

**Bild K.2 – Messaufbau für die Leuchtdichteverteilung der B-Versionen von LED-Lichtquellen**

## K.2 Alternatives Verfahren

In Beratung.

## Anhang L (informativ)

### Verfahren zur Bestimmung des maximalen Leuchtdichtegradienten von LED-Lichtquellen

#### L.1 Leuchtdichtemessung

Vor Beginn der Messung sollte der Aufbau für die Leuchtdichtemessung paraxial zum mechanischen Bezugssystem der LED-Lichtquelle (z. B. Bezugsachse und Bezugsebene), wie im entsprechenden Datenblatt definiert, ausgerichtet werden.

Die Einrichtung für die Leuchtdichtemessung sollte eine geeignete Auflösung haben;

z. B. für einen Messabstand von 50 µm ist eine Auflösung zwischen 10 µm und 20 µm geeignet. Wenn eine Einrichtung mit einer höheren Auflösung verwendet wird, sollten benachbarte Leuchtdichtemesswerte arithmetisch gemittelt werden, so dass sie den Leuchtdichtewert einer Fläche zwischen 10 µm und 20 µm ergeben.

Die Leuchtdichtemessung sollte in einem Gitter mit gleichem Abstand in x- und y-Richtung erfolgen, das die gesamte lichtemittierende Fläche der Lichtquelle abdeckt.

ANMERKUNG Die Größe des abgetasteten Bereichs hat keinen Einfluss auf die Ergebnisse, solange die gesamte lichtemittierende Fläche in die Messung einbezogen wird.

Während der Leuchtdichtemessung sollte entweder die Prüfspannung  $V_{\text{test}}$  bei einer spannungsgesteuerten Lichtquelle oder der Steuerstrom  $I_f$  bei einer stromgesteuerten Lichtquelle und die entsprechende(n) Temperatur(en) aufgezeichnet werden.

Wenn aus der Messung Aussagen Bestanden/Durchgefallen abgeleitet werden, sollte die erweiterte Messunsicherheit des Ergebnisses zur Verfügung gestellt werden.

#### L.2 Berechnung des maximalen Leuchtdichtegradienten

Die folgenden Schritte sollten zur Berechnung des maximalen Leuchtdichtegradienten durchgeführt werden.

Schritt 1: Berechnen der mittleren Leuchtdichte  $L(x)$  der gemessenen Leuchtdichtedaten entlang der y-Achse für alle x-Werte, d. h. Mittelwertbildung in einer Richtung parallel zu der/den die Dunkelgrenze erzeugenden Seite(n) der LED-Lichtquelle, siehe Bild L.1.

Schritt 2: Verwendung der linearen Interpolation der berechneten mittleren Leuchtdichtewerte  $L(x)$ , um mittlere Leuchtdichtedaten in Schritten der Weite „s“ auf der die Dunkelgrenze erzeugenden Seite zu ermitteln.

Die Schrittweite „s“ sollte 1/50 oder kleiner als der Bewertungsabstand „p“ sein.

Der Bewertungsabstand „p“ (p ausgedrückt in µm) ist im Datenblatt der Lichtquelle definiert.

Schritt 3: Auf der Grundlage dieser mittleren Leuchtdichtewerte  $L(x)$  mit der Schrittweite „s“ wird mit der folgenden Formel der Leuchtdichtegradient  $G_p$  für alle x-Werte berechnet:

$$G_p(x) = | \log L(x) - \log L(x + p) |$$

Schritt 4: Ermitteln des Werts für x, so dass  $G_p(x)$  maximal wird, d. h. ermitteln von  $G_{p,\text{max}}$ , siehe Bild L.2.

Schritt 5: Runden des Werts für  $G_{p,\text{max}}$  auf zwei Dezimalstellen.

Beispiele für den maximalen Leuchtdichtegradienten, der für eine LED-Lichtquelle ermittelt wird, sind dann:

Beispiel 1:  $G_{50\ \mu\text{m},\text{max}} = 0,95$  (wenn = 600 mA,  $T_b = 50\ \text{°C}$ )

für eine stromgesteuerte Lichtquelle mit einem definierten  $T_b$ -Punkt.

Beispiel 2:  $G_{50\ \mu\text{m},\text{max}} = 0,95$  ( $V_{\text{test}} = 13,5\ \text{V}$  Gleichspannung,  $T_{\text{ambient}} = 25\ \text{°C}$  bei 30 min)

für eine spannungsgesteuerte Lichtquelle mit integriertem Kühlkörper.

