

SECTION 559 (of BS 7671:2008) luminaires and lighting installations is a new series of Regulations giving particular requirements for fixed outdoor lighting installations, extralow voltage lighting installations and lighting for display stands.

Section 559 includes requirements from Regulations 553-03 (lampholders) and 553-04 (lighting points) in the 16th Edition. This new section also includes requirements from Section 611 (Highway Power Supplies and Street Furniture) of the 16th Edition.

The impact of this new section is that additional requirements are now included in the Regulations for general lighting including requirements for protection against fire, connection of luminaires to the fixed wiring, fixing of the luminaires, requirements for through wiring in a luminaire, requirements for control gear, e.g. ballasts and compensation capacitors. A further new requirement is the need to give consideration to stroboscopic effects.

The Regulations for outdoor lighting

installations has been expanded, compared to Section 611 in the 16th Edition, to cover car parks, gardens, parks, places open to the public, illumination of monuments and floodlighting. Other lighting arrangements specifically mentioned include telephone kiosks, bus shelters, advertising panels and town plans, which it is recommended are provided with additional protection by a 30mA RCD.

Regulation group 559.11 is a completely new series of Regulations that were not included in the 16th edition covering requirements for extra-low voltage lighting installations. The particular requirements of these Regulations apply to extra-low voltage lighting installations supplied from sources with a maximum rated voltage of 50 V ac rms or 120 V dc. The Regulations include requirements for protection against electric shock (SELV), protection against the risk of fire due to short circuit, types of wiring systems including special

requirements where bare conductors are used, the types of transformers and converters and requirements for suspended systems.

LUMINAIRES

Protection against fire

Regulation 559.5.1 requires that in the selection and erection of a luminaire the thermal effects of radiant and convected energy on the surroundings are to be taken into account, including: (i) the maximum permissible power dissipated by the lamps (ii) the fire-resistance of adjacent material at the point of installation and in the thermally affected areas (iii) the minimum distance to combustible materials, including material in the path of a spotlight beam.

Luminaires are usually installed on non-combustible surfaces, defined in BS EN 60598-1 as "material incapable of supporting combustion" and taken to include metal, plaster and concrete. However, sometimes it may be necessary to mount luminaires on materials that may be considered to be flammable (e.g. wood and wood based materials of more than 2 mm thick) and in such cases a classified luminaire to BS EN 60598 marked with the following symbol should be selected:



Luminaire suitable for direct mounting on normal flammable surfaces

Where luminaires are marked with this symbol, the excessive temperatures which may arise in operation, or due to the failure of a component, will not cause the mounting surface temperature to exceed 90 °C and, thereby, cause a risk of fire. Originally this mark only covered luminaires with integral control gear but is now applicable to all luminaires complying with the BS EN 60598 series of standards.

Luminaires which cannot comply with this criterion are required to carry a warning notice or have the following symbol:



Luminaire suitable for direct mounting on non-combustible surfaces only

NOTE: These symbols are referenced within BS EN 60598-1:2004. However, some of these symbols, at the time of writing this article are the subject of change; the reader is advised to consult the latest edition of BS EN 60598 for current luminaire marking requirements.

From a thermal view the temperature of illuminated objects is also important and the heat from a wrongly placed luminaire can initiate combustion. Luminaires to BS EN 60598, where required to be so, can also be marked with a symbol to indicate the minimum distance from a lighted object and a maximum lamp wattage.

___m

The above figure shows minimum distance from a lighted object (m).

Regulations 422.3.1 and 422.4.2 give the following minimum distances at which spotlights and projectors shall be installed from combustible materials:

(i) rating up to 100 W - 0.5 m
(ii) rating over 100 W up to 300 W - 0.8 m
(iii) rating over 300 W up to 500 W - 1.0 m.

Table 55.2 of BS 7671 gives a full explanation of symbols used in luminaires, in controlgear for luminaires and in the installation of luminaires

Connection of luminaires

Regulation 559.6.1.1 has requirements for Connection to the fixed wiring. The Regulation states: At each fixed lighting point one of the following shall be used: (i) A ceiling rose to BS 67 (ii) A luminaire supporting coupler to BS 6972 or BS 7001 (iii) A batten lampholder or a pendant set to BS EN 60598 (iv) A luminaire to BS EN 60598 (v) A suitable socket-outlet to BS 1363-2, BS 546 or BS EN 60309-2 (vi) A plug-in lighting distribution unit to BS 5733 (vii) A connection unit to BS 1263.4

(vii) A connection unit to BS 1363-4 (viii) Appropriate terminals enclosed in a box complying with the relevant part of BS EN 60670 series or BS 4662 (ix) A device for connecting a luminaire (DCL) outlet according to IEC 61995-1.

NOTE: In suspended ceilings one plugin lighting distribution unit may be used for a number of luminaires.

Fixing of the luminaires

Regulation 559.6.1.5 requires that adequate means to fix the luminaire shall be provided.

The fixing means may be by mechanical accessories (e.g. hooks or screws), boxes or enclosures which are able to support luminaires or supporting devices for connecting a luminaire.





In places where the fixing means is intended to support a pendant luminaire, the fixing means shall be capable of carrying a mass of not less than 5 kg. If the mass of the luminaire is greater than 5 kg, the installer shall ensure that the fixing means is capable of supporting the mass of the pendant luminaire.

The installation of the fixing means shall be in accordance with the manufacturer's instructions.

The weight of luminaires and their eventual accessories shall be compatible with the mechanical capability of the ceiling or suspended ceiling or supporting structure where installed.

Any cable or cord between the fixing means and the luminaire shall be

installed so that any expected stresses in the conductors, terminals and terminations will not impair the safety of the installation.

