

GTB Working Group Light Sources

Status February 2013

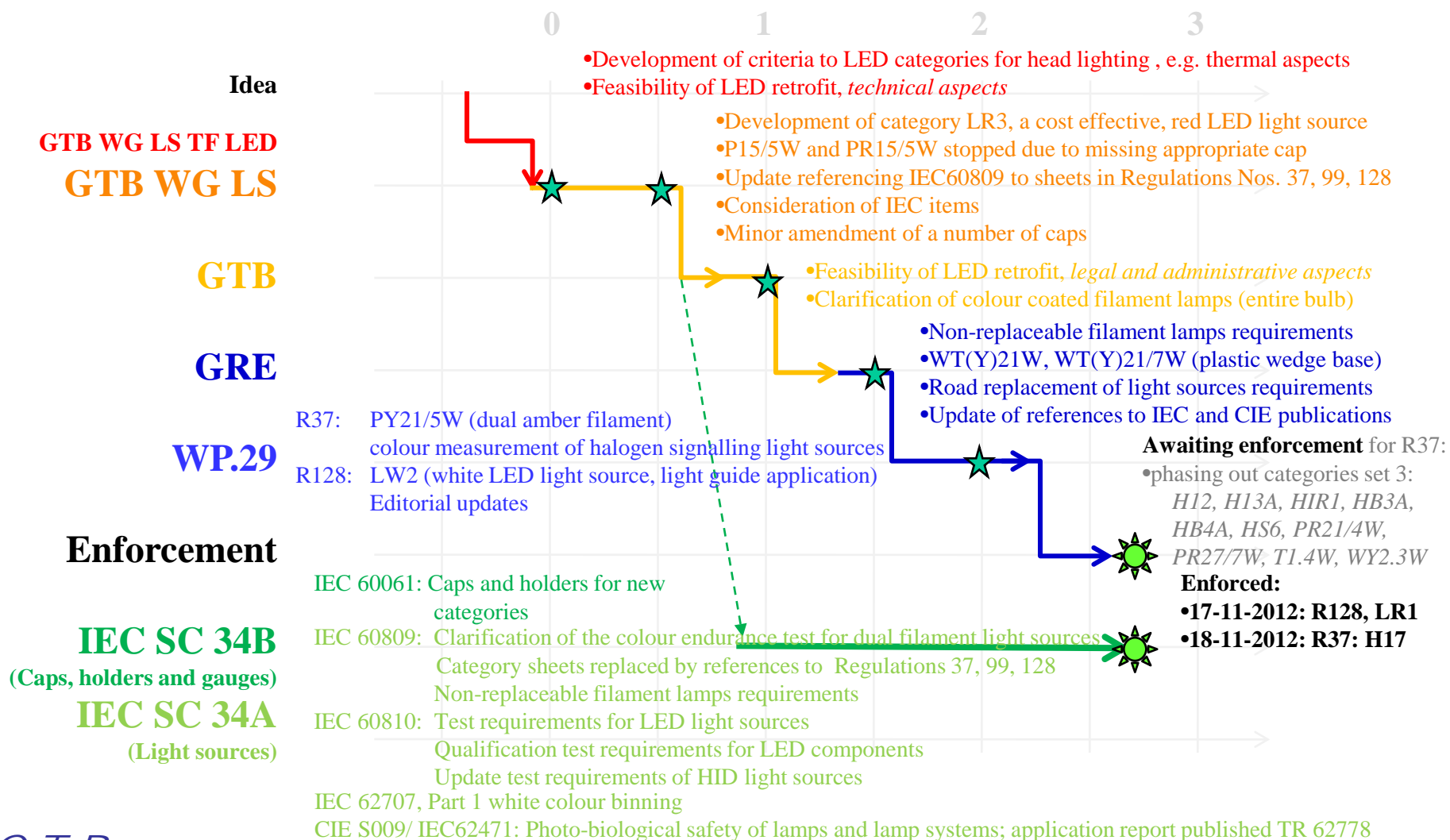


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2. GTB "*Performance based feasibility*" study
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3. GTB WG LS "*Feasibility of LED retrofit*" study