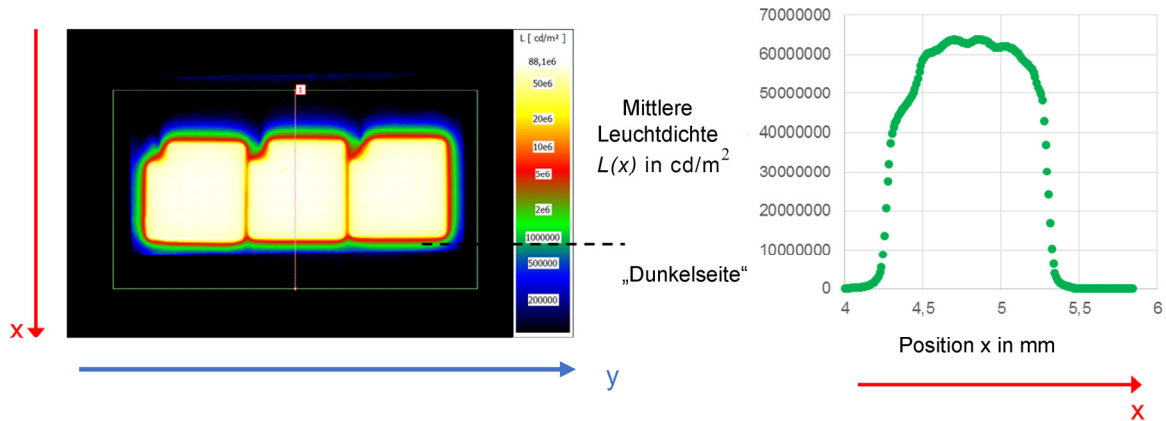


Bild L.1 – Beispiel für eine Leuchtdichteabbildung und die berechneten Leuchtdichtewerte  $L(x)$

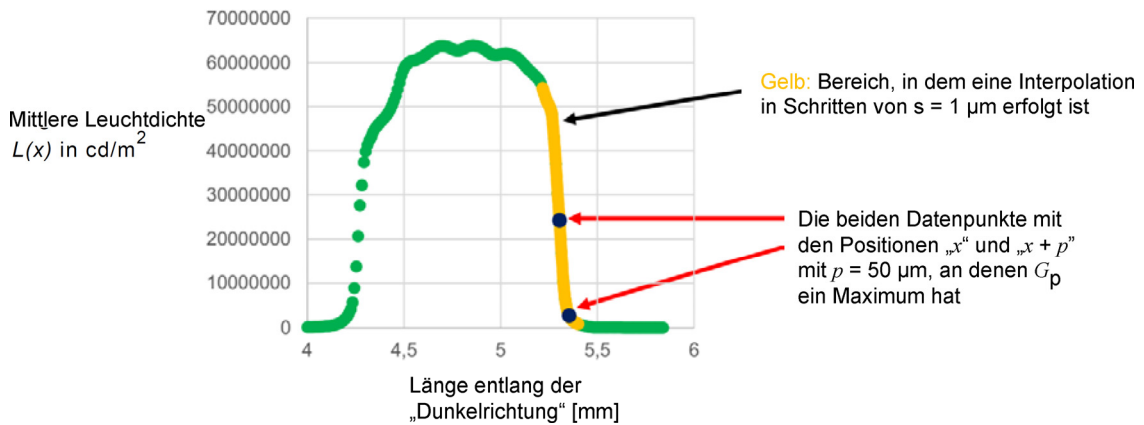


Bild L.2 – Beispiel für eine 1- $\mu\text{m}$ -Interpolation und die Position des maximalen Leuchtdichtegradienten

### Literaturhinweise

CIE Publication 070-1987, *The Measurement of Absolute Luminous Intensity Distributions*

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2 **Introduction (not part of the proposal)**

3 The main motivation to amend the current edition 3.3, resulting in a new edition is due to the  
4 request to insert a LED gradient measurement method and caused a review of the edition 3.3  
5 for its consistency.

