

# Deutsche Akkreditierungsstelle

## Annex to the Partial Accreditation Certificate D-PL-19088-01-01 according to DIN EN ISO/IEC 17025:2018

**Valid from:** 03.01.2024

**Date of issue:** 03.01.2024

This annex is a part of the accreditation certificate D-PL-19088-01-00.

Holder of partial accreditation certificate:

**TÜV Rheinland Lichttechnik GmbH, TÜV Rheinland Group  
Rhinstraße 46, 12681 Berlin**

with the location

**TÜV Rheinland Lichttechnik GmbH  
Rhinstraße 46, 12681 Berlin**

The testing laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The testing laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of testing laboratories and confirm generally with the principles of DIN EN ISO 9001.

Tests in the field of:

**Testing of Reflection; Measurement of Retroreflecting Surfaces; Measurement of Colour; Measurement of Spectral Irradiance or Radiance, Luminous Flux, Luminous Intensity and the Luminous Intensity Distribution, Luminance, Illuminance, Illuminance with high temporal resolution (flash light measurement), Refractive Power; Testing the resistance of the surface to damage by small particles; Testing against fogging of translucent surfaces; Testing of Transmission; Testing of Stray Light Proportion; Determination of the Luminance Factor**

*This certificate annex is only valid together with the written accreditation certificate and reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at <https://www.dakks.de>.*

Abbreviations used: see last page

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Within the scope of accreditation the testing laboratory is permitted, without being required to inform and obtain prior approval from DAkKS S, the following:  
the free choice of standard or equivalent testing methods.

The testing laboratory maintains a current list of all testing within the flexible scope of accreditation.

**1. Testing of Reflection**

Determination of the degree of reflection

DIN 5036-3 1979-11	Radiometric and photometric properties of materials; methods of measurement for photometric and spectral radiometric characteristics <i>5.1 Measurement of Reflectance <math>\rho</math></i>
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**2. Measurement of Retroreflecting Surfaces**

Detection of the coefficient of luminous intensity R (CIL), the coefficient of luminous intensity R' by means of a retro-reflection measuring device

CIE 54.2 2001	Retroreflection: Definition and Measurement
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DIN 67520 2013-10	Retro-reflecting materials for traffic safety – Photometric minimum requirements for retro-reflective sheetings <i>5 Measurement and testing methods</i>
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ISO 6742 2015-05	Cycles - Lighting and retro-reflective devices - Photometric and physical requirements: 8 Photometric Test
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**3. Measurement of Colour**

Spectral method: Measurement of the relative spectral radiant intensity, radiance, radiant flux and irradiance and calculation of the colour coordinates.

Tristimulus method: Integral measurement of the colour coordinates via a spectrally adapted colour measuring head

CIE 15 2004	Colorimetry
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DIN 5033-4 1992-07	Colorimetry – Spectrophotometric method
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DIN 5033-6                      Colorimetry – Tristimulus method  
1976-08

**4. Measurement of Spectral Irradiance or Radiance**

Measurement of the spectral irradiance  $E_{e\lambda}$  or radiance  $L_{e\lambda}$ , calculation of the radiometric quantities radiant intensity  $I_e$ , radiant flux  $\Phi_e$ , irradiance  $E_e$  and radiance  $L_e$

DIN 5030-2                      Spectral measurement of radiation – Emitter for spectral radiation  
1984-12                              measurements; selection criteria

DIN EN 62471                      Photobiological safety of lamps and lamp systems  
2009-03                              (limited to the investigations blue light hazard, photochemical..)

CIE 103                              Solariums and home tanning  
1993

CIE 157                              Control of damage to museum objects by optical radiation  
2004

**5. Measurement of Luminous Flux**

Measurement of the luminous flux  $\Phi$  with an Integrating Sphere

CIE 84                              The Measurement of Luminous Flux  
1989                              (limited to thermal radiators and electric lamps with direct current supply)

DIN 5032-1                      Photometry - Part 1: Methods of measurement  
1999-04                              9.5 Luminous flux  
*(limited to thermal radiators and electric lamps with direct current supply)*

DIN EN 13032-1                      Light and lighting - Measurement and presentation of photometric data of  
2004-10                              lamps and luminaires  
5.5 Measurement of luminous flux  
*(limited to thermal radiators and electric lamps with direct current supply)*

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**6. Measurement of Luminous Intensity and the Luminous Intensity Distribution**

Measurement of luminous intensity in a defined direction or luminous intensity distribution using a goniophotometer

CIE 70 1987	The Measurement of Absolute Luminous Intensity Distribution <i>(limited to thermal radiators and electric lamps with direct current supply)</i>
DIN 5032-1 1999-04	Photometry - Part 1: Methods of measurement 9.4 Luminous intensity <i>(limited to thermal radiators and electric lamps with direct current supply)</i>
DIN EN 13032-1 2004-10	Light and lighting - Measurement and presentation of photometric data of lamps and luminaires 5.4 Measurement of luminous intensity distribution <i>(limited to thermal radiators and electric lamps with direct current supply)</i>
CIE 121-SP1 2009	The photometry and goniophotometry of luminaires <i>(limited to thermal radiators and electric lamps with direct current supply)</i>

