



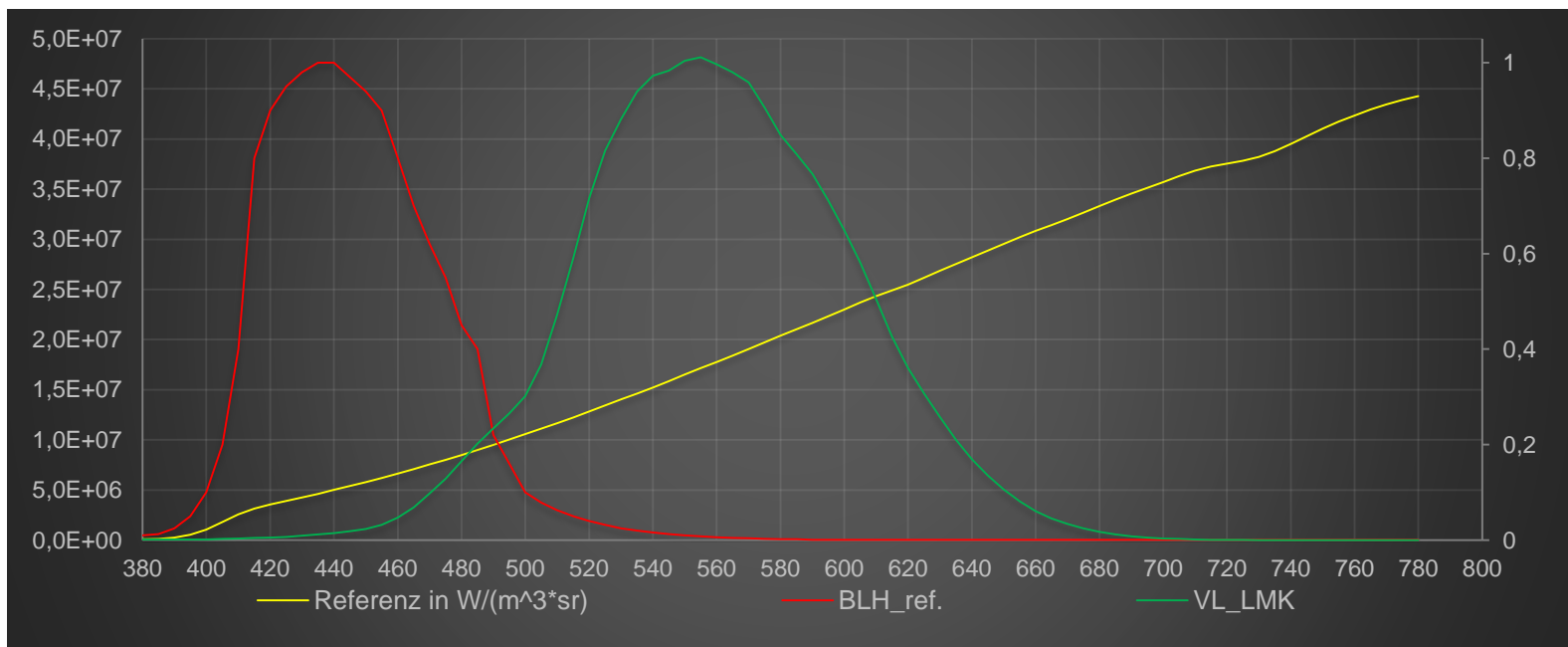
## **LMK explanation of Blue light hazard (BLH) analysis procedure**



## Motivation – EN 62471

The EN 62471 standard deals with the photobiological safety of lamps and lighting systems. It specifies limit values for various effects on the eye. Among others, the blue light hazard (BLH) of the human eye. Compliance with these limits and threshold values can be monitored by measurements.

The measurements with the LMK are based on the determination of the weighted radiance  $Le(BLH) (\lambda)$  by spectral filtering with a full glass filter.





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Depending on the standardized sorting into risk groups, certain measurement angles or aperture angles must be used: 100 mrad (5.73 °); 11 mrad (0.63 °) or 1.7 mrad (approx. 0.1 °)

Measuring angle (FOV) according to EN 62471	Object field diameter at 200mm distance	Object field surface at 200mm distance	Edge length for a circumscribing square
mrad	mm	mm <sup>2</sup>	mm
1,7	0,34	0,1	0,32
11	2,2	3,8	1,9
100	20	314	18



