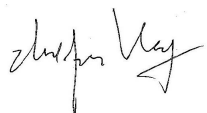





Test Report issued under the responsibility of:



| | |
|--|--|
| TEST REPORT IEC TR 62778 Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires | |
| Report Number..... : | 6072426.50P |
| Date of issue | 2020-02-25 |
| Total number of pages | 28 |
| Name of Testing Laboratory preparing the Report | DEKRA Testing and Certification (Shanghai) Ltd. 3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibei Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436 |
| Applicant's name | Lumileds Malaysia Sdn. Bhd |
| Address..... | No. 3 , Lintang Bayan Lepas 8, Phase 4, Bayan Lepas Industrial Park, 11900 Penang, Malaysia |
| Test specification: | |
| Standard | IEC TR 62778:2014 (Second Edition) |
| Test procedure | CB Scheme |
| Non-standard test method | N/A |
| Test Report Form No. | IEC62778A |
| Test Report Form(s) Originator | TÜV SÜD Product Service GmbH |
| Master TRF | Dated 2016-02 |
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| General disclaimer: The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report. The purpose of this report is only for export activities. | |

| | | |
|---|--|--|
| Test item description..... : | LED module | |
| Trade Mark..... : | LUMILEDS | |
| Manufacturer : | Lumileds Malaysia Sdn. Bhd No. 3 , Lintang Bayan Lepas 8, Phase 4, Bayan Lepas Industrial Park, 11900 Penang, Malaysia | |
| Model/Type reference : | L1RX-5760000000000 ; L1RX-RYL1000000000; L1RX-GRN1000000000 (Detailed lists refer to Appendix 2: Model List) | |
| Ratings : | Max current 2500mA for L1RX-5760000000000; Max current 3000mA for L1RX-RYL1000000000; Max current 3000mA for L1RX-GRN1000000000. (Detailed lists refer to Appendix 2: Model List) | |
| Responsible Testing Laboratory (as applicable), testing procedure and testing location(s): | | |
| <input checked="" type="checkbox"/> | CB Testing Laboratory: | DEKRA Testing and Certification (Shanghai) Ltd. |
| Testing location/ address..... | | 3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibe Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436 |
| <input type="checkbox"/> | Associated CB Testing Laboratory: | |
| Testing location/ address | | |
| Tested by (name, function, signature) | | Zhijun Wang  |
| Approved by (name, function, signature)... | | Hanson Zhang  |
| <input type="checkbox"/> | Testing procedure: CTF Stage 1: | |
| Testing location/ address | | |
| Tested by (name, function, signature) | | |
| Approved by (name, function, signature) | | |
| <input type="checkbox"/> | Testing procedure: CTF Stage 2: | |
| Testing location/ address | | |
| Tested by (name + signature) | | |
| Witnessed by (name, function, signature) | | |

| | | | |
|---|----------------------------------|--|--|
| Approved by (name, function, signature)..... | | | |
| | | | |
| <input type="checkbox"/> | Testing procedure: CTF Stage 3:- | | |
| <input type="checkbox"/> | Testing procedure: CTF Stage 4:- | | |
| Testing location/ address | | | |
| Tested by (name, function, signature) | | | |
| Witnessed by (name, function, signature) | | | |
| Approved by (name, function, signature) | | | |
| Supervised by (name, function, signature) | | | |
| | | | |

| | |
|--|---|
| List of Attachments (including a total number of pages in each attachment): <ul style="list-style-type: none"> ● Appendix 1: Photo Documentation ● Appendix 2: Model List ● Appendix 3: Relative Spectrum Of Tested Sample(s) ● Appendix 4: Table 6.1 Based On IEC 62471:2006 ● Appendix 5: Table 6.1 Based On EN62471:2008, Attachment To IEC 62471 European Group Differences And National Differences | |
| Summary of testing: | |
| Tests performed (name of test and test clause): <p>These tests fulfil the requirements of standard ISO/IEC 17025. When determining the test conclusion, the Measurement Uncertainty of test has been considered.</p> <p>The tested sample of L1RX-5760000000000 (350mA) L1RX-GRN1000000000 (3000mA) have been tested according to the IEC 62471(first edition, 2006-07) at 200mm and been classified as RG 0. have been tested according to the EN 62471:2008 at 200mm and been classified as RG 1. have been tested according to the IEC/TR 62778:2014 and been classified as RG 1 Unlimited for blue light hazard.</p> <p>L1RX-5760000000000 (2500 mA) L1RX-RYL1000000000 (3000 mA) have been tested according to the IEC 62471(first edition, 2006-07) at 200mm and been classified as RG 2. have been tested according to the EN 62471:2008 at 200mm and been classified as RG 2. have been tested according to the IEC/TR 62778:2014 and been classified as RG 2 for blue light hazard.</p> | Testing location: <p>DEKRA Testing and Certification (Shanghai) Ltd. 3/F, #250, Jiangchangsan Road building 16 Headquater Economy Park Shibe Hi-Tech Park, Jing'an District, Shanghai, P.R.C 200436</p> |

