 270                       | 1,000  | 345                       | 0,00024                              |
| 275                       | 0,960  | 350                       | 0,00020                              |
| 280*                      | 0,880  | 355                       | 0,00016                              |
| 285                       | 0,770  | 360                       | 0,00013                              |
| 290                       | 0,640  | 365*                      | 0,00011                              |
| 295                       | 0,540  | 370                       | 0,000093                             |
| 297*                      | 0,460  | 375                       | 0,000077                             |
| 300                       | 0,300  | 380                       | 0,000064                             |
| 303*                      | 0,120  | 385                       | 0,000053                             |
| 305                       | 0,060  | 390                       | 0,000044                             |
| 308                       | 0,026  | 395                       | 0,000036                             |
| 310                       | 0,015  | 400                       | 0,000030                             |

<sup>1</sup> Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.

\* Emission lines of a mercury discharge spectrum.

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25, 2025

Page 10 of 16

| IEC 62471        |   |   |         |
|------------------|---|---|---------|
| Clause           | Requirement + Test  | Result – Remark                         | Verdict |
| <b>Table 4.2</b> | Spectral weighting functions for assessing retinal hazards from broadband optical sources |   | N/A     |
| Wavelength<br>nm | Blue-light hazard function<br>B ( $\lambda$ )   | Burn hazard function<br>R ( $\lambda$ ) |         |
| 300              | 0,01  |   |         |
| 305              | 0,01  |   |         |
| 310              | 0,01  |   |         |
| 315              | 0,01  |   |         |
| 320              | 0,01  |   |         |
| 325              | 0,01  |   |         |
| 330              | 0,01  |   |         |
| 335              | 0,01  |   |         |
| 340              | 0,01  |   |         |
| 345              | 0,01  |   |         |
| 350              | 0,01  |   |         |
| 355              | 0,01  |   |         |
| 360              | 0,01  |   |         |
| 365              | 0,01  |   |         |
| 370              | 0,01  |   |         |
| 375              | 0,01  |   |         |
| 380              | 0,01  | 0,1                                     |         |
| 385              | 0,013   | 0,13                                    |         |
| 390              | 0,025   | 0,25                                    |         |
| 395              | 0,05  | 0,5                                     |         |
| 400              | 0,10  | 1,0                                     |         |
| 405              | 0,20  | 2,0                                     |         |
| 410              | 0,40  | 4,0                                     |         |
| 415              | 0,80  | 8,0                                     |         |
| 420              | 0,90  | 9,0                                     |         |
| 425              | 0,95  | 9,5                                     |         |
| 430              | 0,98  | 9,8                                     |         |
| 435              | 1,00  | 10,0                                    |         |
| 440              | 1,00  | 10,0                                    |         |
| 445              | 0,97  | 9,7                                     |         |
| 450              | 0,94  | 9,4                                     |         |
| 455              | 0,90  | 9,0                                     |         |
| 460              | 0,80  | 8,0                                     |         |
| 465              | 0,70  | 7,0                                     |         |
| 470              | 0,62  | 6,2                                     |         |
| 475              | 0,55  | 5,5                                     |         |
| 480              | 0,45  | 4,5                                     |         |
| 485              | 0,40  | 4,0                                     |         |
| 490              | 0,22  | 2,2                                     |         |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 11 of 16

| IEC 62471        |   |                                     |         |
|------------------|---|-------------------------------------|---------|
| Clause           | Requirement + Test  | Result – Remark                     | Verdict |
| <b>Table 4.2</b> | Spectral weighting functions for assessing retinal hazards from broadband optical sources |                                     | N/A     |
| 495              | 0,16  | 1,6                                 |         |
| 500-600          | $10[(450-\lambda)/50]$  | 1,0                                 |         |
| 600-700          | 0,001   | 1,0                                 |         |
| 700-1050         |   | $10[(700-\lambda)/500]$             |         |
| 1050-1150        |   | 0,2                                 |         |
| 1150-1200        |   | $0,2 \cdot 10^{0,02(1150-\lambda)}$ |         |
| 1200-1400        |   | 0,02                                |         |

