



NATIONAL FORUM ON MALAYSIAN STANDARDS ON LIGHT EMITTING DIODES (LEDs)





MALAYSIAN STANDARDS FOR LED TESTING AND SAFETY

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Managed by :



NATIONAL FORUM ON MALAYSIAN STANDARDS ON LIGHT EMITTING DIODES (LEDs)



Malaysian Standards for LED Performance By: John See Keat Siang WG LED Group 1 Organized by : Ma





Managed by :-



LED Control Gear Type

Built-in





LED Module Type

Integral





Independent





Overview of Systems composed of LED & Control Gears



Standards Available

Product type	Safety Standard	Performance Standard
LED lamps	MS IEC 62560 Edition 1 Publication expected 2010	MS IEC 62612/PAS Publicly Available Specification
LED Drivers	MS IEC 61347-2-13 Published 2006	MS IEC 62384 Published 2006
LED Modules	MS IEC 62031 Edition 1 Publication 2008	MS IEC 62717/PAS
LED Luminaires	MS IEC 60598-1	MS IEC 62722-1 & 62722-2-1
LED products	MS IEC TS 62504 Terms and	Definitions for LED [*] 's and LED

Malaysian Standard for LED Safety Performance

- 1) MS IEC 62560 2011 Self ballasted LED lamps safety specification
- 2) MS IEC 60838-2-2 2008 Connectors for LED modules
- 3) MS IEC 60598-1 Luminaires General Requirement
- 4) MS IEC 62031 Edition 1.0 2008-01 LED Modules safety specification

Self Ballasted LED Lamps >50V for General Lightings Safety Specification

Scope

This Malaysian Standard specifies the safety and interchangeability requirements intended for domestic and similar general lighting purposes, having

- □ A rated wattage up to 60W
- \Box A rated voltage >50 and up to 250V.
- □ Cap according to table 1

Self Ballasted LED Lamps >50V for General Lightings Safety Specification

• Type Test

Marking

Lamps shall be clearly and durably marked with the following mandatory markings:

- a) mark of origin (this may take the form of a trademark, the manufacturer's name or the name of the responsible vendor);
- b) rated voltage or voltage range (marked "V" or "volts");
- c) rated wattage (marked "W" or "watts");
- d) rated frequency (marked in "Hz")

Interchangeability

Interchangeability shall be ensured by the use of caps in accordance with IEC 60061-1 and gauges in accordance with IEC 60061-3, see Table 1.

Self Ballasted LED Lamps >50V for General Lightings Safety Specification

• Type Test

Bending Moment And Masses- value shall not exceed value below

Lamp cap	Bending moment (Nm)	Mass (kg)
B15d	1	*
B22d	2	1
E11	0,5	*
E12	0,5	*
E14	1	*
E17	1	*
E26	2	*
E27	2	1
GU10	0,1	*
GZ10	0,1	*
GX53	0,3	*

Self Ballasted LED Lamps >50V for General Lightings Safety Specification

Type Test

Protection against accidental contact with live parts

The lamps shall be so constructed that, without any additional enclosure in the form of a luminaire, no internal metal parts, basic insulated external metal parts or live metal parts of the lamp cap or of the lamp itself are accessible when the lamp is installed in a lamp holder according to the relevant IEC lamp holder data sheet.

Insulation resistance and electric strength after humidity treatment

Insulation resistance and electric strength shall be adequate between live parts of the lamp and accessible parts of the lamp.



Self Ballasted LED Lamps >50V for General Lightings Safety Specification

• Type Test

Mechanical Strength

The cap shall remain firmly attached to the bulb or that part of the lamp which is used for screwing the lamp in or out when subjected to the torque levels in Table below.

Сар	Torsion moment Nm		
B15d	1,15		
B22d	3		
E11	0,8		
E12	0,8		
E14	1,15		
E17	1,5		
E26 and E27	3		
GX53	3 u.c.		
u.c.: under consideration			

Torque test values for unused lamps

Self Ballasted LED Lamps >50V for General Lightings Safety Specification

• Type Test

Resistance to heat

The lamp shall be sufficiently resistant to heat. External parts of insulating material providing protection against electric shock, and parts of insulating material retaining live parts in position shall be sufficiently resistant to heat.

