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Federation of National Manufacturers Association for Luminaires and Electrotechnical Components for Luminaires in the European Union

EUROPEAN LAMP COMPANIES FEDERATION

Joint CELMA / ELC LED Forum
Light+Building Fair
14 April 2010

Photometric data:
a fundamental tool to evaluate the performance of LED luminaires

Tommy Govén

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Why Photometric Data is included in the CELMA Guide on LED luminaires?

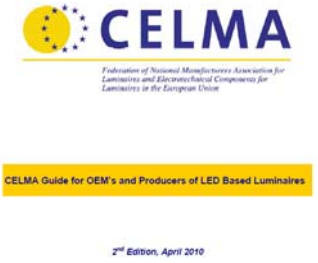
- Why CELMA Guidance for manufacturers to present photometric data for LED luminaires?
  - The existing CEN standards for measurements and presentation of photometric data of lamps and luminaires are not completely applicable for LED luminaires

    EN 13032 Part 1 - Measurements and file format
    EN 13032 Part 2 - Presentation of indoor and outdoor workplaces


EUROPEAN STANDARD EN 13032-1
NORME EUROPÉENNE
EUROPÄISCH NORM

Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 1: Measurement and file format

  - Revised CEN Standards are expected by earliest 2012/2013
  - No harmonized comparison on quality and efficiency between different LED Lighting Systems existing today
  - To show if the application fulfils existing Standards and requirements in Lighting design and Energy performance
  - To avoid mistakes in today's Lighting Design based on LEDs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CELMA Guide for OEM's and Producers of LED Based Luminaires

2nd Edition, April 2010

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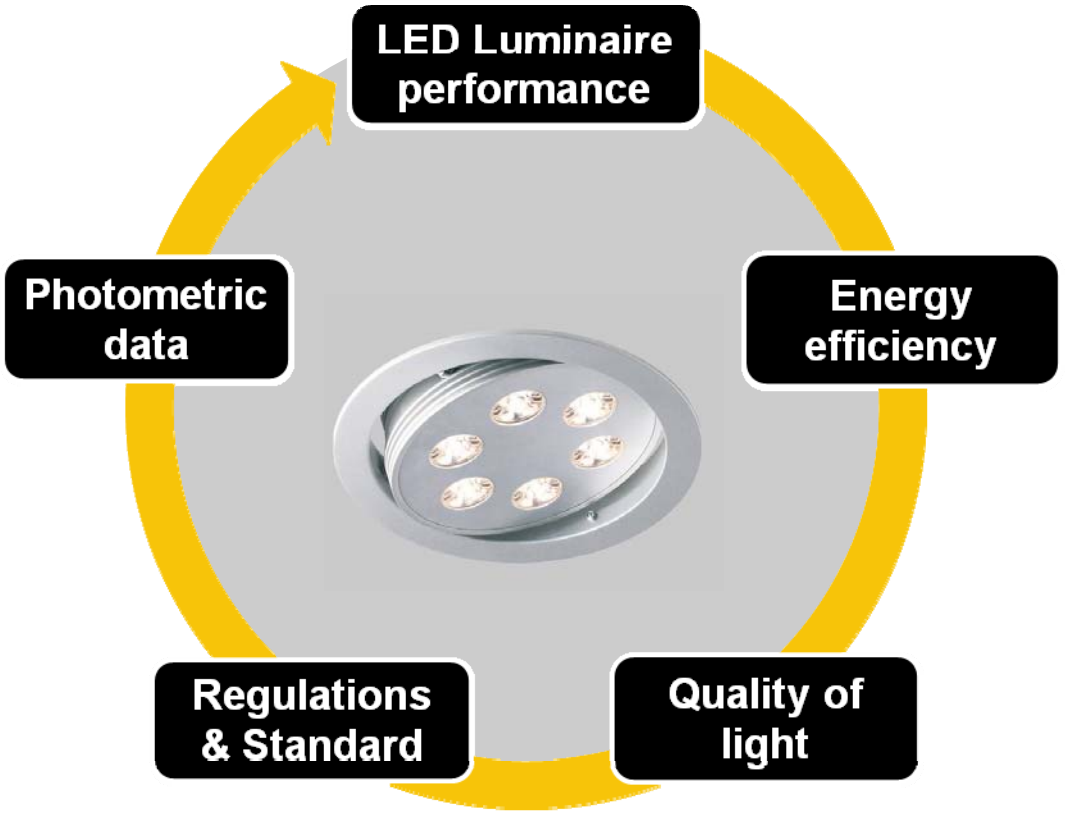
LED luminaires