Summary of compliance with National Differences (List of countries addressed): EN Standards

EN 62471:2008

☒ **The product fulfills the requirements****Copy of marking plate:**

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

N/A

| | |
|--|--|
| Test item particulars: See below | |
| Product evaluated: <input type="checkbox"/> LED package <input checked="" type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire | |
| Rated voltage (V): -- | |
| Rated current (mA): Max current 2500mA for L1RX-5760000000000; Max current 3000mA for L1RX-RYL1000000000; Max current 3000mA for L1RX-GRN1000000000. | |
| Rated CCT (K): -- | |
| Rated Luminance (Mcd/m²): -- | |
| Component report data used: <input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> LED package <input type="checkbox"/> Lamp Report number: -- | |
| Possible test case verdicts: - test case does not apply to the test object.....: N/A - test object does meet the requirement.....: P (Pass) - test object does not meet the requirement.....: F (Fail) | |
| Testing: -- | |
| Date of receipt of test item: 2020-02-18 | |
| Date (s) of performance of tests: 2020-02-20 to 2020-02-25 | |
| General remarks: | |
| "(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator. The product complied with the following standards: <input checked="" type="checkbox"/> IEC 62471:2006 <input checked="" type="checkbox"/> EN 62471:2008 <input type="checkbox"/> IEC/TR 62471-2:2009 <input checked="" type="checkbox"/> IEC/TR 62778:2014 | |
| Manufacturer's Declaration per sub-clause 4.2.5 of IEC 62778: | |
| The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided: | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable |

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) : Lumileds Malaysia Sdn. Bhd
No. 3 , Lintang Bayan Lepas 8, Phase 4, Bayan
Lepas Industrial Park, 11900 Penang, Malaysia

General product information:

Full tests were performed on model L1RX-5760000000000, L1RX-RYL1000000000, and L1RX-GRN1000000000.

The products were considered as worst case which should be evaluated at 200mm.

The sample of L1RX-5760000000000 was tested at 200mm from the light source. The CCT of spectral irradiance was found at 6565 K.

Base on the Model list which listed on the appendix 2, The tested sample can be considered as

☐ typical product ☒ worst product

Which the results can be reference used for the other models.

Type test was performed according to IEC 62471:2006 procedure.

| IEC TR 62778 | | | |
|--------------|---|---|------------|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 7 | MEASUREMENT INFORMATION FLOW | | P |
| 7.1 | Basic flow | | P |
| | 'Law of conservation of luminance' applied | | N/A |
| | Use of only true luminance/radiance values | | P |
| | In case of luminaire: The light source is operated in the luminaire under similar conditions as when tested as a component | | N/A |
| | In case E_{thr} value for RG2 was established the peak value was derived from angular light distribution | | N/A |
| 7.2 | Conditions for the radiance measurement | | P |
| | Standard condition applied (200mm distance, 0,011rad field of view) | | P |
| | Non-standard condition applied | | N/A |
| 7.3 | Special cases (I): Replacement by a lamp or LUXEON Flash 9/9X of another type | | N/A |
| | Light source is a white light source | | N/A |
| | Evaluation done based on highest luminance | | N/A |
| | Evaluation done based on CCT value | | N/A |
| 7.4 | Special cases (II): Arrays and clusters of primary light sources | | N/A |
| | LED package is evaluated as : <input type="checkbox"/> RG0 unlimited <input type="checkbox"/> RG1 unlimited | | N/A |
| | E_{thr} of LED package applies to array | | N/A |
| 8 | RISK GROUP CLASSIFICATION | | P |
| | Risk group achieved: | | P |
| | - ..Risk Group 0 unlimited | | N/A |
| | - ..Risk Group 1 unlimited | | P |
| | - E_{thr} (lx) : Distance to reach RG1 (m) : | Refer to the Supplementary information of TABLE: Spectroradiometric measurement as following | P |