Resistance to flame and ignition

Parts of insulating material retaining live parts in position and external parts of insulating material providing protection against electric shock are subjected to the glow-wire test in accordance with IEC 60695-2-10, IEC 60695-2-11, IEC 60695-2-12 and IEC 60695-2-13, subject to the following details. -The test specimen is a complete lamp. It may be necessary to take away parts of the lamp to perform the

test, but care is taken to ensure that the test conditions are not significantly different from those occurring in normal use.

Fault condition

Lamp shall not impair safety when operated under fault conditions which may occur during the intended use. Each of the following fault conditions is applied in turn, as well as any other associated fault condition that may arise from them as logical consequence.

Creepage distances and clearances

The requirements of IEC 61347-1 apply.

Scope

This Malaysian Standard specifies the requirements for connectors for building in (including those used for interconnection between LED modules) of miscellanous types to be used with PCB-based LED Modules

Standard ratings – 50V, Imin=10mA ; I max= 3A, Operating temperature of -30C to 65C

Classification Follow Clause 5 of MS IEC 60838-1

Marking Follow Clause 6 of MS IEC 60838-1

Protection Against Electric Shock Follow Clause 7 of MS IEC 60838-1

Terminals Follow Clause 8 of MS IEC 60838-1

Provision of Earthing Follow Clause 9 of MS IEC 60838-1

Construction Follow Clause 10 of MS IEC 60838-1

Moisture Resistance, Insulation Resistance and Electric Strength Follow Clause 11 of MS IEC 60838-1

Mechanical Strength Follow Clause 12 of MS IEC 60838-1

Screws, current carrying parts and connections Follow Clause 13 of MS IEC 60838-1

Creepage Distances and Clearances Follow Clause 14 of MS IEC 60838-1

Endurance

- a) 100 cycles of min Top and mx of Top dwell time 30 minutes and transition time of less than 30 sec.Connector must not be impaired and after 12 hrs of recovery from TMCL, the resistance will be measured using clause 16.3
- b) Connectors to be subjected to 6 cycle of damp het cycle per MS IEC 60068-2-30 using variation 2 and max temperature of 55C

Resistance to Heat and Fire Follow Clause 16 of MS IEC 60838-1

Resistance to Excessive Residual Stresses(season cracking) and to rusting Follow Clause 17 of MS IEC 60838-1



Cyclic Humidity





Photometric Test

IP Test

Vibrations

The connector and the LED module is subjected t vibration test per MS IEC 60068-2-6 Total of 5 sweeps of between 5Hz to 500Hz with 2 hrs per axis. Acceleration is 5G

During the test, the connector shall not undergo any change impairing its further use, especially with respect to its contact making

Vibration Test





Sideway Direction

Upward Direction

UUT is lighted up during test Fixture has to be designed with resonance frequency >20KH

MS IEC 62031:2008-01 General lighting - LED modules Safety

Specification

Scope

This Malaysian Standard specifies general and safety requirements for light-emitting diode

- □ LED modules without integral control gear for operation under constant voltage, constant current or constant power;
- self-ballasted LED modules for use on d.c. supplies up to 250 V or a.c. supplies up to 1 000 V at 50 Hz or 60 Hz.
- □ Modules are classified as built in , independent or integral

MS IEC 62031:2008-01

General lighting - LED modules Safety Specification

Scope

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MS IEC 62031:2008-01

General lighting - LED modules Safety Specification

- Type Test
 - □ Mandatory marking for built-in or independent modules
 - □ Terminals criteria for screw and screwless per MS IEC 60598-1
 - □ Provisions for protective earthing . The requirements of MS IEC 61347-1, Clause 9, apply.
 - Protection against accidental contact with live parts The requirements of MS IEC 61347-1, Clause 10, apply.
 - □ Moisture resistance and insulation The requirements of MS IEC 61347-1, Clause 11, apply.
 - Electric strength. The requirements of MS IEC 61347-1, Clause 12, apply.
 - Fault Condition with also 150% of rated voltage. The requirement of MS IEC 61347-1, Clause 14 apply
 - □ Construction. Wood, cotton, silk, paper and similar fibrous material shall not be used as insulation.