**7. Measurement of Luminance**

Measurement of the Luminance  $L$  with a luminance meter on an optical bench

DIN 5032-1 1999-04	Photometry – Part 1: Methods of measurement 9.3 Luminance $L$ <i>(limited to thermal radiators and electric lamps with direct current supply)</i>
DIN EN 13032-1 2004-10	Light and lighting – Measurement and presentation of photometric data of lamps and luminaires 5.6 Measurement of luminance <i>(limited to thermal radiators and electric lamps with direct current supply)</i>

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**8. Measurement of Illuminance**

Measurement of the Illuminance  $E$  on an optical bench at a defined distance

DIN 5032-1                      Photometry – Part 1: Methods of measurement  
1999-04                      9.2 Illuminance  $E$   
*(limited to thermal radiators and electric lamps with direct current supply)*

**9. Measurement of Illuminance with high temporal resolution (flash light measurement)**

Measurement of the course of illuminance  $E$  with high temporal resolution

DIN V ENV 50234              Flashing lights – Equipment specifications and tests  
1998-04

**10. Measurement of Refractive Power**

Measurement of spherical, astigmatic and prismatic refractive power

DIN EN 167                      Personal eye-protection – Optical test methods  
2002-04                      *Annex A Method for measuring spherical and astigmatic refractive values  
in small ranges*

**11. Testing of Transmission**

Test rig to determine the spectral and/or absolute transmission

DIN 5036-3                      Radiometric and photometric properties of materials; methods of  
1979-11                      measurement for photometric and spectral radiometric characteristics  
*5.4 Measurement of the transmittance  $\tau$*

DIN EN 167                      Personal eye-protection – Optical test methods  
2002-04                      *6 Determination of the transmittance*

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**12. Testing of Stray Light Proportion**

Test bench for determining the stray light proportion

- DIN 5036-3  
1979-11                      Radiometric and photometric properties of materials; methods of measurement for photometric and spectral radiometric characteristics  
*5.5 Measurement of the degree of diffuse transmission  $\tau_d$*
- DIN EN 167  
2002-04                      Personal eye-protection – Optical test methods  
*4 Testing of stray light*

**13. Determination of the Luminance Factor**

Test rig for determination of the luminance factor

- DIN 5036-3  
1979-11                      Radiometric and photometric properties of materials; methods of measurement for photometric and spectral radiometric characteristics  
*7 Measurement of Luminance Factor  $\beta$  and Luminance coefficient  $q$*

**The tests can be carried out within the following parameters:**

Type of test	Measurand	Measuring range	smallest achievable measurement uncertainty (k = 2)	Characteristic test procedure
<b>Retroreflection</b>	Coefficient of luminous intensity (CIL Reflection value R) Coefficient of retro-reflection (Specific reflection value R')	0,1 mcd/lx ... 199.900 mcd/lx 0,01 cd/lx/m <sup>2</sup> ... 19.990 cd/lx/m <sup>2</sup> Observation angle 0,100°... 4,000°	3,6%	CIE 54.2
<b>Radiometry</b>	spectral and integral radiance	250 ... 1000 nm	3%	DIN 5030-2
	spectral and integral radiance	250 ... 1000 nm	4,4%	DIN 5030-2
	spectral and integral radiation power	250 ... 1000 nm	3%	DIN 5030-2
	spectral and integral irradiance	250 ... 1000 nm	2,4%	DIN 5030-2
<b>Photometry</b>	Light intensity	10 <sup>-2</sup> ... 2·10 <sup>6</sup> cd	2%	CIE 70 DIN 5032 DIN EN 13032
	Luminance	10 <sup>-3</sup> ... 2·10 <sup>6</sup> cd/m <sup>2</sup>	3,4%	DIN 5032 DIN EN 13032

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Type of test	Measurand	Measuring range	smallest achievable measurement uncertainty (k = 2)	Characteristic test procedure
	Illuminance	$10^{-3} \dots 2 \cdot 10^5$ lx	2%	DIN 5032 DIN EN 13032
	Luminous flux	$10^{-3} \dots 2 \cdot 10^6$ lm	3%	CIE 84 DIN 5032 DIN EN 13032
	light color	CIE color space x, y	$\pm 0,001$	CIE 15
<b>Goniometry</b>	Angle	H: $-180^\circ \dots 180^\circ$ V: $-40^\circ \dots 90^\circ$	$\pm 0,005^\circ$	CIE 70 CIE 121
<b>Refractive power</b>	Spherical and astigmatic	0,01 ... 1,00 dpt	4,5% min. 0,015dpt	DIN EN 167 UNECE-R 22
<b>Transmission</b>		0% ... 100%	0,5% for spectrally selective samples	DIN 5036-3 DIN EN 167
<b>Reflection</b>		0 ... 100%		DIN 5036-3
<b>Stray Light</b>	Degree of stray light with diffuse transmitting materials	0,1% ... 50%	2% relative measurement	DIN 5036-3 DIN EN 167

**Abbreviations used:**

CIE	Commission Internationale de l'Éclairage (International commission for lighting)
DIN	German institut for standardisation
EN	European Standard
ISO	International Organization for Standardisation
IEC	International Electrotechnical Commission

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