1. Light source work items the pipeline

Light source work items the pipeline



2. GTB "*Performance based feasibility*" study

Rationale for exclusion of the Light Source Regulations from the study

2. GTB "*Performance based feasibility*" study

Rationale for exclusion of the Light Source Regulations from the study

Requirements in Light Source Regulations

for approved and replaceable light sources

- No. 37 (filament light sources)
- No. 99 (HID light sources)
- No. 128 (LED light sources)

are detailed specifications of

- photometrical,
- dimensional,
- electrical

characteristics, necessary for

- Replacement (interchange-ability, unique to each category)
- Safety

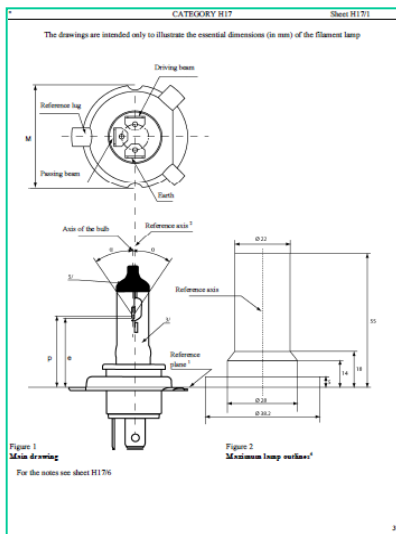
2. GTB "*Performance based feasibility*" study

Rationale for exclusion of the Light Source Regulations from the study

Prescriptive characteristics

- Luminous flux
- Distortion free area
- Metal-free-zone
- Position of black top or black stripes
- Maximum wattage
- Filament or arc position
- Other internal geometry
- Maximum outline
- Mechanical interface

Example - R37 Light Source Specifications



CATEGORY H17 Sheet H172

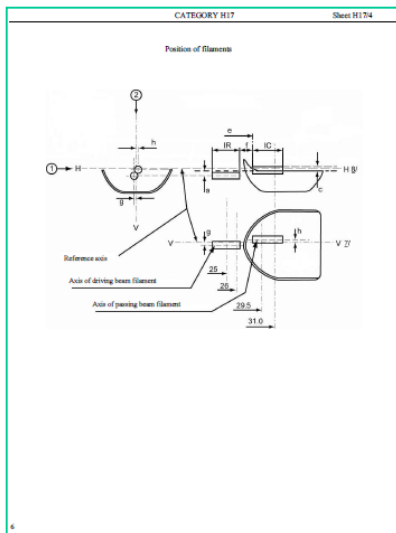
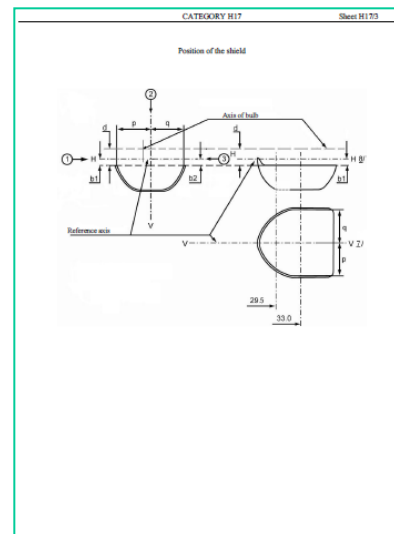
Dimensions in mm	Filament lamps of normal production		Standard filament lamp	
	12 V		12 V	
a	28.5 + 0.35 / - 0.15		28.5 + 0.30 / - 0.0	
p	28.95		28.95	
θ	max. 40°		max. 40°	

Cap P10434 in accordance with IEC Publication 60061 (sheet 7004-axx)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated value ¹	12 V ^a		12 V ^a	
	35	35	35	35
Test voltage	13.2		13.2	
Objective values	37 max.		37 max.	
Luminous flux	900 ± 10%	600 ± 10%		
Reference luminous flux at approximately	12.0 V		700	470
	13.2 V		900	600

For note² see sheet H176



CATEGORY H17 Sheet H175

Table of the dimensions (in mm) referred to in the drawings on sheets H173 and H174

