TEST REPORT

IEC 60598-2-1

Luminaires

Part 2-1: Particular requirements – Fixed general purpose luminaires

Test Report

Reference No. ..... : **12980809-SA00**

Tested by (+ signature) ..... : David Liu
ENGINEER .....

Approved by (+ signature) ..... : Rajasekar Perumanandham
PROJECT ENGINEER .....

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Contents ..... : 62 pages

Laboratory details

Name ..... : **UL International New Zealand Ltd**

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Test specification

Standard ..... : IEC 60598-2-1 : 1979, AMD1 : 1987
IEC 60598-1 : 2014, AMD1 : 2017
Including EN and AS/NZS deviations

Client details

Applicant ..... : IQ Commercial

Address ..... : 21 Honan Place, Avondale, Auckland 1026, NEW ZEALAND

Product details (see additional details on page 3)

Type of test object ..... : Fixed luminaire

Model/type reference ..... : 1018-B

Rating ..... : See marking details page 3

Accreditation details

Accreditation No. 69

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

TRF revision 190717

Possible results

Test case does not apply to the test object ..... : N(.A.)

Test sample does meet the requirement..... : P(ass)

Test sample does not meet the requirement..... : F(ail)

General remarks

"(see remark #)" refers to a remark appended to the report.

"(see appended table)" refers to a table appended to the report.

"(see appended results)" refers to results appended to the report.

The test results presented in this report relate only to the sample tested.
The test sample was provided by the client and was tested as submitted.

This report does not contain corrections or erasures.

All measurements within this test report are made using instruments with accuracy in accordance with appropriate IECEE CTL Decision Sheet. Details of specific measurement uncertainty is available upon request

In accordance with laboratory policy, a result of “COMPLIES” is recorded for any measurement not exceeding the compliance limit, irrespective of measured uncertainty.

This report shall not be reproduced except in full without the written approval of the testing laboratory.

Clause references in parentheses ( ) refer to clauses in part 1.

Specific remarks

This test report includes the EN and AS/NZS differences according to the following test specifications:

EN 60598-2-1 : 1989

EN 60598-1: 2015

AS/NZS 60598.2.1 : 2014 + A1 – A2

AS/NZS 60598.1: 2017 + A1

Statement of results

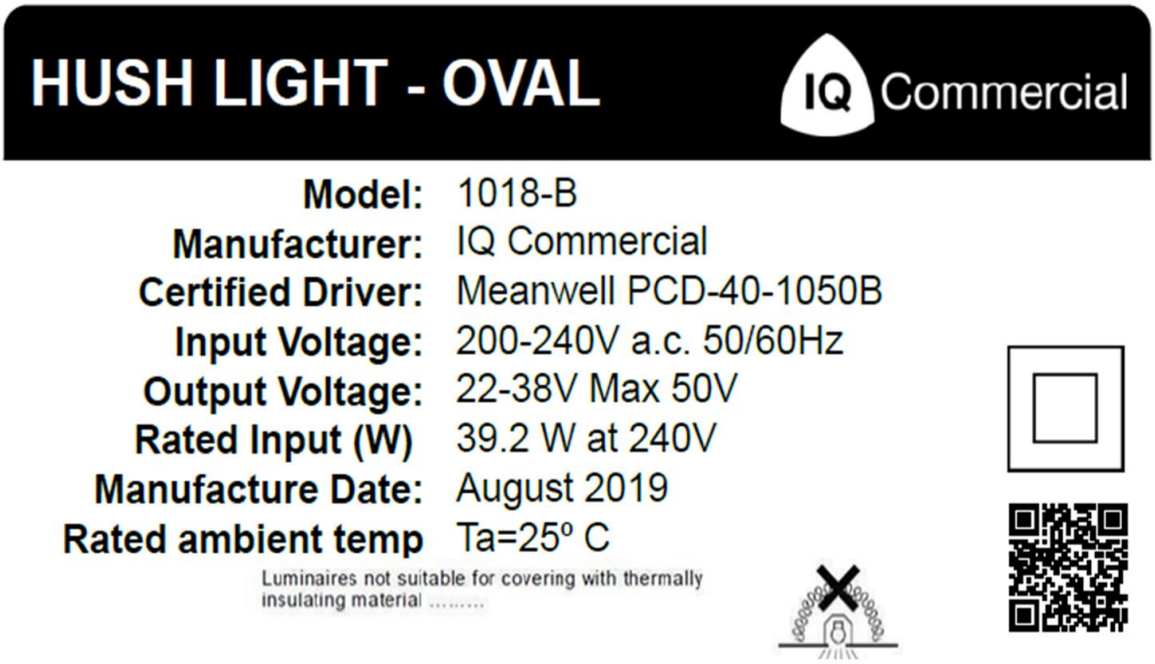
The test samples were fully assessed to all clauses of the test specification.

The test samples COMPLY with clauses of the test specification.

Product details

Enclosure type	:	thermoplastic and metal
Supply connection	:	Fixed wiring
Insulated pin plug	:	yes
Control switch	:	no
Other automatic controls	:	no
Electronic circuits	:	yes
Interconnection circuits	:	no
Product mass	:	9.5 kg
Product dimensions	:	540 mm(H) x 2000 mm(W) x 1400 mm(D)

Marking details (Representative)



IEC 60598-2-1			
Clause	Requirement – Test	Remark	Result
1.1	SCOPE		NOTED
1.2 (0.)	GENERAL TEST REQUIREMENTS		NOTED
1.3 (1.)	DEFINITIONS		NOTED
1.4 (2.)	CLASSIFICATION OF LUMINAIRE		P
(2.1)	General		NOTED
(2.2)	Classification according to type of protection against electric shock	Class II	P
(2.3)	Classification according to degree of protection against ingress of dust, solid objects and moisture		P
(2.4)	Classification according to material of supporting surface for which the luminaire is designed	suitable for direct mounting on normally flammable surfaces	P
(2.5)	Classification according to the circumstances of use	luminaire for normal use	P
4.6 (3)	MARKING		P
(3.1)	General		NOTED
(3.2)	Marking on luminaires		P
a)	Marking visible on the outside of the luminaire or behind a cover which is removed during lamp replacement and with the lamp removed		P
	Rated wattage (3.2.8)	marked	P
	Special lamps (3.2.10)		N
	Symbol for “cool beam” lamps (3.2.11)		N
	Symbol for bowl mirror lamps (3.2.15)		N
	Luminaires with glass protective shield (3.2.16)		N
	Symbol for igniters exceeding 34 V peak (3.2.18)		N
	Symbol for self-shielded lamps (3.2.19)		N
	Symbol for internal replaceable fuses (3.2.22)		N
	For luminaires with light sources that are directly visible during luminaire maintenance marked with warning symbol (3.2.23)		N
	Symbol for electric shock risk marked (3.2.24)		N
	Minimum height of the symbol is 15 mm (3.2.24)		N

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Clause	Requirement – Test	Remark	Result
b)	Marking visible during installation on the outside of the luminaire or behind a cover or part which is removed during installation		P
	Mark of origin (3.2.1)	marked	P
	Rated voltage (3.2.2)	marked	P
	Luminaires with built-in transformer or convertor marked with nominal voltage and/or current of the light source (3.2.2)		N
	Ambient temperature (3.2.3)		N
	Symbol for class II luminaires (3.2.4)	marked	P
	Symbol for class III luminaires (3.2.5)		N
	IP classification (3.2.6)		N
	Model or type reference (3.2.7)	marked	P
	Rated input power (3.2.8.2)		N
	Symbol for mounting restrictions (3.2.9)		N
	Supply terminations (3.2.12)	marked on LED driver	P
	Terminals provided for earthing in Class II luminaires marked with the letter E (3.2.12)		N
	Marking for interconnected luminaires (3.2.17)		N
	Symbol for luminaires not to be covered (3.2.21)	marked	P
	Rated input constant voltage (3.2.25)		N
	Rated input constant current and value of U_{out} (3.2.26)		N
c)	Marking visible with the luminaire assembled and installed as for normal use and with the lamp in place		P
	Symbol for distance from lighted objects (3.2.13)		N
	Symbol for rough service luminaires (3.2.14)		N
	Means of adjustment (3.2.20)		N
	Relevant symbol for suitability or non-suitability for direct mounting on normally flammable surfaces or suitability for mounting in/on normally flammable surfaces when thermally insulating material may cover the luminaire (3.2.21)		N
	For luminaire is marked for luminaires have been classified as having a threshold illuminance E_{thr} in accordance with IEC/TR 62778 and E_{thr} can be reached at a distance further than 200 mm from the luminaire. (3.2.23)		N
	For portable and handheld luminaires, warning symbol marked(3.2.23)		N

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Clause	Requirement – Test	Remark	Result
	Symbol positioned that it can be read without looking into the operating light source (3.2.23)		N
	For fixed luminaires, specified text is given in the instruction manual (3.2.23)	Instruction provided - The luminaire should be positioned so that prolonged staring into the luminaire at a distance closer than 1 m is not expected	P
	For luminaires with light sources that are directly visible during luminaire maintenance marked with warning symbol (3.2.23)		N
	Height of graphical symbols	9.6 mm	
	Height of letters and numerals	2.2 mm	
(3.3)	Additional information		P
(3.3.1)	Combination luminaires		N
(3.3.2)	Nominal frequency	50 Hz	P
(3.3.3)	Operating temperatures		N
a)	Rated maximum temperature of a winding		N
b)	Rated maximum temperature of a capacitor		N
c)	Symbol for maximum temperature of the insulation of supply cables and interconnecting cables		N
d)	Spacing requirements to be observed during installation		N
(3.3.4)	Not used		
(3.3.5)	Wiring diagram		N
(3.3.6)	Special conditions		N
(3.3.7)	Luminaires provided with metal halide lamps		N
(3.3.8)	Limitations for semi-luminaires		N
(3.3.9)	Power factor and supply current	marked on LED driver	P
(3.3.10)	Suitability for indoor use and ambient temperature		P
(3.3.11)	Luminaries using remote control gear		N
(3.3.12)	Clip-mounted luminaires – warning		N
(3.3.13)	Specifications of protective shields		N
(3.3.14)	Symbol for nature of supply		P
(3.3.15)	Rated current at rated voltage		N
(3.3.16)	Rough service luminaires		N
(3.3.17)	Luminaires with type X, Y or Z attachments		N

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Clause	Requirement – Test	Remark	Result
(3.3.18)	Luminaires other than ordinary, provided with PVC cord		N
(3.3.19)	Instructions for protective conductor current		N
(3.3.20)	Instructions for wall mounted and adjustable luminaire		N
(3.3.21)	Luminaire with non-replaceable and non-user replaceable light source instruction to be provided	non-replaceable light source	P
(3.3.22)	For controllable luminaires, classification of insulation that has been maintained between LV supply and control conductors provided.		N
(3.3.23)	Luminaire delivered without controlgear provided with the necessary information for the selection of the appropriate component		N
	Together with the highest allowed Uout value of the controlgear and the maximum Up or equivalent peak voltage Up where pulse voltage is used		N
	The classification of insulation of the external controlgear that has been maintained between LV supply and secondary output provided if there is a need for at least basic insulation.		N
	Insulation required between LV supply and output of the external controlgear.		N
	Information provided regarding to insulation.		N
(3.3.24)	Where the terminal block is not supplied with the luminaire, the packaging contains the specific wording。		P
(3.4)	Test of marking; legible and durable		P
1.6 (4)	CONSTRUCTION		P
(4.1)	General		NOTED
(4.2)	Component replacement without difficulty and without impairing safety		N
(4.3)	Wireways smooth and free from sharp edges		P
(4.4)	Lampholders		N
(4.4.1)	Integral lampholders		N
	Safety during insertion of the lamp		N
(4.4.2)	Connection of wiring to lampholder contacts gives reliable contact		N
(4.4.3)	Lampholders for end-to-end mounting		N

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Clause	Requirement – Test	Remark	Result
(4.4.4)	Lampholders put into position by the user capable of correct and easy positioning		N
	Distance between pair of fixed lampholders for fluorescent lamp complies with specified dimension		N
	Fixing of lampholders has adequate mechanical strength		N
	Compliance test as specified		N
(4.4.5)	Peak pulse voltage across lampholder not greater than marked or specified value		N
	Measured		
(4.4.6)	Centre contact of ES lampholder in luminaire with ignitor connected to lead supplying pulse voltage		N
(4.4.7)	Insulating parts of lampholders and plugs in rough service luminaires resistant to tracking		N
(4.4.8)	Lamp connectors comply with requirements for lampholders		N
(4.4.9)	Caps or bases derived for single-capped ELV lamps not used for lamps with general purpose halogen lamps with rated voltages higher than 50 V		N
(4.4.10)	It is not allowed to use a light source without its designed lampholder		N
(4.5)	Starter holders in luminaires other than class II accept starters complying with IEC 60155		N
	Class II luminaires where starter can be touched by test finger only accept starter complying with IEC 60155		N
(4.6)	Terminal blocks		P
	Luminaire provided with connecting leads; adequate space for terminal block; applicable for leads with cross-sectional area not exceeding 2.5 mm^2		P
	Conductor nominal cross-sectional areas	1.0 mm^2	
	Compliance checked by measurement and installation test		P
(4.7)	Terminals and supply connections		P
(4.7.1)	Adequate precautions to prevent metal parts from becoming live due to detached wire or screw		N
(4.7.2)	Supply terminals located or shielded such that escaped wire cannot result in contact between live parts and metal parts that can be touched with the standard test finger		N
	Compliance checked by 8 mm loose strand		N