## Motivation - Measuring angle LMK (1.4 megapixel)

Geometric resolution of the lenses

BLH - Measuring angle in pixels

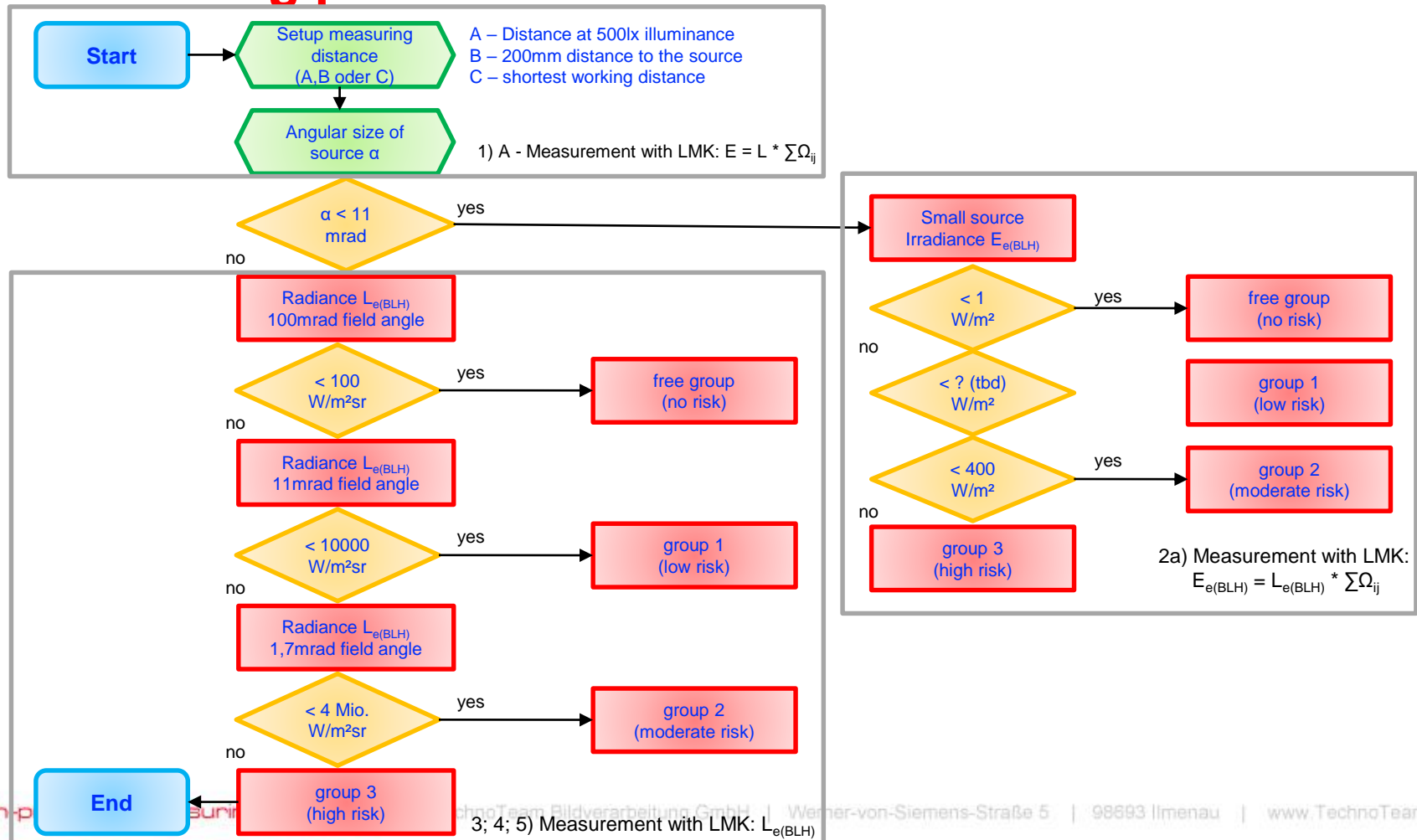
Lens type	Degrees/pixel	mrاد/Pixel	Pixel/mrad	1,7 mrad in pixel	11 mrad in pixel	100 mrad in pixel
50 mm	0,0064	0,11	9	15	99	900
25 mm	0,015	0,26	4	7	44	400
16 mm	0,022	0,38	3	5	33	300
8 mm	0,04	0,69	2	4	22	200
Fisheye	0,239815	4,19	0,24	0	3	24



## Measuring procedure of EN 62471

1. Selection of the measuring distance:
  - a. For products of general lighting: Determination of the distance from the source at which it generates an illuminance of 500 lx
  - b. All other applications: Use 200mm as measuring distance – (if necessary, a different distance must also be set depending on the application)
2. Determination of the angular expansion  $\alpha$  of the source
  - a. if  $\alpha < 11$  mrad, a small source is assumed and the irradiance  $E$  (BLH) is measured
3. Measurement of the radiance  $L_{e(BLH)}$  with a measuring field angle of 100 mrad (regardless of the actual angular extent of the source)
  - a. Classification in the free group if  $L_{e(BLH)} < 100 \text{ W} / (\text{sr} \cdot \text{m}^2) \rightarrow$  End of procedure
4. Measurement of the weighted radiance with a measuring field angle of 11 mrad
  - a. Classification in risk class 1 if  $L_{e(BLH)} < 10e4 \text{ W} / (\text{sr} \cdot \text{m}^2) \rightarrow$  End of procedure
5. Measurement of the weighted radiance with a measuring field angle of 1.7 mrad
  - a. Classification in risk class 2 if  $L_{e(BLH)} < 4 \cdot 10e6 \text{ W} / (\text{sr} \cdot \text{m}^2) \rightarrow$  End of procedure
  - b. Classification in risk class 3 if  $L_{e(BLH)} > 4 \cdot 10e6 \text{ W} / (\text{sr} \cdot \text{m}^2) \rightarrow$  End of procedure

# Measuring procedure – EN 62471





# Literature

[1] DIN EN 62471



**Thank you for your attention!**

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