Reference **	Dimension **	Filaments	
		Filament lamps of normal production	Standard filament lamp
a/25.0	0.3	± 0.40	± 0.30
a/26.0	0.3	± 0.35	± 0.30
b/29.5	0.0	± 0.30	± 0.25
b/33.0	b/29.5 sev	± 0.30	± 0.15
c/29.5	0.0	± 0.30	± 0.25
c/33.0	c/29.5 sev	± 0.30	± 0.15
d/29.5	0.5	± 0.25	± 0.15
d/31.0	d/29.5 sev	± 0.25	± 0.15
e	with 0.3	-	-
e ¹	28.5	+ 0.35 / - 0.15	+ 0.20 / - 0.0
f ¹ to 1.1	1.7	± 0.30	± 0.15
g/25.0	0	± 0.50	± 0.30
g/26.0	0	± 0.40	± 0.25
h/29.5	0	± 0.40	± 0.25
h/31.0	h/29.5 sev	± 0.30	± 0.15
h ¹ to 1.1	4.0	± 0.40	± 0.20
h ¹ to 1.5	4.2	± 0.40	± 0.20
i/33.0	Depends on the shape of the shield	-	-
q/33.0	q ¹ to 2	± 0.60	± 0.30

* - .25/0° means dimension to be measured at the distance from the reference plane indicated in mm after the stroke.
** 25.5 mm¹ means the value measured at a distance of 25.5 mm from the reference plane.

For the notes see sheet H176

CATEGORY H17 Sheet H176

Additional explanations to sheets H173 and H174

The dimensions below are measured in three directions:

- For dimensions b1, a, c, d, e, f, h and i.
- For dimensions g, h, p and q.
- For dimension b2.

Dimensions p and q are measured in planes parallel to and 33.0 mm away from the reference plane.

Dimensions b1, b2 are measured in planes parallel to and 29.5 mm and 33.0 mm away from the reference plane.

Dimensions c and h are measured in planes parallel to and 29.5 mm and 31.0 mm away from the reference plane.

Dimensions a and g are measured in planes parallel to and 25.0 mm and 26.0 mm away from the reference plane.

Note: For the method of measurement, see Appendix E of IEC Publication 60893²



see
WP29-156-08e

Example – 49 CFR Part 564 NHTSA docket 1998-3397 Replaceable Light Source Information

SPECIFICATION FOR THE D2R REPLACEABLE LIGHT SOURCE

The drawing is intended only to indicate the shape and main dimensions of the D2R replaceable light source.

The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the base ring will rest.

Glass bulb and support shall not exceed the above envelope.

Dimensions in millimeters

SPECIFICATION FOR THE D2R REPLACEABLE LIGHT SOURCE

The drawing is intended to indicate the position of the electrodes.

Measuring direction: side and top view

a1	d + 0.5
a2	d + 0.7
b1	0.4
b2	0.8
c	4.2

d = diameter of the electrode < 0.3

The top of the electrode nearest to the reference plane shall be positioned in the area defined by a1 and b1. The top of the electrode furthest from the reference plane shall be positioned in the area defined by a2 and b2. The position of the electrodes shall be measured before the ageing period, the light source unit.

SPECIFICATION FOR THE D2R REPLACEABLE LIGHT SOURCE

The drawing is intended to indicate the position, form and sharpness of the arc.

The form of the arc is for distribution purposes only nominal position of electrodes.

When measuring the relative luminance distribution in the central cross section as indicated in the drawing above, the maximum value shall be located within a distance r from the reference axis. The points of 20% of the maximum value shall be within s.

r	0.50 ± 0.40
s	1.10 ± 0.40

Relative luminance distribution in the central cross section. Determination of: g/c beam/f, g/c diffusion, luminance at cross sections B and C.

When measuring the luminances from measuring direction B as defined on sheet D2R-4, the relative luminance expressed as a percentage of Lmax (at cross section D) shall be:

Line B	≤ 15 %
Line C	≤ 5.0 %

In the area of zone A, defined by the black coating, the outer bulb and a plane at 24.5 mm from the reference plane, the relative luminance shall be ≤ 4.5 %

SPECIFICATION FOR THE D2R REPLACEABLE LIGHT SOURCE

The drawing is intended to indicate the position and dimensions of the black stripes.

View from A

When measuring the luminance distribution of the arc in the central cross section as defined on sheet D2R-3, after having turned the light source so that the black stripe is covering the arc, the measured luminance shall be ≤ 0.5 % of Lmax. In the area defined by a1 and a2 the black coating may be replaced by any other means which prevents light transmission through the specified area.

