

# LED Luminaires

## CE 安規簡介

普衡驗證服務股份有限公司

Acts Certification & Testing Services

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# APPLICABLE STANDARDS

- LED Luminaires 之主測標準:
  - 原各燈具標準，如 EN 60598-1+EN 60598-2-1(固定燈)或EN 60598-2-3(路燈)等
  
- LED Luminaires 加測之標準:
  - EN 61347-2-13 + EN 61347-1
  - EN 60825 或 IEC 62471 (Laser requirement)
  
- LED Light (Bulb) 之標準:
  - EN 60968 + EN 61347-2-13 + EN 61347-1
  
- LED Driver 單件之標準:
  - EN 61347-2-13 + EN 61347-1

# MARKING REQUIREMENT

## ■ Luminaires should be marked with:

- Trade mark or company name
- Model number
- Rated input voltage (should include 230V~) 
- Rated input frequency (should include 50Hz) and power
- IP rating
- Class II symbol 
- $t_a$  (rated ambient) (e.g.  $t_a=40^{\circ}\text{C}$ )
- Symbol for suitability for direct mounting on normally flammable surfaces 
- L, N and  markings by the input terminals

# CONSTRUCTIONAL REQUIREMENT

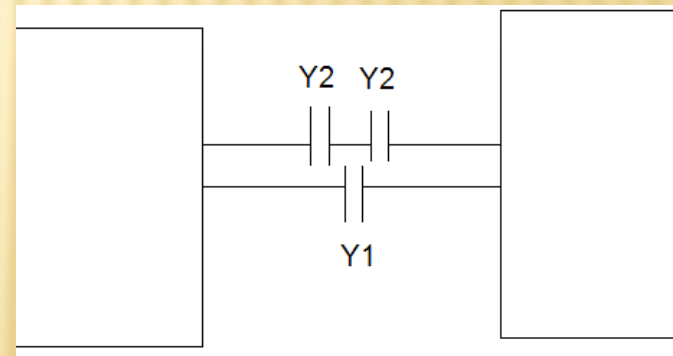
- For a SELV(Safety Extra Low Voltage) LED driver, the loaded output voltage should be less than 25Vrms and the no-load output should be less than 33Vrms or 46.6Vp.
- The ends of flexible stranded conductors shall not have additional soldering except for the PCB soldering.
- Laser power should not over Class 1 limit (400~700nm < 390nW) of EN 60825.
- No sharp edges, burrs, flashes and the like should be found on the outside enclosure.
- Suggest to put an insulation sheet underneath the terminal block connecting to external wiring.

# CONSTRUCTIONAL REQUIREMENT

- Electrical connections shall be so designed that contact pressure is not transmitted through insulating material.
- Spring washer or star washer should be used for all electrical screw connection, including the earth connection.
- Adjusting devices, for example joints or adjusting brackets, shall be so constructed that cords or cables are not pressed, clamped, damaged or twisted along the longitudinal axis by more than 360° during operation.
- The nominal cross-sectional area of the conductors shall be not less than:
  - – 0,75 mm<sup>2</sup> for ordinary luminaires;
  - – 1,0 mm<sup>2</sup> for other luminaires.

# CONSTRUCTIONAL REQUIREMENT

- All street lights shall be at least IPX3.
- Cord anchorage (strain-relief device) should be provided for street lights.
- Bushing should be provided at the entering location of external cord.
- If capacitors are connected between the SELV output and primary circuits, one Y1 or two Y2 in series with the same value specified must be used.