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Clause	Requirement – Test	Remark	Result
(4.7.3)	Terminals for supply conductors suitable for connection to be made by means of screws, nuts or equally effective devices		P
(4.7.3.1)	Welding method and material		P
(4.7.4)	Terminals, other than supply connection, not covered by separate standards for components shall, comply with the requirements of section 14 or 15		P
	Terminals of lampholders, switches and similar parts used for multiple connection of internal wiring:		N
	Have dimensions adequate for the purpose; and		N
	Not used for connection of external wiring		N
(4.7.5)	External wiring or cable unsuitable for temperatures reached inside luminaire; either		N
	Connection provided at the point of entry of the external wiring into the luminaire for the use of heat-resistant wiring after this point, or		N
	Heat resistant parts supplied with luminaire to cover the parts of the wiring placed inside it		N
(4.7.6)	Electrical connections made by multi-pole plug and socket, unsafe connections shall be prevented		N
(4.8)	Switches;		N
	Adequately rated		N
	Secured against rotation		N
	Cannot be removed by hand		N
	Switches in flexible cables or cords and switched lampholders not used in lampholders other than ordinary; unless		N
	Degree of protection of switch is in accordance with classification of luminaire		N
	Luminaires for use in polarized supply and having single pole switch; switch wired into live side of the supply		N
	Electronic switches in compliance with IEC 61058-1		N
(4.9)	Insulating linings and sleeves		P
(4.9.1)	So designed that they are reliably retained in position when switches, lampholders, terminals , wires or similar parts have been mounted		P
(4.9.2)	Have adequate mechanical, electrical and thermal strength		P
	Compliance checked by electric strength test		P

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Clause	Requirement – Test	Remark	Result
(4.10)	Double and reinforced insulation		P
(4.10.1)	Metal encased class II luminaires, contact between mounting surfaces, accessible metal parts and wiring with basic insulation only, effectively prevented		N
	Class II fixed luminaires; the required degree of protection against electric shock is not impaired as a result of the installation of the luminaire		P
	Capacitors shall not be connected between live parts and the body of metal encased class II luminaires; except for		N
	Interference suppression capacitors in accordance with IEC 60384-14 having method of connection in accordance with 9.3.4 of IEC 60065		N
(4.10.2)	Assembly gap with a width greater than 0.3 mm in supplementary insulation not coincidental with any gap in basic installation		N
	Openings in reinforced insulation do not give straight access to live parts which can be touched with the conical pin of test probe 13 of IEC 61032		P
(4.10.3)	Parts of Class II luminaires which serve as supplementary insulation or reinforced insulation, fixed so that they cannot be removed without being seriously damaged, or		P
	Unable to be replaced in an incorrect position		N
(4.10.4)	Protective impedance device		N
	Accessible conductive parts separated by double or reinforced insulation bridged by resistors or Y2 capacitors provided they consist of at least two separated components of the same rated value, each rated for the total working voltage and impedance is unlikely to change significantly during the individual lifetime of the luminaire.		N
	For working voltage not exceed the rated voltage of capacitor, double or reinforced insulation from live parts may be bridged by a single Y1 capacitor.		N
	Y1 or Y2 capacitors comply with relevant requirements of IEC 60384 and		N
	Resistors used comply with the requirement of test (a) in 14.1 of IEC 60065:2001 amendment 1:2005		N
(4.11)	Electrical connections and current-carrying parts		P
(4.11.1)	Contact pressure not transmitted through insulating material other than ceramic, pure mica or other material with characteristics at least equivalent		P

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Clause	Requirement – Test	Remark	Result
(4.11.2)	Self-tapping screws not used for the connection of current-carrying parts, unless they clamp these parts directly in contact with each other		P
	Thread-tapping screws not used for the interconnection of current-carrying parts of metal which is soft or liable to creep		P
	Self-tapping screws may be used to provide earth continuity, least two screws used		N
(4.11.3)	Screws and rivets serving as electrical and mechanical connections locked against loosening		N
(4.11.4)	Current-carrying parts of copper, alloy at least 50% copper, or material having equivalent characteristics		P
	Current-carrying parts resistant to, or adequately protected against corrosion		P
(4.11.5)	Current-carrying parts not in contact with wood		P
(4.11.6)	Electro-mechanical contact systems withstand the electrical stresses occurring in normal use		N
	Compliance checked by 100 operations, voltage drop across each contact not exceeding 50 mV		N
	Maximum voltage drops		
(4.12)	Screws and connections (mechanical) and glands		P
(4.12.1)	Withstand mechanical stresses occurring in normal use		N
	Screw not of soft metal or material liable to creep		N
	Screws operated for maintenance not of insulating material, if their replacement by a metal screw could impair supplementary or reinforced insulation		N
	Test of screws		N
(4.12.2)	Screws transmitting contact pressure, which are operated when mounting or connecting the luminaires and having nominal diameter less than 3mm, screw into metal		N
(4.12.3)	Not used		
(4.12.4)	Screws and other fixed connections between different parts of luminaires do not work loose through such torsion, bending stresses, vibration, etc		N
	Fixed arms and suspension tubes shall be securely attached		N
	Fixed arms; torque (Nm)		N
	Lampholder; torque (Nm)		N
	Push-button switches; torque (Nm)		N

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Clause	Requirement – Test	Remark	Result
(4.12.5)	Screwed glands; fitted with a cylindrical metal rod, tightened by a suitable spanner by a force in table 4.2 applied for one minute at a point 250 mm from the axis of the gland		P
	Luminaire and glands show no damage		P
(4.13)	Mechanical strength		P
(4.13.1)	Luminaire has adequate mechanical strength and is constructed as to withstand rough handling	0.5 Nm	P
	No damage after three blows applied to various parts of the enclosure, impact energy as specified		P
(4.13.2)	Metal parts enclosing live parts shall have adequate mechanical strength		N
(4.13.3)	Straight test finger with a force of 30 N, pressed against the surface		N
	Metal part of test finger does not touch live parts		N
(4.13.4)	Rough service luminaires; ingress protection of at least IP54		N
	Fixation means of stand to which luminaire is connected has adequate mechanical strength		N
a)	Fixed and portable luminaires; impact tests as specified		N
b)	Hand-held luminaires; drop test as specified		N
c)	Luminaires delivered with stand; do not overturn at 6° and withstand specified tests		N
d)	Luminaires for temporary installations and suitable for mounting on a stand; impact tests as specified		N
(4.13.5)	Not used		
(4.13.6)	Plug-ballast/transformers and mains socket-outlet-mounted luminaires have adequate mechanical strength		N
	No damage after tumbling barrel test		N
	Number of falls		
(4.14)	Suspensions and adjusting devices		P
(4.14.1)	Mechanical suspensions have adequate factors of safety		P
	Test A, for suspend or fixed luminaires and other external parts held by the luminaire		P
	Suspended or fixed luminaires tested with four times the weight of the luminaire in addition to its weight in the normal direction for 1 hour		P

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Clause	Requirement – Test	Remark	Result
	Weight added	40 kg	
	External parts fixed to the luminaire, test with four times the weight of the parts being held, in addition to its weight in the normal direction for 1 hour		N
	This test can be exempt if this is obvious from available information and by visual inspection		N
	Weight added		
	Test B, for rigid suspension luminaires		P
	Torque of 2.5 Nm applied for 1 minute to luminaire for a period of 1 min, first in a clockwise and then in anticlockwise direction		P
	Not possible to rotate luminaire relative to the fixed part by more than one revolution in either direction		P
	Test C, for rigid suspension brackets		N
a)	Heavy duty brackets, force of 40 N applied for 1 min, in various direction at the free end, bracket arm not permanently displaced or deformed		N
b)	Light-duty brackets, force of 10 N applied for 1 min, in various direction at the free end, bracket arm not permanently displaced or deformed		N
	Test D, for track-mounted luminaires		N
	Mass of luminaire not exceeding value of maximum loading for which suspension devices are suitable		N
	Test A, for clip-mounted luminaires		N
	Pull force applied on the cable for 1 minute. Mounted on standard test shelves made of ordinary window glass. No movement on glass at a pull of 20 N		N
	Test on metal sheet rod having polished chromium plated finish. Luminaire does shall not rotate under its own weight, does not fall off at a pull of 20 N		N
	Any damage to the mounting surface is not a failure		N
(4.14.2)	Mass of luminaire suspended by flexible cables or cord not exceeding 5 kg per flexible cable or cord		N
	Stress in the conductors does not exceed 15 N/mm^2		N
	Total nominal cross-sectional area of the conductor		
	Total weight of the luminaire		
	Stress in the conductors		
	Mounting instruction state all necessary information to prevent overloading of any cable or cord		N

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Clause	Requirement – Test	Remark	Result
	Luminaries mass exceeds 5 kg per flexible cable or cord intended to be suspended, design of the luminaire or design of the luminaire or flexible cable or cord shall prevent any tension being applied to the conductor		N
	Semi-luminaires for connection to Edison screw or bayonet lampholder, mass and bending moment not exceeding the values in table 4.4		N
	Mass limit		
	Mass measured		N
	Bending moment limit		
	Bending moment measured		N
(4.14.3) a)	Adjusting devices constructed that cords, cables are not pressed, clamped, damaged or twisted along the longitudinal axis by more than 360º		N
	Rotating test; number of cycles		N
	Strands broken		N
	High voltage test		N
b)	Luminaires with a means of adjustment intended to be installed within arm's reach, allow the operation of its intended function without impairing the stability or		N
	the luminaire or causing deformation of any part of the construction, nor		N
	Cause injury due to temperature above Table 12.1. temperature measured in 12.4		N
c)	For luminaires intended to be mounted within arm's reach, spaces 5 cm away from the means of adjustment in any direction, except the light beam aperture, comply with temperature specified in Table 12.1.		N
	Means of adjustment which are lit after the positioning of the luminaire light beam aperture also comply with Table 12.1		N
(4.14.4)	Cords or cables passing through telescopic tubes not fixed to the outer tube		N
(4.14.5)	Guide pulleys for flexible cords dimensioned to prevent damage to the cords by excessive bending.		N
	Grooves in pulleys well rounded		N
	Accessible metal pullets except of SELV supplied luminaires shall be earthed		N

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Clause	Requirement – Test	Remark	Result
(4.14.6)	Plug-ballast/transformers and main socket-outlet-mounted luminaires do not impose undue strain on socket outlets		N
	Plug-ballast/transformers provided with 1 m cable supplying the luminaire in question or a cable specified by the manufacturer.		N
	Cable length		
	Cable hanging freely during the test		N
	Torque applied to socket outlet shall not exceed 0.25 Nm		N
	Measured torque		
	Torque applied to socket outlet by adjustable luminaire shall not exceed 0.5 Nm		N
	Measured torque		
(4.15)	Flammable materials		P
(4.15.1)	Covers, shades and similar parts not having an insulation function, glow-wire test at 650°C; or	(see appended result)	P
	Adequately spaced from heated parts of luminaire:		N
	Spacing from heated parts at least 30 mm; unless		N
	Material protected by a screen spaced at least 3 mm from heated parts		N
	Screen withstands the needle flame-test of 13.3.1		N
	Fiercely burning materials not used		P
(4.15.2)	Luminaires made of thermoplastic material withstand temperature rise due to fault conditions; compliance by one of the following measures:		P
a)	Constructive measures ensuring that components are kept in place and luminaire parts not overheated		P
b)	Use of temperature sensing control		N
c)	Thermoplastic materials suitable for maximum surface temperature permitted by use of thermally protected ballasts		N
(4.16)	Luminaires for mounting on normally flammable surfaces, comply with one of the following requirements, unless		P
	Transformer supplied within an enclosure of its own		N
	Shaver transformer and shaver units complying with IEC 61558-2-5, 4.16.1 apply.		N
	Electronic lamp control gear and small wound devices exempt from the requirements of this clause.		P
	Luminaire do not contain lamp control gear, requirement met by compliance with Section 12.		N

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Clause	Requirement – Test	Remark	Result
(4.16.1)	Lamp control gear spaced from mounting surface by minimum distance		N
	Minimum distance		
	Distance measured		
(4.16.2)	Temperature sensing control incorporated to limit the temperature of the mounting surface of the luminaire		N
(4.16.3)	Luminaire does not comply with 4.16.1 and 4.16.2 , designed that it satisfies 12.6		N
(4.17)	Drain holes designed that water drains out effectively		N
(4.18)	Resistance to corrosion		N
(4.18.1)	Ferrous parts adequately protected against rusting		N
	Compliance by specified test		N
(4.18.2)	Copper and copper alloy free from stress corrosion		N
(4.18.3)	Aluminium and aluminium alloy resistant to corrosion		N
(4.19)	Igniters electrically compatible with associated ballast		N
(4.20)	Rough service luminaires adequately resistance to vibration		N
(4.21)	Protective shield (tungsten halogen lamps)		N
(4.21.1)	Luminaries incorporating tungsten halogen lamp, and luminaires designed for metal halide lamp fitted with a protective shield		N
	Self-shielded lamp and symbol		N
	Glass shield for tungsten halogen lamp and symbol		N
(4.21.2)	Particles from shattering lamp do not impair safety		N
(4.21.3)	Openings in luminaire designed that no shattered glass leaves the luminaire by a direct path		N
(4.21.4)	Protective shield complies with the impact test of 4.13.1		N
	Parts of insulating material comply with 13.3.2		N
(4.22)	Luminaries not incorporating attachments which cause overheating or damage to lamps, caps or holders		P
	Attachments to fluorescent lamps allowed if supplied or approved by manufacturer		N
	Total weight of lamp and attachment shall not exceed 200 g for G5, 500g for G13 caps		N
	Total weight		
(4.23)	Semi-luminaires comply with requirements for class II luminaires		N

