



RTECH-PHOTOMETRY LABORATORY

Testreport : Measurement of luminous intensity distribution related to the standard
NBN-EN 13032-1; NBN-EN 13032-4; CIE 121-1996; CIE S 025/E; IES LM-79-08 and procedures PT-P-01
and PT-P-02

rue de Mons, 3 B-4000 LIEGE - Tel : 04/224.71.40 - Fax : 04/224.25.90
Measurement for Schröder group.

LED

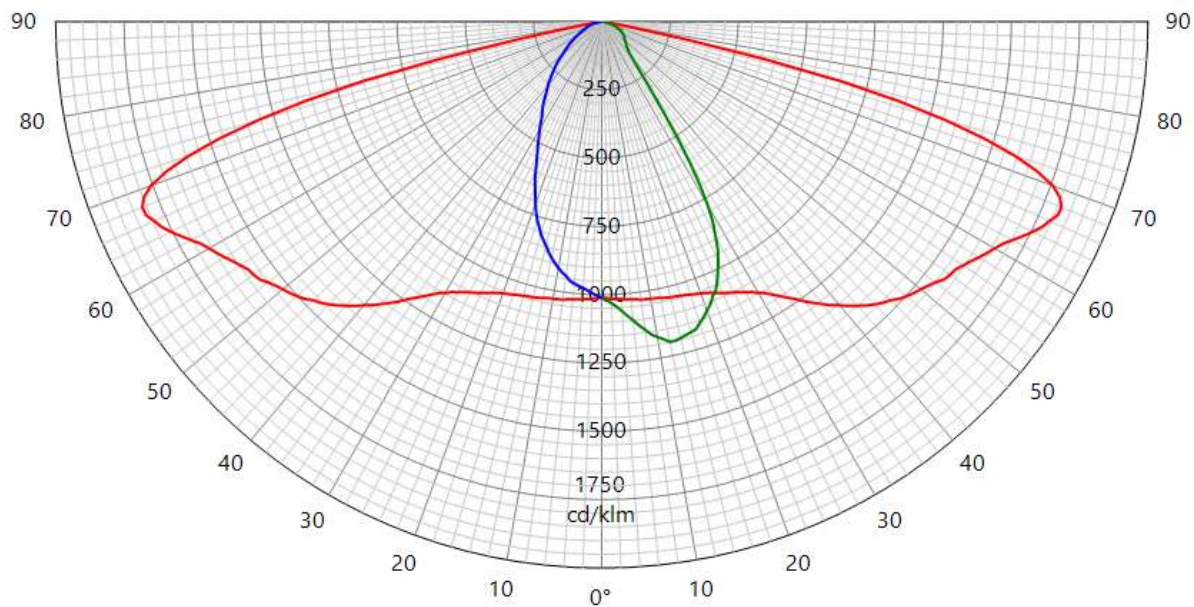
| | | | | |
|--|---|------------------------|---------------------|-------------------------|
| Origin TUNGSRAM-Schröder Zrt. Hungary | Production TUNGSRAM-Schröder Zrt. Hungary | Luminaire VOLTANA 2 | Inclination 0° | Request # FD39014 |
| Source | | | | |
| Type LED | BIN 40-70M-4-TB-RB | Trademark Samsung | Reference LH351C | # LEDs 16 |
| Reflector 5136 | Master - | | | Reflector No 5136 |
| Schreder Led assembly Narrow Assembled 0.0° | | | | |
| Protector Refractor Lens | | | | |
| Protector Glass Extra Clear Flat Smooth | Lens Gaggione 5136 PMMA | | | |
| Laboratory observation | | | | |
| VOLTANA 2 with 16 SAMSUNG LH351C Used flux for efficiency matrix calculation = 3074 lm - CCT = 3863 K - CRI = 72,23 (see sphere test report 2019/64 on appendix). | | | | |
| Purpose DOC | Sample date 08-01-2019 | | Sample # 39R006 | |
| Observation | | | | |
| DOC VOLTANA 2 with lenses 5136 | | | | |
| Flux coefficient multiplicator (only for efficiency matrix): From 350 to 500 mA : 1,380 From 350 to 700 mA : 1,840 From 350 to 1000 mA : 2,453 | | | | |
| Fixture powered with driver Osram OT40/120-277/1A0 4DIM LT2E for matrix @350/500/700mA Fixture powered with driver Philips Xitanium LP 75W 0,3 - 1,0A SNLDAE 230V C133 sXt for matrix @1000mA | | | | |
| Notes | | | | |
| The publication of this report in another form than the original one is not allowed without agreement of the laboratory. This report concerns type tests on one or a series of specimens. | | | | |