Compliance is checked by inspection.

- □ Creepage distances and clearances The requirements of IEC 60598-1, Section 11, apply.
- Screws, current-carrying parts and connections. The requirements of IEC 61347-1, Clause 17, apply.
- □ Resistance to heat, fire and tracking. The requirements of IEC 61347-1, Clause 18, apply.
- Resistance to corrosion. The requirements of IEC 61347-1, Clause 19, apply

- Scope
 - Specifies the general requirement for luminaires incorporating electric light sources for operation from voltages up to 1000V. It covers classifications, marking, mechanical construction and electrical construction

MS IEC 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict

1.2 (0)	GENERAL TEST REQUIREMENTS	
1.2 (0.1)	Information for luminaire design considered	
1.2 (0.3)	More section applicable:	

1.4 (2)	CLASSIFICATION	
1.4 (2.2)	Type of protection:	
1.4 (2.4)	Degree of protection:	
	Luminaire only suitable for non-combustible surface	
	Luminaire suitable for normally flammable surface:	
	Luminaire suitable to be covered by insulating material:	
1.4 (2.5)	Luminaire for normal use:	
	Luminaire for rough service:	

1.5 (3)	MARKING
1.5 (3.2)	Mandatory markings
	Position of the markings
	Format of symbols/text
1.5 (3.3)	Additional information
	Language of instructions
1.5 (3.3.1)	Combination luminaires
1.5 (3.3.2)	Nominal frequency in Hz
1.5 (3.3.3)	Operating temperature
1.5 (3.3.4)	Symbol or warning notice
1.5 (3.3.5)	Wiring diagram
1.5 (3.3.6)	Special conditions
1.5 (3.3.7)	Metal halide lamp luminaire – warning
1.5 (3.3.8)	Limitation for semi-luminaires
1.5 (3.3.9)	Power factor and supply current
1.5 (3.3.10)	Suitability for use indoors
1.5 (3.3.11)	Luminaire with remote control
1.5 (3.3.12)	Clip-mounted luminaire – warning
1.5 (3.3.13)	Specifications of protective shields
1.5 (3.3.14)	Symbol for nature of supply
1.5 (3.3.15)	Rated current of socket outlet
1.5 (3.3.16)	Rough service luminaire
1.5 (3.3.17)	Mounting instruction for type Y, type Z and some type X attachments
1.5 (3.3.18)	Non-ordinary luminaires with PVC cable
1.5 (3.3.101)	Adequate warning on the package (EN)

MS IEC 60598-1				
Clause	Requirement + Test	Result - Remark	Verdict	
4 5 (2 1)				

1.5 (3.4)	Test with water	
	Test with hexane	
	Legible after test	
	Label attached	

1.6 (4)	CONSTRUCTION	
1.6 (4.2)	Components replaceable without difficulty	
1.6 (4.3)	Wire ways smooth and free from sharp edges	
1.6 (4.4)	Lampholders	
1.6 (4.4.1)	Integral lampholder	
1.6 (4.4.2)	Wiring connection	
1.6 (4.4.3)	Lampholder for end-to-end mounting	
1.6 (4.4.4)	Positioning	
	- pressure test (N):	
	- bending test (Nm) :	