considering different aspects



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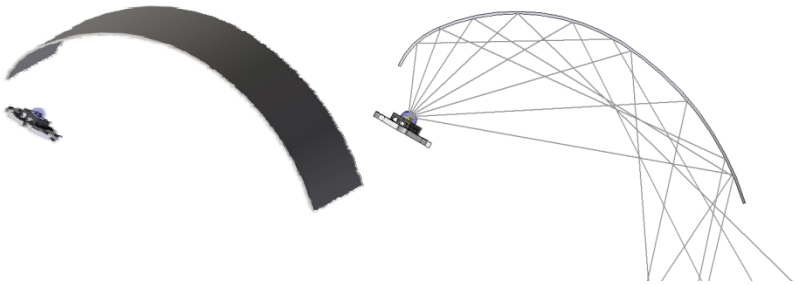
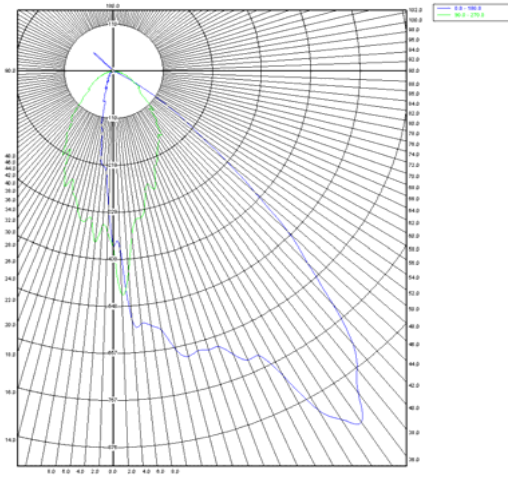
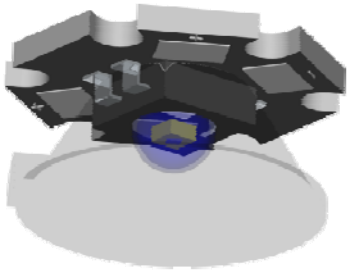
Energy efficiency
from efficient optical systems in LED luminaires

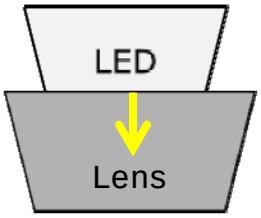
Optical Efficiency - Reflector technology

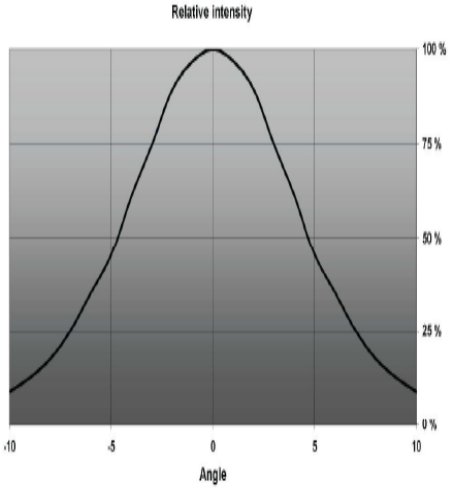


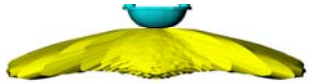


Optical Efficiency - LENS Technology









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Quality aspects
in LED luminaire design

- Quality aspects to consider in LED luminaire design
  - Efficacy & Visual aspects
  - Use of optimized optical systems
  - Low junction temperature for optimized performance
  - Appropriate light distribution for the visual task
  - Glare control
  - Colour rendering
  - Maintenance
  - Use of dimmable control gears for presence & daylight sensing