| | | | | | |
|-----------------|--------------------|----------------------|---------------|---|--------------|
| Asked by RCA | Measured by BMA | Approved by RLABO | Appendix 1 |   226-TEST NBN EN ISO/IEC 17025 : 2005 | 42457 |
|-----------------|--------------------|----------------------|---------------|---|--------------|

LUMINOUS INTENSITY DIAGRAM

| | | | | | | | | | |
|---|--|---|---------------------------------------|-------------------------------|---------------------|--------------------------|-------------|-----------------------------|--|
| Origin TUNGSRAM-Schröder Zrt. Hungary | | Production TUNGSRAM-Schröder Zrt. Hungary | | Luminaire VOLTANA 2 | | Inclination 0° | | Request # FD39014 | |
| Source | Type LED | BIN 40-70M-4-TB-RB | Trademark Samsung | Reference LH351C | # LEDs 16 | Reflector 5136 | | | |
| Reflector | Schreder Led assembly Narrow Assembled 0.0° | | | | | No | 5136 | | |
| Matrices | 424571 | | Φ 0-90° = 2662lm - 90-180° = 0lm | | | Absolute measurement | | | |
| Protector Refractor Lens | Protector Glass Extra Clear Flat Smooth - VOLTANA 2 Lens 16 x Gaggione 5136 PMMA | | | | | | | | |
| Observation | <p>Matrix in total flux @350 mA</p> <p>Light losses due to thermal stabilization: 1 %</p> <p>Electrical measurement on LED (#1) : Voltage = 44.68 V Current = 0.350 A Power = 15.61 W</p> <p>Electrical measurement on driver (#1) : Voltage = 230.00 V Current = 0.091 A Power = 18.91 W PF = 0.902</p> <p>Total luminaire power = 18.91 W : Lm/Watt = 140.75 lm/W</p> <p>Driver #1 : See observations for driver details - pcb : 00-71-627 A</p> | | | | | | | | |

| Plane | I Peak | Peak position | Index | I zero | Laboratory ambient t° | Measurement date | ↕ |
|---------|--------|---------------|-------|--------|-----------------------|------------------|---|
| 5 - 175 | 1815 | 68 | S | 1011 | 25.1° | 30-01-2019 | |
| 90 | 1199 | 13 | D | | | | |
| 270 | 1011 | 0 | G | | | | |