Creepage Inspection





Marking Test

Bending/Pressure Test

1.6 (4.4.5)	Peak pulse voltage
1.6 (4.4.6)	Centre contact
1.6 (4.4.7)	Parts in rough service luminaires resistance to tracking
1.6 (4.4.8)	Lamp connectors
1.6 (4.4.9)	Caps and bases correctly used
1.6 (4.5)	Starter holders
	Starter holder in luminaires other than class II
	Starter holder class II construction
1.6 (4.6)	Terminal blocks
	Tails
	Unsecured blocks
1.6 (4.7)	Terminals and supply connections
1.6 (4.7.1)	Contact to metal parts
1.6 (4.7.2)	Test 8 mm live conductor
	Test 8 mm earth conductor
1.6 (4.7.3)	Terminals for supply conductors
1.6 (4.7.3.1)	Welded connections:
	- stranded or solid conductor
	- spot welding
	- welding between wires
	- Type Z attachment
	- mechanical test according to 15.8.2
	- electrical test according to 15.9
	- ageing test according to 15.9.2.3 and 15.9.2.4

MS IEC 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.6 (4.7.4)	Terminals other than supply connection		
1.6 (4.7.5)	Heat-resistant wiring/sleeves		
1.6 (4.7.6)	Multi-pole plug		
	- test at 30 N		
1.6 (4.8)	1.6 (4.8) Switches:		
	- adequate rating		
	- adequate fixing		
	- polarized supply		
	- compliance with 61058-1 for electronic switches		
1.6 (4.9)	Insulating lining and sleeves		
1.6 (4.9.1)	Retainment		
	Method of fixing		
1.6 (4.9.2)	Insulated linings and sleeves		
	a) & c) Insulation resistance and electric strength		
	b) Ageing test. Temperature (°C):		
1.6 (4.10)	Insulation of Class II luminaires		
16(4101)	No contact, mounting surface - accessible metal parts -		
1.0 (4.10.1)	wiring of basic insulation		
	Safe installation fixed luminaires		
	Capacitors and switches		
	Interference suppression capacitors according to		
	IEC 60384-14		

Tumbler Tester





Check For Heat Resistance

1.6 (4.10.2)	Assembly gaps:	
	- not coincidental	
	- no straight access with test probe	
1.6 (4.10.3)	Retainment of insulation:	
	- fixed	
	- unable to be replaced; luminaire inoperative	
	- sleeves retained in position	
	- lining in lampholder	
1.6 (4.11)	Electrical connections	
1.6 (4.11.1)	Contact pressure	
1.6 (4.11.2)	Screws:	
	- self-tapping screws	
	- thread-cutting screws	
	- at least two self-tapping screws	
1.6 (4.11.3)	Screw locking:	
	- spring washer	
	- rivets	

MS IEC 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict

1.6 (4.11.4)	Material of current-carrying parts	
1.6 (4.11.5)	No contact to wood	
1.6 (4.11.6)	Electro-mechanical contact systems	
1.6 (4.12)	Mechanical connections and glands	
1.6 (4.12.1)	Screws not made of soft metal	
	Screws of insulating material	
	Torque test: torque (Nm); part:	
	Torque test: torque (Nm); part:	
	Torque test: torque (Nm); part:	

1.6 (4.12.2)	Screws with diameter < 3 mm screwed into metal
1.6 (4.12.4)	Locked connections:
	- fixed arms; torque (Nm):
	- lampholder; torque (Nm):
	- push-button switches; torque 0,8 Nm:
1.6 (4.12.5)	Screwed glands; force (N):
1.6 (4.13)	Mechanical strength
1.6 (4.13.1)	Impact tests:
	- fragile parts; energy (Nm):
	- other parts; energy (Nm):
	1) live parts
	2) linings
	3) protection
	4) covers
1.6 (4.13.3)	Straight test finger
1.6 (4.13.4)	Rough service luminaires
	- IP54 or higher
	a) fixed
	b) hand-held
	c) delivered with a stand
	d) for temporary installations and suitable for mounting on a stand

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Power Up Dust Test

1 meter wate submerging test

IP TEST

	1
1.6 (4.13.6)	Tumbling barrel
1.6 (4.14)	Suspensions and adjusting devices
1.6 (4.14.1)	Mechanical load:
	A) four times the weight
	B) torque 2,5 Nm
	C) bracket arm; bending moment (Nm):
	D) load track-mounted luminaires
	E) clip-mounted luminaires, glass-shelve.
	Thickness (mm):
	metal rod. Diameter (mm):
	Fixed luminaire or independent control gear without fixing
	devices

