

# Safety Standards for LED Lighting

FORTALECIMIENTO DE ESTÁNDARES DE EFICIENCIA ENERGÉTICA EN ILUMINACIÓN  
Primera Reunión y Taller Presencial del Grupo Técnico de Eficiencia Energética (GTEE)

Michael Scholand  
6 November 2019



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**Safety Standards for LED Lamps**

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**Discussion**

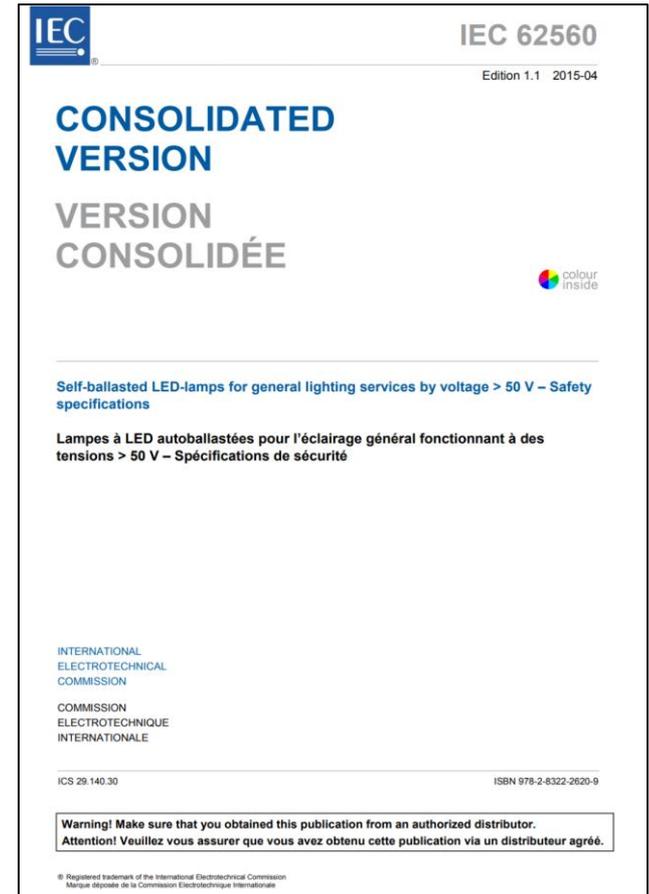
# Market is shifting to LED

- There is a rapid transition to LED
- Standards have struggled to keep up with the innovation and market transformation
- Some economies around the world do not have safety standards in place for LED products
- It is important to adopt Safety standards as soon as possible and make them mandatory for all lighting products, including special purpose (i.e., those that might be exempt from MEPS)



# IEC 62560:2011+AMD1:2015 CSV

- Self-ballasted LED-lamps for general lighting services by voltage  $>50\text{ V}$  - Safety specifications
- Specifies the safety and interchangeability requirements, test methods and conditions required for integrally ballasted LED-lamps
- Intended for general lighting purposes, having:
  - - a rated wattage up to  $60\text{ W}$
  - - a rated voltage of  $> 50\text{V}$  up to  $250\text{V}$
  - - caps according to Table 1



# Contents Summary of IEC 62560

- General requirements and test conditions
- Marking
- Interchangeability – cap, bending moment and mass of lamp
- Protection against accidental contact with live parts
- Insulation resistance and electric strength after humidity treatment
- Mechanical strength – axial strength
- Cap temperature rise
- Resistance to heat
- Resistance to flame and ignition
- Fault conditions
- Creepage distances and clearances
- Abnormal operation
- Test conditions for dimmable lamps
- Photobiological safety
- Ingress protection
- Information for luminaire design



# IEC 62838:2015 (COR1:2017)

- LEDsi lamps for general lighting services with supply voltages not exceeding 50 V a.c. r.m.s. or 120 V ripple free d.c. - Safety specifications
- Specifies safety and interchangeability requirements, test methods and conditions required for LED-lamps
- Intended for general lighting purposes, having:
  - rated wattage up to 60 W
  - rated voltage  $\leq 50\text{V AC}$  or  $\leq 120\text{V}$  ripple free DC
  - caps according to Table 1