α1	45° ± 6°
α2	70° min
α3	65° min
α4	25° ± 6°
β1/24, β1/30, β2/24, β2/30	0.15 ± 0.25
γ1/30 1/	γ1/24 mv ± 0.15 2/
γ2/30 1/	γ2/24 mv ± 0.15 2/
γ1/24 mv + γ2/24 mv	± 0.3 max
d	5 ± 1

1/ "1/1", " means dimension B to be measured at the distance from the reference plane indicated in mm after the stroke.

2/ "1/24 mv" means the value measured at a distance of 24 mm from the reference plane.

SPECIFICATION FOR THE D2R REPLACEABLE LIGHT SOURCE

BASE P32D-3

The drawing is intended only to indicate the dimensions essential for correct insertion in the lamp holder.

Dimensions in millimeters

Dimension	Min.	Max.
A	24	25
A2	21.5	21.9
M	31.5	32
K		0.3
S	0.2	0.5
T1	4	4.1
T2	2.5	3.1
T3	0.2	0.3
U	2.7	3
V	9°	11°
X	29°	31°
α	23°30'	25°30'
β		

Detail a: hemispherical

SPECIFICATION FOR THE D2R REPLACEABLE LIGHT SOURCE

HOLDER P32D-3

The drawing is intended only to indicate the dimensions essential for correct insertion of the replaceable light source.

1) The light source shall be inserted in this direction.

Dimension	Min.	Max.
A1		23
A2	20.5	21.5
A3	32.1	32
T1	3.5	3.5
T2	2.0	2.6
T3	13.1	14.0
U	14.1	14.9
X		1.5
α	89°30'	90°30'
β	29°	31°

Dimensions in millimeters

2. GTB "*Performance based feasibility*" study

Rationale for exclusion of the Light Source Regulations from the study

Testing according to Light Source Regulations

- is **technology dependent**

Examples:

- Filament light sources have a high red content
- HID light sources have a rise-time
- LED light sources switch on immediately
- The light emitted by the light emitting elements per technology
 - filament
 - discharge arc
 - pn-junction

is physically different;

consequently many characteristics of the light source are different

2. GTB "*Performance based feasibility*" study

Rationale for exclusion of the Light Source Regulations from the study

Light source characteristics that are not and should not be prescribed

- Material of bulb
- Material of filament, electrodes or semiconductor
- Material of cap
- Material and colour of black top
- Material of internal support
- Number of turns in the filament, number of chips
- Gas filling

These non-prescriptive characteristics allow design freedom for the performance of the required safety and replacement characteristics

2. GTB "*Performance based feasibility*" study

Rationale for exclusion of the Light Source Regulations from the study

Conclusion

Taking into account

- The detailed specifications necessary for replacement and safety
- The technology dependent testing
- The already existing "performance based" and not prescriptive characteristics

Light Source Regulations are excluded
from the GTB performance based feasibility study

3. GTB WG LS "*Feasibility of LED retrofit*" study

"Feasibility of LED retrofit"

With reference to

"Replacement light sources and compliance"

GRE-66-19; WP.29-156-08

on one hand:

there are worries about

- non-approved light sources,
- including non-approved LED retrofits



see
WP29-156-08e

"Feasibility of LED retrofit"

on the other hand:

- The public is stimulated to apply energy saving products in *general* lighting
- But is not aware that *automotive* LED retrofits are non-approved light sources

Today, there are **no legal energy saving replacement light sources for vehicles available**

"Feasibility of LED retrofit"

New work item

To investigate **feasibility of new LED categories** according to R128, **as replacement parts for filament light source** categories according to R37.*

Study should include:

- Development of equivalence criteria
- Investigation on how to implement retrofit provisions in the relevant UN regulations

*GTB document CE-4792

Conditions for equivalent performance

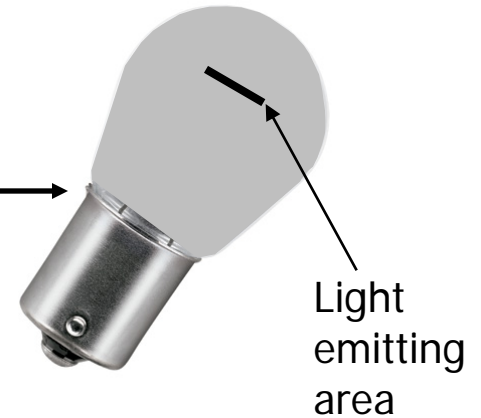
R37 light source



“Identical”
performance based and prescriptive criteria

- Luminous flux
- Light emission characteristics
- Colour of the light emitted
- Geometry of light emitting area
- Maximum outline
- Wattage (\leq)
- IEC cap/ holder system

R128-retrofit



We would appreciate your valuable input and guidance.