| IEC TR 62778 | | | |
|--------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | TABLE:Spectroradiometric measurement | | | | |
|-----------------------------------|---|---|--------------------------------------|-----------------|---------|
| | Measurement performed on: | <input type="checkbox"/> LED package <input checked="" type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire | | | |
| | Model number..... | L1RX-5760000000000 | | | |
| | Test voltage (V) | 2,94 Vdc | | | — |
| | Test current (mA) | 350 mA | | | — |
| | Test frequency (Hz)..... | -- | | | — |
| | Ambient, t(°C) | 25°C | | | — |
| | Measurement distance | <input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm | | | — |
| | Source size | <input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1.4 x 1.4 mm | | | — |
| | Field of view | <input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources) | | | — |
| Item | | Symb ol | Units | Result | Remark |
| Correlated colour temperature | | CCT | K | 6414 | |
| x/y colour coordinates | | | | 0,3148 / 0,3258 | |
| Blue light hazard radiance | | L _B | W/(m ² •sr ¹) | -- | @11mrad |
| Blue light hazard irradiance | | E _B | W/m ² | 0,92E+00 | |
| Luminance | | L | cd/m ² | 1,66E+07 | @11mrad |
| Illuminance | | E | lx | 9,58E+02 | |
| | | | | | |
| Supplementary information: N/A | | | | | |

| IEC TR 62778 | | | |
|--------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | TABLE:Spectroradiometric measurement | | | | |
|--|---|---|--------------------------------------|-----------------|---------|
| | Measurement performed on: | <input type="checkbox"/> LED package <input checked="" type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire | | | |
| | Model number..... | L1RX-5760000000000 | | | |
| | Test voltage (V) | 3,5 Vdc | | | — |
| | Test current (mA) | 2500 mA | | | — |
| | Test frequency (Hz)..... | -- | | | — |
| | Ambient, t(°C) | 25°C | | | — |
| | Measurement distance | <input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm | | | — |
| | Source size | <input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1.4 x 1.4 mm | | | — |
| | Field of view | <input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources) | | | — |
| Item | | Symb ol | Units | Result | Remark |
| Correlated colour temperature | | CCT | K | 6565 | |
| x/y colour coordinates | | | | 0,3128 / 0,3208 | |
| Blue light hazard radiance | | L _B | W/(m ² •sr ¹) | -- | @11mrad |
| Blue light hazard irradiance | | E _B | W/m ² | 4,46E+00 | |
| Luminance | | L | cd/m ² | 8,06E+07 | @11mrad |
| Illuminance | | E | lx | 4,57E+03 | |
| | | | | | |
| Supplementary information: Per IEC/TR 62778:2014 Ethr= 1026 lx Dmin= 422 mm | | | | | |

| IEC TR 62778 | | | |
|--------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | TABLE:Spectroradiometric measurement | | | | |
|--|---|---|--------------------------------------|-----------|---------|
| | Measurement performed on: | <input type="checkbox"/> LED package <input checked="" type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire | | | |
| | Model number..... | L1RX-RYL1000000000 | | | |
| | Test voltage (V) | 3,5 Vdc | | | — |
| | Test current (mA) | 3000 mA | | | — |
| | Test frequency (Hz)..... | -- | | | — |
| | Ambient, t(°C) | 25°C | | | — |
| | Measurement distance | <input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm | | | — |
| | Source size | <input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1.4 x 1.4 mm | | | — |
| | Field of view | <input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources) | | | — |
| Item | | Symb ol | Units | Result | Remark |
| Correlated colour temperature | | CCT | K | -- | |
| x/y colour coordinates | | | | -- | |
| Blue light hazard radiance | | L _B | W/(m ² •sr ¹) | -- | @11mrad |
| Blue light hazard irradiance | | E _B | W/m ² | 16,71E+00 | |
| Luminance | | L | cd/m ² | 9,46E+06 | @11mrad |
| Illuminance | | E | lx | 6,63E+02 | |
| | | | | | |
| Supplementary information: Per IEC/TR 62778:2014 Ethr= 28 lx Dmin= 813 mm | | | | | |