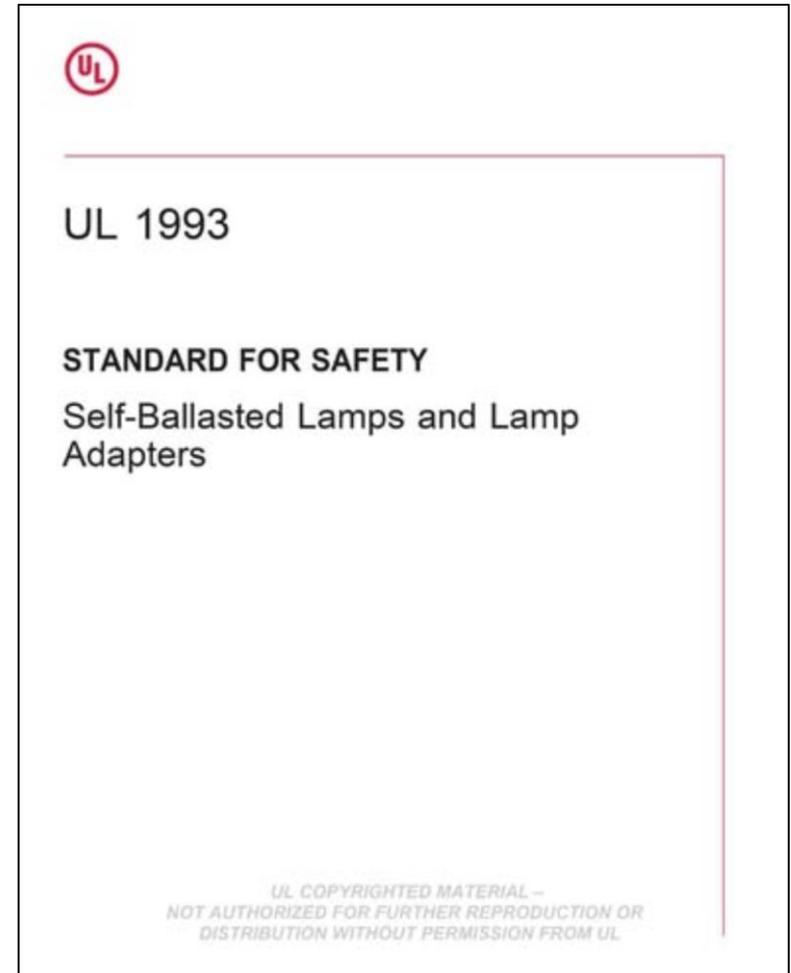
# Contents Summary of IEC 62838:2015

- General requirements and test conditions
- Marking
- Interchangeability – cap, bending moment and mass of lamp
- Protection against accidental contact with live parts
- Insulation resistance and electric strength after humidity treatment
- Mechanical strength – pull force
- Cap temperature rise
- Resistance to heat
- Resistance to flame and ignition
- Fault conditions
- Creepage distances and clearances
- Abnormal operation
- Photobiological safety
- Ingress protection
- Information for luminaire design



# UL 1993 (edition 5) – Standard for Safety

- Published 2017-01-27
- ANSI approved: 2018-08-06
- Scope: self-ballasted lamps and adapters rated 120 to 347 VAC nominal for connection to screw-base, pin-base or recessed contact
- For LEDs, have a Supplement:
  - Self-ballasted LED lamps as above
  - Linear LED retrofit lamps for fluorescent tubes
  - Component LED lamps, replacing halogen, MR11 and MR16
  - Excludes LED lamps with controls like photocells, motion sensors and wifi



# Contents Summary of UL 1993 (edition 5)

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- General requirements
- Mechanical construction – enclosure, openings, materials, weight
- Electrical construction – lamp base, current-carrying parts, PCB, capacitors, live part risk, LED light sources
- Environmental locations – dry, damp, wet locations
- Tests – starting and operating, leakage-current, temperature, dielectric voltage-withstand, harmonic distortion, drop-impact, mold-stress, deflection, strain relief test, dimmer test, humidity, water spray, cold impact, lamp fault
- Test equipment – instruments, etc.
- Device markings – general, identifications, ratings