THANK YOU

BACK UP PERFORMANCE BASED

Taken from: WP29-156-08e

“Good” bulbs



Illumination – Position of Filament

“Good”

Measurements - Complete

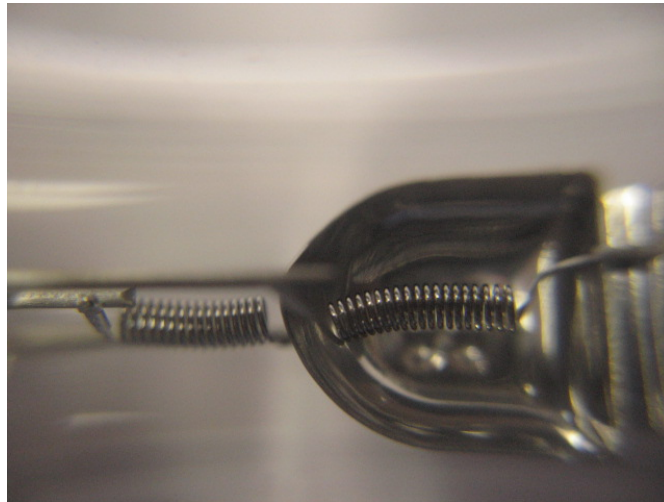
Nbr	Name	Target	Low	High	Result	Tol	%Tol	Range	Yquer	Signa	Cpk
0	0_F	4.20	4.00	4.40	4.13	317	5.83	5.18	4.22	0.14	0.42
1	1_E	25.00	24.80	25.20	25.09	1039	7.74	1.69	24.99	0.13	0.49
2	2_H1/0	0.00	-0.15	0.15	-0.04	4200	31.30	2.90	-0.06	0.27	0.12
3	3_H2/0	0.00	-0.25	0.25	-0.03	2516	18.73	2.95	-0.10	0.25	0.19
4	4_H1/90	0.00	-0.15	0.15	0.01	3191	23.76	3.85	-0.01	0.28	0.17
5	5_H2/90	0.00	-0.25	0.25	0.04	2305	17.16	3.54	-0.04	0.29	0.24
6	6_G1/0	0.70	0.00	1.20	0.93	1038	7.73	2.62	0.83	0.20	0.61
7	7_G2/0	0.70	0.00	1.20	1.04	102	0.76	2.74	0.89	0.16	0.66
8	8_wD/0	1.30	1.20	1.43	1.38	1574	11.72	0.72	1.39	0.04	0.35
9	9_wD/90	1.30	1.20	1.43	1.39	366	2.73	0.28	1.38	0.03	0.60
10	A_FabKante	34.20	33.70	34.70	34.23	6513	48.50	8.73	34.62	0.70	0.04
11	Elektr	0.00	0.00	0.00	0.18	0	0.00	3.29	0.27	0.48	-0.19