| IEC TR 62778 | | | |
|--------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | TABLE:Spectroradiometric measurement | | | | |
|-----------------------------------|---|---|--------------------------------------|----------|---------|
| | Measurement performed on: | <input type="checkbox"/> LED package <input checked="" type="checkbox"/> LED module <input type="checkbox"/> Lamp <input type="checkbox"/> Luminaire | | | |
| | Model number..... | L1RX-GRN1000000000 | | | |
| | Test voltage (V) | 4,00 Vdc | | | — |
| | Test current (mA) | 3000 mA | | | — |
| | Test frequency (Hz)..... | -- | | | — |
| | Ambient, t(°C) | 25°C | | | — |
| | Measurement distance | <input checked="" type="checkbox"/> 20 cm <input type="checkbox"/> ... cm | | | — |
| | Source size | <input type="checkbox"/> Non-small <input checked="" type="checkbox"/> Small : 1.4 x 1.4 mm | | | — |
| | Field of view | <input type="checkbox"/> 100 mrad <input checked="" type="checkbox"/> 11 mrad <input type="checkbox"/> 1,7 mrad (for small sources) | | | — |
| Item | | Symb ol | Units | Result | Remark |
| Correlated colour temperature | | CCT | K | -- | |
| x/y colour coordinates | | | | -- | |
| Blue light hazard radiance | | L _B | W/(m ² •sr ¹) | -- | @11mrad |
| Blue light hazard irradiance | | E _B | W/m ² | 0,24E+00 | |
| Luminance | | L | cd/m ² | 4,91E+07 | @11mrad |
| Illuminance | | E | lx | 2,30E+03 | |
| | | | | | |
| Supplementary information: N/A | | | | | |

| IEC TR 62778 | | | |
|--------------|--------------------|-----------------|---------|
| Clause | Requirement + Test | Result - Remark | Verdict |

| | | |
|--|-----------------------------------|-----|
| | TABLE: Angular light distribution | N/A |
| | | |

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.

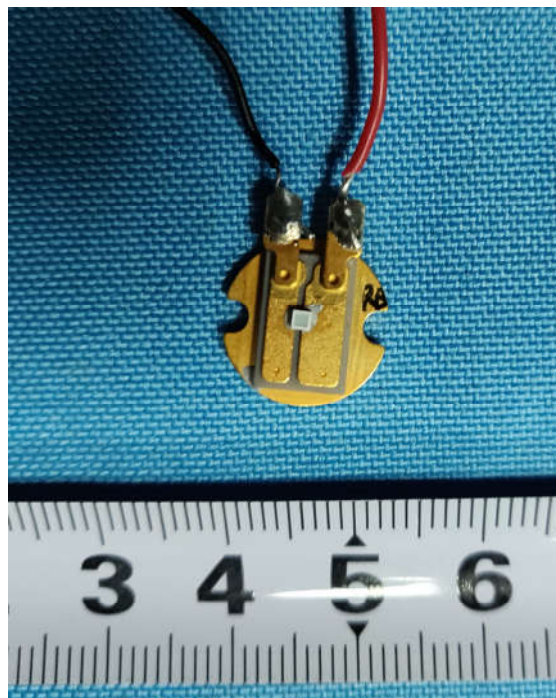
Note: This page may be removed when CTF stage 1 CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

| Clause | Measurement / testing | Testing / measuring equipment / material used, (Equipment ID) | Range used | Last Calibration date | Calibration due date |
|--------|--|---|-------------|-----------------------|----------------------|
| 7 | Irradiance measurements Radiance measurements | IDR 300 Monochromator (SH 344) | 200-3000nm | / | / |
| 7 | Radiance measurements | S009 Telescope (SH 345) | 300-1400nm | / | / |
| 7 | Radiance measurements | SRS 12 Radiance Standard (SH 348) | 300-1400nm | 2020/2/25 | 2021/2/24 |
| 7 | Irradiance measurements | CL6 Spectral irradiance standard (SH 350) | 300-3000nm | 2020/2/25 | 2021/2/24 |
| 7 | Irradiance measurements | CL7 Spectral irradiance standard (SH 351) | 200-400nm | 2020/2/25 | 2021/2/24 |
| 7 | Irradiance measurements | Photometric detector head (SH 359) | 380nm-800nm | 2020/2/26 | 2021/2/25 |
| 7 | Irradiance measurements Radiance measurements | Wattmeter (SH030) | 500V,40A | 2019/10/10 | 2020/10/10 |