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Clause	Requirement – Test	Remark	Result
(4.24)	Luminaire does not emit excessive UV radiation		P
(4.24.1)	UV radiation		P
(4.24.2)	Retinal blue light hazard		P
	Luminaires with light sources that not excluded the lamp from retinal blue light hazard assessment, assessed according to IEC/TR 62778		P
	Use of light sources with greater than RG2 rating are not expected		P
	Additional requirements apply for the management of these types of light sources:		N
	No requirements for RG0 unlimited and RG1 unlimited rated lamps.		N
	Luminaires having threshold illuminance E_{thr} assessed in accordance to IEC/TR 62778 the following requirements apply		P
a)	For fix mounted luminaires, additional assessment made to find the distance between luminaire and the borderline between RG2 and RG1. And marked according to 3.2.23		P
b)	Portable and handheld luminaires exceeding RG1 at 200 mm are marked according to 3.2.23.		N
	Protable luminaires for children, covered by and mains socket-outlet nightlights do not exceed RG1 at 200 mm.		N
(4.25)	No sharp point or edges which cause a hazard to the user		P
(4.26)	Short-circuit protection:		N
(4.26.1)	Adequate means to prevent impairing of safety due to unintended short-circuiting of uninsulated accessible SELV parts of opposite polarity		N
(4.26.2)	Type test sample operated at 0.9, 1.1 times rated voltage with nominal load. Test chain hung over accessible uninsulated SELV parts.		N
	Test voltage		N
	Test chain does not melt through, nor any part exceed a temperature given in table 12.1and 12.2		N
(4.26.3)	Test chain		NOTED
(4.27)	Terminals blocks with integrated screwless earthing contacts		N
	Mounted in accordance with requirements specified by the manufacturer with reference to Annex V		N

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Clause	Requirement – Test	Remark	Result
(4.28)	Fixing of thermal sensing control		N
	Temperature sensing control external to t lamp control gear not of plug-in or any easily replaceable type, and		N
	It is Kept in its specified position with regard to the control gear.		N
	Adhesive fixing of temperature sensing controls not used where UV radiation emitted, and		N
	It is not mounted outside of the luminaire enclosure		N
	Transformers complying with IEC 61558 (series) do not subject to this test.		N
	Temperature sensing control, together with the ballast/transformer is subjected to the temperature change test in IEC 60068-2-14, test Na		N
	Subjected to 100 cycles between the minimum and the maximum temperature values		N
	Maximum temperature is measured on the adhesive material when the ballast/transformer is loaded by a current equal to 0.95 times the value of the lowest current that causes the protect device to operate in steady state conditions.		N
	Maximum temperature obtained:		N
	Minimum test temperature is 0 °C		N
	Expose duration is 30 min each		N
	Standard transfer time is between 2 min and 3 min.		N
	Transfer time (t2) less than 30 s is allowed, if an automatic test system is used		N
	During the test, the temperature sensing control do not undergo any change in fixing impairing its further us, especially with respect to its operating temperature		N
	After the test, the temperature sensing control do not detached /moved from its designed position.		N
(4.29)	Luminaire with non-replaceable light source		P
	It is not possible to replace and/or to give access to live parts without breaking the luminaire or its parts.		P
	Parts giving access to the light source which is possible to open by hand or by using a tool opened or dismantled.		P
	Parts that sealed, or glued, or fixed by screws are designed and shaped to be used only once, or permanently embedded barriers, are not opened.		P

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Clause	Requirement – Test	Remark	Result
	After removing all parts above, not possible to access live parts according to section 8		P
(4.30)	Luminaires with non-user replaceable light sources		N
	Protect cover is used and marked with symbol detailed by 3.2.24.		N
	Cover live the place during the tests and inspection detailed by section 8		N
	Cover held securely in position by at least two independent fixings that each requiring tool for removal.		N
(4.31)	Insulation between circuits		P
	luminaires with transformers or control gears providing insulation between circuits and using circuits insulated from a LV supply, provided with suitable insulation between circuits and		P
	between these circuits and external accessible conductive parts		P
	Requirements apply to the circuits connected to the control terminals of a controllable luminaire where it is required to maintain the same level of simulation for all components.		N
	Information given by the controlgear manufacturer taken into account.		N
(4.31.1)	SELV circuits		P
	Sources of supply for SELV circuits	controlgear providing SELV	
	Voltage in the circuit not higher than ELV		P
	Voltage in the circuit	50 V d.c max	P
	SELV insulated from LV supply by double or reinforced insulation		P
	SELV insulated from FELV circuit by supplementary insulation		N
	SELV insulated from other SELV circuit by basic insulation		N
	SELV insulated from all other circuits by double or reinforced insulation.		N
	SELV insulated from accessible conductive parts by insulation according to Table X.1		N
	Insulation type:		N
	For SELV system, plugs not able to enter socket-outlets of other voltage systems, and		N
	Socket-outlets not admit plugs for other voltage systems, and		N
	Plugs and socket-outlets do not have a protective conductor contact.		N

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Clause	Requirement – Test	Remark	Result
(4.31.2)	FELV circuits		N
(4.31.3)	Other circuits		N
(4.32)	Overvoltage protective devices		N
1.7 (11)	CREEPAGE DISTANCES AND CLEARANCES		P
(11.1)	General		NOTED
(11.2)	Creepage distances and clearances		P
	Parts detailed in Annex M adequately spaced	(see appended table)	P
	SELV parts adequately spaced		P
	Creepage distances and clearances not less than the values given in table 11.1.A, 11.1.B and 11.2 as appropriate	(see appended table)	P
	Distances between current –carrying parts of opposite polarity shall comply with the requirements for basic insulation		P
	Compliance checked by measurement		P
1.8 (7.)	PROVISION FOR EARTHING		N
1.9 (14), (15)	TERMINALS		P
(14.)	Screw terminals		N
(15.)	Screwless terminals and electrical connections		P
(15.1)	General		P
(15.2)	Terms and definitions		P
(15.3)	General requirements		P
(15.3.1)	Parts of terminal or connections for carrying current shall be made of one of the following materials		P
	Copper;		P
	Alloy containing at least 58% copper for parts that are worked cold or 50% copper for other parts;		P
	Metal no less resistant to corrosion than copper and having mechanical properties no less suitable		N
(15.3.2)	Terminals and connections clamp the conductor with sufficient pressure and without undue damage to the conductor		N
	Conductors clamped between metal surfaces, however;		N

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Clause	Requirement – Test	Remark	Result
	Terminals for circuits having a rated current not exceeding 2A may have one non-metallic surface if the requirements of 15.3.5 are met		N
	Insulation piercing terminals are acceptable only if used in the SELV circuits of luminaires, or;		N
	As permanent, non-rewireable connections in other luminaires		N
(15.3.3)	Terminals designed that when conductor is adequately inserted into terminal, further insertion of its end is prevented by a stop		N
(15.3.4)	Terminals other than lead assemblies accept non-prepared conductors		N
(15.3.5)	Electrical connections designed that pressure essential for good electrical conductivity, not transmitted through material other than ceramic, pure mica or other material with characteristics no less suitable , unless;		P
	There is sufficient resilience in the metallic parts to compensate for possible shrinking of the insulating material		N
(15.3.6)	Clear in which way the connection of the conductor to, and disconnection from, spring-type non-permanent screwless terminals is affected		N
	Disconnection of conductor requires an operation other than a pull of the conductor,		N
	Disconnection can be made by hand or with the aid of a simple generally available device		N
(15.3.7)	Terminals for connection to several conductors under spring clamps clamp each conductor independently		N
	Terminals designed for non-permanent connections, possible to withdraw the conductors together or separately		N
(15.3.8)	Terminals suitably fixed to equipment or terminal block or otherwise fixed in position, do not work loose when conductors are inserted or withdrawn		P
(15.3.9)	Withstand the mechanical, electrical and thermal stresses		P
(15.3.10)	Manufacturer shall state conductor size or sizes for which the component is designed and type of conductor		N
(15.4)	General instructions on tests		P
(15.4.1)	Preparation of samples		N

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Clause	Requirement – Test	Remark	Result
(15.4.2)	Test conductors	Conductor supplied with terminal	N
(15.4.3)	Multi-conductor terminals		N
(15.4.4)	Multi-way terminals		N
(15.4.5)	Test quantities		P
(15.5)	Terminal and connections for internal wiring	LED module connector only	P
(15.5.1)	Mechanical tests		P
(15.5.1.1)	Non-permanent connections		P
(15.5.1.1.1)	Pull test spring-type terminals		N
(15.5.1.1.2)	Pull test pin or tab terminals	4 N	P
	Insertion force not exceeding 50 N	12 N	P
(15.5.1.2)	Permanent connections: pull-off test (20 N)		N
(15.5.2)	Electrical tests		P
	Terminals and connections have adequate electrical performance		P
(15.6.1)	Contact resistance test, check on a set of four terminals, for every type of terminal contained in the luminaire		P
(15.5.2.1.1)	Spring-type terminals, tested according to 15.5.2.1.3, on a set of four solid non-insulated conductors		N
	If a range of conductors is specified, two terminals are tested with the conductors having the smallest cross-sectional area and two remaining terminals with conductors having the largest cross sectional area		N
(15.5.2.1.2)	Pin or tab and receptacle type terminals, test of 15.5.2.1.3 made with lead assemblies	(see appended table)	P
(15.5.2.1.3)	Each terminal and conductor loaded with test current (a.c. or d.c.), after 1 hour voltage drop across the terminal is measured	2 A	P
	Voltage drop does not exceed 15 mV		P
(15.5.2.2)	Heating tests		P
(15.5.2.2.1)	Terminal rated current up to and including 6A are subjected to an ageing test, without current, of 25 cycles duration, each cycle comprising 30 min at a temperature of T ± 5°C or 100°C ± 5°C , followed by a cooling down period to a temperature 15°C and 30°C		P
	Terminals with rated current exceeding 6 A subjected to an ageing test of 100 such cycles		N

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Clause	Requirement – Test	Remark	Result
(15.5.2.2.2)	Voltage drop measured on each terminal		P
	a) After the 10th and 25th cycle for terminals rated up to and including 6 A;	(see appended table)	P
	b) After the 50th and 100th cycles for terminals with rated current greater than 6 A;		N
	Voltage drop does not exceed by more than 50% the voltage drop measured on the same terminal tested under 15.6.1, or the increase in voltage is less than 2 mV, the terminals comply with the requirements		P
	Voltage drop exceeds 22,5 mV the terminal are rejected		N
	Voltage drop measured under a) b) exceeds more than 50%, with a minimum of 2mV, voltage drop measured on the same terminal under 15.6.1 but does not exceed 22,5mV, the four terminals are subjected to a new aging test, according to current rating, of 25 cycles or 100 cycles duration without current		N
	After the 10th and 25th and 100th cycle , voltage drops are measured, for any terminal voltage drop does not exceed 22,5mV	(see appended table)	P
	Total voltage drops of two inseparable joints, when measures together, do not exceed twice the values given in this subclause		N
(15.5.2.2.3)	Terminals designed that the conductor is tightened against a surface of insulating material, surface not deformed during these heating tests		N
(15.6)	Terminals and connections for external wiring		N
(15.6.1)	Conductors;		N
	Spring terminals suitable for the connection of rigid conductors, solid or stranded, with nominal cross-sectional areas given in table 15.1		N
(15.6.2)	Mechanical tests;		N
	Terminal and connections have adequate mechanical strength		N
(15.6.2.1)	Pull test spring-type terminals (4 samples); pull (N)		N
(15.6.2.2)	Pin, tab and receptacle type connections also subjected to pull test according to table 15.2		N
	Pull applied without jerks for 1 min		N
	Pull force		

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Clause	Requirement – Test	Remark	Result
	During the test conductor or lead assembly shall not move out from the terminal and neither the terminal nor the conductor or lead assembly shall undergo any alteration impairing its further use		N
(15.6.3)	Electrical tests		N
	Terminals and connections have adequate electrical performance		N
(15.6.3.1)	Contact resistance		N
	Electrical performance of terminals checked on a set of 10 terminals, of every type contained in the luminaire		N
(15.6.3.1.1)	Spring-type terminal tested according to 15.9.1.3 made with 10 copper non-insulated conductors		N
	Five conductors having the largest cross-sectional areas specified in clause 15.7		N
	Five conductors having the smallest cross-sectional areas specified in clause 15.7		N
(15.6.3.1.2)	Pin or tab and receptacle type terminals, tested according to 15.9.1.3 made with lead assemblies		N
(15.6.3.1.3)	Each terminal loaded with the test current (a.c. or d.c), after 1 hour the voltage drop across the terminal is measured		N
	Measured voltage drop does not exceed 15mV		N
	Total voltage drop of two inseparable joints when measured together, does not exceed twice the value given in this subclause		N
(15.6.3.2)	Heating tests;		N
	Thermal performance of terminals is checked on the terminals subjected to the test of 15.9.1		N
(15.6.3.2.1)	After cooling down to ambient temperature, each conductor replaced by a new copper non-insulated conductor having the largest cross-sectional area specified in Clause 15.7		N
	Each lead assembly replaced by a new appropriate lead assembly connected to, and withdrawn from the connection five times		N
	Conductors replaced by new lead non-insulated conductors		N
(15.6.3.2.2)	Each terminal loaded with the test current (a.c or d.c) for a time sufficient for the voltage drop to be measured		N