MS IEC 60598-1				
Clause	Requirement + Test	Result - Remark	Verdict	
1.6 (4.14.2)	Load to flexible cables			
	Mass (kg)			
	Stress in conductors (N/mm ²):			
	Semi-luminaires - mass (kg):			
	Semi-luminaires - bending moment (Nm):			
1.6 (4.14.3)	Adjusting devices:			
	- flexing test; number of cycles:			
	- strands broken			
	- electric strength test afterwards			
16(4144)	Telescopic tubes: cords not fixed to tube; no strain on			
1.0 (4.14.4)	conductors			
1.6 (4.14.5)	Guide pulleys			
1.6 (4.14.6)	Strain on socket-outlets			
1.6 (4.15)	Flammable materials:			
	- glow-wire test 650 °C			
	- spacing \geq 30 mm			
	- screen withstanding test of 13.3.1			
	- screen dimensions			
	- no fiercely burning material			
	- thermal protection			
	- electronic circuits exempted			

1.6 (4.15.2)	Luminaires made of thermoplastic material with lamp control gear	
	a) construction	
	b) temperature sensing control	
	c) surface temperature	
1.6 (4.16)	Luminaires marked with F-symbol	
	No lamp control gear	
1.6 (4.16.1)	Lamp control gear spacing:	
	- spacing 35 mm	
	- spacing 10 mm	
1.6 (4.16.2)	Thermal protection:	
	- in lamp control gear	
	- external	
	- fixed position	
	- temperature marked lamp control gear	
1.6 (4.16.3)	"F" curve measured	
1.6 (4.17)	Drain holes	
	Clearance at least 5 mm	

MS IEC 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
	·		
1.6 (4.18)	Resistance to corrosion:		
1.6 (4.18.1)	- rust-resistance		
1.6 (4.18.2)	- season cracking in copper		
1.6 (4.18.3)	- corrosion of aluminium		
1.6 (4.19)	Ignitors compatible with ballast		
1.6 (4.20)	Rough service vibration		
1.6 (4.21)	Protective shield:		
1.6 (4.21.1)	Shield fitted		
1.6 (4.21.2)	Particles from a shattering lamp not impair safety		
1.6 (4.21.3)	No direct path		
1.6 (4.21.4)	Impact test on shield		
	Glow-wire test on lamp compartment		
1.6 (4.22)	Attachments to lamps		
1.6 (4.23)	Semi-luminaires comply class II		
1.6 (4.24)	UV radiation, metal halide lamps		
1.6 (4.25)	No sharp point or edges		
1.6 (4.26)	Short-circuit protection:		
1.6 (4.26.1)	Uninsulated accessible SELV parts		
1.6 (4.26.2)	Short-circuit test		
1.6 (4.26.3)	Test chain according to Figure 29		

SC340 Solar Simulation Chamber



UV and Metal Halides



Corrosion Tester

1.7 (11)	CREEPAGE DISTANCES AND CLEARANCES	
	Working voltage (V)	
	Voltage form	
	PTI	
	Rated pulse voltage (kV)	
	1) Current-carrying parts of different polarity: cr (mm); cl	
	(mm):	
	2) Current-carrying parts and accessible parts: cr (mm); cl	
	(mm):	
	Parts becoming live due to breakdown of basic	
	insulation and metal parts: cr (mm); cl (mm):	
	4) Outer surface of cable where it is clamped and metal	
	parts: cr (mm); cl (mm):	
	5) Not used	
	6) Current-carrying parts and supporting surface: cr (mm); cl	
	(mm):	