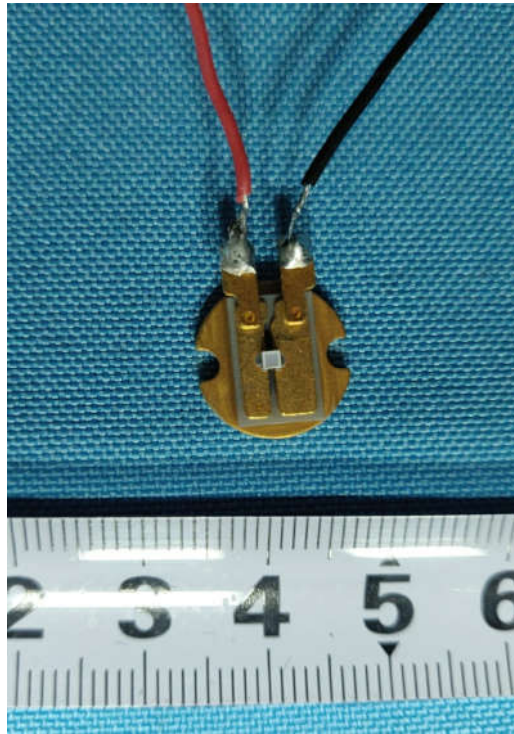
Appendix 1: Photo Documentation



L1RX-5760000000000



L1RX-RYL1000000000



L1RX-GRN1000000000

Appendix 2: Model List

L1RX-576000000000, L1RX-RYL1000000000 and L1RX-GRN1000000000 are part of Lumileds LUXEON Rubix product line. The samples are with White, Royal-Blue, and Green colors separately, and we got different hazard classifications for them at maximum driven current. The tested sample of L1RX-576000000000 is with the worst hazard of white LEDs in that product line, the classifications are thus valid (worst case) within the LUXEON Rubix product line with part number L1RX-AABB000000000, where AA represents nominal CCT, and BB represents minimum CRI. See the appendix below for an explanation of the type designation.

The tested sample of L1RX-RYL1000000000 is with the worst hazard of colored LEDs in that product line, and the tested sample of L1RX-GRN1000000000 is with the threshold hazard of RG1 and RG2 in that product line, the classifications are thus valid (worst case) within the LUXEON Rubix product line with part number L1RX-ABCD000000000, where ABC represents color, and D represents color version. See the appendix below for an explanation of the type designation.

L 1 R X – A A B B 0 0 0 0 0 0 0 0

Where

A A: designates nominal CCT (e.g. 27=2700K, 30=3000K, 35=3500K, 40=4000K, 50=5000K, 57=5700K or any nominal CCT less than 5700K)

B B: designates minimum CRI (e.g. 60=60CRI, 70=70CRI, 80=80CRI, 90=90CRI or any CRI greater than min 60)

and

L 1 R X – A B C D 0 0 0 0 0 0 0 0

Where

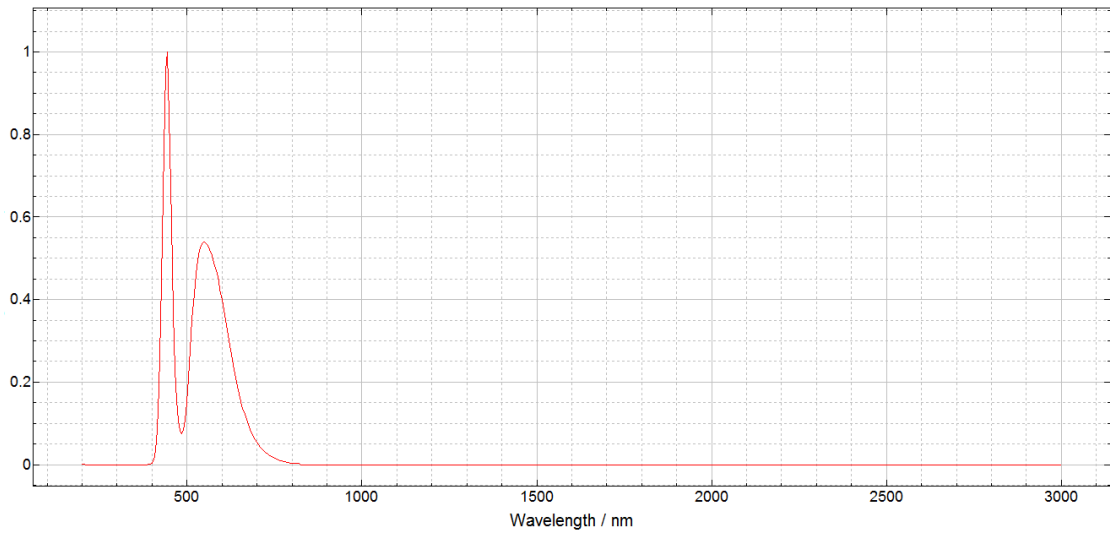
A B C: designates color (RYL=Royal Blue, GRN= Green, BLU=Blue, RED=Red, AMB=Amber, CYN= Cyan, DRD=Deep Red, FRD= Far Red, LME=Lime, MNT=Mint, PCA= PC Amber, RNG= Red Orange, PCR= PC Red, PCO=PC Orange, PCB= PC Blue)

D: designates color version (example: 1, 2, 3)