# CONSTRUCTIONAL REQUIREMENT

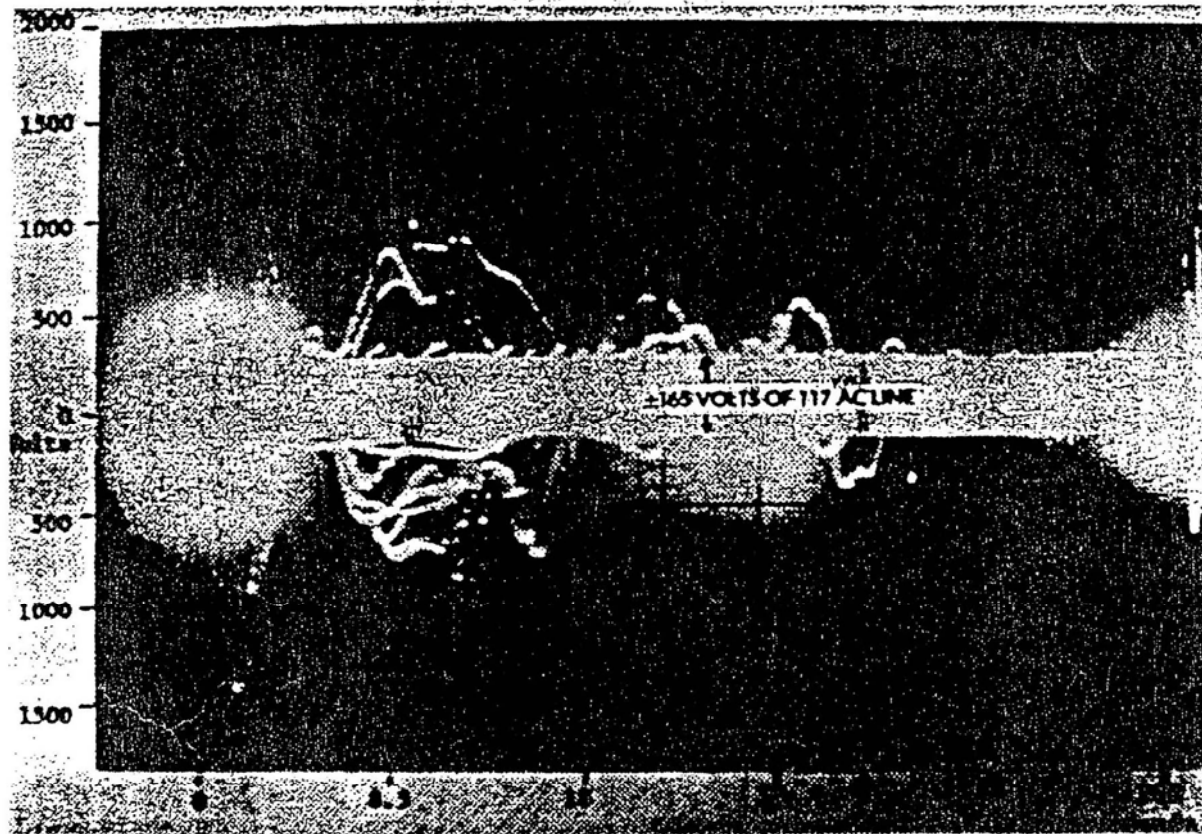
- External cable requirement

	Rubber	PVC
Ordinary class I luminaires	HD3RT-F	HD3VVH2-F HD3VV-F
Ordinary class II luminaires	HD5RR-F	HD3VVH2-F HD3VV-F
Luminaires other than ordinary	HD5RN-F	–
Portable rough service luminaires	HD7RN-F	–





# CONSTRUCTIONAL REQUIREMENT



**Typical surge voltages on residential power line; recordings taken over 24-hour period** (Photography courtesy F. Martzloff, General Electric Company)

# CONSTRUCTIONAL REQUIREMENT

- Spacing requirement (for water resistance LED luminaires)

		<i>RMS working voltage not exceeding V</i>			
		<i>50</i>	<i>150</i>	<i>250</i>	<i>500</i>
<i>Distances in mm</i>					
<i>Creepage distance</i>					
– <i>Basic insulation</i>	<i>PTI* ≥ 600</i>	1,5	2	3,2	6,3
	<i>PTI* ≥ 175 &lt; 600</i>	1,9	2,5	4	8
– <i>Supplementary insulation</i>		–	3,2	4	8
– <i>Reinforced insulation</i>		–	5,5	6,5	9
<i>Clearances</i>					
– <i>Basic insulation</i>		0,8	1,5	3	4
– <i>Supplementary insulation</i>		–	3,2	3,6	4,8
– <i>Reinforced insulation</i>		–	5,5	6,5	9