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Clause	Requirement – Test	Remark	Result
(15.6.3.2.3)	Terminal rated current up to and including 6A are subjected to an ageing test, without current, of 25 cycles duration, each cycle comprising 30 min at a temperature of T ± 5°C or 100°C ± 5°C , followed by a cooling down period to a temperature 15°C and 30°C		N
	Terminals with rated current exceeding 6 A subjected to an ageing test of 100 such cycles		N
(15.9.3.2.4)	Voltage drop measured on each terminal		N
	a) After the 10th and 25th cycle for terminals rated up to and including 6 A;		N
	b) After the 50th and 100th cycles for terminals with rated current greater than 6 A;		N
	Voltage drop does not exceed by more than 50% the voltage drop measured on the same terminal tested under 15.6.1, or the increase in voltage is less than 2 mV, the terminals comply with the requirements		N
	Voltage drop exceeds 22,5mV the terminal are rejected		N
	Voltage drop measured under a) b) exceeds more than 50%, with a minimum of 2mV, voltage drop measured on the same terminal under 15.6.1 but does not exceed 22,5mV, the four terminals are subjected to a new aging test, according to current rating, of 25 cycles or 100 cycles duration without current		N
	After the 10th and 25th and 100th cycle , voltage drops are measured, for any terminal voltage drop does not exceed 22,5mV		N
	Total voltage drop of two inseparable joints, when measures together, do not exceed twice the values given in this subclause		N
(15.6.3.2.5)	Terminal designed that the conductor is tightened against a surface of insulating material, the surface does not become deformed during these heating tests		N
1.10 (5)	EXTERNAL AND INTERNAL WIRING		P
(5.1)	General		NOTED
(5.2)	Supply connection and other external wiring		P
(5.2.1)	Luminaires provided with means of connection as specified		P

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Clause	Requirement – Test	Remark	Result
a)	Fixed luminaires		P
	Means of connection	Connection lead	
	For fixed luminaire with connecting leads (tails), specified details are provided.		P
	Details provided	Provided in installation instruction	
b)	Portable luminaire with supply cords; with plugs; appliance inlets only.		N
c)	Track-mounted luminaires with adaptors or connectors only		N
d)	Semi-luminaires with Edison screw or bayonet cap only.		N
	Portable luminaires intended for wall mounting and incorporating a junction box and cord anchorage may be delivered without a supply cord, if instruction for mounting are enclosed with the luminaire.		N
	Luminaires declared suitable for outdoor use not provided with PVC insulated external wiring		N
	This requirement is not applicable to Class III or SELV circuits and		N
	Not applicable to external wiring that is protected from the outdoor environment by other means		N
(5.2.2)	Flexible cables or cords		N
	Fitting type		N
	Cord type		N
	Unsheathed basic insulated conductors subjected to the electric strength test specified in Section 10 of SELV (500 V)		N
	To provide adequate mechanical strength, nominal cross-sectional area of conductors not less than specified in Table 5.3		N
	Condition		
	Fitting type		
	Cross-section area required		
	Cross-section area provided		
	Luminaire provided with a 10/16A socket-outlet; flexible conductor nominal cross-sectional area at least 1.5 mm²		N

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Clause	Requirement – Test	Remark	Result
	Class III luminaires or SELV circuits in luminaires, or those used for SELV connections between parts of other luminaire types, having maximum rated current not exceeding 2 A, have a cross-sectional area of less than 0.75 mm2 or 1.0 mm2 but no less than 0.4 mm2. if		N
	current carrying capacity and mechanical properties are adequate.		N
	Cables provided with two or more conductors may have a cross sectional area of each conductor of minimum 0.2 mm2 , if		N
	The cable can withstand the normal and short circuit current provided by the associated control gear.		N
(5.2.3)	Non-detachable cord provided with luminaire; connection means as specified		N
(5.2.4)	Compliance with 5.2.1 to 5.2.3 checked by inspection and by fitting appropriate cable or cord		P
(5.2.5)	Terminations within luminaires having type Z attachment not made by screw connections		N
(5.2.6)	Cable entries:		N
	Suitable for introduction of conduit or protective covering of cable or flexible cord		N
	Provide degree of protection in accordance with classification of the luminaire		N
(5.2.7)	Cable entries through rigid material have rounded edges of minimum radius 0.5 mm		N
(5.2.8)	Opening in metal parts provided with bushing of insulating material having smoothly rounded edges		N
	Bushing cannot easily be removed		N
	Bushing of material likely to deteriorate not used in openings with sharp edges		N
	Tubes or guards made of insulating material		N
	Helical metal springs and similar not guards		N
(5.2.9)	Bushings which screw into luminaire locked in position		N
	Bushings fixed with adhesive, of self-hardening resin type		N
(5.2.10)	Luminaires with a non-detachable flexible cable or cord provided with cord anchorage such that conductors are relieved from strain		N
	Covering protected from abrasion		N

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Clause	Requirement – Test	Remark	Result
	Clear how relief from strain and prevention of twisting is intended		N
	Not possible to push the flexible cable or cord into the luminaire		N
	No tying of cables or cord into knots etc.		N
	Cord anchorage made of insulating material or provided with fixed lining		N
(5.2.10.1)	Cord anchorage for type X attachment cord constructed and located that:		N
a)	At least one part fixed to, or integral with, luminaire		N
b)	Suitable for different types of flexible cord or cable appropriate for the luminaire; except where		N
	Luminaire allows only on type of cord to be fitted		N
c)	Do not damage cord; and		N
	Unlikely to be damaged when tightened or loosened in normal use		N
d)	Whole flexible cord is capable of being mounted into the cord anchorage		N
e)	Cord does not touch clamping screws if of metal and accessible or connected to accessible parts		N
f)	Cord not clamped by metal screw which bears directly on the cord		N
g)	Replacement of the cord does not require the use of a special tool		N
(5.2.10.2)	Cord anchorages for type Y and Z are adequate		N
(5.2.10.3)	Test of cord anchorage		N
	Pull force		
	Applied torque		
	Displacement of the cord not exceeding 2 mm		N
	No movement of conductors in terminals		N
	No damage of cable or cord		N
(5.2.11)	External wiring passing into luminaire complies with requirements for internal wiring		N
(5.2.12)	Fixed luminaires for looping-in provided with terminals intended for maintaining the electrical continuity of the supply cable, but not terminating		N
(5.2.13)	Ends of flexible stranded conductors may be tinned, not having additional solder applied		N
(5.2.14)	Mains plug has same degree of protection as the luminaire		N

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Clause	Requirement – Test	Remark	Result
	Instructions for connection to the supply ensuring an equivalent degree of protection against harmful ingress of dust and moisture for some countries		N
	Class III luminaires		N
	Class III luminaire not provided with a plug which permits connection with a socket-outlet according to IEC 60083		N
	There is no unsafe compatibility between couplers for Class II and Class III systems and national domestic plug and socket-outlet systems.		N
	Plugs and sockets for class III luminaire delivered with transformer; requirements as specified		N
	Plugs do not able to enter socket-outlets of other voltage systems		N
	Sockets-outlets do not admit plugs of other voltage systems		N
	Socket-outlets do not have the protective earth contact		N
(5.2.15)	Not used		
(5.2.16)	Appliance inlets incorporated into luminaires as the means of connection to the supply, comply with the requirements of IEC 60320		N
	Looping-in of luminaires achieved by appliance couplers		N
	Class II appliance couplers do not accept class I type plugs, or achieved using screw or screwless terminals		N
(5.2.17)	Interconnecting cables made of standardized insulated and sheathed cables; or		N
	Defined assembly made by the manufacturer of wiring within sleeve or tube		N
(5.2.18)	Portable luminaire or luminaire intended to be connected to supply via a socket-outlet; fitted with plug in accordance with IEC 60083 or regional standards; appropriate to luminaire classification		N
(5.3)	Internal wiring		P
(5.3.1)	Internal wiring made with conductors of suitable size and type		P
	Insulation capable of withstanding voltage and temperature to which it is subjected		P
	Wires coloured green and yellow used for earth connections only		N
	Compliance checked by inspection and specified test		P

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Clause	Requirement – Test	Remark	Result
(5.3.1.1)	For wiring including connecting lead directly connected to fixed wiring and where disconnection from the mains is relied upon by external protection device(s);		P
	Normal operating current 2 A and higher;		N
	Nominal cross-sections not less than 0.5 mm² (1.5 mm² for through-wiring of fixed luminaires)		N
	Minimum nominal cross-section		
	Minimum insulation thickness of 0.6 mm		N
	Minimum insulation thickness		
	Mechanical protected wiring with normal operating current lower than 2 A;		P
	Nominal cross-sections not less than 0.4 mm²		P
	Minimum nominal cross-section	(see appended table)	
	Minimum insulation thickness of 0.5 mm		P
	Minimum insulation thickness	(see appended table)	
	Mechanical protection adequate where extra insulation is added to places where wire insulation may be damaged		N
(5.3.1.2)	Wiring connected to fixed wiring via internal current-limiting device (2 A max.);		P
	Minimum cross-section may be less than 0.4 mm²; if overheating of the wire conductor insulation is prevented under normal and short circuit operating conditions in accordance with the tests of 5.4		P
	Minimum insulation thickness may be less than 0.5 mm; selected in relation to voltage stress		P
	The current limit rating of the protection device proven characteristic of the device used.		P
(5.3.1.3)	Class II luminaires; live conductors touching accessible metal parts comply with requirements for double or reinforced insulation		N
(5.3.1.4)	Conductors without insulation used; adequate precautions to ensure adherence to creepage distance and clearance requirements etc		N
(5.3.1.5)	SELV current carrying parts not insulated; or		N
	Insulation tested in accordance with section 10		P
(5.3.1.6)	Insulation materials with properties higher than PVC or rubber; insulation thickness selected to give same degree of protection		N
(5.3.2)	Internal wiring situated or protected to prevent damage from sharp edges or moving parts		P
	Wiring not twisted along longitudinal axis through angle exceeding 360°		P
(5.3.3)	Opening in metal parts provided with bushing of insulating material having smoothly rounded edges		P
	Bushing cannot easily be removed		P

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Clause	Requirement – Test	Remark	Result
	Bushing of material likely to deteriorate not used in openings with sharp edges		P
	Cable entry with smoothly rounded edges and wiring not moved in service; protective sheath acceptable		P
(5.3.4)	Joints and junctions provided with insulating covering		N
(5.3.5)	Internal wiring passing out of luminaire and subject to strain; requirements for external wiring apply		P
(5.3.6)	Wire in adjustable luminaires fixed by wire carriers, clips or similar parts of insulating material where rubbing against metal parts occur		N
(5.3.7)	Ends of flexible stranded conductors tinned not having additional solder applied unless,		P
	Means provided to ensure clamped connections cannot work loose, due to cold solder flow		P
(5.4)	Test to determine suitability of conductors having a reduced cross-sectional area		N
	Under test the temperature of the luminaire wiring insulation not exceed the limits stated in Table 12.2		N
	No damage to luminaire wiring after test		N
1.11 (8)	PROTECTION AGAINST ELECTRIC SHOCK		P
	Parts of luminaire and components within the ceiling space provide same degree of protection against electric shock as luminaire parts below the ceiling space		P
(8.1)	General		NOTED
(8.2)	Protection against electric shock		P
(8.2.1)	Live parts not accessible when mounted, wired as in normal use and when replacing lamps or starters		P
	Basic insulated parts not used on outer surface of luminaire without protection against accidental contact		N
	Protective cover is used over a non-user replaceable light source in accordance with Clause 4.30 left in place during the test and inspections.		N
	Live parts not accessible with standard test finger when the luminaire has been installed and/or assembled for normal use		P
	For portable luminaires and adjustable luminaires, no access to basic insulated parts with the standard test finger		N
	For wall-mounted luminaires, within arm's reach, no access to basic insulated parts from the outside of the luminaire by means of a Ø 50 mm probe according to Figure 1 in IEC 61032.		N

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Clause	Requirement – Test	Remark	Result
	Lampholders and starter holders comply with double or reinforced insulation if accessible or in portable or adjustable luminaires.		N
	Basic insulation may be accessible when the luminaire is opened for lamp or starter replacement.		N
	Build-in component used on the outside of a fully assembled luminaire that can be touch be the 50 mm sphere, comply with the relevant requirements applied to an independent component.		N
	Protection against electric shock maintained for all methods and positions; and		P
	After removal of all parts which can be removed by hand except lamps and specified parts of lampholders		P
	Covers in fixed luminaires that cannot be removed by a single action are not removed		P
	Covers which have to be removed for changing lamps or starters removed		N
	Conductors held by screwless terminals with push-button release not removed		N
	Luminaires intended for lamps having cap/base at each end incorporate automatic double-pole disconnection when lamp is changed; unless		N
	Relevant cap and holder combination covered by standard(s) which incorporate special requirements with regard to accessibility of live parts		N
	Lacquer, enamel, paper and similar not relied upon to give required protection against electric shock or short-circuit		P
	Luminaires with ignitors intended for double ended high pressure discharge lamps tested according to figure 26		N
	Voltage exceeds 34V (peak), ignitor only active if lamp is fully inserted, or		N
	Warning label according to 3.2.18 a) or b) fitted to the luminaire		N
(8.2.2)	Protection for portable luminaires maintained after movable parts of luminaire been placed in the most unfavourable position, which is affected by hand		N
(8.2.3) a)	Metal parts of class II luminaires insulated from live parts by basic insulation are live for the section		P
	Does not apply to the non-current carrying parts of caps which comply with their relevant IEC safety standard		N
	For class II luminaires, glass bowls and other protective glasses not be used as supplementary insulation		P

