National standard

Until recently, the national standard for the design, installation and maintenance of suspended ceilings was BS 8290: 1991. Parts 1 and 3 of that standard contained a number of design and maintenance requirements relating to the earthing and bonding of conductive parts of ceiling suspension systems with which, in practice, it would have been difficult to comply. Fortunately for the electrical designer and contractor, however, those electrical safety requirements were applicable only if the conductive parts of the ceiling were intended to be used to conduct earth fault current or to act as a bonding conductor.

BS 8290 has now been superseded by BS EN 13964: 2004 – Suspended ceilings – Requirements and test methods. This new harmonised European Standard provides information for the various parties responsible for designing, manufacturing, specifying and selecting suspended ceilings used for interior applications.

The committee responsible for BS 7671 was invited to provide basic advice on the electrical safety issues relating to suspended ceilings during the development of the standard. As a consequence, the provisions for electrical safety in the new standard are simply that:

• The suspended ceiling shall be capable of being installed in accordance with the CENELEC HD 384 series of documents (upon which BS 7671 is based)
• Electrical wiring may also be carried in exposed or concealed trays specifically designed and installed for that purpose, provided the ceiling has been designed for this
• Where regulations require that the suspended ceiling is earthed and/or bonded, the ceiling and its components shall be designed to allow this, in accordance with the requirements valid in the country of use of the product.

Earthing and bonding

In practice, unless the ceiling suspension system has been designed to contain unsheathed cables*, or there are other exceptional circumstances, which would need to be taken into account by the electrical designer, the conductive parts of the suspension system will be neither exposed-conductive-parts nor extraneous-conductive-parts. Consequently, in normal circumstances, such ceiling suspension systems need neither be earthed nor equipotentially bonded.

* If the ceiling suspension system incorporates cable trunking designed to contain unsheathed cables and it is intended to use the trunking for that purpose, the trunking will be an exposed-conductive-part, and will need to be earthed throughout its length. The trunking must have a lid to provide adequate mechanical protection for the unsheathed cables.

Conductive containment systems used exclusively for insulated-and-sheathed cables are not exposed-conductive-parts, and therefore need not be intentionally earthed.

Electrical equipment, such as luminaires, lighting track, overhead busbars, air conditioning units and the like incorporated in a suspended ceiling will normally be of either Class I or Class II construction. The exposed-conductive-parts of Class I equipment are required to be connected to the main earthing terminal of the installation by a protective conductor designed to conduct any earth fault current. Class II equipment is designed such that any insulation fault in the equipment cannot result in fault current flowing into any conductive parts with which it may be in contact.

The conductive parts of a suspended ceiling incorporating Class I and/or Class II equipment are therefore not expected to conduct earth fault current, and so such parts need not be intentionally earthed. (Some conductive parts of a suspended ceiling may be earthed, however, by virtue of fortuitous contact with the exposed-conductive-parts of Class I equipment.)

Also, unless there are exceptional circumstances, the conductive parts of a suspended ceiling will not introduce a potential that does not already exist in the space in which the ceiling is installed. In normal circumstances, therefore, there is no need to arrange for the conductive parts of the ceiling to be connected to either a main equipotential bonding conductor or a supplementary equipotential bonding conductor.

It needs to be borne in mind that, if the risk of electric shock from the ceiling is to be avoided, the installation of all electrical equipment including wiring systems above, and incorporated in, a suspended ceiling must fully comply with the requirements of BS 7671, including appropriate support for cables.
Cable support

Unless the design of the ceiling system incorporates an appropriate cable tray or trunking system, cables for fixed wiring need to be supported continuously or at appropriate intervals independently of the ceiling. The method of support must be such that no damage or undue strain occurs to the conductors, their insulation or terminations.

Some of the requirements relevant to cables in suspended ceilings are embodied in Regulations 522-06, 522-07 and 522-08 (thirteen regulations in all). In particular, Regulations 522-08-04 and 522-08-05 call for cables for fixed wiring to be either continuously supported or supported at intervals such that no damage and undue strain occur to the conductors and their terminations.

Unless suitable provision has been designed into the ceiling system, insulated and sheathed cables (to BS 6004) for fixed wiring must not be laid directly on to the ceiling for a number of reasons, such as:

- the cables are liable to be damaged, both during installation and later, by sharp edges of the grid (e.g. Regulations 522-06-01, 522-06-05 and 522-08-01), and
- the inverted ‘T’ section of the grid does not afford a suitably smooth surface for supporting cables, and
- the suspended ceiling grid may not have been designed to take the additional weight of cables.

Where a suspended ceiling does not incorporate a purpose-designed cable support system, adequate support for cables for fixed wiring above the ceiling can be achieved in a number of ways to ensure that they are kept well away from the grid and from other services. For example, the designer may consider:

- providing a conduit or trunking system or cable tray (metallic or non-metallic) fixed, at suitable spacings, to the concrete floor slab (if any) above, or to walls or other structural element, or
- providing a catenary system to which the wiring system is attached using proprietary clips, cable-ties or cable-hangers at suitable intervals.

Final connections

Final connection of a luminaire can be achieved by the use of a luminaire supporting coupler (LSC) mounted reasonably close to the luminaire (such as on a conduit box above) and where it can be accessed without undue difficulty, keeping the final connection as short as practicable. Alternatively, a suitable plug and socket-outlet (correctly orientated) may be used. Both of these options can provide a means of isolation and switching off for mechanical maintenance for the connected luminaire.

Safe working practices

In order to avoid danger, safe working practices must be adopted when working on services above or within suspended ceilings. In particular, working on or near any live equipment should be avoided (in accordance with the Electricity at Work Regulations), and any portable electrical equipment used, such as handlamps and power tools, should be suitable for the purpose and properly maintained. The work must also be carried out in accordance with the Work at Height Regulations that came into force in April 2005.