

Measurement of the Luminous Area of an automotive lamp signal

Wilfried van Laarhoven, The Netherlands, 24-03-2022

GRE IWG SLR-54

Agenda

- Problem statement
- Method (and measurement system)
- Examples
- Conclusions
- Question / Consideration



Problem Statement

The “Apparent Surface” definition of UN (ECE) Regulation No. 48:

- contains complex text including difficult to understand “light emitting surface” and “illuminating surface” and
- contains many examples but still unclear situations related to single, independent, interdependent lamps and lighting units, or with “textured” and “non-textured” lamps, or related to the part or full aperture of a reflector.

Is it possible to simplify and find an objective (test) method?

This presentation primarily focuses on a test method.



Method

And measurement system

How is apparent surface used?

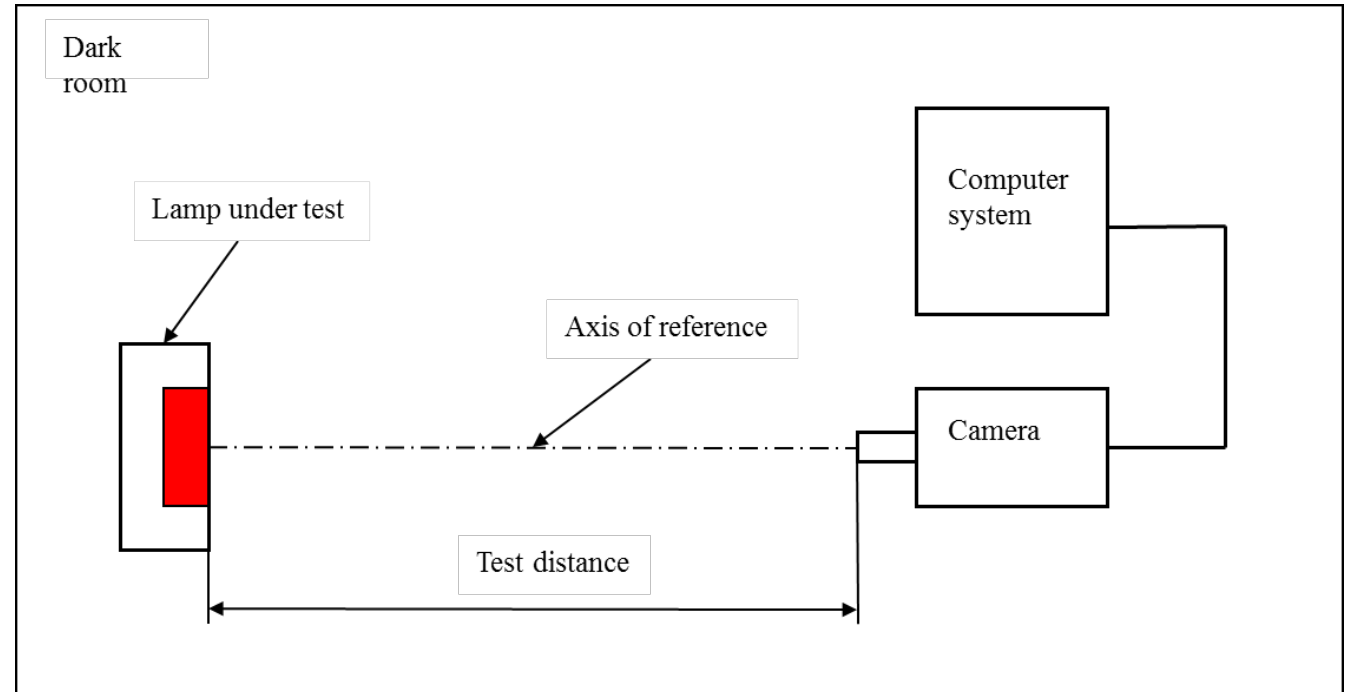
- Size (area) of a lamps
- Distance between lamp parts or lamp functions
- Mounting conditions (installation on the vehicles)
- In the future also to define the logo or other symbols