*yellow box right top is for automatic camera operation

BACK UP LED RETROFIT

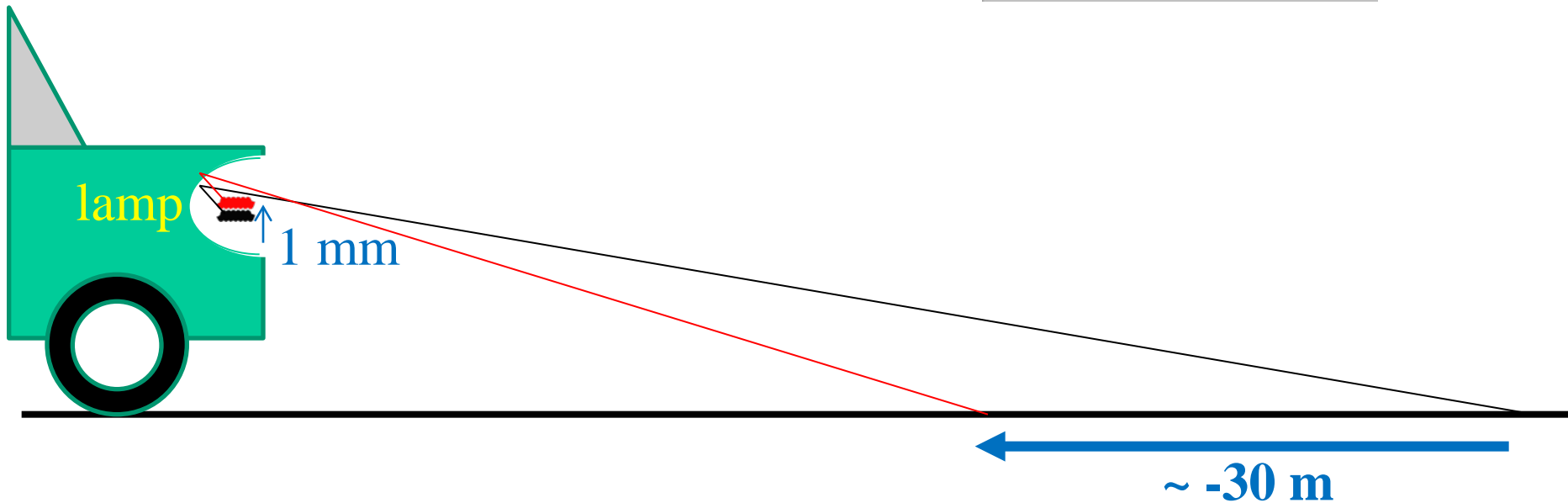
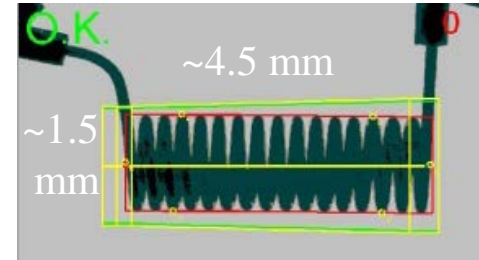
Taken from: WP29-156-08e

“Bad” bulbs



One effect of displacement of the filament:

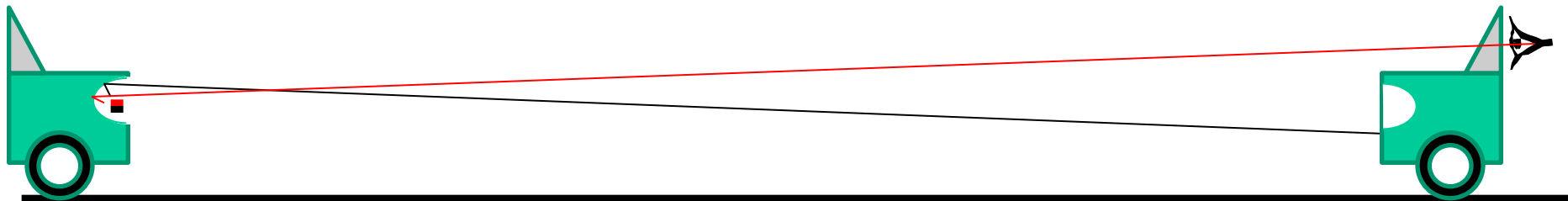
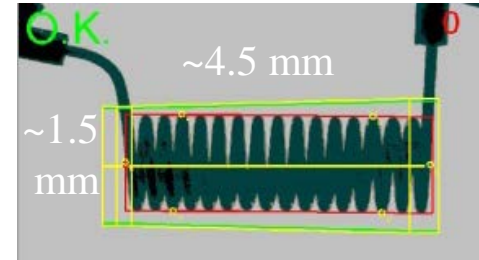
Δ visibility range



