CELMA

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

2010 State of the art of LED lamps

Joep Rooijmans

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Content

Content of this presentation:

1. LED lamps classification explained
2. LED lamps performance aspects
3. LED lamps & regulations
4. LED lamps replacing fluorescent lamps

LED lamp classification explained

- Split-up in:
  - Self-ballasted versions & Non self-ballasted
  - Directional & Non-directional
  - Clear & Non-clear
- Product variety and assortment already available.

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LED lamps

Self-ballasted LED lamp

Non self-ballasted LED lamp

LED lamp classification explained

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LED lamps

Directional LED lamp

Non directional LED lamp

LED lamp classification explained

- Split-up in:
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  - Directional & Non-directional (examples)
  - Clear & Non-clear (examples)
- Product variety and assortment already available.

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LED lamps

Clear LED lamp

Non clear LED lamp

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Product portfolio 2010

Performance equivalence towards other lamps

- Survey of performance of 2010 LED lamps
  - See tables for Non-directional and Directional Lamps

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Lumen equivalence Non-directional

Lumen equivalency requirements from EU Regulation 244/2009

Table 6

Rated lamp luminous flux Φ [lm]			Claimed equivalent incandescent lamp power
CFL	Halogen	LED and other lamps	[W]
125	119	136	15
229	217	249	25
432	410	470	40
741	702	806	60
970	920	1 055	75
1 398	1 326	1 521	100
2 253	2 137	2 452	150
3 172	3 009	3 452	200

Average status LED lamps 2010 versus Incandescent

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Lumen equivalence Directional

Low voltage (12 V) Reflector type		
Type	Wattage	Flux 90° cone
MR11 GU4	20	200
	35	400
MR16 GU 5.3	20	200
	35	385
	50	600
AR111	35	350
	50	550
	75	800
	100	1050
Mains Voltage (230 V) Blown Glass Reflector type		
Type	Wattage	Flux 90° cone
R50/NR50	25	90
	40	170
R63/NR63	40	180
	60	300
R80/NR80	60	300
	75	350
	100	580
R95/NR95	75	350
	100	540
R125	100	580
	150	1000
Mains Voltage (230 V) Pressed Glass Reflector type		
Type	Wattage	Flux 90° cone
PAR16	20	90
	25	125
	35	200
	50	300
PAR20	35	200
	50	300
	75	500
PAR25	50	350
	75	550
PAR30S	50	350
	75	550
	100	750
PAR36	50	350
	75	550
	100	720
PAR38	60	400
	75	555
	80	600
	100	760
	120	900

ELC proposal for future new EU Ecodesign Regulation for directional lamps (part 2):

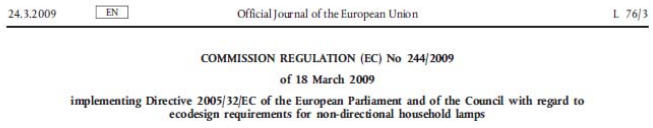
- Minimum lumen output of Directional conventional lamps had never been laid down
- ELC has now agreed and defined minimum output
- This is also minimum requirement for LED lamps when replacing conventional lamps

Performance equivalence towards other lamps

- Survey of performance of 2010 LED lamps
  - See tables for Non-directional and Directional Lamps
- Economical advantages and pay-back time
  - Higher initial cost paid back via lower energy and maintenance
  - Professional applications, e.g. replacing Halogen
  - Typical pay-back: 12 to 24 months depending on burning hrs
- Energy saving contributions LED lamps: ≈ 80 lm/W by 2012
  - In comparison with CFL-i: average 30 to 50 lm/W
  - Sole alternative for most Halogen spots: 10 to 25 lm/W

Retrofit LED lamps in (EU) Regulations

- Survey of applicable Regulations
  - EU Regulation 244/2009 for Non-directional lamps
  - National (voluntary) regulations; e.g. EST in UK
- Minimum requirements for LED lamps:
  - Minimum Efficacy, lumen equivalency, provided product data (see Tables in 244/2009)
  - Unclear aspects of 244/2009 Regulation:
    - Definition of LED lamp life
    - Functionality requirements for LED lamps


24.3.2009 EN Official Journal of the European Union L 76/3

COMMISSION REGULATION (EC) No 244/2009

of 18 March 2009

implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for non-directional household lamps

Retrofit LED lamps in new EU Regulation Part 2

- ELC recommendation to include Directional LED lamps in Part 2
  - Definitions LED lamp life
  - Functionality requirements

Functionality parameter	All stages	
Minimum lamp lifetime (for L_{70},F_{50})	≥ 10000 h	
Switching cycle test (acc IEC/PAS 62612 Ed 1)	> 5000 cycles (30 sec on/off) without failure	
Lamp power factor (Note 1)	*P ≤ 2 W*	No PF requirements
	2W< PF ≤ 25W	PF > 0.5
	P > 25W	PF > 0,9
Starting time	< 0,5 sec	
Run-up time to 95% rated lumen output	< 30 sec	
Max. early failure rate (at 10% of rated life in hrs)	≤ 2%	
CRI (acc CIE 13.3:1995)	≥ 80 (>65 for outdoor and industrial applications)	
CCT (acc IEC/PAS 62612 Ed 1, IEC 60081, Annex D)	2700K, 3000K, 3500K, 4000K, 5000K or 6500K	

- Make above LED specific input also applicable to 244/2009 Reg.

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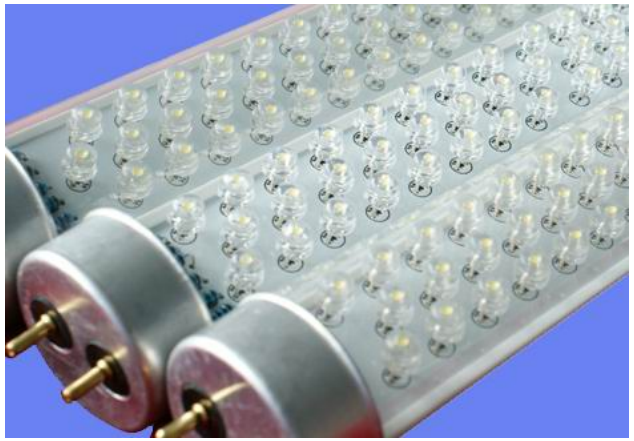
Examples of LED fluorescent lamps



Do these products fulfil safety and performance criteria?

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LED lamps 4 / 4

- **LED lamps replacing linear Fluorescent lamps**
- Split-up in 2 basic versions
  - "Full replaceable version" (able to function with any fluo ballast!)
  - "Conversion kit" (requires changing the luminaire)
- Dangers and future actions required
  - "Unauthorized" people modifying the luminaire!!
  - CE marking no longer valid after changing luminaire??
  - Inclusion specific safety requirements in IEC 62560 (draft)

  >More details available in the CELMA Statement on retrofit LED lamps

- Need for additional EU Regulation (Performance requirements)
- Minimum performance requirements (based on EU Regulation 245/2009)

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Conclusion

- ELC & CELMA are actively lobbying EU Commission to embody these recommendations for LED lamps in future EcoDesign Regulation on Directional Lamps

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Thank you very much

for your kind attention!

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