6 The following topics have been discussed within the SC34A/WG2 to build a mature proposal.

- 7 • A revision creating a more technology independent standard (merging the common  
8 section for incandescent-, discharge- and solid-state-light sources was considered but  
9 not agreed for its impact, without seen advantage related to the required effort.
- 10 • The proposal for the LED-gradient measurement: 34A/2155/CD and 34A/2171/CC  
11 including the agreed observations recently issued),
- 12 • An update on the title and scope based on the proposal and comments received by  
13 34A/2163/CD and 34A/2171/CC,
- 14 • The normative references are reviewed and updated if considered appropriate  
15 (publication dates and some additional references),
- 16 • This proposal is embedding a clean-up on the very old bilingual datasheets, with out-  
17 dated references like IEC 61 and IEC 809. These datasheets converted into  
18 monolingual representations with the mentioned editorial corrections and sharpened  
19 figures (with support from the figure editing team at IEC Central Office.  
20 A further improvement on these datasheets is suggested to replace the text in the  
21 figures with note numbers, and add the notes and related text below the figures (but  
22 not yet implemented by the SC34A/WG2).  
23 Since the technical content is not changed there is no need to change to the sheet  
24 numbers (version / date).

25 Due to recent progress of the related IEV (IEC 60050-845 ED2: 1/2421/FDIS & 1/2426/RVD), a  
26 review on the terms still need still a decent review, and will be performed by SC34A/WG  
27 as soon as the publication is available.

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## CONTENTS

30	FOREWORD.....	8
31	1 Scope.....	11
32	2 Normative references .....	11
33	3 Terms and definitions .....	13
34	4 Requirements and test conditions for filament lamps .....	16
35	4.1 General requirements .....	16
36	4.2 Lamp marking .....	16
37	4.3 Bulbs .....	17
38	4.4 Colour.....	17
39	4.4.1 Colour of light.....	17
40	4.4.2 Colour endurance .....	18
41	4.4.3 Coated bulb.....	19
42	4.5 Lamp dimensions.....	19
43	4.6 Caps and bases .....	19
44	4.7 Initial electrical and luminous requirements.....	19
45	4.8 Check on optical quality .....	19
46	4.8.1 General .....	19
47	4.8.2 12 V lamps emitting white light .....	19
48	4.8.3 6 V and 24 V lamps emitting white light .....	20
49	4.8.4 Lamps emitting selective-yellow light .....	20
50	4.9 UV radiation.....	20
51	4.10 Standard (étalon) filament lamps .....	20
52	4.11 Non-replaceable filament lamps .....	21
53	4.11.1 General .....	21
54	4.11.2 Fixation .....	21
55	4.11.3 Lifetime .....	22
56	4.11.4 Colour endurance .....	22
57	4.11.5 Luminous flux and colour maintenance .....	22
58	4.11.6 Vibration and shock resistance .....	23
59	5 Requirements and test conditions for discharge lamps .....	23
60	5.1 General requirements .....	23
61	5.2 Lamp marking .....	23
62	5.3 Bulbs .....	23
63	5.4 Caps.....	24
64	5.5 Position and dimensions of electrodes, arc and black stripes .....	24
65	5.5.1 Measurements.....	24
66	5.5.2 Electrodes .....	24
67	5.5.3 Arc .....	24
68	5.5.4 Black stripes.....	24
69	5.6 Starting, run-up and hot-restrike characteristics .....	24
70	5.6.1 Starting.....	24
71	5.6.2 Run-up .....	24
72	5.6.3 Hot-restrike .....	25
73	5.6.4 Compliance .....	25
74	5.7 Electrical and photometric characteristics .....	25
75	5.7.1 Voltage and wattage .....	25

76	5.7.2	Luminous flux .....	25
77	5.7.3	Compliance .....	25
78	5.8	Colour.....	26
79	5.9	UV radiation.....	26
80	5.10	Standard (étalon) discharge lamps.....	27
81	6	Requirements and test conditions for LED light sources .....	27
82	6.1	General requirements .....	27
83	6.2	Light source marking.....	27
84	6.3	Optical surfaces .....	28
85	6.4	Colour of light .....	28
86	6.5	Lamp dimensions .....	28
87	6.6	Caps and bases .....	29
88	6.7	Initial electrical and photometrical requirements.....	29
89	6.8	Red content .....	29
90	6.9	UV radiation.....	29
91	6.10	Standard (étalon) light sources .....	29
92	7	Sampling and conditions of compliance .....	30
93	8	Lamp data sheets .....	30
94	8.1	General.....	30
95	8.2	List of specific lamp types .....	30
96	8.3	Datasheets not transferred to UN R.E.5 .....	35
97	Annex A (normative)	Filament shape, length and position .....	56
98	A.1	General.....	56
99	A.2	Filaments shown as points .....	56
100	A.3	Line filaments .....	56
101	A.4	Coiled-coil filaments .....	56
102	A.5	Extreme filament turns .....	56
103	A.6	Filament extremities.....	56
104	A.6.1	General .....	56
105	A.6.2	Axial filaments .....	56
106	A.6.3	Transverse filaments .....	56
107	A.7	Determination of filament length .....	57
108	A.8	Filament offsets .....	57
109	A.9	Lateral deviation .....	57
110	A.10	Filament location check system (box system).....	57
111	Annex B (normative)	Measurement method of the colour of filament lamps .....	60
112	B.1	General.....	60
113	B.2	Colour.....	60
114	B.3	Measuring directions.....	60
115	B.3.1	General .....	60
116	B.3.2	Filament lamps used in headlamps .....	60
117	B.3.3	Filament lamps used in light signalling devices .....	61
118	Annex C (normative)	Test conditions for electrical and luminous characteristics .....	62
119	C.1	Filament lamps .....	62
120	C.1.1	Ageing .....	62
121	C.1.2	Test conditions .....	62
122	C.1.3	Electrical instrumentation .....	62
123	C.1.4	Photometry .....	62