# CONSTRUCTIONAL REQUIREMENT

- Spacing requirement (for built-in LED driver)

	RMS working voltage not exceeding					
	V					
	50	150	250	500	750	1 000
<b>Minimum clearance mm</b>						
a) between live parts of different polarity, and						
b) between live parts and accessible metal parts which are permanently fixed to the lamp controlgear, including screws or devices for fixing covers or fixing the lamp controlgear to its support						
– Creepage distances						
Insulation PTI ≥ 600	0,6	1,4	1,7	3	4	5,5
< 600	1,2	1,6	2,5	5	8	10
– Clearances	0,2	1,4	1,7	3	4	5,5
c) between live parts and a flat supporting surface or a loose metal cover, if any, if the construction does not ensure that the values under b) above are maintained under the most unfavourable circumstances						
– Clearances	2	3,2	3,6	4,8	6	8



# CONSTRUCTIONAL REQUIREMENT

- Spacing requirement (for independent LED driver)

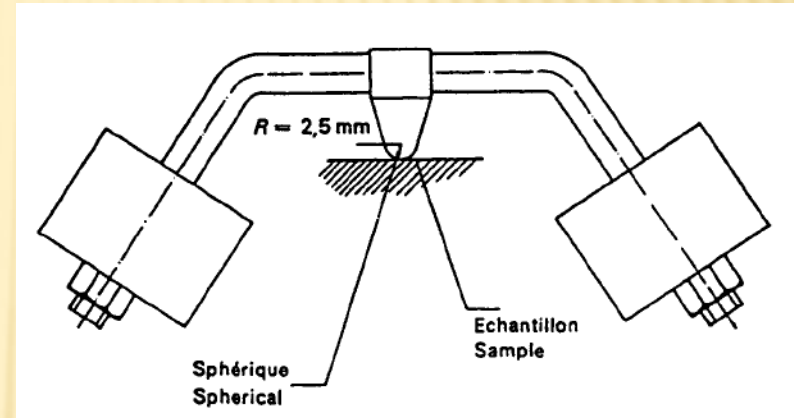
Location	Clearance		Creepage distance	
	Through winding enamel	Other than through winding enamel	Through winding enamel	Other than through winding enamel
Different polarity before fuse	-	-	3.0mm	3.0mm
Basic insulation	2.0mm	3.0mm	2.4mm	3.0mm
Reinforce insulation	4.0mm	6.0mm	4.8mm	6.0mm



# TESTING REQUIREMENT

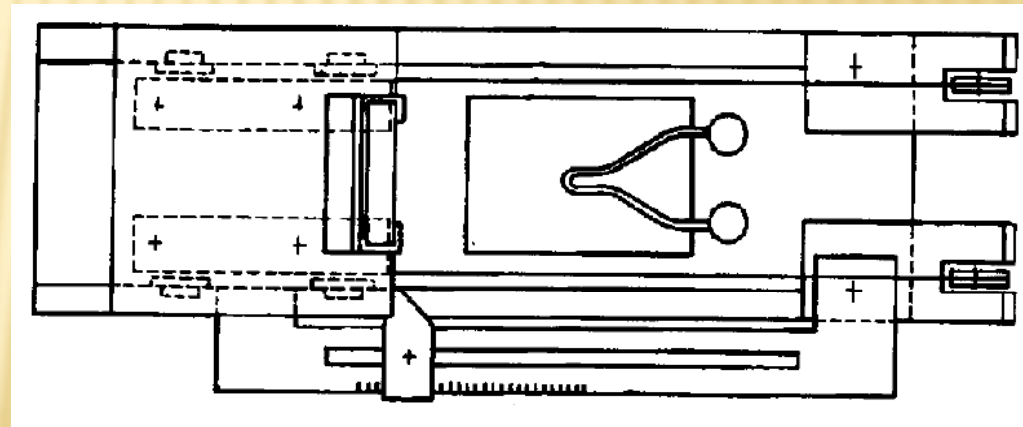
## ■ Ball Pressure Test:

- 125°C (for plastic supporting the live parts)
- 75°C (for plastic enclosure)
- Duration: 1 hour
- Limit:  $\varnothing 2\text{mm}$  max.