| Table 5.4 Summary of the ELs for the surface of the skin or cornea (irradiance based values) |   |                     |                       |                             | P   |
|--|---|---------------------|-----------------------|-----------------------------|---|
| Hazard Name  | Relevant equation   | Wavelength range nm | Exposure duration sec | Limiting aperture rad (deg) | EL in terms of constant irradiance $W \cdot m^{-2}$ |
| Actinic UV skin & eye  | $E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$ | 200 – 400           | < 30000               | 1,4 (80)                    | 30/t  |
| Eye UV-A   | $E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$              | 315 – 400           | $\leq 1000$<br>>1000  | 1,4 (80)                    | 10000/t<br>10                                       |
| Blue-light small source  | $E_B = \sum E_\lambda \cdot B(\lambda) \cdot \Delta\lambda$ | 300 – 700           | $\leq 100$<br>>100    | < 0,011                     | 100/t<br>1,0  |
| Eye IR   | $E_{IR} = \sum E_\lambda \cdot \Delta\lambda$               | 780 – 3000          | $\leq 1000$<br>>1000  | 1,4 (80)                    | 18000/t <sup>0,75</sup><br>100                      |
| Skin thermal   | $E_H = \sum E_\lambda \cdot \Delta\lambda$                  | 380 – 3000          | < 10                  | 2π sr                       | 20000/t <sup>0,75</sup>                             |

| Table 5.5 Summary of the ELs for the retina (radiance based values) |  |                     |  |  | P  |
|---|--|---------------------|--|--|--|
| Hazard Name   | Relevant equation  | Wavelength range nm | Exposure duration sec                            | Field of view radians  | EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$    |
| Blue light  | $L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$    | 300 – 700           | 0,25 – 10<br>10-100<br>100-10000<br>$\geq 10000$ | $0,011 \cdot \sqrt{(t/10)}$<br>0,011<br>$0,0011 \cdot \sqrt{t}$<br>0,1 | $10^6/t$<br>$10^6/t$<br>$10^6/t$<br>100                            |
| Retinal thermal   | $L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$    | 380 – 1400          | < 0,25<br>0,25 – 10                              | 0,0017<br>$0,011 \cdot \sqrt{(t/10)}$                                  | $50000/(\alpha \cdot t^{0,25})$<br>$50000/(\alpha \cdot t^{0,25})$ |
| Retinal thermal (weak visual stimulus)                              | $L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$ | 780 – 1400          | > 10   | 0,011  | 6000/α   |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 12 of 16

| IEC 62471   |  |                  |                                     |                      |                 |          |        |          |         |
|---|--|------------------|-------------------------------------|----------------------|-----------------|----------|--------|----------|---------|
| Clause  | Requirement + Test                                       |                  |                                     |                      | Result – Remark |          |        |          | Verdict |
| Table 6.1   | Emission limits for risk groups of continuous wave lamps |                  |                                     |                      |                 |          |        |          | P       |
| Risk  | Action spectrum  | Symbol           | Units                               | Emission Measurement |                 |          |        |          |         |
|   |  |                  |                                     | Exempt               |                 | Low risk |        | Mod risk |         |
|   |  |                  |                                     | Limit                | Result          | Limit    | Result | Limit    | Result  |
| Actinic UV  | S <sub>UV</sub> (λ)                                      | E <sub>s</sub>   | W•m <sup>-2</sup>                   | 0,001                | 0.00e+00        | 0,003    | -      | 0,03     | -       |
| Near UV   |  | E <sub>UVA</sub> | W•m <sup>-2</sup>                   | 10                   | 0.00e+00        | 33       | -      | 100      | -       |
| Blue light  | B(λ)   | L <sub>B</sub>   | W•m <sup>-2</sup> •sr <sup>-1</sup> | 100                  | 7.12e-02        | 10000    | -      | 4000000  | -       |
| Blue light, small source  | B(λ)   | E <sub>B</sub>   | W•m <sup>-2</sup>                   | 1,0*                 | -               | 1,0      | -      | 400      | -       |
| Retinal thermal   | R(λ)   | L <sub>R</sub>   | W•m <sup>-2</sup> •sr <sup>-1</sup> | 28000/α              | 1.65e+01        | 28000/α  | -      | 71000/α  | -       |
| Retinal thermal, weak visual stimulus**   | R(λ)   | L <sub>IR</sub>  | W•m <sup>-2</sup> •sr <sup>-1</sup> | 6000/α               | 1.13e-02        | 6000/α   | -      | 6000/α   | -       |
| IR radiation, eye   |  | E <sub>IR</sub>  | W•m <sup>-2</sup>                   | 100                  | 2.09e-04        | 570      | -      | 3200     | -       |
| * Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0.1 radian. ** Involves evaluation of non-GLS source |  |                  |                                     |                      |                 |          |        |          |         |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 13 of 16