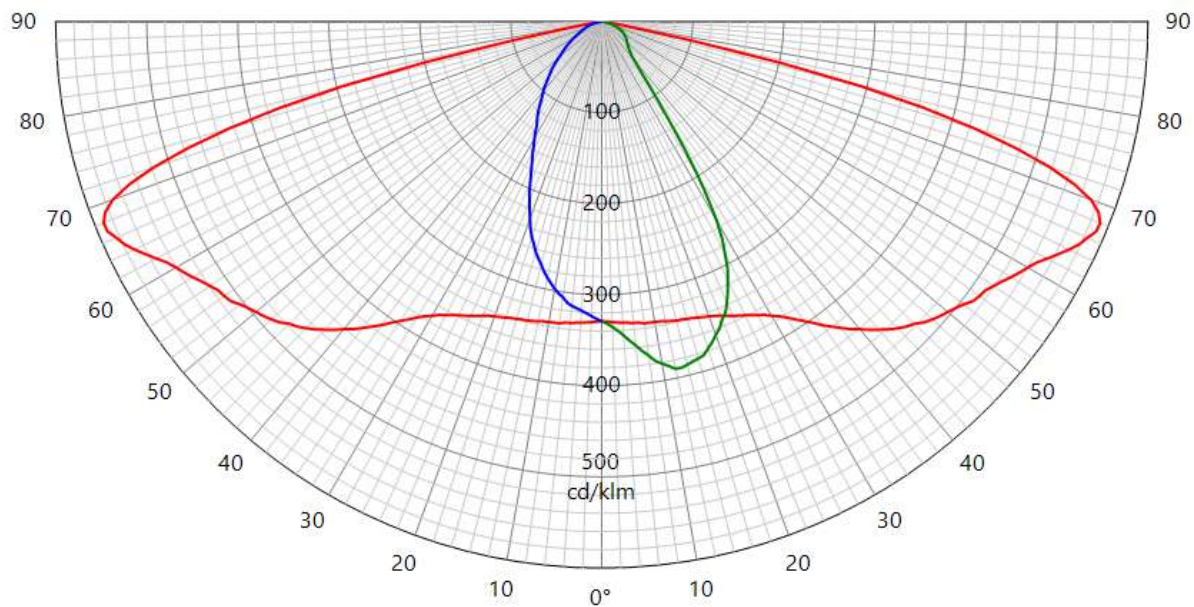


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LUMINOUS INTENSITY DIAGRAM

| | | | | | | | | | |
|---|---|---|---------------------------------------|-------------------------------|----------------------|--------------------------|--|-----------------------------|--|
| Origin TUNGSRAM-Schröder Zrt. Hungary | | Production TUNGSRAM-Schröder Zrt. Hungary | | Luminaire VOLTANA 2 | | Inclination 0° | | Request # FD39014 | |
| Source | Type LED | BIN 40-70M-4-TB-RB | Trademark Samsung | Reference LH351C | # LEDs 16 | Reflector 5136 | | | |
| Reflector | Schreder Led assembly Narrow Assembled 0.0° | | | | No | 5136 | | | |
| Matrices | 424572 | | η 0-90° = 86.6% - 90-180° = 0.0% | | Relative measurement | | | | |
| Protector Refractor Lens | Protector Glass Extra Clear Flat Smooth - VOLTANA 2 Lens 16 x Gaggione 5136 PMMA | | | | | | | | |
| Observation | <p>Matrix in efficiency @350 mA</p> <p>Light losses due to thermal stabilization: 1 %</p> <p>Electrical measurement on LED (#1) : Voltage = 44.68 V Current = 0.350 A Power = 15.61 W</p> <p>Electrical measurement on driver (#1) : Voltage = 230.00 V Current = 0.091 A Power = 18.91 W PF = 0.902</p> <p>Total luminaire power = 18.91 W</p> <p>Driver #1 : See observations for driver details - pcb : 00-71-627 A</p> | | | | | | | | |

| Plane | I Peak | Peak position | Index | I zero | Laboratory ambient t° | Measurement date | ↕ |
|---------|--------|---------------|-------|--------|-----------------------|------------------|---|
| 5 - 175 | 590 | 68 | S | 329 | 25.1° | 30-01-2019 | |
| 90 | 390 | 13 | D | | | | |
| 270 | 329 | 0 | G | | | | |