MS IEC 60598-1:2006

Luminaires – Part 1 General Requirement and Tests

MS IEC 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.8 (7)	PROVISION FOR EARTHING		
1.8 (7.2.1 +	Accessible metal parts		
7.2.3)			
	Metal parts in contact with supporting surface		
	Resistance $< 0.5 \Omega$		
	Two self-tapping screws used		
	Thread-forming screws		
	Thread-forming screw used in a groove		
	Earth makes contact first		
1.8 (7.2.1 +	Earth continuity in joints etc		
7.2.3)			
1.8 (7.2.4)	Locking of clamping means		
	Compliance with 4.7.3		
1.8 (7.2.5)	Earth terminal integral part of connector socket		
1.8 (7.2.6)	Earth terminal adjacent to mains terminals		
1.8 (7.2.7)	Electrolytic corrosion of the earth terminal		
1.8 (7.2.8)	Material of earth terminal		
	Contact surface bare metal		
1.8 (7.2.10)	Class II luminaire for looping-in		
	Double or reinforced insulation to functional earth		
1.8 (7.2.11)	Earthing core coloured green-yellow		
	Length of earth conductor		

1.9 (14)	SCREW TERMINALS		
	Separately approved; component list		
	Part of the luminaire		

1.9 (15)	SCREWLESS TERMINALS		
	Separately approved; component list		
	Part of the luminaire		

1.10 (5)	EXTERNAL ABD INTERNAL WIRING
1.10 (5.2)	Supply connection and external wiring
1.10 (5.2.1)	Means of connection:
	Connecting leads (EN)
	- without a means for connection to the supply
	- terminal block specified
	- relevant information provided
	- compliance with 4.6, 4.7.1, 4.7.2, 4.10.1, 11.2, 12 and 13.2
	of Part 1
1.10 (5.2.2)	Type of cable:
	Cables equal to HD21 S2 or HD22 S2 (E)
	Nominal cross-sectional area (mm ²):

MS IEC 60598-1			
Clause	Requirement + Test	Result - Remark	Verdict
1.10 (5.2.3)	Type of attachment, X, Y or Z		
1.10 (5.2.5)	Type Z not connected to screws		
1.10 (5.2.6)	Cable entries:		
	- suitable for introduction		
	- adequate degree of protection		
1.10 (5.2.7)	Cable entries through rigid material have rounded edges		
1.10 (5.2.8)	Insulating bushings:		
	- suitably fixed		
	- material in bushings		
	- material likely to deteriorate		
	- tubes or guards made of insulating material		
1.10 (5.2.9)	Locking of screwed bushings		
1.10 (5.2.10)	Cord anchorage:		
	- covering protected from abrasion		
	- clear how to be effective		
	- no mechanical or thermal stress		
	- no tying of cables into knots etc.		
	- insulating material or lining		

1.10 (5.2.10.1)	Cord anchorage for type X attachment:	
	a) at least one part fixed	
	b) types of cable	
	c) no damaging of the cable	
	d) whole cable can be mounted	
	e) no touching of clamping screws	
	f) metal screw not directly on cable	
	g) replacement without special tool	
	Glands not used as anchorage	
	Labyrinth type anchorages	
1 10 (5 2 10 2)	Adequate cord anchorage for type Y and type Z	
1.10 (3.2.10.2)	attachment	
1.10 (5.2.10.3)	Tests:	
	- impossible to push cable; unsafe	
	- pull test: 25 times; pull (N) :	
	- torque test: torque (Nm) :	
	- displacement ≤ 2 mm	
	- no movement of conductors	
	- no damage of cable or cord	
1.10 (5.2.11)	External wiring passing into luminaire	
1.10 (5.2.12)	Looping-in terminals	
1.10 (5.2.13)	Wire ends not tinned	
	Wire ends tinned: no cold flow	