| IEC 62471B ATTACHMENT   |   |                        |         |
|---|---|------------------------|---------|
| Clause  | Requirement + Test  | Result – Remark        | Verdict |
| <b>ATTACHMENT TO TEST REPORT IEC 62471</b><br><b>EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES</b><br>Photobiological safety of lamps and lamps systems |   |                        |         |
| Differences according to ..... : EN 62471:2008  |   |                        |         |
| TRF template used ..... : IECEE OD-2020-F2:2020, Ed. 1.1  |   |                        |         |
| Attachment Form No. .... : EU_GD_IEC62471B  |   |                        |         |
| Attachment Originator ..... : OVE   |   |                        |         |
| Master Attachment ..... : Dated 2021-04-29  |   |                        |         |
| Copyright © 2021 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.               |   |                        |         |
|   | <b>CENELEC COMMON MODIFICATIONS (EN)</b>  |                        |         |
| <b>4</b>  | <b>EXPOSURE LIMITS</b>  |                        | P       |
|   | Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB  |                        | —       |
|   | Clause 4 replaced by the following:   |                        | P       |
|   | The original Clause 4 of IEC 62471:2006 contains provisions governing limiting values for the exposure of persons falling within the area of the health and safety of workers. Within Europe those limiting values are already covered by the Artificial Optical Radiation Directive (2006/25/EC). Thus, the limits of the directive have to be applied instead of those fixed in IEC 62471:2006. | See appended Table 6.1 | P       |
|   | There are no differences in EN 62471:2008 regarding the classification of lamps according Clause 6 of IEC 62471:2006.   |                        | —       |
| 4.1   | General   |                        | N/A     |
|   | Delete the first paragraph.   |                        | —       |

# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 14 of 16

| IEC 62471B ATTACHMENT   |  |                  |                                     |                             |          |          |        |          |        |
|---|--|------------------|-------------------------------------|-----------------------------|----------|----------|--------|----------|--------|
| Clause  | Requirement + Test   |                  |                                     | Result – Remark             |          |          |        | Verdict  |        |
| Table 6.1   | Emission limits for risk groups of continuous wave lamps<br>(based on EU Directive 2006/25/EC) |                  |                                     |                             |          |          |        | P        |        |
| Risk  | Action spectrum  | Symbol           | Units                               | Emission Measurement        |          |          |        |          |        |
|   |  |                  |                                     | Exempt                      |          | Low risk |        | Mod risk |        |
|   |  |                  |                                     | Limit                       | Result   | Limit    | Result | Limit    | Result |
| Actinic UV  | S <sub>UV</sub> (λ)  | E <sub>s</sub>   | W•m <sup>-2</sup>                   | 0,001                       | 0.00e+00 | -        | -      | -        | -      |
| Near UV   |  | E <sub>UVA</sub> | W•m <sup>-2</sup>                   | 0,33                        | 0.00e+00 | -        | -      | -        | -      |
| Blue light  | B(λ)   | L <sub>B</sub>   | W•m <sup>-2</sup> •sr <sup>-1</sup> | 100                         | 7.50e-02 | 10000    | -      | 4000000  | -      |
| Blue light, small source  | B(λ)   | E <sub>B</sub>   | W•m <sup>-2</sup>                   | 0,01                        | -        | 1,0      | -      | 400      | -      |
| Retinal thermal   | R(λ)   | L <sub>R</sub>   | W•m <sup>-2</sup> •sr <sup>-1</sup> | 28000/α                     | 7.12e-02 | 28000/α  | -      | 71000/α  | -      |
| Retinal thermal, weak visual stimulus**   | R(λ)   | L <sub>IR</sub>  | W•m <sup>-2</sup> •sr <sup>-1</sup> | 545000<br>0,0017≤ α ≤ 0,011 | -        |          |        |          |        |
|   |  |                  |                                     | 6000/α<br>0,011≤ α ≤ 0,1    | 1.13e-02 |          |        |          |        |
| IR radiation, eye   |  | E <sub>IR</sub>  | W•m <sup>-2</sup>                   | 100                         | 2.09e-04 | 570      | -      | 3200     | -      |
| * Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0.1 radian.<br>** Involves evaluation of non-GLS source<br>NOTE The action functions: see Table 4.1 and Table 4.2<br>The applicable aperture diameters: see 4.2.1<br>The limitations for the angular subtenses: see 4.2.2<br>The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.<br>α= 0.0390 radian. |  |                  |                                     |                             |          |          |        |          |        |

Remark(s): Possible test case verdicts:

- test case does not apply to the test object ..... : N/A (Not applicable)
- test object does meet the requirement ..... : P (Pass)



# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 15 of 16

## Appendix 1 Photo Documentation

### PHOTO 1

View:

- ☒ front
- ☐ rear
- ☐ right side
- ☐ left side
- ☐ top
- ☐ bottom
- ☐ internal



### PHOTO 2

View:

- ☐ front
- ☐ rear
- ☐ right side
- ☐ left side
- ☐ top
- ☐ bottom
- ☒ internal



# TEST REPORT

Report No.: DPHTL2504153050E

Date: Apr 25,2025

Page 16 of 16

Photo(s):



Test Sample Photo

<<<<<< END OF REPORT >>>>>>



## 声明 Statement

1. 广州市德普华检测技术有限公司(以下简称[DPHTL])为提供符合下述条款的测试和报告,而接受有关样品和货品。本公司基于下述条款提供服务,下述条款为本公司与申请服务的个人、企业或公司(以下简称[客户])的协议。  
All samples and goods are accepted by the Guangzhou Depuhua Test Services Co., Ltd. (the "DPHTL") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").
2. 由此测试申请所发出的任何报告(以下简称[报告]),本公司会严格为客户保密。未经本公司的书面同意,报告的整体或部分不得复制,也不得用于广告或授权的其他用途。然而,客户可以将本公司印制的报告或认可的副本,向其客户、供货商或直接相关的其它人出示或提交。除非相关政府部门、法律或法规要求,否则未经客户同意,本公司不得将报告内容向任何第三方讨论或披露。  
Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court order.
3. 本公司接受样品进行测试的前提是,该测试报告不能作为针对本公司法律行动的依据。  
Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
4. 本检测报告首页所列信息中除样品来源、接样日期、检测日期、检测结果和检测结论外,均由委托方提供,委托方对样品的代表性和资料的真实性负责,本实验室不承担任何相关责任。  
The information as listed on the first page of this test report was all provided by the client except the sample from, date received, test period, test results and test conclusion. The client shall be responsible for the representativeness of sample and authenticity of materials, for which DPHTL shall bear no responsibilities.
5. 本检测报告以实测值进行符合性判定,未考虑不确定度所带来的风险,特别约定、标准或规范中有明确规定的除外。此种判定方式所带来的风险由客户自行承担,本实验室不承担相关责任。  
The judgment method of determining the conformity in this test report is according to the measured value without considering the risk caused by uncertainty, unless otherwise clearly stipulated in special agreement, standard or specification. The client shall assume the risk caused by the judgment method, and DPHTL shall not bear related responsibilities.
6. 检测报告无批准人签字及“检验检测专用章”无效,未经本实验室书面同意,不得整体或部分复制本报告。  
The test report is effective only with both signature and specialized stamp. Without written approval of DPHTL, this report can't be reproduced in full or in part.
7. 除非本公司进行抽样,并已在报告中说明,否则报告中适用于送测的样品(样品信息为客户提供),不适用于批量。  
The Report refers only to the tested sample (Sample information is provided by customer) and does not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
8. 本检测报告的检测结果仅对送测样品负责,未加盖资质认定标志的检测报告不对社会具有公证证明作用,对于检测数据、结果的使用,所产生的直接或间接损失及一切法律后果,本实验室不承担任何经济和法律责任。  
This test data is only responsible for the tested sample. The data and results provided by the report without CMA accreditation are not to prove to the society, and DPHTL is not responsible for any economic and legal responsibility for the use of the test data, the direct or indirect losses resulting from the use of the test and all legal consequences.
9. 如果本公司确定报告被不当使用,本公司保留撤回报告的权利,并有权要求其它适当的额外赔偿。  
In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
10. 除非相关政府部门、法律或法院要求,否则未经公司预先书面同意,本公司毋需,也并无义务到法院对有关报告作证。  
The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
11. 若需要在法院审理程序或者仲裁过程中使用测试报告,客户必须在提交测试样品前将该意图告知本公司。  
Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
12. 该测试报告的支持数据和信息本公司保存6年。个别评审机构有特别要求的,检测数据和报告的保存期可依情况变动。一旦超过上述提交的存期限,数据和信息将被处理掉。任何情况下,本公司不必提供任何被处理的过期数据或信息。即使本公司事先被告知可能会发生相关的损害,本公司在任何情况下也不必承担任何损害,包括(但不限于)补偿性赔偿、利润损失、数据遗失、或任何形式的特殊损害、附带损害、间接损害、从属损害或任何违反约定、违反承诺、侵权(包括疏忽)、产品责任或其他原因的惩罚性损害。  
Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of 6 years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.