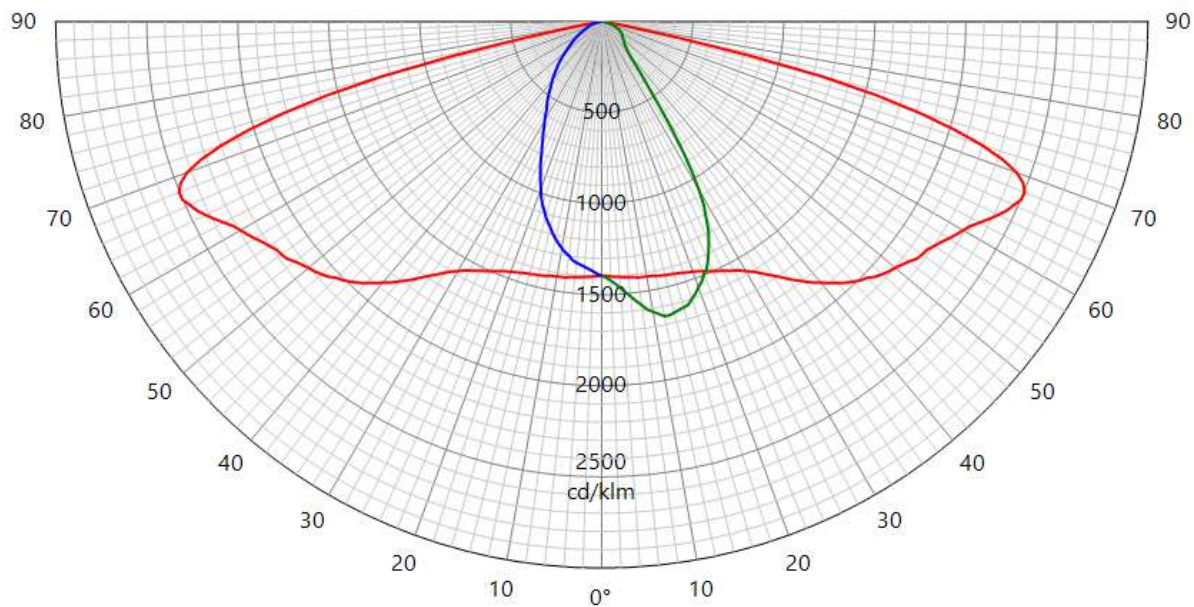


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LUMINOUS INTENSITY DIAGRAM

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|---|---|---|---------------------------------------|-------------------------------|---------------------|-----------------------------|-------------|-----------------------------|--|
| Origin TUNGSRAM-Schröder Zrt. Hungary | | Production TUNGSRAM-Schröder Zrt. Hungary | | Luminaire VOLTANA 2 | | Inclination 0° | | Request # FD39014 | |
| Source | Type LED | BIN 40-70M-4-TB-RB | Trademark Samsung | Reference LH351C | # LEDs 16 | Reflector 5136 | | | |
| Reflector | Schreder Led assembly Narrow Assembled 0.0° | | | | No | | 5136 | | |
| Matrices | 424573 | | Φ 0-90° = 3673lm - 90-180° = 0lm | | | Absolute measurement | | | |
| Protector Refractor Lens | Protector Glass Extra Clear Flat Smooth - VOLTANA 2 Lens 16 x Gaggione 5136 PMMA | | | | | | | | |
| Observation | <p>Matrix in total flux @500 mA</p> <p>Light losses due to thermal stabilization: 1,5 %</p> <p>Electrical measurement on LED (#1) : Voltage = 45.54 V Current = 0.500 A Power = 22.74 W</p> <p>Electrical measurement on driver (#1) : Voltage = 230.00 V Current = 0.120 A Power = 26.40 W PF = 0.954</p> <p>Total luminaire power = 26.40 W : Lm/Watt = 139.13 lm/W</p> <p>Driver #1 : See observations for driver details - pcb : 00-71-627 A</p> | | | | | | | | |

| Plane | I Peak | Peak position | Index | I zero | Laboratory ambient t° | Measurement date | ↕ |
|---------|--------|---------------|-------|--------|-----------------------|------------------|---|
| 5 - 175 | 2504 | 68 | S | 1396 | 25.1° | 30-01-2019 | |
| 90 | 1654 | 13 | D | | | | |
| 270 | 1396 | 0 | G | | | | |