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Clause	Requirement – Test	Remark	Result
b)	For class I luminaires, metal lamp holders for bayonet cap lamps are earthed		N
c)	SELV circuits may having exposed current carrying parts under following conditions		N
	For ordinary luminaires the voltage under load do not exceed 25 V r.m.s. or 60 V ripple-free d.c. and		N
	The no-load voltage does not exceed 35 V peak or 60 V ripple-free d.c.		N
	For voltage exceed 25 V r.m.s or 60 V d.c., the touch current does not exceed 0.7 mA peak) a.c. or 2.0 mA d.c.		N
	Voltage or current exceed the values above, at least one of the conductive parts in the SELV circuits insulated by insulation capable of withstanding a test voltage of 500 V r.m.s. for 1 min		N
	Luminaires other than ordinary, the nominal voltage does not exceed 12 V r.m.s or 30 V ripple-free d.c. however,		N
	The voltage limit for ordinary luminaires are applicable to parts only accessible during maintenance only when the luminaire is opened for light source replacement.		N
	Class III luminaire are acceptable only for connection to an SELV source		N
	PELV source are not used at present for luminaires		N
	A Class III luminaire does not provided with means for protective earthing.		N
(8.2.4)	Portable luminaire with connection to supply by non-detachable flexible cord and plug; protection against electric shock independent of the supporting surface		N
(8.2.5)	Compliance with 8.2.1 to 8.2.4 checked by inspection and test finger or relevant probe		P
(8.2.6)	Covers and other parts providing protection against electric shock have adequate strength; and		P
	Reliably secured		P
	Comply with force test		N
(8.2.7)	Luminaires incorporating a capacitor exceeding 0.5 μF, provided with a discharge device so voltage across the capacitor after 1 min after disconnection does not exceed 50V		P
	Measured voltage	7.5 V	

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Clause	Requirement – Test	Remark	Result
	Portable luminaires connected to supply by plug, track adaptor connected luminaires, luminaires with supply connector accessible with the standard test finger incorporating a capacitor exceeding 0.1 µF (or 0.25 µF if rated voltage less than 150V) provided with discharge device so voltage across plug pins or adaptor/connector contacts 1s after disconnection does not exceed 34V		N
	Measured voltage		
	Other luminaires connected to supply via plug and incorporating a capacitor exceeding 0.1 µF (or 0.25 µF if rated voltage less than 150V) and track adaptors mounted in luminaires discharge so that after 5 s voltage between plug pins does not exceed 60V r.m.s		N
	Measured voltage		
1.12 (12)	ENDURANCE TESTS AND THERMAL TESTS		P
	Luminaires with IP classification greater than IP20 subjected to relevant tests after test(s) of 9.2 but before test(s) of 9.3 of 60598-1		N
(12.1)	General		NOTED
(12.2)	Selection of lamps and ballasts in accordance with annex B		N
(12.3)	Endurance test:		P
	Luminaire shall not become unsafe or fail prematurely		P
(12.3.1)	Test		P
a)	Luminaire mounted in thermal enclosure with means for controlling ambient temperature		P
b)	Ambient temperature within enclosure maintained within ±2°C of (t_a + 10)°C	35 °C	P
	Ambient temperature within enclosure measured in accordance with annex K		P
c)	Luminaire tested in enclosure for 168 h consisting of seven successive cycles of 24 h. Supply voltage as item d) applied for the first 21 h and disconnected for the remaining 3 h of each cycle		P
	Circuit condition as normal operation for the first six cycles and as in abnormal operation for the seventh cycle		N
	Luminaires for which there is no abnormal condition, total test duration is 240 h		N

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Clause	Requirement – Test	Remark	Result
	For filament luminaires total test duration is 240 h		N
d)	Supply voltage for filament lamp luminaires is 1.05 ± 0.015 times the rated voltage at which the rated wattage of the lamp is obtained		N
	Supply voltage for other luminaires is 1.10 ± 0.015 times the rated voltage or the maximum of the rated voltage range		P
	Luminaire for constant voltage or constant current operation not equipped with 1,1 times the rated input constant voltage or rated input constant current as appropriate.		N
e)	Luminaire ceases to operate because of chance failure of part of the luminaire , the instructions in item g) of 12.4.1 apply except if		N
	A thermal protective device in the luminaire operates the test is modified as follows;		N
1)	Luminaire with cyclic protective device, luminaire allowed to cool until device resets, with one-shot thermal protective devices, the device replaced		N
2)	Test continued up to 240h in total with the circuit and the temperature adjusted in such a way that the protective device just fails to operated		N
(12.3.2)	After endurance test:		P
	No part of luminaire has become unserviceable		P
	Plastic ES lampholders not deformed		N
	Luminaire not unsafe		P
	No damage to track system		N
	Marking legible		P
(12.4)	Thermal test (normal operation)		P
	Under conditions representing normal service, no parts of the luminaire, the supply wiring within the luminaire or the mounting surface, attain a temperature which would impair safety		P
	Luminaire does not cause excessive heating of lighted object		P
	Track-mounted luminaires do not cause excessive heating of tracks		N
(12.4.1)	Temperatures measured as indicated in 12.4.2 in accordance with the following conditions:		P
a)	Luminaire tested in draught-proof enclosure in accordance with annex D		P
	Temperature measurements made in accordance with annexes E and K		P

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Clause	Requirement – Test	Remark	Result
b)	Thermally most onerous operating position used		P
c)	Ambient temperature between 10°C and 30°C, preferably 25°C		P
	Lamp has temperature-sensitive electrical characteristics or t_a rating exceeding 30°C, ambient temperature within 5°C of the t_a rating		N
d)	Test voltage for luminaires as follows:		P
	Filament lamp luminaires voltage produces 1.05 times rated wattage of the lamp; except		N
	HTS lamps are always operated at the rated voltage marked on the lamp		N
	For other luminaires; 1.06 times rated voltage or maximum of rated voltage range		P
	Motors contained in luminaires; 1,06 times rated voltage or maximum of rated voltage range		N
	Luminaire for constant voltage or constant current operation not equipped with 1,1 times the rated input constant voltage or rated input constant current as appropriate.		N
e)	During and immediately before measurement , supply voltage held within ±1% of the test voltage preferably ±0.5% of test voltage		P
f)	Measurements taken when the luminaire stabilised thermally		P
g)	Luminaire ceases to operate because of a defective part (including the lamp), part replaced and test continued		N
	Hazardous condition does not arise, parts not unserviceable or protective device in luminaire does not operate		N
h)	Remote control gear/components supplied as part of luminaire, mounted and operated in accordance with the manufacturer's instructions		N
	Remote control gear not supplied as part of the luminaire, operated in free air at an ambient of 25°C. Temperature of control gear not measured		N
i)	Test for filament lamp luminaire repeated with heat source (HTS) lamp.		N
j)	Light beam from luminaire directed towards matt black painted wooden vertical surface, luminaire mounted at the marked distance from the surface		N
	During the test temperature measurements of insulating parts made for section 13		N

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Clause	Requirement – Test	Remark	Result
k)	Measurements of lampholder temperature of double-capped fluorescent lamps, hot junction of thermocouple located flush with the surface of the lamp holder adjacent to lamp cap; or		N
	Hot junction of thermocouple placed as close as possible to this point but without touching lamp cap		N
(12.4.2)	During test of 12.4.1;		P
	Temperatures do not exceed values given in tables 12.1 and 12.2 when luminaire operated at rated ambient temperature (t_a)	(see appended table)	P
	Where temperature in test enclosure differs from t_a difference taken into account;		P
a)	Temperature not exceeding values shown in tables 12.1 and 12.2 by more than 5°C		N
b)	Temperature of parts of the luminaire liable to thermal degradation in service not exceeding value corresponding to reasonable service period for the type of luminaire given in tables 12.1 and 12.2		N
	Materials claimed to withstand higher temperatures, not exposed to temperatures in excess of those temperatures proved permissible for these materials		N
c)	Temperature of test piece does not exceed 90°C or higher temperatures as indicated on the luminaire or in manufacturer's instructions		N
(12.5)	Thermal test (abnormal operation)		P
	Under conditions representing abnormal service; parts of the luminaire and mounting surface do not exceed values given in table 12.3		P
	Track-mounted luminaires do not cause excessive heating of tracks		N
(12.5.1)	Temperatures measured in accordance with following conditions:		P
a)	Test made in abnormal condition in cases 1), 2), 3) and 4) below, which cause any part to be higher than during normal operation		P
	Test not applicable to fixed non-adjustable filament lamp luminaires except in case 3)		N
1)	Unsafe operating position arising from other than misuse		N
2)	Possible unsafe circuit condition arising other than from defective manufacture or misuse		N
3)	Possible unsafe condition arising from use of a GLS lamp in a filament lamp luminaire intended for a special lamp		N
4)	A possible unsafe circuit condition arising from a short circuit in the secondary circuit of a luminaire with a transformer fitted for lamp voltage supply		P

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Clause	Requirement – Test	Remark	Result
	Test 2) is only applicable to tubular fluorescent and other discharge lamp luminaires		N
	Test 4) made with a short-circuit in the lampholder		P
b)	Filament lamp luminaire operated with a test voltage as specified in item d) of 12.4.1		N
	Tubular fluorescent and other discharge lamp luminaires operated with a test voltage 1,1 times rated voltage or;		N
	Maximum of the rated voltage range		N
	During short-circuit according to test 4) between 0.9 and 1,1 times rated supply voltage		P
c)	Luminaire ceases to operate due to a defective part of the luminaire, that part replaced and test continued		N
	Unless a hazardous condition arose, or any part becomes unserviceable as a type defect, luminaire deemed to have failed		N
d)	Luminaire incorporates a capacitor, capacitor short circuited, notwithstanding requirements of annex C, voltage across it under test conditions would exceed 1,25 times its rated voltage for self-healing capacitors or, 1,3 times rated voltage for non-self-healing capacitors		N
	Unless capacitor is directly connected across supply		N
e)	Luminaire of lamps which according to specification can lead to ballast or transformer overheating tested as per 2b) of annex C		N
(12.5.2)	During test of 12.5.1;		P
	Temperatures do not exceed values given in tables 12.3, 12.4 and 12.5 by more than 5 ºC when luminaire operated at rated ambient temperature (t_a)		P
	Where temperature in test enclosure differs from t_a difference taken into account;		P
(12.6)	Thermal test (failed lamp control gear condition):		N
	Electronic lamp control gear and small wound devices incorporated into these components are exempted from the requirements of this clause		N
(12.6.1)	Luminaire without thermal cutout operated in accordance with 12.4.1 a) c) e) f), h) and l); together with specified conditions		N
a)	Temperature of mounting surface does not exceed 130°C		N

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Clause	Requirement – Test	Remark	Result
	Measured mounting surface temperature		
b)	Specified extrapolation does not give calculated surface temperature of 180°C at winding temperature less than 350°C		N
	Calculated winding temperature		
c)	Track-mounted luminaires; no part of track shows sign of unsafe deterioration		N
(12.6.2)	Luminaire with temperature sensing controls or with temperature declared thermally protected ballasts:		N
	Cutout / control type		
	Luminaire set up as per 12.6.1; additional test conditions as specified		N
	Temperature of mounting surface does not exceed 135°C; and		N
	Measured mounting surface temperature		
	Not exceeding 110°C when protector recloses circuit; except		N
	Measured mounting surface temperature		
	During any cycle of protector; surface temperature may be more than 135°C provided length of time does not exceed value specified in Table 12.6		N
	Measured mounting surface temperature		
	Measured overshoot time		
	Temperature of mounting surface does not exceed 180°C for thermal links and manual reset cutouts; or		N
	Does not exceed 130°C for auto-reset cutouts		N
	Measured mounting surface temperature		
	Track-mounted luminaires; no part of track shows sign of unsafe deterioration		N
(12.7)	Thermal test in regard to fault conditions in lamp controlgear or electronic devices in plastic luminaires		N
	Test applicable to luminaires with thermoplastic housing not fitted with extra mechanical temperature-independent device as per 14.5.2		N
(12.7.1)	Test for luminaires without temperature sensing controls		N
(12.7.1.1)	Test for luminaires incorporating ballast(s) of fluorescent lamps with a lamp load ≤ 70 W		N
	Luminaire tested in accordance with 12.4.1 a) c) e) f)and h); together with specified conditions		N