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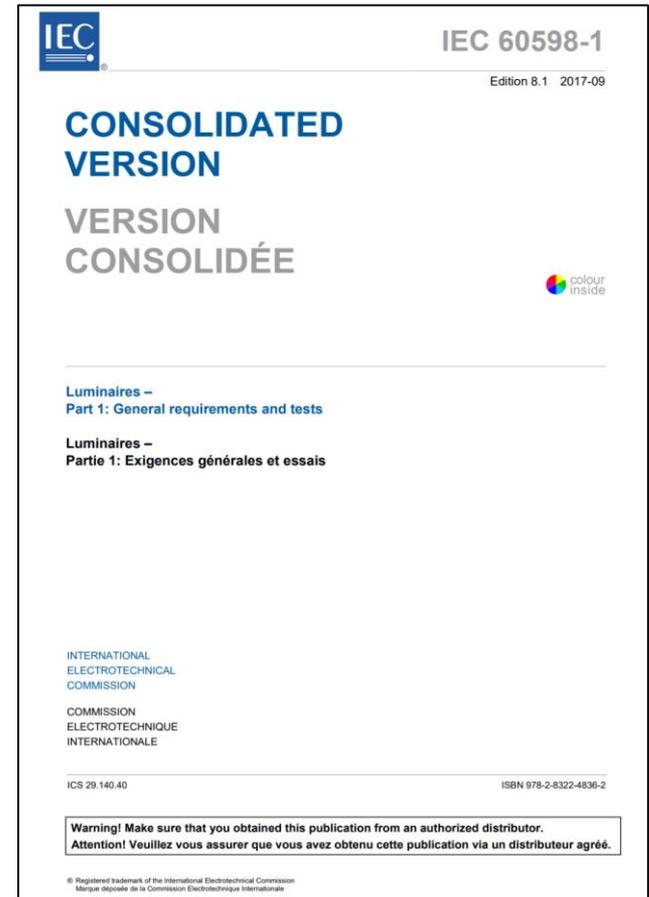
Safety Standards for Street Lights

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# IEC 60598-1:2014+AMD1:2017 CSV

- Luminaires - Part 1: General requirements and tests
- Specifies the general requirements for luminaires, including sources up to 1000V.
- The requirements and related tests of this standard cover:
  - classification,
  - marking,
  - mechanical construction,
  - electrical construction and
  - photobiological safety.



# Contents Summary of IEC 60598

- General requirements and test conditions
- Classification of Luminaires
- Marking of luminaire
- Construction – components, wireways, lamp-holders, terminal blocks, supply connections, switches, insulating linings and sleeves, connections, corrosion, ignitors, photobiological hazards, mechanical hazards, thermal sensing and more.
- External and internal wiring
- Provision for earthing
- Protection against electric shock
- Resistance to dust, objects and moisture
- Creepage distances
- Endurance test and thermal test
- Resistance to fire and heat
- Screw terminals and screwless terminals



# UL 8750 (edition 2) – Safety Standard for LED Lighting

- Published 2015-09-15
- ANSI approved: 2019-10-11
- Scope: LED equipment that is part of a luminaire, including drivers, controllers, arrays (modules) and packages
- Visible spectrum (400-700nm) LEDs
  - LED controllers integral to luminaire or remotely located (Class 2 circuit)
  - Not for controllers in Class 1 circuits
  - Not for controllers in scope of plug-in locking photocontrols (UL 773) or dimming controls (UL 1472)
- Intended for branch circuits of 600V or less
- A range of LED equipment and products



# Contents Summary of UL 8750 (edition 2)

- General requirements
- Mechanical construction – metal parts, materials, enclosure and openings, conductor protection, strain relief
- Electrical construction – accessibility, grounding and bonding, wiring, connections, separation of circuits, insulation, printed wiring boards, components
- Environmental considerations
- Tests – input, temperature, dielectric voltage withstand, abnormal, circuit power limit, leakage current, cord strain and pushback relief, security of output terminals, insulation-piercing connection, adhesive support, environmental, mechanical strength, knockout secureness, enclosure
- Device markings – general, identifications, ratings



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Discussion

# Discussion on Safety Standards

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- Which Safety Standards are already in place in the region?
- How will the market respond to these new requirements?
- Which ones are better for alignment – or should both be accepted?



# Thank you, any questions?

**Michael Scholand**  
Senior Advisor

Policy & Analysis Team  
CLASP | Europe  
T: +44-7931-701-568  
E: mscholand@clasp.ngo

**Steve Coyne**  
Consultant

Director  
Light Naturally  
T: +61 413 314 346  
E: steve@lighthnaturally.com.au