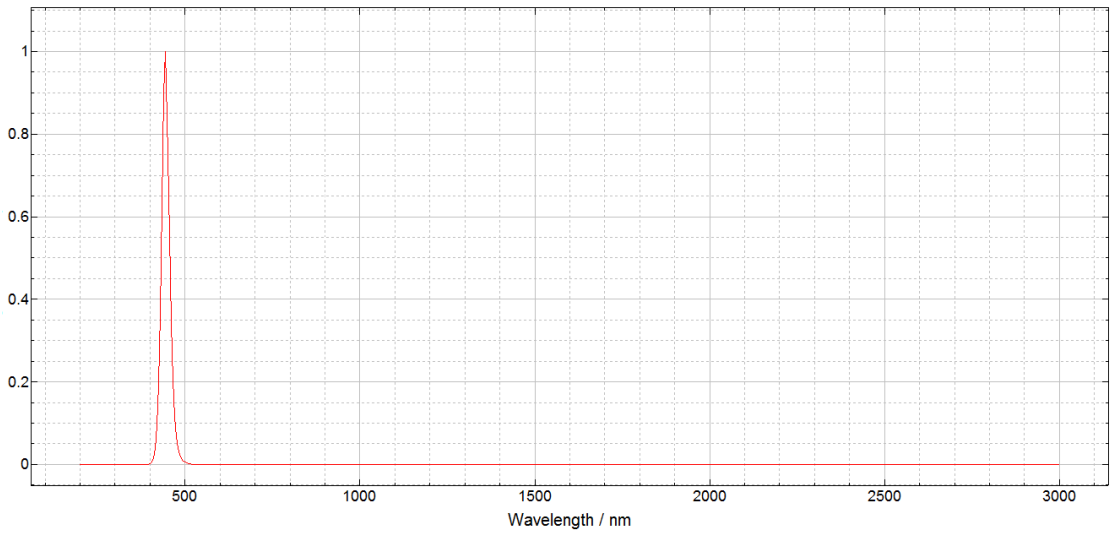
| Commercial Part number | LUXEON Rubix Colors | Drive current (mA) | PBS rating |
|------------------------|---------------------|--------------------|---------------|
| L1RX-AABB000000000 | White | 2500 | RG2 |
| | | 350 | RG1 Unlimited |

| Commercial Part number | LUXEON Rubix Colors | Drive current (mA) | PBS rating |
|------------------------|---------------------|--------------------|---------------|
| L1RX-RYL1000000000 | Royal Blue | 3000 | RG2 |
| L1RX-BLU1000000000 | Blue | 3000 | RG2 |
| L1RX-PCB1000000000 | PC Blue | 3000 | RG2 |
| L1RX-CYN1000000000 | Cyan | 3000 | RG2 |
| L1RX-GRN1000000000 | Green | 3000 | RG1 Unlimited |
| L1RX-RED1000000000 | Red | 2200 | RG1 Unlimited |
| L1RX-LME1000000000 | Lime | 3000 | RG1 Unlimited |
| L1RX-MNT1000000000 | Mint | 3000 | RG1 Unlimited |
| L1RX-AMB1000000000 | Amber | 3000 | RG1 Unlimited |
| L1RX-PCA1000000000 | PC Amber | 3000 | RG1 Unlimited |
| L1RX-RNG1000000000 | Red Orange | 3000 | RG1 Unlimited |
| L1RX-PCO1000000000 | PC Orange | 3000 | RG1 Unlimited |
| L1RX-PCR1000000000 | PC Red | 3000 | RG1 Unlimited |
| L1RX-DRD1000000000 | Deep Red | 3000 | RG1 Unlimited |
| L1RX-FRD1000000000 | Far Red | 3000 | RG1 Unlimited |