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Clause	Requirement – Test	Remark	Result
(12.7.1.2)	Test for luminaires incorporating discharge lamps, fluorescent lamps (>70 W), transformer of power >10 VA		N
	Luminaire tested in accordance with 12.4.1 a) c) e) f)and h); together with specified conditions		N
(12.7.1.3)	Test for luminaires with inherently short-circuit proof transformer of power ≤ 10 VA		N
	Fault test conducted according to the test method in 12.7.1.2		N
	In case of no failure, the voltage incremented by the same steps as in 12.7.1.1 up to the failure.		N
(12.7.2)	Luminaires with temperature sensing control; set up in accordance with 12.7.1, as modified		N
	Calculated temperature of fixing point/ exposed part does not exceed temperature of deflection under load in accordance with ISO 75, method A		N
1.13 (9)	RESISTANCE TO DUST AND MOISTURE		P
	Luminaires with IP classification greater than IP20; order of tests as specified in 1.12		N
(9.1)	General		NOTED
(9.2)	Tests for ingress of dust, solid objects and moisture:	IP20	P
	Test as per IEC 60529; modified as specified		P
(9.2.0)	Tests		N
(9.2.1)	Dust-proof luminaires (IP 5X)		N
(9.2.2)	Dust-tight luminaires (IP6X)		N
(9.2.3)	Drip-proof luminaires (IPX1)		N
(9.2.4)	Rain-proof luminaires (IPX3)		N
(9.2.5)	Splash-proof luminaires (IPX4)		N
(9.2.6)	Jet-proof luminaires (IPX5)		N
(9.2.7)	Powerful water jet-proof luminaires (IPX6)		N
(9.2.8)	Watertight luminaires (IPX7)		N
(9.2.9)	Pressure watertight luminaires (IPX8)		N
(9.3)	Humidity test; 48 h, 91-95% RH		P
1.14 (10.)	INSULATION RESISTANCE AND ELECTRIC STRENGTH		P
(10.1)	General		NOTED

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Clause	Requirement – Test	Remark	Result
(10.2)	Insulation resistance and electric strength		P
	Insulation resistance and electric strength shall be adequate		P
(10.2.1)	Test - Insulation resistance		P
	Insulation resistance measured with a d.c voltage of approximately 500 V, 1 min after application of voltage		P
	Insulation of SELV parts luminaires , d.c to be used for measurement is 100 V		N
	Insulation resistance not less than the values specified in table 10.1	(see appended table)	P
(10.2.2)	Test - Electric strength	(see appended table)	P
	A voltage of substantially sine-wave form, having a frequency of 50Hz or 60Hz and values specified in table 10.2, applied for 1 min across insulation in the table		P
	Luminaires with ignitors , electric strength of parts of luminaire stressed by the pulse voltage tested with the ignitor operating		N
	Luminaires with ignitor, and lampholders according to the manufacture instructions achieve their maximum impulse voltage protection only with a lamp inserted, a dummy lamp shall be inserted for this tested		N
	Luminaires with ignitor connected operated at rated voltage for 24 h test, electric strength test applied with all terminals of the ignitor connected together		N
	Luminaires with ignitor such as push-buttons, supplied at rated voltage subjected to 3's on/10's off switching cycle for 1 hour		N
	Luminaries provided with ballasts which are marked with an ignitor having a time limitation device, conforming to IEC 61347-2-9, subjected to the test before but for a period consisting 250 on/off cycles, keeping an off-period of 2 min		N
(10.3)	Touch current, protective conductor current and electric burn		P
(10.3.1)	Touch current or protective conductor currentthat occurs during normal operation the values in table 10.3 when measured in accordance with Annex G	(see appended table)	P

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Clause	Requirement – Test	Remark	Result
1.15 (13)	RESISTANCE TO HEAT, FIRE AND TRACKING		P
(13.1)	General		NOTED
(13.2)	Resistance to heat		P
	External parts of non-metallic material, parts supporting live parts or SELV parts sufficiently resistant to heat		P
(13.2.1)	Ball-pressure test with a force of 20 N, diameter of impression not exceeding 2 mm		P
	Parts supporting live parts: at 125°C	(see appended table)	P
	Other parts: at 75°C	(see appended table)	P
	Test not made on parts of ceramic material or insulation of wiring		P
(13.3)	Resistance to flame and ignition		P
	Parts of insulating material adequately resistant to flame and ignition; compliance checked by tests		P
(13.3.1)	Parts of insulating material retaining current carrying parts in position - needle flame test	(see appended results)	P
(13.3.2)	Parts of insulating material which do not retain current-carrying parts in position but which provide protection against electric shock, and parts retaining SELV – glow wire test at 650°C	(see appended results)	P
(13.4)	Resistance to tracking		N
	Insulating parts retaining current-carrying parts or SELV parts in other than ordinary luminaires resistant to tracking; unless		N
	Protected against dust and moisture		N
	Proof tracking test; PTI of 175		N

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Clause	Requirement – Test	Remark	Result

TABLES OF RESULTS

(5.3)	TABLE: Internal wiring		P
Internal wiring function / colour		Nominal cross sectional area (mm^2)	Minimum insulation thickness
LED driver output wiring		1.0	0.5
LED module supply cord		0.8	0.6
LED module interconnecting wire (50V max) (Cl 5.3.1.2)		0.8	0.3

(10.2.1)	TABLE: Insulation resistance		P
Insulation of parts:		Insulation resistance (MΩ)	Minimum required (MΩ)
SELV:			
Between current-carrying parts of different polarity		>100	1
Between current-carrying and the mounting surface		>100	1
Between current-carrying and metal parts of the luminaire		>100	1
Other than SELV:			
Between current-carrying and the mounting surface		>100	4
Between current-carrying and metal parts of the luminaire		>100	4

(10.2.2)	TABLE: Electric strength		P
Insulation of parts:		Test voltage (V)	Breakdown
SELV:			
Between current-carrying parts of different polarity		500	No
Between current-carrying and the mounting surface		500	No
Between current-carrying and metal parts of the luminaire		500	No
Other than SELV:			
Between current-carrying and the mounting surface		2960	No
Between current-carrying and metal parts of the luminaire		2960	No

(10.3)	TABLE: Touch current, protective conductor current and electric burn		P
	Test voltage	264 V	
		Measured (mA) (peak)	Allowed (mA) (peak)
Touch current		0.18	0.7

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Clause	Requirement – Test	Remark	Result

(11.2)	TABLE: Creepage distances and clearances												P
Creepage (cr) and clearance (cl) distance (mm):	R.M.S working voltage not exceeding												Measured
	50 V		150 V		250 V		500 V		750 V		1000 V		
	Cr	Cl	Cr	Cl	Cr	Cl	Cr	Cl	Cr	Cl	Cr	Cl	
(1)Live parts of different polarity	**1.2**	**0.2**											10 / 10
(2)Live part and accessible metal parts, also between live parts and the outer accessible surface of insulating parts	**-**	**0.2**											3.5 / 3.5
(2)Live part and accessible metal parts, also between live parts and the outer accessible surface of insulating parts					**5**	**3**							10 / 10
(3)Parts which may become live due to the breakdown of functional insulation in luminaires of class II and accessible metal parts													-
(4)The outer surface of a flexible cord or cable and an accessible metal part to which it is secured by means of a cord grip, cable carrier or clip of insulating material													-
(5) Not used													
(6) Live parts and other metal parts, between them and the supporting surface or between live parts and the supporting surface where there is no intervening metal	**-**	**0.2**											3.5 / 3.5

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Clause	Requirement – Test	Remark	Result

(12.4.1)	TABLE: Thermal test (Normal operation)		P
	Initial ambient temperature (T1)	25 °C	
	Final ambient temperature (T2)	25 °C	
	Test input	39.2 W	
	Test voltage	254 V	

Measured part	T measured (°C)	T allowed (°C)
Supply lead	32	90
LED driver tc point	51	90
Interconnection wiring	30	90
Interconnection connector	29	Ref only
LED light rear enclosure and mounting surface	35	90
LED module lens	82	Ref only

(12.5.2)	TABLE: Thermal test (Abnormal operation)		P
	Ambient temperature	25 °C	
	Test voltage	264 V	

Measured part	T measured (°C)	T allowed (°C)
LED driver tc point	51	100
LED light rear enclosure and mounting surface	35	130

(13.2.1)	TABLE: Ball pressure tests		P

Component tested	Temperature (°C)	Diameter of impression (mm)
LED driver enclosure	125	1.1
Interconnection connector enclosure	125	1.2
LED module board base enclosure	125	1.3

(15.5.2.1.3)	TABLE: Voltage drop measurements				P
	Test current	2 A			
Terminal	Voltage drop (mV) after 1 h				
	1	2	3	4	
LED driver output connector	4.4	2.8	3.1	3.2	
LED module connector	1.7	1.8	1.5	1.6	

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Clause	Requirement – Test	Remark	Result

(15.6.2.2)	TABLE: Voltage drop measurements after heating tests								P
	Test current	2 A							
Terminal		Voltage drop (mV) after 1 h							
		10th cycle				25th cycle			
		1	2	3	4	1	2	3	4
LED driver output connector		4.4	3.5	3.9	4.5	5.2	4.2	4.0	4.3
LED module connector		1.7	1.8	1.9	1.9	1.7	1.8	2.0	2.1

	TABLE: Components			
Component	Manufacturer	Type/model	Technical data	Approval marks
Supply lead	not marked			
LED driver*	MW MEANWELL	PCD-40-1050B	INPUT: 200-240V~0.35A 50/60Hz λ:0.95 ta: 50°C tc: 90°C OUTPUT: 22-38V, max.50V⎓1050mA for CC mode IP42	05 **35-103241**
LED driver output wiring	LM	1430	105°C 300V 18AWG	**E315421**
LED driver output connector	TE connectivity	2008144-1	18AWG	**TESTED WITHIN THE LUMINIARE**
LED module supply cord	TANG YAO	TY1961	2x18AWG 300/500V FEP/PVC	**VDE 4002707**
LED module board	Cree, Inc	XPLBWT	I_F: 3000mA, V_F: 2.82~3.15Vdc RG2	**-**
LED module connector	Amphenol Aerospace	M39029/56-351		**TESTED WITHIN THE LUMINIARE**

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Clause	Requirement – Test	Remark	Result
1.5 (3)	MARKING		
(3.3)	Instructions and other texts		
(3.3.101)	Where terminal block is not supplied with luminaire, packaging contains specified wording		P
1.6 (4)	CONSTRUCTION		
(4.11)	Electrical connections and current-carrying parts		
(4.11.6)	Test voltage reduced to 1 500 V		N
1.10 (5)	EXTERNAL AND INTERNAL WIRING		
(5.2.1)	Luminaires provided with means of connection as specified		P
	Means of connection	Connection lead	
	Requirements of 4.6, 4.7.1, 4.7.2, 4.10.1, 11.2, 12 and 13.2 applied	Terminal detail provided in installation instruction.	N
(5.2.2)	Flexible cables or cords used for connection to the supply; having properties at least equal to those in table 5.1 and capable of withstanding highest temperatures to which they can be exposed in normal use		N
	Fitting type		
	Cord type		
1.12 (12)	ENDURANCE TESTS AND THERMAL TESTS		
(12.4.2)	During test of 12.4.1;		
c)	Temperature of test piece does not exceed 90°C or higher temperatures as indicated on the luminaire or in manufacturer's instructions		N
ZA	ANNEX ZA NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS		NOTED
ZB	ANNEX ZB SPECIAL NATIONAL CONDITIONS		NOTED
	Specific national conditions are not assessed within this report; however attention is drawn to the requirements of this Annex		NOTED
ZC	ANNEX ZC A-DEVIATIONS		NOTED
	Specific national conditions are not assessed within this report; however attention is drawn to the requirements of this Annex		NOTED

EN 60598-2-1			
Clause	Requirement – Test	Remark	Result
1.12	ENDURANCE TESTS AND THERMAL TESTS		
	Luminaires with IP classification greater than IP20 subjected to relevant tests after test(s) of 9.2 but before test(s) of 9.3 of 60598-1		N
1.13	RESISTANCE TO DUST AND MOISTURE		
	Luminaires with IP classification greater than IP20; order of tests as specified in 1.12		N

AS/NZS 60598.2.1			
Clause	Requirement – Test	Remark	Result
6. (3.)	MARKING		
Part 2.1	G5 and G13 lampholders marked with specified warning		N
	Warning label is durable		N
	Front size is 5 mm minimum for letters and numbers		N
	Front size measured		
	Symbol size is 5 mm minimum		N
	Symbol size measured		
	Warning and symbols are visible during lamp replacement		N
(3.1)	In Australia and New Zealand, instruction and other texts required by this Standard shall at least be written in English		P
(3.2)	Marking on luminaires		
a)	Marking to be observed when replacing lamps shall be visible on the outside of the luminaire or behind a cover which is removed during lamp replacement and with the lamp removed		
AS/NZS	Do not stare at light source (3.2.23)		N
b)	Marking to be observed during installation shall be visible during installation on the outside of the luminaire or behind a cover or part which is removed during installation		
AS/NZS	Rated maximum ambient temperature (3.2.3), including 25°C	t_a = 25 °C	P
AS	Supply cords which are not fitted with a plug shall be marked with a cord tag with the symbol (3.2.12)		N
(3.3)	Additional information		
(3.3.7) AS/NZS	Instructions for luminaires provided with metal halide lamps		N
(3.3.18) AS/NZS	Luminaires other than ordinary, provided with PVC cord		N
(3.3.21) AS/NZS	Instructions for component replacement		N
(3.3.101) AS/NZS	Details of components in the luminaire that require replacement as part of a maintenance program.		N
(3.3.102) AS/NZS	Instruction for luminaire with coin/button cell batteries include the safety warning.		N