To ensure

- Visibility while minimizing glare
- Recognition and minimizing confusion

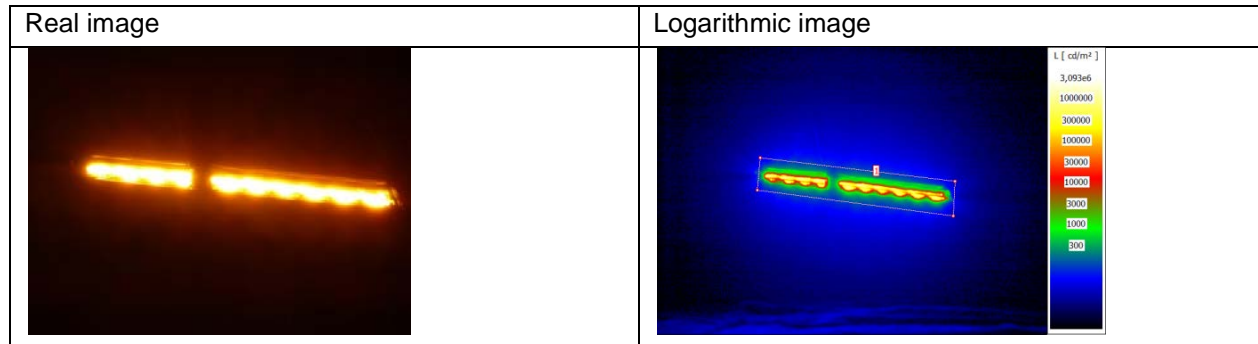
Luminance (brightness) measurements might be helpful

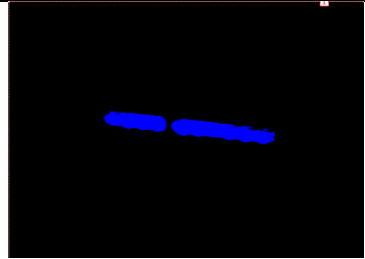
- Luminance is what you see
- It shows the contours of a luminous area with objective values in Cd / m^2



Examples

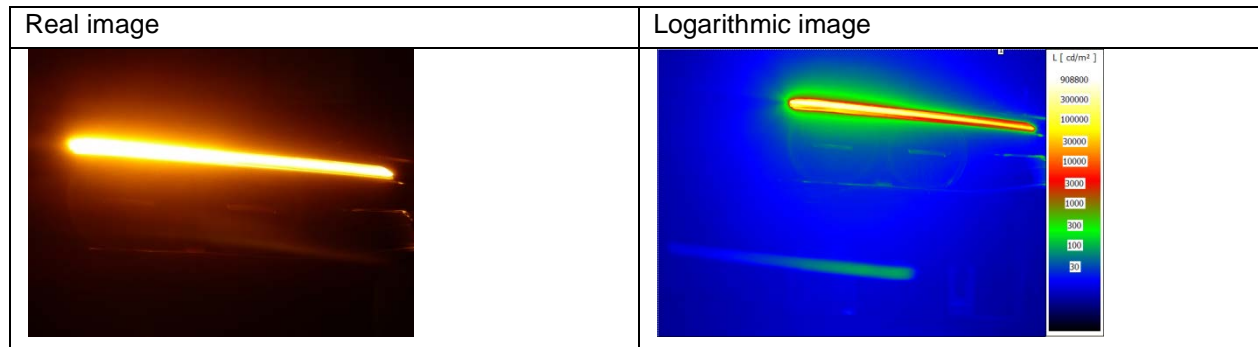
Example 1

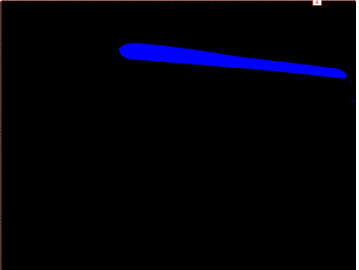


Threshold cd/m^2	Area cm^2	Image of area > threshold
500	58	 A binary image showing the area of the light source that is greater than the threshold of 500 cd/m^2 . The light source is highlighted in blue against a black background.