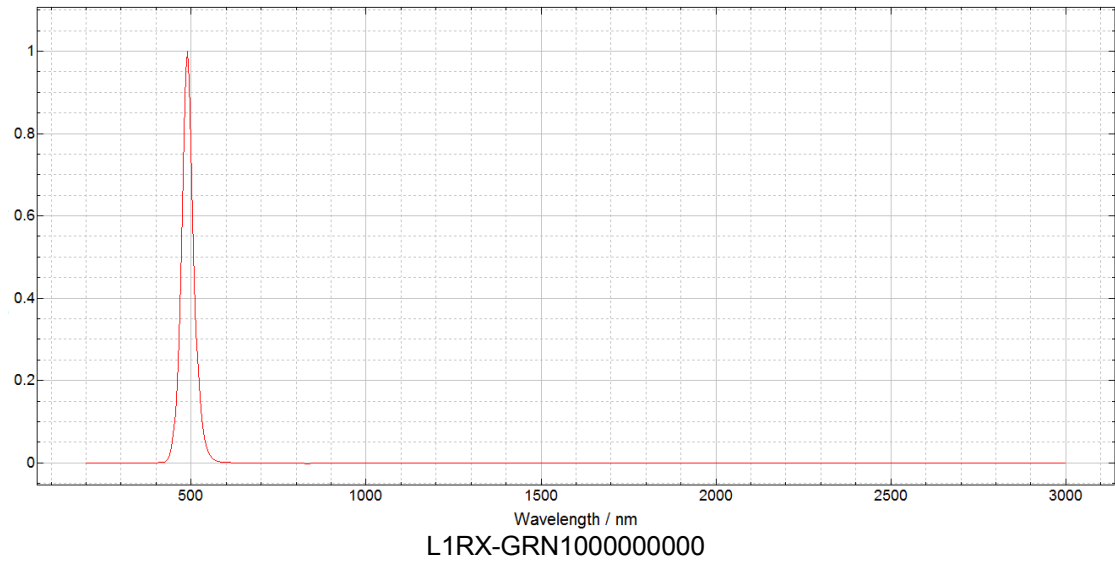
Appendix 3: Relative Spectrum Of Tested Sample(s)



L1RX-576000000000



L1RX-RYL1000000000



Appendix 4: Table 6.1 Based On IEC 62471:2006

DUT: L1RX-5760000000000, Evaluation Distance: 200mm, Test current: 350mA, Angular subtense of the apparent source α : 7 mrad

| 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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | 0,003 | | 0,03 | |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 10 | 0,0000 | 33 | | 100 | |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 1,0* | 0,92E+00 | 1,0 | | 400 | |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 2,11E+05 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 6000/ α | -- | 6000/ α | | 6000/ α | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,05 | 570 | | 3200 | |
| * Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. ** Involves evaluation of non-GLS source | | | | | | | | | |

DUT: L1RX-5760000000000, Evaluation Distance: 200mm, Test current: 2500mA, Angular subtense of the apparent source α : 7 mrad

| 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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | 0,003 | | 0,03 | |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 10 | 0,0000 | 33 | | 100 | |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 1,0* | 4,46E+00 | 1,0 | 4,46E+00 | 400 | 4,46E+00 |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 1,06E+06 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 6000/ α | -- | 6000/ α | | 6000/ α | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,07 | 570 | | 3200 | |
| * Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. | | | | | | | | | |
| ** Involves evaluation of non-GLS source | | | | | | | | | |

DUT: L1RX-RYL1000000000, Evaluation Distance: 200mm, Test current: 3000mA, Angular subtense of the apparent source α : 7 mrad

| 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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | 0,003 | | 0,03 | |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 10 | 0,0000 | 33 | | 100 | |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 1,0* | 16.71E+00 | 1,0 | 16.71E+00 | 400 | 16.71E+00 |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 3,53E+06 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 6000/ α | -- | 6000/ α | | 6000/ α | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,03 | 570 | | 3200 | |
| * Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. ** Involves evaluation of non-GLS source | | | | | | | | | |

DUT: L1RX-GRN1000000000, Evaluation Distance: 200mm, Test current: 3000mA, Angular subtense of the apparent source α : 7 mrad

| 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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | 0,003 | | 0,03 | |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 10 | 0,0000 | 33 | | 100 | |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 1,0* | 0,24E+00 | 1,0 | | 400 | |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 1,12E+05 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 6000/ α | -- | 6000/ α | | 6000/ α | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,04 | 570 | | 3200 | |
| * Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian. ** Involves evaluation of non-GLS source | | | | | | | | | |

Appendix 5: Table 6.1 Based On EN62471:2008, Attachment To IEC 62471 European Group Differences And National Differences

DUT: L1RX-5760000000000, Evaluation Distance: 200mm, Test current: 350mA, Angular subtense of the apparent source α : 7 mrad

| EN 62471 | | | | | | | | | |
|----------|--------------------|--|--|--|-----------------|--|--|--|---------|
| Clause | Requirement + Test | | | | Result – Remark | | | | Verdict |

| Table 6.1 | Emission limits for risk groups of continuous wave lamps (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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | -- | -- | -- | -- |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 0,33 | 0,0000 | -- | -- | -- | -- |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 0,01* | 0,92E+00 | 1,0 | 0,92E+00 | 400 | |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 2,11E+05 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 545000 0,0017 ≤ α ≤ 0,011 | -- | | | | |
| | | | | 6000/ α 0,011 ≤ α ≤ 0,1 | -- | | | | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,05 | 570 | | 3200 | |
| <p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>NOTE The action functions: see Table 4.1 and Table 4.2 The applicable aperture diameters: see 4.2.1 The limitations for the angular subtenses: see 4.2.2 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.</p> | | | | | | | | | |