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Why standards

on photometric data on LED Luminaire Systems

Lighting Design <u>without</u> photometric data of LED luminaires

Different LED Modules and Non Ballasted LED Lamps used in LED Luminaires

LED LUMINAIRE

⇒ Inhomogeneous light distribution - lack of data

LED APPLICATION

⇒ Undesired glare, poor uniformity of light

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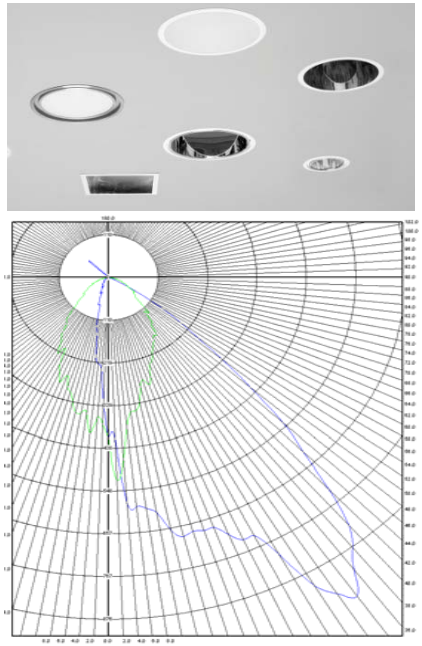
Why standards

on photometric data on LED Luminaires Systems

Lighting Design based on photometric data of LED luminaires

Different LED Modules and Non Ballasted LED Lamps used in LED Luminaires

LED LUMINAIRE
selected from harmonised photometric data



LED APPLICATION
designed and calculated from data on photometric and power

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CELMA proposal

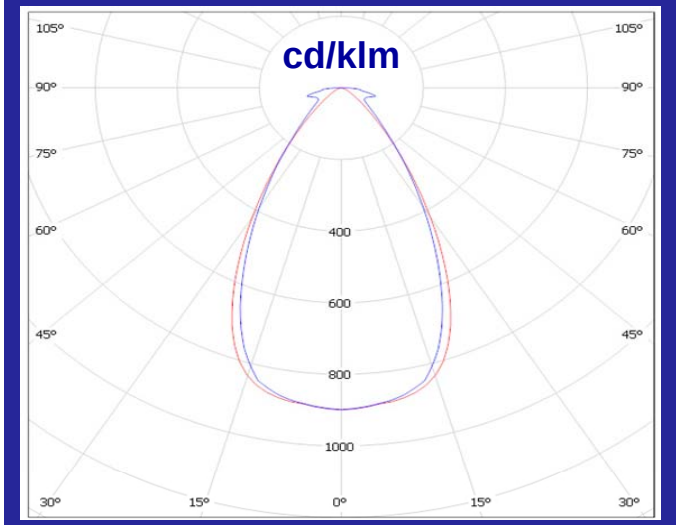
on presentation of photometric data of LED luminaires until EN Standards are revised

The proposal in the CELMA Guide

- Presentation of essential photometric data of LED luminaires
- Performance measured from LED luminaires with its own control gears powering all lamps used in the luminaire
- Total LED luminaire light output and light distribution measured under stabilized conditions
- Total LED luminaire power measured under stabilized conditions

Example

Luminous intensity distribution



LO 475 lm
LLE 23,75 lm/W

Ra 80
Tcp 6500 K

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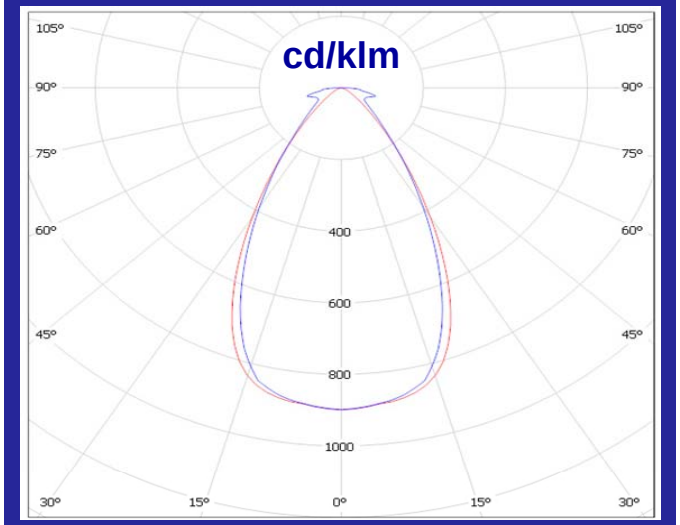
Essential LED Luminaire data