Examples


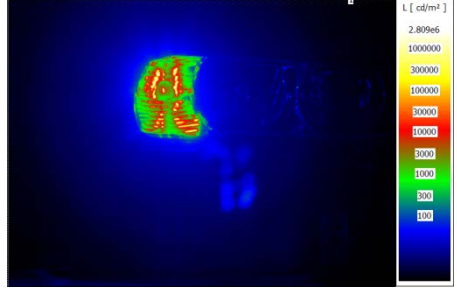
Example 2

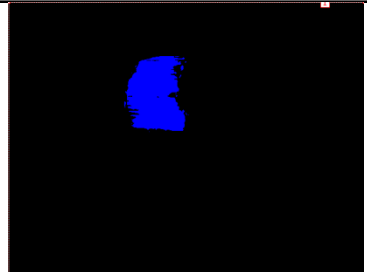


Threshold cd/m^2	Area cm^2	Image of area $>$ threshold
500	68	

Examples


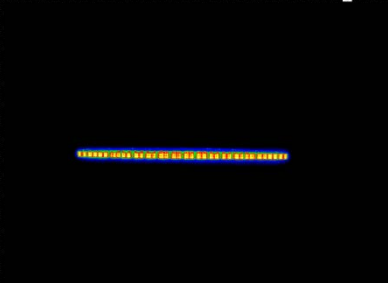
Example 3

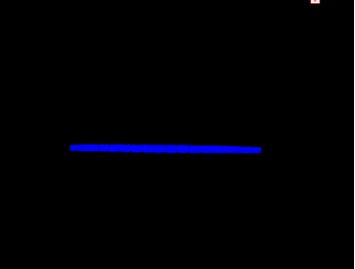
Real image	Logarithmic image
	 <p>The logarithmic image shows the headlight's intensity distribution. A color scale legend on the right indicates luminance values in cd/m^2, ranging from 100 (dark blue) to 2.809e6 (yellow). The headlight's core is shown in yellow and red, indicating high luminance, while the surrounding area is in blue and green, indicating lower luminance.</p>

Threshold cd/m^2	Area cm^2	Image of area > threshold
500	82	

Examples

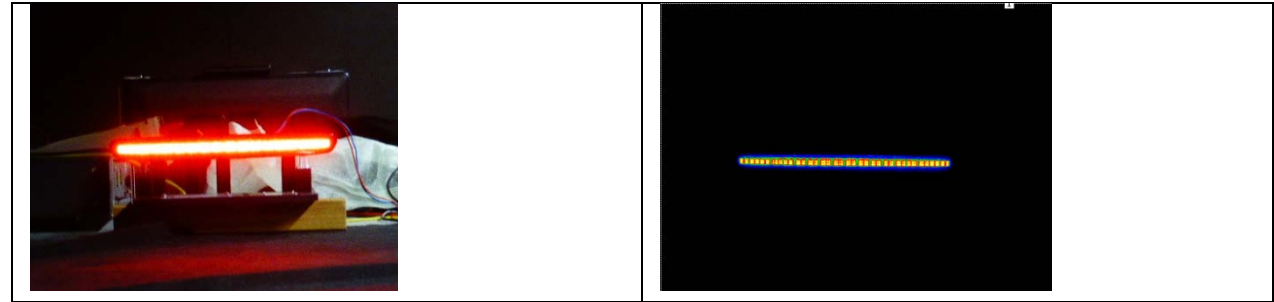
Example 4

Real image	Logarithmic image
	

Threshold cd/m^2	Area cm^2	Image of area $>$ threshold
500	33	

Examples

Example 5 - Threshold makes a difference

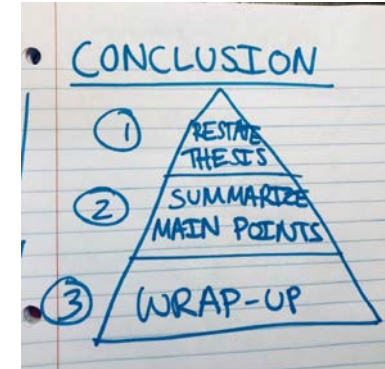


Threshold cd/m^2	Area cm^2	Image of area > threshold
250	40	
500	33	
1000	30	

Note: The contour position (in cm or mm) is less sensitive to the threshold value because the area in cm^2 is quadratically proportional with the dimensions (in cm).

Conclusions

- Luminous area or **luminous contour** can be determined by measurement of luminance distribution
- The threshold values have to be discussed
- The method could be useful for installation position purposes
- If the method is used to limit the luminous area of a lamp then the next question should be considered.



Question / consideration

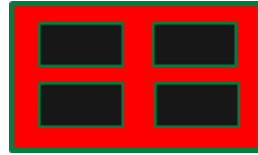
Consider stop lamps with identical outer dimensions. All e.g. 120 cd at HV.



50 cm²



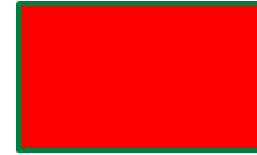
50 cm²



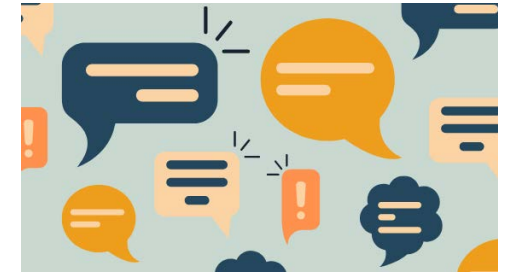
50 cm²



10 cm²



100 cm²



At **long** distance the experience is the same intensity although the luminous area is different.

What is the glare experience at **short** distance?