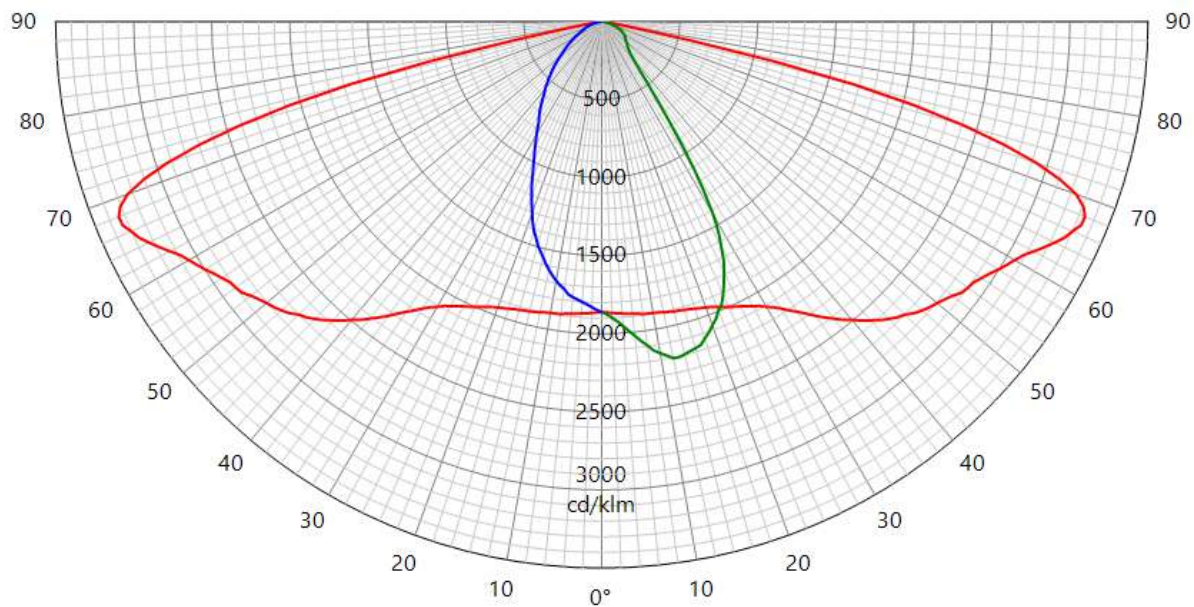


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LUMINOUS INTENSITY DIAGRAM

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|---|---|---|---------------------------------------|-------------------------------|---------------------|-----------------------------|-------------|-----------------------------|--|
| Origin TUNGSRAM-Schröder Zrt. Hungary | | Production TUNGSRAM-Schröder Zrt. Hungary | | Luminaire VOLTANA 2 | | Inclination 0° | | Request # FD39014 | |
| Source | Type LED | BIN 40-70M-4-TB-RB | Trademark Samsung | Reference LH351C | # LEDs 16 | Reflector 5136 | | | |
| Reflector | Schreder Led assembly Narrow Assembled 0.0° | | | | No | | 5136 | | |
| Matrices | 424574 | | Φ 0-90° = 4897lm - 90-180° = 0lm | | | Absolute measurement | | | |
| Protector Refractor Lens | Protector Glass Extra Clear Flat Smooth - VOLTANA 2 Lens 16 x Gaggione 5136 PMMA | | | | | | | | |
| Observation | <p>Matrix in total flux @700 mA</p> <p>Light losses due to thermal stabilization: 2,6 %</p> <p>Electrical measurement on LED (#1) : Voltage = 46.53 V Current = 0.700 A Power = 32.52 W</p> <p>Electrical measurement on driver (#1) : Voltage = 230.00 V Current = 0.165 A Power = 36.87 W PF = 0.973</p> <p>Total luminaire power = 36.87 W : Lm/Watt = 132.83 lm/W</p> <p>Driver #1 : See observations for driver details - pcb : 00-71-627 A</p> | | | | | | | | |

| Plane | I Peak | Peak position | Index | I zero | Laboratory ambient t° | Measurement date | ↕ |
|---------|--------|---------------|-------|--------|-----------------------|------------------|---|
| 5 - 175 | 3339 | 68 | S | 1861 | 25.1° | 30-01-2019 | |
| 90 | 2206 | 13 | D | | | | |
| 270 | 1861 | 0 | G | | | | |