MS IEC 60598-1:2006

Luminaires – Part 1 General Requirement and Tests

MS IEC 60598-1					
Clause Requirement + Test Result - Remark Ver					
_					
Mains plug same protection					
Class III luminaire plug					
Colour code low voltage (E)					
Appliance inlets (IEC 60320)					
Appliance couplers of class II type					
No standardized interconnecting cables properly					
assembled					
Used plug in accordance with					
- IEC 60083					
- other standard					
Internal wiring					
Internal wiring of suitable size and type					
Through wiring					
- not delivered/ mounting instruction					
- factory assembled					
- socket outlet loaded (A) :					
- temperatures :					
Green-yellow for earth only					
Internal wiring connected directly to fixed wiring					
Cross-sectional area (mm ²) :					
Insulation thickness					
Extra insulation added where necessary					
	MS IEC 60598-1 Requirement + Test Mains plug same protection Class III luminaire plug Colour code low voltage (E) Appliance inlets (IEC 60320) Appliance couplers of class II type No standardized interconnecting cables properly assembled Used plug in accordance with - IEC 60083 - other standard Internal wiring Internal wiring of suitable size and type Through wiring - not delivered/ mounting instruction - factory assembled - socket outlet loaded (A) : - temperatures : Green-yellow for earth only Internal wiring connected directly to fixed wiring Cross-sectional area (mm ²) : Insulation thickness Extra insulation added where necessary	MS IEC 60598-1 Requirement + Test Result - Remark Mains plug same protection			

	-
1.10 (5.3.1.2)	Internal wiring connected to fixed wiring via internal
	current-limiting device
	Adequate cross-sectional area and insulation thickness
1.10 (5.3.1.3)	Double or reinforced insulation for class II
1.10 (5.3.1.4)	Conductors without insulation
1.10 (5.3.1.5)	SELV current-carrying parts
1.10 (5.3.1.6)	Insulation thickness other than PVC or rubber
1.10 (5.3.2)	Sharp edges etc.
	No moving parts of switches etc.
	Joints, raising/lowering devices
	Telescopic tubes etc.
	No twisting over 360°
1.10 (5.3.3)	Insulating bushings:
	- suitable fixed
	- material in bushings
	- material likely to deteriorate
	- cables with protective sheath
1.10(5.3.4)	Joints and junctions effectively insulated
1.10(5.3.5)	Strain on internal wiring
1.10(5.3.6)	Wire carriers
1.10(5.3.7)	Wire ends not tinned
	Wire ends tinned: no cold flow

MS IEC 60598-1:2006

Luminaires – Part 1 General Requirement and Tests

MS IEC 60598-1				
Clause	Requirement + Test	Result - Remark	Verdict	

1.11 (8)	PROTECTION AGAINST ELECTRIC SHOCK	
1.11 (8.2.1)	Live parts not accessible	
	Basic insulated parts not used on the outer surface without	
	appropriate protection	
	Protection in any position	
	Double-ended tungsten filament lamp	
	Insulation lacquer not reliable	
	Double-ended high pressure discharge lamp	
	Relevant warning according to 3.2.18 fitted to the	
	luminaire	
1.11 (8.2.2)	Portable luminaire adjusted in most unfavourable position	
1.11 (8.2.3)	Class II luminaire:	
	- basic insulated metal parts not accessible during starter	
	or lamp replacement	
	- basic insulation not accessible other than during starter or	
	lamp replacement	
	- glass protective shields not used as supplementary	
	insulation	
	Class I luminaire with BC lampholder	

1.11 (8.2.4)	Portable luminaire:
	 protection independent of supporting surface
	 terminal block completely covered
1.11 (8.2.5)	Compliance with the standard test finger or relevant probe
1.11 (8.2.6)	Covers reliably secured
1.11 (8.2.7)	Discharging of capacitors $\ge 0,5 \ \mu F$
	Portable plug connected luminaire with capacitor
	Other plug connected luminaire with capacitor
	Discharge device on or within capacitor
	Discharge device mounted separately

1.12 (12)	ENDURANCE TEST AND THERMAL TEST
1.12 (12.3)	Endurance test:
	- mounting-position
	- test temperature (°C):
	- total duration (h)
	- supply voltage: Un factor; calculated voltage (V)
	- lamp used

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Clause	Requirement + Test	Result - Remark	Verdict
		•	
1.12 (12.3.2)	After endurance test:		
	- no part unserviceable		
	- luminaire not unsafe		
	- no damage to track system		
	- marking legible		
	- no cracks, deformation etc.		
1.12 (12.4)	Thermal test (normal operation)		
1.12 (12.5)	Thermal test (abnormal operation)		
1.12 (12.6)	Thermal test (failed lamp control gear condition):		
1.12 (12.6.1)	Through wiring or looping-in wiring loaded by a current		
	of (A)		
	- case of abnormal conditions:		
	- electronic lamp control gear		
	- measured winding temperature (°C) at 1,1 Un:		
	- measured mounting surface temperature (°C) at		
	1,1 Un:		
	- calculated mounting surface temperature (°C):		
	- track-mounted luminaires		