Through wiring in a luminaire

In some instances, it may be necessary to link the wiring through the luminaire on to the next luminaire. This method of installation should only be used if the luminaire is designed for such practice.

A cable for through wiring shall be selected in accordance with the temperature information on the luminaire or on the manufacturer's instruction sheet, if any, as follows: (i) unless specified in the manufacturer's instructions, for a luminaire complying with BS EN 60598 but with no temperature marking, heat resistant cables are not required (ii) for a luminaire complying with BS EN 60598 but with temperature marking, cables suitable for the marked temperature shall be used (iii) in the absence of information, heat-resistant cables and/or insulated conductors of type H05S-U, H05S-K, H05SJ-K, H05SS-K (BS 6007) or equivalent shall be used.

Stroboscopic effects

Stroboscopic effects can be extremely dangerous in particular circumstances. In the case of lighting for premises where machines with moving parts are in operation, consideration shall be given to stroboscopic effects which can give a misleading impression of moving parts being stationary. Such effects may be avoided by selecting luminaires with suitable lamp controlgear, such as high frequency controlgear, or by distributing lighting loads across all the phases of a three phase supply.

OUTDOOR LIGHTING

Regulation group 559.10 has requirements for outdoor lighting, highway power supplies and street furniture. Similar to the 16th Edition, the protective measures of placing out of reach and obstacles must not be used; Regulations 559.10.1 gives an exception. Also the protective measures non-conducting location and earth-free local equipotential bonding must not be used. A relaxation is permitted giving a maximum disconnection time of 5 s (Regulation 559.10.3.3) for all circuits feeding fixed equipment used in highway power supplies for compliance with Regulation 411.3.2.3 (TN system) or 411.3.2.4 (TT system).

The Regulations now clearly state in 559.10.3.4 that the earthing conductor of a street electrical fixture shall have a minimum copper equivalent cross-sectional area not less than that of the supply neutral conductor at that point or not less than 6 mm, whichever is the smaller.

Regulation 559.10.3.2 now gives recommendations for lighting installations in places such as telephone kiosks, bus shelters, town plans, etc. and requires that additional protection by an RCD having the characteristics specified in Regulation 415.1.1 is provided.

EXTRA-LOW VOLTAGE LIGHTING INSTALLATIONS

Scope

The particular requirements of these Regulations apply to extra-low voltage lighting installations supplied from sources with a maximum rated voltage of 50 V a.c. rms or 120 V d.c.

Protection against electric shock (SELV)

Regulation 559.11.2 requires that an extra-low voltage luminaire without provision for the connection of a protective conductor shall be installed only as part of a SELV system. The protective measure FELV is not permitted.

Protection against the risk of fire due to short circuit

Regulation group 559.11.4 has particular requirements for protection against the risk of fire due to short circuit. The Regulation states:

559.11.4.1 Where both the live circuit conductors are uninsulated, either:(i) They shall be provided with a protective device complying with the requirements of Regulation 559.11.4.2, or(ii) The system shall comply with

BS EN 60598-2-23.

559.11.4.2 A device providing protection against the risk of fire in accordance with Regulation 559.11.4.1 shall meet the following requirements:

(i) The device shall continuously monitor the power demand of the luminaires

(ii) The device shall automatically disconnect the supply circuit within 0.3 s in the case of a short-circuit or failure which causes a power increase of more than 60 W

(iii) The device shall provide automatic disconnection while the supply circuit is operating with reduced power (for example,



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by gating control or a regulating process or a lamp failure) or if there is a failure which causes a power increase of more than 60 W (iv) The device shall provide automatic disconnection upon connection of the supply circuit if there is a failure which causes a power increase of more than 60 W

(v) The device shall be fail-safe.

NOTE: Account needs to be taken of starting currents.

Bare conductors

If the nominal voltage does not exceed 25 V a.c. or 60 V d.c., bare conductors may be used providing that the extralow voltage lighting installation complies with all the following requirements:

(i) the lighting installation shall be designed, and installed or enclosed in such a way that the risk of a shortcircuit is reduced to a minimum, and
(ii) the conductors used shall have a cross-sectional area of at least 4 mm, for mechanical reasons, and
(iii) the conductors shall not be not placed directly on combustible material.

For suspended bare conductors, at least one conductor and its terminals

shall be insulated for that part of the circuit between the transformer and the short-circuit protective device to prevent a short-circuit.

Types of transformers and converters

Where the SELV source of a SELV lighting system is a safety isolating transformer, it should meet the requirements of BS EN 61558-2-6. Regulation 559.11.4.2 requires that the transformer has a protective device on the primary side or it should be shortcircuit proof and marked with the following symbol:



Where an electronic converter, such as a switch-mode power supply, is used to supply an extra-low voltage lighting installation, it should comply with BS EN 61347-2-2 bearing the following symbol:

Suspended systems

Regulation 559.11.6 has requirements for Suspended systems.

Suspension devices for extra-low voltage luminaires, including supporting conductors, shall be capable of carrying five times the mass of the luminaires (including their lamps) intended to be supported but not less than 5 kg. Terminations and connections of conductors shall be made by screw terminals or screwless clamping devices complying with BS EN 60998-2-1 or BS EN 60998-2-2.

Insulation piercing connectors and termination wires which rely on counterweights hung over suspended conductors to maintain the electrical connection shall not be used. The suspended system shall be fixed to walls or ceilings by insulated distance cleats and shall be continuously accessible throughout the route.

CONCLUSION

Under the 17th Edition, designers and persons involved in general lighting, fixed outdoor lighting installations and extra-low voltage lighting installations now have detailed requirements to follow. For further information consult BS 7671:2008.

Also, help is at hand, in the form of a new edition of IEE Guidance Note 1 (*Selection & Erection* edited by Mark Coles) available soon. ■