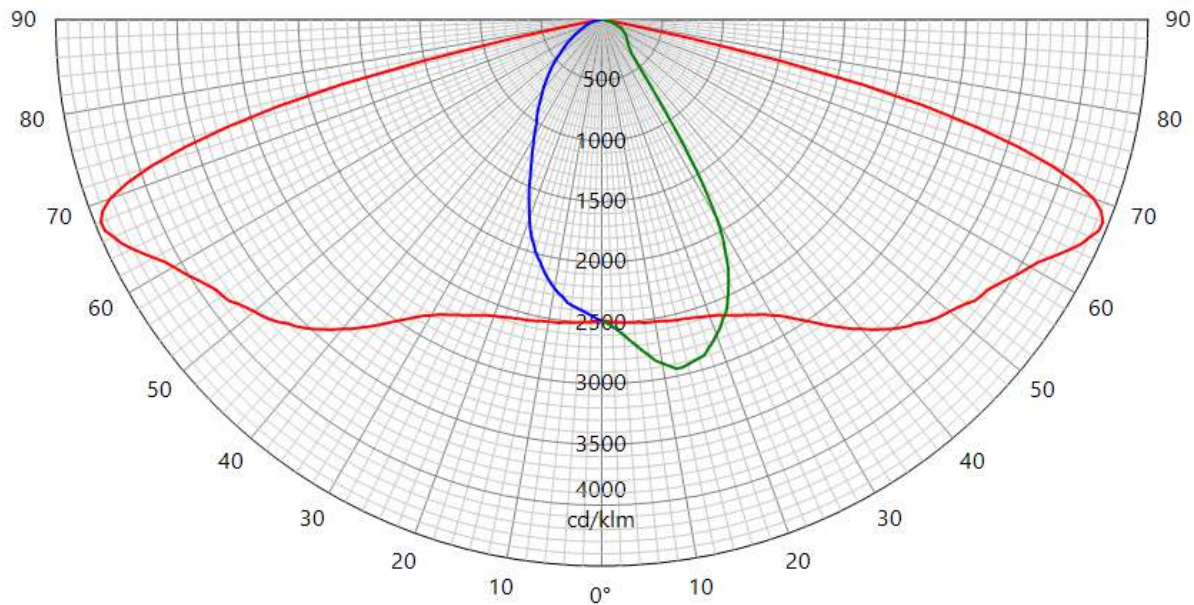


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LUMINOUS INTENSITY DIAGRAM

| | | | | | | | | | |
|---|--|---|---------------------------------------|-------------------------------|---------------------|-----------------------------|-------------|-----------------------------|--|
| Origin TUNGSRAM-Schröder Zrt. Hungary | | Production TUNGSRAM-Schröder Zrt. Hungary | | Luminaire VOLTANA 2 | | Inclination 0° | | Request # FD39014 | |
| Source | Type LED | BIN 40-70M-4-TB-RB | Trademark Samsung | Reference LH351C | # LEDs 16 | Reflector 5136 | | | |
| Reflector | Schreder Led assembly Narrow Assembled 0.0° | | | | No | | 5136 | | |
| Matrices | 424575 | | Φ 0-90° = 6529lm - 90-180° = 0lm | | | Absolute measurement | | | |
| Protector Refractor Lens | Protector Glass Extra Clear Flat Smooth - VOLTANA 2 Lens 16 x Gaggione 5136 PMMA | | | | | | | | |
| Observation | <p>Matrix in total flux @1000 mA</p> <p>Light losses due to thermal stabilization: 3,6 %</p> <p>Electrical measurement on LED (#1) : Voltage = 47.84 V Current = 1.000 A Power = 47.84 W</p> <p>Electrical measurement on driver (#1) : Voltage = 230.00 V Current = 0.236 A Power = 53.37 W PF = 0.982</p> <p>Total luminaire power = 53.37 W : Lm/Watt = 122.34 lm/W</p> <p>Driver #1 : See observations for driver details - pcb : 00-71-627 A</p> | | | | | | | | |

| Plane | I Peak | Peak position | Index | I zero | Laboratory ambient t° | Measurement date | ↕ |
|---------|--------|---------------|-------|--------|-----------------------|------------------|---|
| 5 - 175 | 4452 | 68 | S | 2481 | 25.1° | 30-01-2019 | |
| 90 | 2941 | 13 | D | | | | |
| 270 | 2481 | 0 | G | | | | |