Not to scale

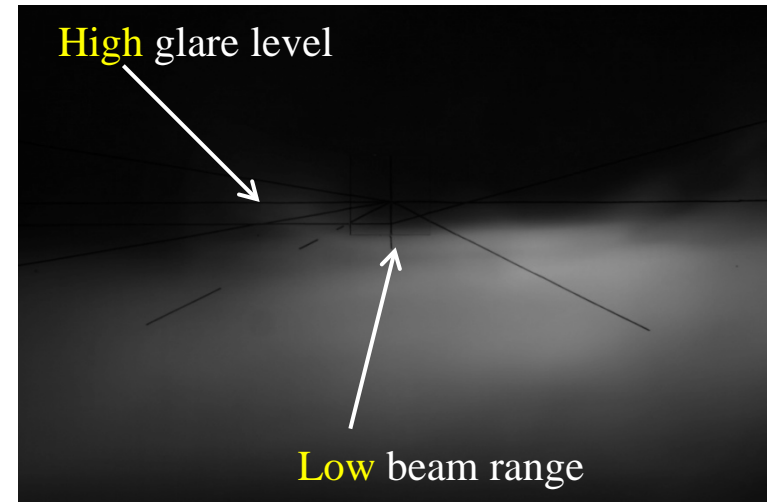
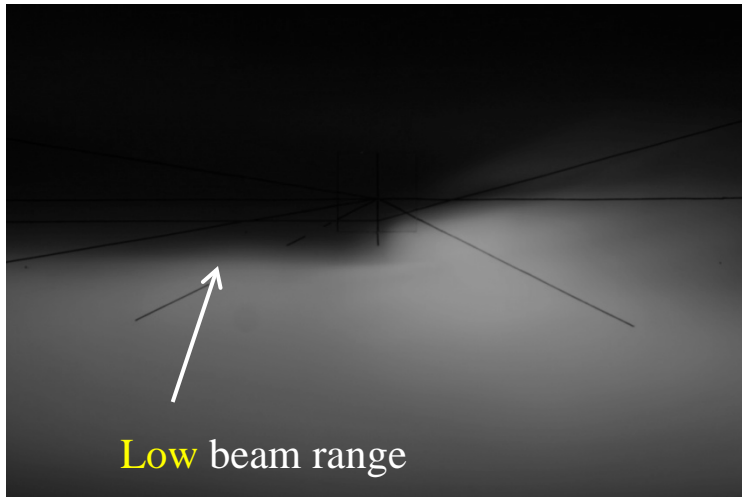
Another effect of displacement of the filament:

Δ glare



Not to scale

"Bad" beam pattern



LED retrofit in signal lighting

example

approved filament lamp

vs.

non-approved LED retrofit



- | | | | |
|---------------------------|-----|-----|--------------------------------|
| ➤ Luminous output: | ok | vs. | not sufficient |
| ➤ Red color: | ok | vs. | ok |
| ➤ Emitter size: | 4mm | vs. | 12mm (too large) |
| ➤ Intensity distribution: | ok | vs. | does not fit to optical system |

LED retrofit in front lighting

example

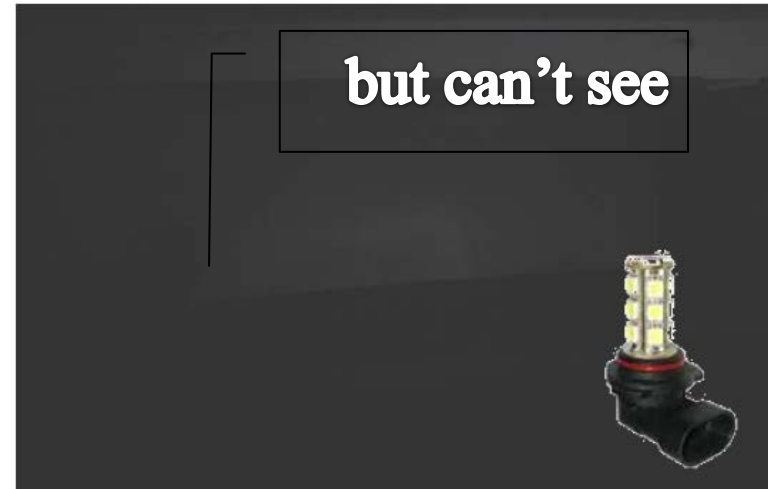
approved halogen light source

vs.

non-approved LED retrofit



looks cool



- | | | | |
|---------------------------|----------|-----|--|
| ➤ Luminous output: | 1100lm | vs. | 67lm |
| ➤ Color of light: | 3200K | vs. | 9300K (outside boundaries for white) |
| ➤ Emitter size: | 4mm | vs. | 20mm |
| ➤ Intensity distribution: | circular | vs. | non-symmetrical |

END