DUT: L1RX-5760000000000, Evaluation Distance: 200mm, Test current: 2500mA, Angular subtense of the apparent source α : 7 mrad

| EN 62471 | | | | | | | | | |
|----------|--------------------|--|--|--|-----------------|--|--|--|---------|
| Clause | Requirement + Test | | | | Result – Remark | | | | Verdict |

| Table 6.1 | Emission limits for risk groups of continuous wave lamps (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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | -- | -- | -- | -- |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 0,33 | 0,0000 | -- | -- | -- | -- |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 0,01* | 4,46E+00 | 1,0 | 4,46E+00 | 400 | 4,46E+00 |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 1,06E+06 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 545000 0,0017 ≤ α ≤ 0,011 | -- | | | | |
| | | | | 6000/ α 0,011 ≤ α ≤ 0,1 | -- | | | | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,07 | 570 | | 3200 | |
| <p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>NOTE The action functions: see Table 4.1 and Table 4.2 The applicable aperture diameters: see 4.2.1 The limitations for the angular subtenses: see 4.2.2 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.</p> | | | | | | | | | |

DUT: L1RX-RYL1000000000, Evaluation Distance: 200mm, Test current: 3000mA, Angular subtense of the apparent source α : 7 mrad

| EN 62471 | | | | | | | | | |
|----------|--------------------|--|--|--|-----------------|--|--|---------|--|
| Clause | Requirement + Test | | | | Result – Remark | | | Verdict | |

| Table 6.1 | Emission limits for risk groups of continuous wave lamps (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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | -- | -- | -- | -- |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 0,33 | 0,0000 | -- | -- | -- | -- |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 0,01* | 16.71E+00 | 1,0 | 16.71E+00 | 400 | 16.71E+00 |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 3,53E+06 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 545000 0,0017 ≤ α ≤ 0,011 | -- | | | | |
| | | | | 6000/ α 0,011 ≤ α ≤ 0,1 | -- | | | | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,03 | 570 | | 3200 | |
| <p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>NOTE The action functions: see Table 4.1 and Table 4.2 The applicable aperture diameters: see 4.2.1 The limitations for the angular subtenses: see 4.2.2 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.</p> | | | | | | | | | |

DUT: L1RX-GRN1000000000, Evaluation Distance: 200mm, Test current: 3000mA, Angular subtense of the apparent source α : 7 mrad

| EN 62471 | | | | | | | | | |
|----------|--------------------|--|--|--|-----------------|--|--|--|---------|
| Clause | Requirement + Test | | | | Result – Remark | | | | Verdict |

| Table 6.1 Emission limits for risk groups of continuous wave lamps (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 | $S_{UV}(\lambda)$ | E_s | $W \cdot m^{-2}$ | 0,001 | 0,0000 | -- | -- | -- | -- |
| Near UV | | E_{UVA} | $W \cdot m^{-2}$ | 0,33 | 0,0000 | -- | -- | -- | -- |
| Blue light | $B(\lambda)$ | L_B | $W \cdot m^{-2} \cdot sr^{-1}$ | 100 | -- | 10000 | | 4000000 | |
| Blue light, small source | $B(\lambda)$ | E_B | $W \cdot m^{-2}$ | 0,01* | 0,24E+00 | 1,0 | 0,24E+00 | 400 | |
| Retinal thermal | $R(\lambda)$ | L_R | $W \cdot m^{-2} \cdot sr^{-1}$ | 28000/ α | 1,12E+05 | 28000/ α | | 71000/ α | |
| Retinal thermal, weak visual stimulus** | $R(\lambda)$ | L_{IR} | $W \cdot m^{-2} \cdot sr^{-1}$ | 545000 0,0017 $\leq \alpha \leq$ 0,011 | -- | | | | |
| | | | | 6000/ α 0,011 $\leq \alpha \leq$ 0,1 | -- | | | | |
| IR radiation, eye | | E_{IR} | $W \cdot m^{-2}$ | 100 | 0,04 | 570 | | 3200 | |
| <p>* Small source defined as one with $\alpha < 0,011$ radian. Averaging field of view at 10000 s is 0,1 radian.</p> <p>** Involves evaluation of non-GLS source</p> <p>NOTE The action functions: see Table 4.1 and Table 4.2 The applicable aperture diameters: see 4.2.1 The limitations for the angular subtenses: see 4.2.2 The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.</p> | | | | | | | | | |

-----The End-----