- Luminaire light output (LO)
  Total flux of the luminaire
- Luminaire power (Pi)
  The total rated power (in watts)
- Luminaire Lumens Efficacy (LLE)
  Total luminaire light output, (LO) divided by the total luminaire power, (Pi)
- Normalised intensity table
  The tabulated luminous intensity values

Example

Luminous intensity distribution



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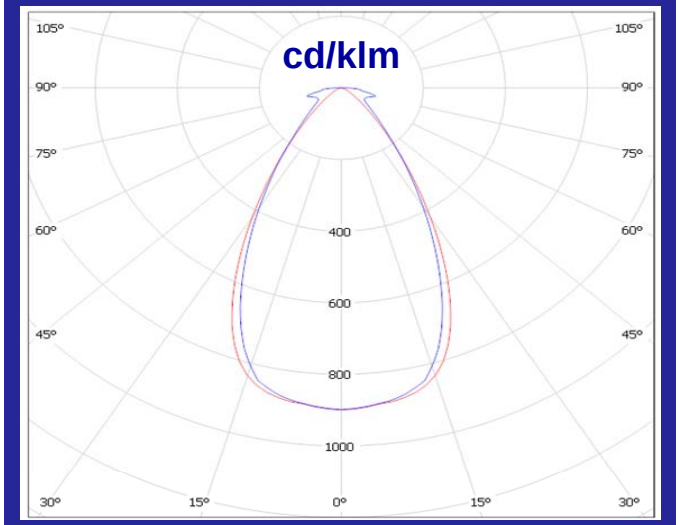
Essential LED Lamp & Luminaire data

- Correlated colour temperature, T_{CP} (K)
- Colour Rendering Index, CRI (Ra)
- Lifetime, L_{xx} , F_{xx} (h)
- Lamp Lumen Maintenance Factor **(LLMF)**
- Lamp Survival Factor **(LSF)**
- Operating temperature on the module (T_C)

Example

Luminous intensity distribution



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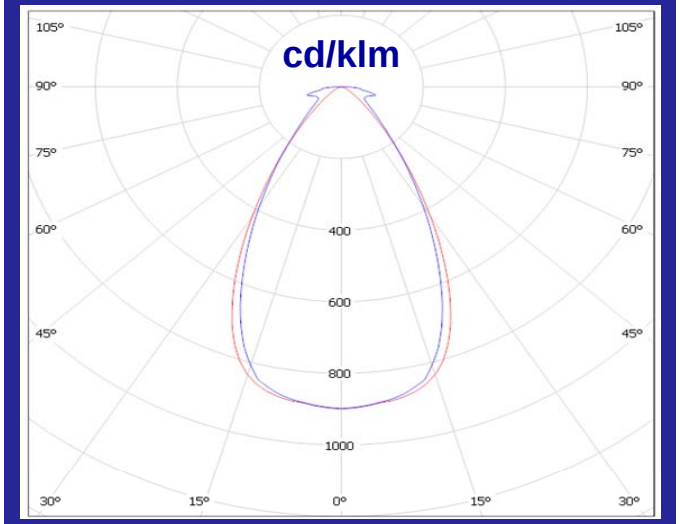
Conclusion

Why standards on photometric data on LED Luminaire Systems?

- To compare different LED luminaires in the lighting design process
- To avoid mistakes in LED applications and avoid setbacks in the implementation
- To state and verify compliance with lighting quality & energy efficiency requirements
- To plan for the maintenance of the lighting installation
- To verify compliance with EcoDesign Regulations

Example

Luminous intensity distribution



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Available on your USB stick
& on www.celma.org!

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Thank you very much

for your kind attention!

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