AS/NZS 60598.2.1			
Clause	Requirement – Test	Remark	Result
7. (4.)	CONSTRUCTION		
Part 2.1	LED luminaires or new luminaires designed for T8 and T5 converters with G5 and G13 lampholders include a fuse to protect a fluorescent lamp that is inadvertently installed, fuse is of:		N
a)	250V HRC type and		N
b)	2 A max, quick-acting type rating and		N
c)	Used to protect a maximum of two lamps only		N
(4.7)	Terminals and supply connections		
(4.7.2) AS/NZS	Not possible to touch a live free wire with the standard test finger when the luminaire is fully assembled for use or open for the replacement of light sources or starters.		N
	Compliance checked by 8 mm loose strand		N
(4.8)	Switches;		
AS/NZS	Switches comply with AS/NZS 3133, the AS/NZS 60669 series or AS/NZS 61058.1		N
AS/NZS	Switches indicates an off position have contact with an air break and comply with AS/NZS 3133, AS/NZS 60669.1 or AS/NZS 61058.1		N
AS/NZS	Electronic switches compliance AS/NZS 60669.2.1 or IEC 61058-1 classified for 10,000 operation cycles		N
(4.10)	Double and reinforced insulation		N
(4.10.4)	Protective impedance device		
AS/NZS	Accessible conductive parts separated from live parts by double or reinforced insulation bridged by a single Y1 capacitor with qualification approval as specified in IEC 60384-14		N
(4.14)	Suspensions and adjusting devices		
(4.14.6) AS/NZS	A fixed socket-outlet complying with AS/NZS 3112 or AS/NZS 60884.1 is used for the test.		NOTED
(4.32) AS/NZS	Metal oxide varistors comply with the requirement of AS/NZS 3100.		N
(4.101) (4.101.1)	Small batteries		N
AS/NZS	Batteries that fit wholly within the small parts cylinder not be removeable without the aid of a tool.		N
	Luminaire intended for children under the age of three, or parts of such luminaires contain batteries, cannot fit wholly into the small part cylinder as specified.		N

AS/NZS 60598.2.1			
Clause	Requirement – Test	Remark	Result
	Battery fit into the small parts cylinder not accessible		N
	Force applied without jerk for 10s in the most unfavourable direction		N
	Test fingernail of Figure 7 applied for 10 N and slid sideways with a force of 10 N but not twisted or used as a lever.		N
	If axial pull is unlikely, test finger nail inserted in any aperture with a force of 10 N and pulled for 10s with 30 N in direction of removal.		N
	Part likely to be twisted, torque is applied		N
	Project of the part that is gripped less than 10 mm, torque is reduced by 50%		N
(4.101.2)	Battery compartment fasteners		N
AS/NZS	Screw or similar fastener used to secure a door or cover providing access to the battery compartment, captive to ensure that it remains with the door, cover or equipment.		N
	20 N force applied to the screw or similar without jerks for a duration of 10 s in any direction.		N
9. (7.)	PROVISION FOR EARTHING		
(7.2)	Provision for earthing		
(7.2.11) AS/NZS	Conductors identified by green, yellow or green / yellow only connected to earthing terminal		N
11. (5)	EXTERNAL AND INTERNAL WIRING		
(5.2)	Supply connection and other external wiring		
(5.2.1) AS/NZS	Luminaires provided with means of connection as specified		P
	Means of connection	Connection lead	
AS	For non-portable luminaires complying with 3.2.12; plug or coupler not required		N
	Plug portion of a luminaire with integral pins comply with relevant requirements of AS/NZS 3112		N
(5.2.2) AS/NZS	Supply cords used for connection to the supply; having properties at least equal to those in table 5.1 or AS/NZS 3191, and capable of withstanding highest temperatures to which they can be exposed in normal use		N

AS/NZS 60598.2.1			
Clause	Requirement – Test	Remark	Result
AS/NZS	To provide adequate mechanical strength, nominal cross-sectional area of conductors not less than:		N
	0.75 mm²		N
	1 mm² for portable rough service luminaires		N
(5.2.16) AS/NZS	No means to allow further luminaires to be connected, including looping in by cascading in class II luminaires		N
	Installation couplers complying with IEC 61995-1		N
(5.2.18) AS/NZS	Portable luminaire with a flexible supply cord fitted with a plug complying with AS/NZS 3112., unless		N
	They have the warning allowed by Clause 3.2.12		N
(5.3)	Internal wiring		
(5.3.1) AS/NZS	Internal wires coloured green, yellow or green/yellow combination shall be used for making protective earth connection only.		N
(5.3.1.3) AS/NZS	In Class II luminaires, the insulation at the contact of live conductor and the accessible metal parts comply with the requirements for double or reinforced insulation.		P
12. (8)	PROTECTION AGAINST ELECTRIC SHOCK		
(8.2.1) AS/NZS	Live parts and basic insulation are not accessible when the luminaire has been installed and wired as in normal use		P
	Live parts not accessible when the luminaire is opened as necessary for replacing lamps, replaceable light sources or starters, even if the operation cannot be achieved by hand, and		N
	This does not apply to the non-current-carrying parts of caps which comply with the relevant IEC safety standard.		P
13. (12)	ENDURANCE TESTS AND THERMAL TESTS		
Part 2.1	Luminaires with IP classification greater than IP20 subjected to relevant tests after test(s) of 9.2 but before test(s) of 9.3 of 60598-1		N
14. (9)	RESISTANCE TO DUST AND MOISTURE		
Part 2.1	Luminaires with IP classification greater than IP20; order of tests as specified in Clause 13.		N

AS/NZS 60598.2.1			
Clause	Requirement – Test	Remark	Result
16. (13)	RESISTANCE TO HEAT, FIRE AND TRACKING		
(13.3.)	Resistance to flame and ignition		P
AS/NZS	Parts of non-metallic material adequately resistant to flame and ignition; compliance checked by tests		P
	This requirement not applicable to decorative trims, knobs wiring insulation and other parts not likely to propagate flames from inside the luminaires		P
	This clause applies to all parts and components		P
(13.3.1.) AS/NZS	Parts of non-metallic supporting connections - glow-wire test at 750°C	(see appended result)	P
(13.3.2.) AS/NZS	All other parts of non-metallic material – glow wire test at 650°C	(see appended result)	P
(13.3.3) AS/NZS	Flame height measured during 750 ºC glow wire test		N
	Parts likely to be impinged upon by flame, the needle-flame test of IEC 60695-11-5 is applied for 30 seconds to non-metallic parts that encroach within the envelope of a vertical cylinder having a diameter of 20 mm and a height of 50 mm above the point of application of the glow wire.		N
	Parts shielded by a barrier that meets the needle-flame test of IEC 60695-11-5 are not tested		N
	Needle flame test not conducted on materials classified as V-1 or V-0 according to AS/NZS 60695.11.10 for correct thickness		N
APPENDIX A	SAFETY REQUIREMENTS FOR DOUBLE-CAPPED LED LAMPS		N
APPENDIX B.	SAFETY RQUIREMENTS FOR T8 TO T5 LAMP CONVERTERS.		N

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Clause	Requirement – Test	Remark	Result
12	FAULT CONDITIONS		P
12.1	GENERAL		NOTED
12.2	Overpower condition		P
	Test stared at ambient temperature specified in Annex A		P
	Voltage supply is adjusted until 150% of rated power is reached.		P
	Module withstand the 15 min overpower condition		P
	Test continued until LED module thermally stabilized		P
	Temperature measured at tc point	194°C on the LED module lens	P
	Device or circuit effectively limits the power for LED module with automatic protective device or circuit which limits power in a period of15 min operation at limit.		N
	Module is operated under normal condition until steady state		P
	Module fails safe with no fire, smoke or flammable gas produced, and		P
	Tissue paper do not ignite		P

GLOW WIRE TEST RESULTS

Glow-wire testing was conducted in accordance with IEC (AS/NZS) 60695-2-11.

Test specimens arranged so that the surface in contact with the tip of the glow-wire was vertical and glow wire tip applied to surface of the specimen likely to be subjected to thermal stresses in normal use.

A layer of white pineboard and wrapping tissue was placed beneath the sample at 200mm ± 5mm distance.

SPECIMEN NUMBER	1	2	3	4
SPECIMEN DESCRIPTION	LED driver enclosure	LED driver output connector	LED module lens and base	LED module plastic cover
Material	Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Colour	White	White	Translucent and white	Translucent
Test specimen	SA	SA	SA	SA
Glow wire tip temperature (°C)	650	750	750	650
Duration of glow wire application (t_a) (s)	30	30	30	30
OBSERVATIONS				
Duration from beginning of glow-wire tip application to ignition of specimen or layer (t_i) (s)	NI	NI	NI	NI
Duration from beginning of glow-wire tip application to when flames extinguish (t_e) (s)	NA	NA	NA	NA
Maximum height of flames after initial 1s (to nearest 5 mm) (mm)	NA	NA	NA	NA
Flame impingement on other parts	NO	NO	NO	NO
Degree of tip penetration	WPNI	WPNI	WPNI	WPNI
Degree of specimen distortion	SMD	SMD	SMD	SMD
Scorching of pinewood board	NO	NO	NO	NO
EVALUATION CRITERIA				
Visible flame or sustained glowing	NO	NO	NO	NO
Duration of flaming or glowing after tip removal (max. allowable 30 s) (s)	0	0	0	0
Surrounding parts burned away completely (not permitted)	NO	NO	NO	NO
Ignition of wrapping tissue layer (not permitted)	NO	NO	NO	NO
RESULTS	PASS	PASS	PASS	PASS

LEGEND:

CE	Complete Equipment	SA	Sub Assembly	SE	Self Extinguished
EBD	Emitted Burning Droplets	SBD	Specimen Burned and Distorted	SMD	Specimen Melted and Distorted
ME	Manually Extinguished	SC	Separate Component	SS	Specimen Scorched
NA	Not Applicable	SCC	Specimen Completely Consumed	WPNI	Wall Penetrated but no Ignition
NI	No Ignition	X	Flame Appeared for an Instant		

GLOW WIRE TEST RESULTS

Glow-wire testing was conducted in accordance with IEC (AS/NZS) 60695-2-11.

Test specimens arranged so that the surface in contact with the tip of the glow-wire was vertical and glow wire tip applied to surface of the specimen likely to be subjected to thermal stresses in normal use.

A layer of white pineboard and wrapping tissue was placed beneath the sample at 200mm ± 5mm distance.

SPECIMEN NUMBER	5			
SPECIMEN DESCRIPTION	Cord anchorage			
Material	Thermoplastic			
Colour	Black			
Test specimen	SA			
Glow wire tip temperature (°C)	650			
Duration of glow wire application (t_a) (s)	30			
OBSERVATIONS				
Duration from beginning of glow-wire tip application to ignition of specimen or layer (t_i) (s)	NI			
Duration from beginning of glow-wire tip application to when flames extinguish (t_e) (s)	NA			
Maximum height of flames after initial 1s (to nearest 5 mm) (mm)	NA			
Flame impingement on other parts	NO			
Degree of tip penetration	WPNI			
Degree of specimen distortion	SMD			
Scorching of pinewood board	NO			
EVALUATION CRITERIA				
Visible flame or sustained glowing	NO			
Duration of flaming or glowing after tip removal (max. allowable 30 s) (s)	0			
Surrounding parts burned away completely (not permitted)	NO			
Ignition of wrapping tissue layer (not permitted)	NO			
RESULTS	PASS			

LEGEND:

CE	Complete Equipment	SA	Sub Assembly	SE	Self Extinguished
EBD	Emitted Burning Droplets	SBD	Specimen Burned and Distorted	SMD	Specimen Melted and Distorted
ME	Manually Extinguished	SC	Separate Component	SS	Specimen Scorched
NA	Not Applicable	SCC	Specimen Completely Consumed	WPNI	Wall Penetrated but no Ignition
NI	No Ignition	X	Flame Appeared for an Instant		

NEEDLE FLAME TEST RESULTS

Needle flame testing was conducted in accordance with IEC (AS/NZS) 60695-2-2.

Test flame applied to the edge of printed circuit boards having the lowest heat sink effect, with board orientated in normal position of use and at a point, where possible, not less than 10 mm from a corner.

For other components (where applicable) test flame applied to the surface of the specimen which could be contacted by the flames produced by surrounding parts.

A layer of white pineboard and wrapping tissue was placed beneath the sample at 200mm ± 5mm distance.