1.12 (12.6.2)	Temperature sensing control
	- case of abnormal conditions:
	- thermal link
	- manual reset cut-out
	- auto reset cut-out
	- measured mounting surface temperature (°C):
	- track-mounted luminaires
1.12 (12.7)	Thermal test (failed lamp control gear in plastic luminaires):
1.12 (12.7.1)	Through wiring or lopping-in wiring loaded by a current
	of (A):
	- case of abnormal conditions:
	- measured winding temperature (°C) at 1,1 Un:
	- measured temperature of fixing point/ exposed part (°C)
	at 1,1 Un:
	- calculated temperature of fixing point/ exposed
	part (°C):
1.12 (12.7.2)	Temperature sensing control
	- thermal link
	- manual reset cut-out
	- auto reset cut-out
	- measured temperature of fixing point/ exposed
	part (°C):

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Clause	Requirement + Test	Result - Remark	Verdict
1.13 (9)	RESISTANCE TO DUST, SOLID OBJECT AND MOIS	TURE	
1.13 (9.2)	Tests for ingress of dust, solid objects and moisture:		
	- classification according to IP		
	- mounting position during test:		
	- fixing screws tightened; torque (Nm):		
	- tests according to clauses:		
	- electric strength test afterwards		
	a) no deposit in dust-proof luminaire		
	b) no talcum in dust-tight luminaire		
	c) no trace of water on current-carrying parts or where it		
	could become a hazard		
	d) i) For luminaires without drain holes - no water entry		
	d) ii) For luminaires with drain holes – no hazardous water		
	entry		
	e) no water in watertight luminaire		
	f) no contact with live parts (IP 2X)		
	f) no entry into enclosure (IP 3X and IP 4X)		
	f) no contact with live parts (IP3X and IP4X)		
1.13 (9.3)	Humidity test 48 h		

1.14 (10)	INSULATION RESISTANCE AND ELECTRIC STREN	NGTH
1.14 (10.2.1)	Insulation resistance test	
	Cable or cord covered by metal foil or replaced by a metal	
	rod of mmØ	
	Insulation resistance (MQ):	
	SELV:	
	- between current-carrying parts of different polarity	
	:	
	- between current-carrying parts and mounting surface	
	:	
	- between current-carrying parts and metal parts of the	
	luminaire:	
	Other than SELV:	
	- between live parts of different polarity	
	- between live parts and mounting surface:	
	- between live parts and metal parts:	
	- between live parts of different polarity through action of	
	a switch:	

1.14 (10.2.2)	Electric strength test	
	Dummy lamp	
	Luminaires with ignitors after 24 h test	
	Luminaires with manual ignitors	
	Test voltage (V):	
	SELV:	
	- between current-carrying parts of different polarity	
	·	
	- between current-carrying parts and mounting surface	
	:	

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Clause	Requirement + Test	Result - Remark	Verdict

	- between current-carrying parts and metal parts of the	
	Other than SELV:	
	between live parts of different polarity	
	between live parts of different polarity	
	- between rive parts and mounting surface	
	- between live parts and metal parts	
	- between live parts of different polarity through action of	
	a switch	
1.14 (10.3.1)	Leakage current (mA):	

1.15 (13)	RESISTANCE TO HEAT, FIRE AND TRACKING
1.15 (13.2.1)	Ball-pressure test:
	- part tested; temperature (°C):
	- part tested; temperature (°C):
1.15 (13.3.1)	Needle flame test (10 s):
	- part tested
	- part tested
1.15 (13.3.2)	Glow wire test (650 °C):
	- part tested
	- part tested
1.15 (13.4.1)	Tracking test: part tested

Thank You

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