124	C.2	LED light sources.....	62
125	C.2.1	Test conditions .....	62
126	C.2.2	Luminous flux .....	62
127	C.2.3	Normalized luminous intensity .....	63
128	C.2.4	Colour .....	63
129	C.2.5	Power consumption .....	63
130	C.2.6	Luminous flux and colour at elevated temperature .....	63
131	Annex D (normative)	Method of measuring internal elements of R2 lamps .....	66
132	D.1	General test conditions .....	66
133	D.1.1	Measurement position .....	66
134	D.1.2	Ageing .....	66
135	D.1.3	Test condition .....	66
136	D.2	Reference axis, reference plane and planes for measurements.....	66
137	D.2.1	Reference axis .....	66
138	D.2.2	Reference plane .....	66
139	D.2.3	Plane V-V .....	66
140	D.2.4	Plane H-H.....	66
141	D.2.5	Plane X-X .....	66
142	D.2.6	Plane Y1-Y1 .....	66
143	D.2.7	Plane Y2-Y2 .....	66
144	D.3	Viewing directions (see Figure D.1).....	67
145	D.3.1	Viewing direction ① .....	67
146	D.3.2	Viewing direction ② .....	67
147	D.3.3	Viewing direction ③ .....	67
148	D.4	Measuring points (MP) .....	67
149	D.5	Dimensions to be measured.....	68
150	Annex E (normative)	Method of measuring internal elements of H4 and HS1 lamps .....	71
151	E.1	General test conditions .....	71
152	E.1.1	Measurement position .....	71
153	E.1.2	Ageing .....	71
154	E.1.3	Test condition .....	71
155	E.2	Reference axis, reference plane and planes for measurements.....	71
156	E.2.1	Reference axis .....	71
157	E.2.2	Reference plane .....	71
158	E.2.3	Plane V-V .....	71
159	E.2.4	Plane H-H.....	71
160	E.2.5	Plane X-X .....	71
161	E.2.6	Plane Y1-Y1 .....	71
162	E.2.7	Plane Y2-Y2 .....	72
163	E.2.8	Plane Y3-Y3 .....	72
164	E.2.9	Plane Y4-Y4 .....	72
165	E.2.10	Plane Y5-Y5 .....	72
166	E.3	Viewing directions (see Figure E.1).....	72
167	E.3.1	Viewing direction ① .....	72
168	E.3.2	Viewing direction ② .....	72
169	E.3.3	Viewing direction ③ .....	72
170	E.3.4	Viewing direction ④ .....	72
171	E.4	Measuring points (MP) .....	72
172	E.4.1	Shield and filaments (see Figure E.2) .....	72