SPECIMEN NUMBER	1			
SPECIMEN DESCRIPTION	LED driver output connector			
Material	Thermoplastic			
Colour	White			
Test specimen	SA			
Duration of flame application (t_a) (s)	30			
Consequential test from specimen	CLAUSE 13.3.1			
OBSERVATION				
Duration of burning of specimen or layer (t_b) (s)	31, SE			
Extent of burning after test specimen has been cooled and cleaned (mm)	15			
Characteristics of burning	SBD			
Physical damage to specimen	SBD			
EVALUATION CRITERIA				
Visible flame or sustained glowing	YES			
Duration of flaming or glowing after removal of needle-flame (max. allowable 30 s) (s)	1, SE			
Duration of flaming or glowing after removal of needle-flame (max. allowable 15 s for circuit boards) (s)	NA			
Surrounding parts burned away completely (not permitted)	NO			
Ignition of wrapping tissue layer (not permitted)	NO			
RESULTS	PASS			

LEGEND:

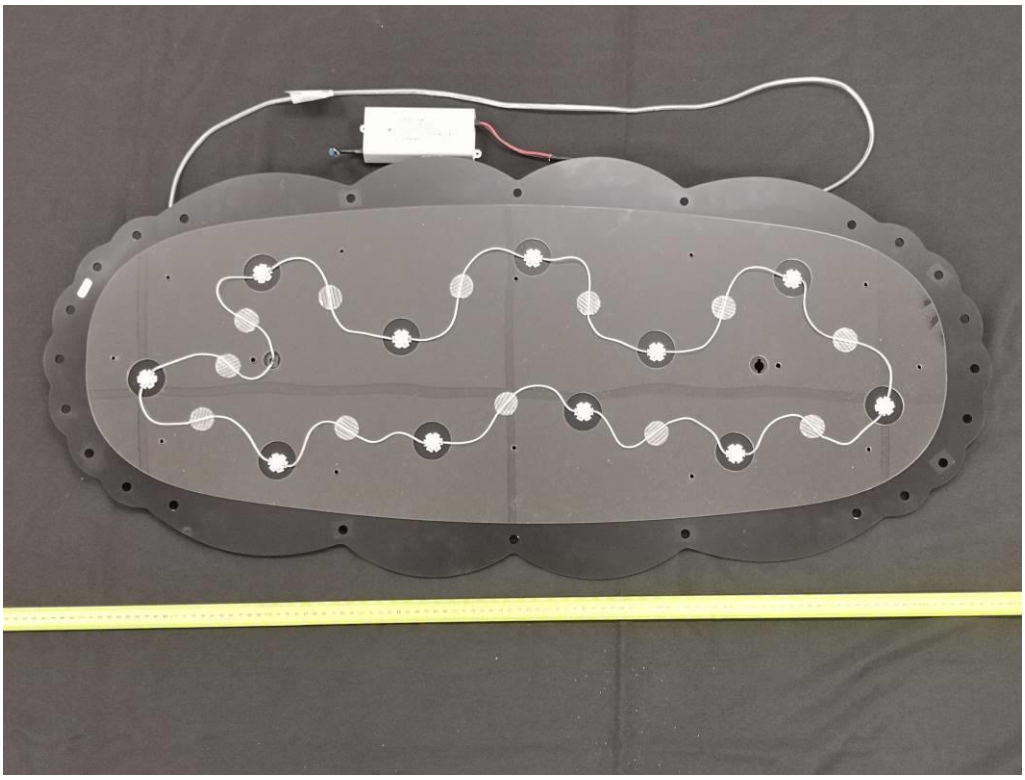
CE	Complete Equipment	SA	Sub Assembly	SE	Self Extinguished
EBD	Emitted Burning Droplets	SBD	Specimen Burned and Distorted	SG	Specimen Glowed
ME	Manually Extinguished	SC	Separate Component	SS	Specimen Scorched
NI	No Ignition	SCC	Specimen Completely Consumed		
NA	Not Applicable	SMD	Specimen Melted and Distorted		

PHOTOGRAPHS

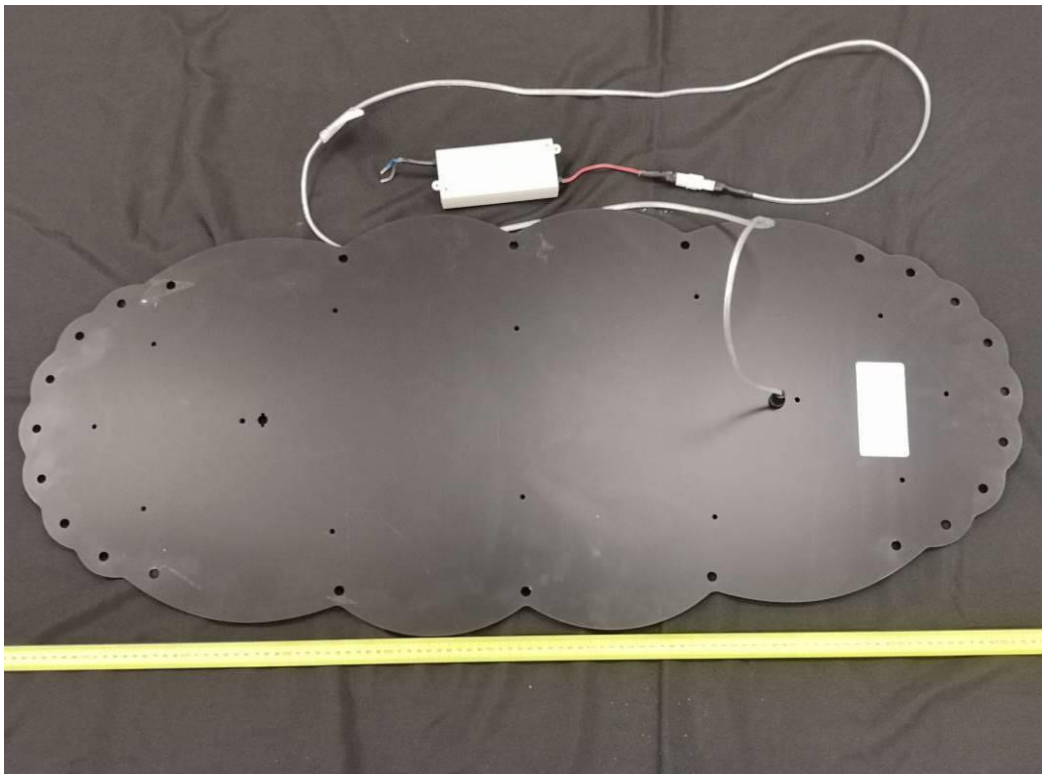
External Rear View

External Front View

PHOTOGRAPHS



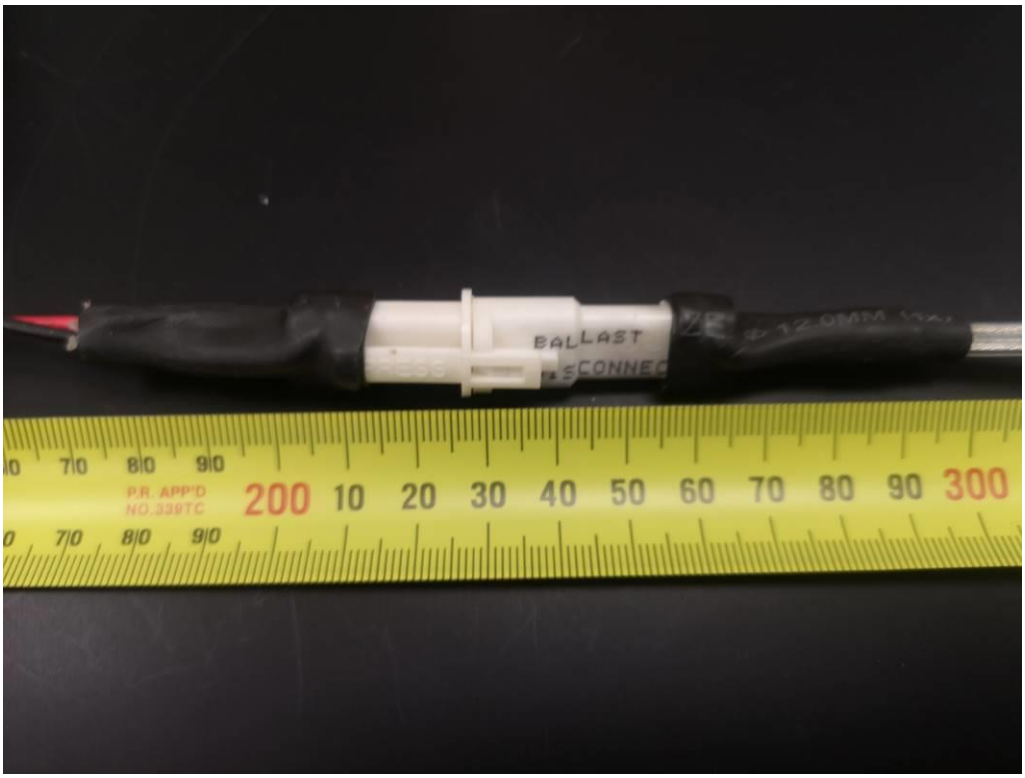
Internal Front View



Internal Rear View

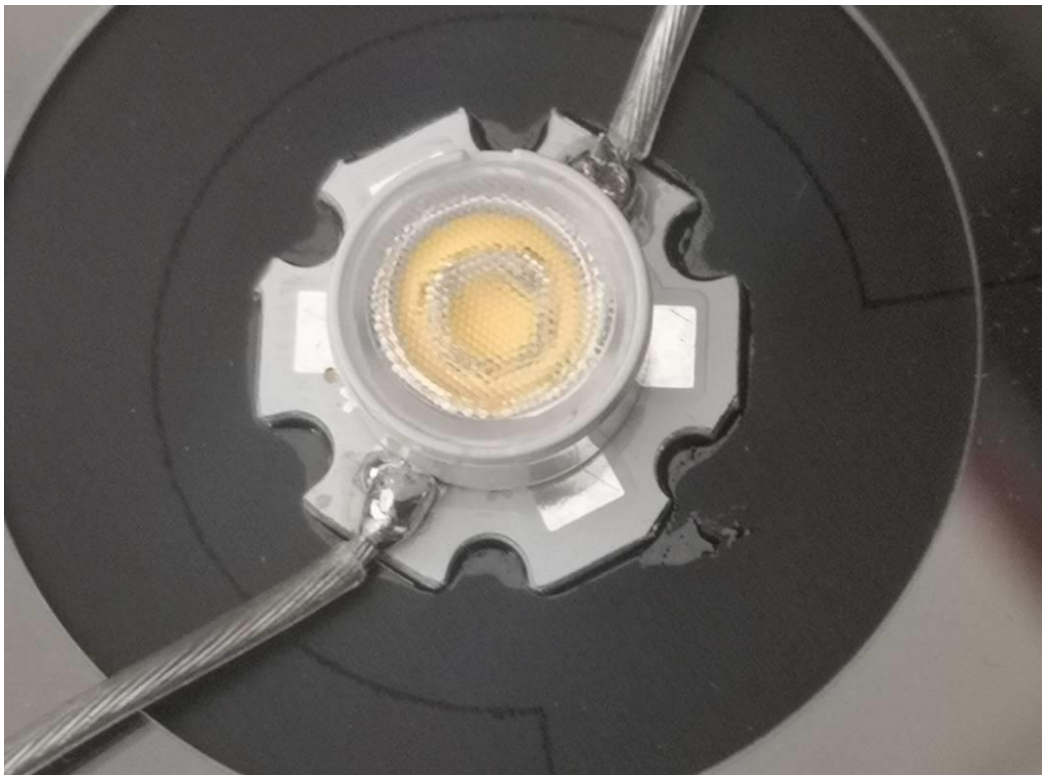
PHOTOGRAPHS

LED Driver

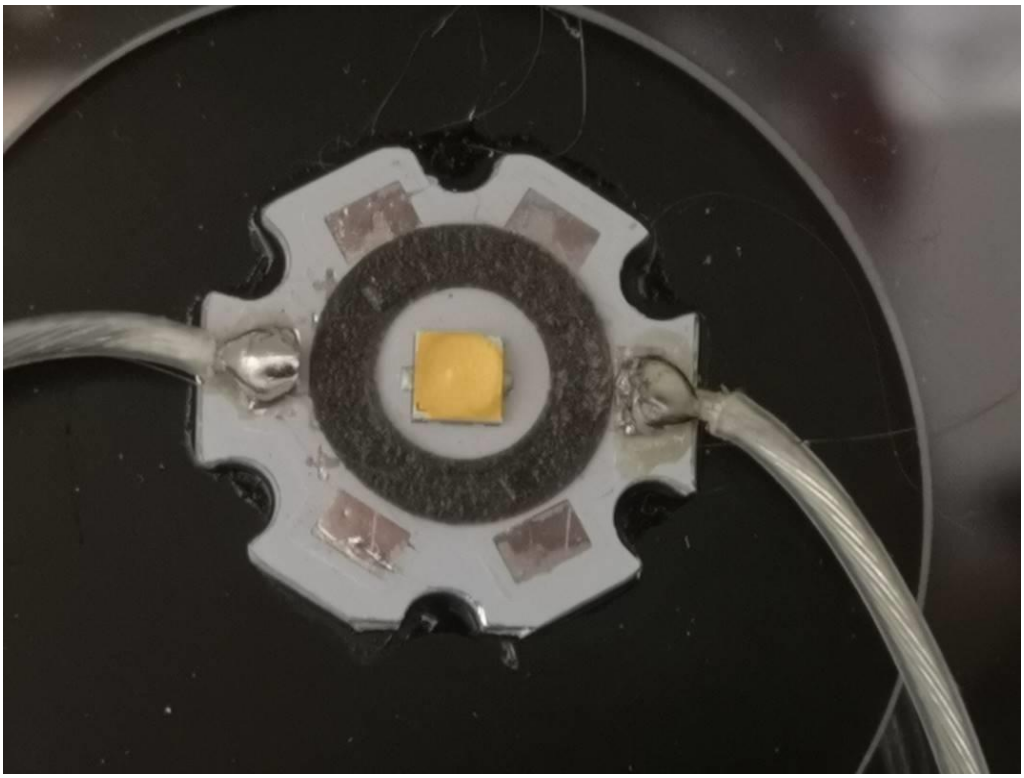


LED Driver to LED Module Interconnector

PHOTOGRAPHS



LED Module with Lens



LED Module – Lens removed

REMARKS

No remark.

**** END OF TEST REPORT ****