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CONFORMITY STATEMENT

Measurement fulfil Standards:

NBN-EN 13032-1
NBN-EN 13032-4
NBN-EN 17025:2005
CIE 121-1996
LM79-08
CIE S 025

Measurement quantities measured:

Light distribution in relative or absolute photometry
Led alone cold lumen package
Led CCT and CRI
Power consumption of the fitting
Lm/watt

Electrical measurement, if not specified:

Primary values are AC with 50Hz frequency
Secondary values on SSL are DC

CCT, CRI and chromaticity coordinates: are measured in Ulbricht sphere.
If specified Main test report refer to sphere extra test report.

Light distribution are measured on gonio. If not otherwise specified, measurement is done at 50 Hz

Number of hours operated prior to measurement: if not otherwise specified, 0 hours (no aging).

Stabilization time: If not otherwise specified, a minimal stabilization time of 0.5 hour is applied; and measurement will start when it exists no more variation above 0.5% in 15 minutes

Total operating time of the product including stabilization:
45 minutes have to be added by measurement.
Minimal operating time is 75 minutes

Luminous intensity distribution: available on electronic file with
.mat format (internal Schröder format)
.ldt format (European standard)
.IES format (American standard)

Statement of uncertainties (K=2, 95% of confidence level):
Uncertainties calculated based on a typical Schröder fitting and PCBA

Intensity measurement: +/- 3%
Angle: +/- 0.5°
Flux: +/- 2.5%
Electrical DC
Power: +/- 0.25%
Voltage: +/- 0.15%
Current: +/- 0.15%
Electrical AC
Power: +/- 0.15%
Voltage: +/- 0.3%
Current: +/- 0.3%
Temperature: +/- 0.65%

| ISP2000 | JETI | |
|---------|--------|----------|
| CCT: | +/- 5% | +/-7.5% |
| CRI: | +/- 2% | +/-2.75% |
| x/y: | +/- 2% | +/-4.6% |

lm/Watt: +/-3.5%

Measuring instruments in use:

Gonio 1

Type C with Moving mirror

Manufacturer: LMT Lichtmesstechnik GmbH Berlin, Helmholtzstrasse 9 10587 Berlin, Germany

Type: GO-DS 2000

Calibration: traceable to PTB (Physikalisch-Technische Bundesanstalt D-Braunschweig) and METAS (Federal Institute of Metrology, CH-Bern)

Photometric test distance: By default 10 meter, on request 30 meter.

Gonio 2

Type C

Manufacturer: Technoteam Bildverarbeitung, Werner-von-Siemens-Strasse 5 98693 Ilmenau, Germany

Calibration: traceable to BIPM (Bureau International des Poids et Mesures F-Sèvres)

Photometric test distance: Near Field

Sphere n°1

4p geometry

Manufacturer: LMT Lichtmesstechnik GmbH, Helmholtzstrasse 9 10587 Berlin, Germany

Type: UL2000 + U1000 V-Lambda photometer

Calibration: traceable to BIPM (Bureau International des Poids et Mesures F-Sèvres)

Sphere n°2

4p geometry

Manufacturer: Instrument Systems GmbH, Neumarkter Str. 83, 81673 Muenchen, Germany

Type ISP2000 + Spectroradiometer CAS120 and CAS140

Calibration: traceable to NIST

Colorimetric portable spectroradiometer

Manufacturer: JETI Technische Instrumente GmbH, Tatzendpromenade 2 07745 Jena

Type: SPECBOS 1201

Calibration: traceable to NIST

Multimeters

Manufacturer: Agilent

Type: 34401A

Calibration: traceable to BIPM (Bureau International des Poids et Mesures F-Sèvres)

Wattmeters

Manufacturer: Yokogawa

Type: WT210 and WT310

Calibration: traceable to BIPM (Bureau International des Poids et Mesures F-Sèvres)

Thermometers

Amarell Precision

Type: Liquid in glass N63833

Calibration: traceable to LBT (Laboratoire Belge de Thermométrie)