173	E.4.2	Top obscuration (see Figure E.3).....	73
174	E.5	Dimensions to be measured.....	73
175	Annex F (normative)	Method of measuring internal elements of HB1 lamps .....	78
176	F.1	General test conditions .....	78
177	F.1.1	Measurement position .....	78
178	F.1.2	Ageing .....	78
179	F.1.3	Test condition .....	78
180	F.2	Dipped beam filament location .....	78
181	F.2.1	Horizontal location .....	78
182	F.2.2	Vertical location.....	78
183	F.2.3	Axial location.....	78
184	F.3	Main beam filament location.....	78
185	F.3.1	Horizontal location.....	78
186	F.3.2	Vertical location.....	78
187	F.3.3	Axial location.....	79
188	Annex G (informative)	Optical set-up for the measurement of the position and form of	
189		the arc and of the position of the electrodes of discharge lamps .....	80
190	Annex H (normative)	Measurement method of electrical and photometric	
191		characteristics of discharge lamps .....	81
192	H.1	General.....	81
193	H.2	Ballast .....	81
194	H.3	Burning position .....	81
195	H.4	Ageing .....	81
196	H.5	Supply voltage .....	81
197	H.6	Starting test .....	81
198	H.7	Run-up test.....	81
199	H.8	Hot restrike test .....	82
200	H.9	Electrical and photometric test.....	82
201	H.10	Colour.....	82
202	Annex I (informative)	Overview of lamp types and their applications .....	83
203	Annex J (normative)	Test conditions for colour endurance measurements .....	86
204	J.1	General.....	86
205	J.2	Calibration and ageing .....	86
206	J.3	Test voltage .....	87
207	J.4	Operating position.....	87
208	J.5	Test rack.....	87
209	J.6	Operating cycles .....	87
210	J.7	Closure .....	90
211	Annex K (informative)	Method(s) to determine the value of the light centre length for	
212		Lx3A, Lx3B, Lx4A, Lx4B, Lx5A, Lx5B, L1A/6 and L1B/6.....	91
213	K.1	Measurement and calculation method based on ray tracing .....	91
214	K.2	Alternative method.....	92
215	Annex L (informative)	Method to determine the maximum luminance gradient of LED	
216		light sources .....	93
217	L.1	Measuring the luminance .....	93
218	L.2	Calculating the maximum luminance gradient.....	93
219	Bibliography.....		95
220			
221	Figure A.1 – Determination of apexes, filament length and filament offsets (A and B) .....		58

222	Figure A.2 – Determination of filament centre.....	58
223	Figure A.3 – Determination of lateral deviations (A and B) and tolerance on the light	
224	centre length (C) .....	59
225	Figure B.1 – Positions of the colorimetric receiver when measuring lamps used in	
226	headlamps .....	61
227	Figure B.2 – Positions of the colorimetric receiver when measuring lamps used in light	
228	signalling devices .....	61
229	Figure D.1 – Viewing directions, seen from the top of the lamp .....	69
230	Figure D.2 – Position of measuring points of R2 lamps .....	70
231	Figure E.1 – Viewing directions, seen from the top of the lamp .....	75
232	Figure E.2 – Position of measuring points of H4, H17, H19 and HS1 lamps .....	76
233	Figure E.3 – Top obscuration .....	77
234	Figure F.1 – Side view, view from ③ <sup>ab</sup> .....	79
235	Figure F.2 – Plan view, view from ④ <sup>a</sup> .....	79
236	Figure G.1 – Optical system.....	80
237	Figure J.1 – Side view of box .....	87
238	Figure J.2 – Front view of box.....	87
239	Figure J.3 – Temperature in the climate chamber during one operating cycle.....	88
240	Figure J.4 – Relative humidity in the climate chamber during one operating cycle.....	88
241	Figure J.5 – Switching modes of filament lamps for intermittent operation during one	
242	operating cycle .....	89
243	Figure J.6 – Switching modes of filament lamps for intermittent and continuous	
244	operation during one operating cycle .....	89
245	Figure J.7 – Switching modes of filament lamps for continuous operation during one	
246	operating cycle .....	90
247	Figure J.8 – Switching modes of filament lamps for intermittent and continuous	
248	operation during one operating cycle .....	90
249	Figure K.1 – Set-up to measure the luminance distribution of the A versions of the LED	
250	light sources .....	91
251	Figure K.2 – Set-up to measure the luminance distribution of the B versions of the LED	
252	light sources .....	92
253	Table 1 – Lifetime of non-replaceable filament lamps.....	22
254	Table 2 – Spectral weighting function .....	27
255	Table C.1 – Luminous flux tolerance limits .....	63
256	Table D.1 – Dimensions to be measured for R2 lamps.....	68
257	Table E.1 – Dimensions to be measured for H4, H17, H19 and HS1 lamps .....	74
258	Table I.1 – Overview of lamp types and their applications .....	83
259	Table J.1 – Applicable switching modes.....	86
260	Table J.2 – Applicable boxes of the test racks .....	86
261	Table J.3 – Dimensions of the applicable boxes and the relative position of the centre	
262	of the filament.....	87
263	Table J.4 – Timing during one operating cycle .....	88
264	Table J.5 – Switching modes of the filament lamps .....	89

265

266