## ■ Glow Wire Test:

- 650°C
- Duration: 30 seconds



# TESTING REQUIREMENT

## ■ Grounding Impedance Test

- Test current: 25A
- Test duration: 1minute
- Limit: 0.5Ω max.

## ■ Suspension test

- 4 times the weight
- Test for 1 hour



# TESTING REQUIREMENT

- **Temperature Test:**
  - 1.06 x rated voltage
  - Test until thermal steady state

Part	Maximum temperature °C
Lamp caps:	As specified in the appropriate IEC lamp standard <sup>1)</sup>
Windings in ballasts or transformers with $t_w$ marking Case (of capacitor, starting device, ballast or convertor etc.) If $t_c$ is marked If $t_c$ is not marked	$t_w$ $t_c$ <sup>2)</sup> 50
Windings in transformers, motors, etc., if the winding insulation system according to IEC 60085 is:	
– of class A material <sup>3)</sup>	100
– of class E material <sup>3)</sup>	115
– of class B material <sup>3)</sup>	120
– of class F material <sup>3)</sup>	140
– of class H material <sup>3)</sup>	165
Insulation of wiring:	See Table 12.2 and items b) and c) of 12.4.2
Contacts of ceramic lampholders and insulating material of lampholders and starterholders: $T_1$ or $T_2$ marked (B15 and B22) <sup>4)</sup> (IEC 61184) Other types with T marking (IEC 60238, IEC 60400, IEC 60838 <sup>5)</sup> and IEC 61184) Other types without T marking (E14, B15) (IEC 60238 and IEC 61184) (E27, B22) (IEC 60238 and IEC 61184) (E26) (E40) (IEC 60238) (E 39) Fluorescent lampholder/starterholders and miscellaneous lampholders without T marking (IEC 60400 and IEC 60838 <sup>5)</sup> )	165 for $T_1$ and 210 for $T_2$ T marking 135 165 225 80
Switches marked with individual ratings:	
With T marking	T marking
Without T marking	55
Other parts of the luminaire (according to material and use):	See Table 12.2 and item b) of 12.4.2
Mounting surface:	
Normally flammable surface	90
Non-combustible surface	Not measured
Parts intended to be handled or touched frequently <sup>6)</sup> :	
Metal parts	70
Non-metal parts	85
Parts intended to be gripped by hand:	
Metal parts	60
Non-metal parts	75
Objects lighted by spotlights (see 12.4.1 j)):	90 (of test surface)
Track (for track-mounted luminaires)	As stated by the track manufacturer <sup>7)</sup>
Mains socket-outlet-mounted-luminaire and plug-ballast/transformer:	
– case parts intended to be gripped by hand	75
– the plug/socket interface	70
– all other parts	85

# TESTING REQUIREMENT

## ■ Electric Strength Test:

- Conditioning at 93%RH and 25°C for 48hours
- Test duration 1 minute
- Test between:
  - Primary circuits and secondary circuits
  - Primary and enclosure
- Test voltage:
  - Basic insulation -  $2U+1000V_{ac}$
  - Double or Reinforced insulation -  $4U+2750V_{ac}$



# TESTING REQUIREMENT

- **Abnormal and Fault-Condition Test**
  - Short-circuit or open-circuit on single component
  - Short one LED chip
  - Short the output of LED driver
  - No load
  - Twice the load

# TESTING REQUIREMENT

## ■ Leakage Current Test

<i>Luminaire type</i>	<i>Maximum, r.m.s. values of leakage current<sup>3)</sup> mA</i>
<i>Class II<sup>1)</sup></i>	<i>0,5</i>
<i>Portable, class I<sup>2)</sup></i>	<i>1,0</i>
<i>Fixed, class I up to 1 kVA rated input increasing by 1,0 mA/kVA up to a maximum of 5,0 mA<sup>1)</sup></i>	<i>1,0</i>

# TESTING REQUIREMENT

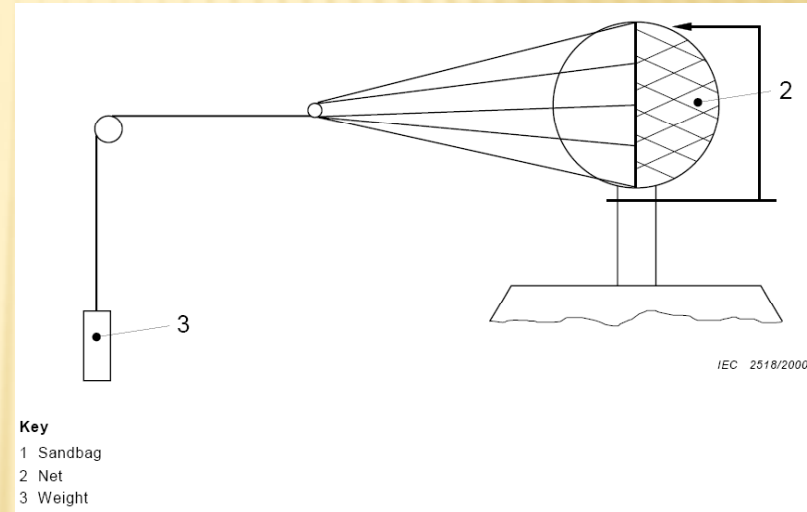
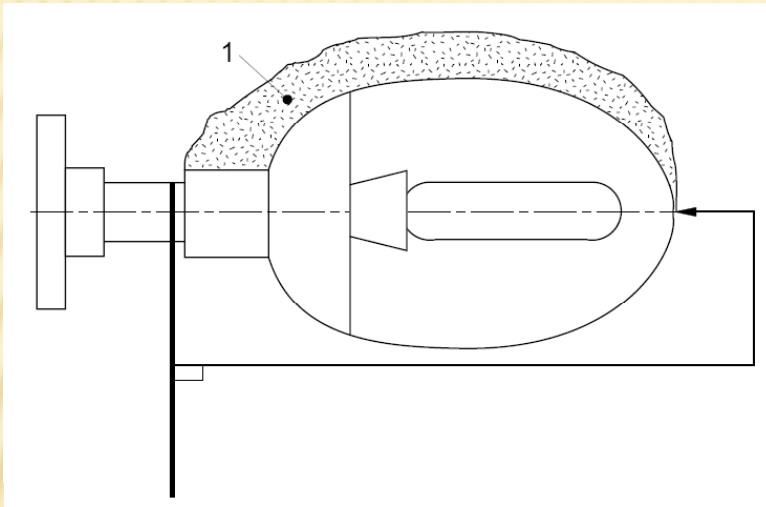
## ■ Wind Force Test

$$F = 1/2 R_h \times S \times C_d \times V^2 \text{ (N)}$$

- ◆  $R_h = 1.225 \text{ kg/m}^3$  (air volumic mass);
  - ◆  $V = 45 \text{ m/s}$  (163 km/h) for heights up to 8 m;
  - ◆  $V = 52 \text{ m/s}$  (188 km/h) for heights between 8 m and 15 m;
  - ◆  $V = 57 \text{ m/s}$  (205 km/h) for heights of more than 15 m.
  - ◆  $C_d = 1.2$
- After the test, there shall be no visible failure impairing the safety, no permanent deformation from the attachment which exceeds a slope of more than 2 cm/m, and no rotation around the point of attachment.

# TESTING REQUIREMENT

## ■ Wind Force Test



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