



Electrical fixtures in furniture

Technical Committee 64 of The International Electrotechnical Commission (IEC) is currently developing a new area of work entitled 'Furniture' with the proposed standard number of IEC 60364-7-713. This article looks at the proposal from IEC and how electrical equipment fixed into furniture is currently electrically supplied.

International standards

To begin, a short paragraph on the standard making process from the electrical industry's perspective is pertinent.

BS 7671 is primarily based on harmonised documents (HD) that have been agreed by member countries of CENELEC. Due to the signing of the Treaty of Rome in 1973 and the joining of the European Economic Community, the UK is obliged to incorporate the technical intent of HDs in its national standards and withdraw any conflicting standards currently in publication. In turn, CENELEC bases its HDs

on IEC standards developed at international, or world, level.

What is furniture?

From the 'Shorter Oxford English Dictionary', the definition of furniture is the movable contents of a building that make it suitable for living or use. From this definition, furniture is anything we can pick up and move around. Note that the 'Shorter Oxford English Dictionary' is used by BS 0-2:2005 A standard for standards – Part 2: Structure and drafting – Requirements and guidance using the dictionary for spelling and general terms.

Taking into consideration kitchen or bedroom fitted furniture, for example, these items are effectively part of the building and, in some circles, cited as "landlord's fixtures and fittings".

Considering the Shorter Oxford English Dictionary's definition, clearly, permanently fixed 'furniture' cannot be considered as movable and, therefore, is not furniture! The BSI Office Furniture committee, FWO/SC3, referred this dilemma to the Health and Safety Executive (HSE) for clarification. The HSE's view was that, in relation to

Office Furniture, furniture could be described as being 'transportable', i.e. an office desk may not be 'portable' when fully assembled and may be regarded as fixed by means of its weight and bulk.

The Scope of IEC 60364-7-713 - Furniture

The definition of furniture from IEC 60364-7-713 is:

Movable or immovable articles such as desks, chairs, tables and work benches, cupboards and beds which are used in domestic, commercial and industrial premises for activities associated with work or leisure.

The scope of IEC 60364-7-713 covers the wiring systems of furniture intended to connect the electrical installation to current using equipment. Examples cited are beds, cupboards, desks and shop display cases, in which electrical equipment such as luminaires, installation couplers, socket-outlets, switching devices and wiring systems are installed. The supply parameters are limited to single-phase, 230V and not exceeding 32A. The proposed requirements do not apply to electrical appliances and equipment manufactured to recognised product standards.

The Scope of IEC 60364-7-713 is a step beyond the conventional accepted boundary of BS 7671, i.e. installations connected to the supply by means of a plug and socket. Perhaps this is why this proposal from IEC is given a Part 7 or Special Location designation, similar to Section 711 (Exhibitions, Shows and Stands) or Section 721 (Caravans). Many modern commercial office installations use underfloor track systems where the connection is not by means of a 13A BS 1363 plug and, therefore, within the Scope of BS 7671.

The proposed requirements of IEC 60364-7-713

The table opposite is a breakdown of the proposed requirements of IEC 60364-7-713 showing where they currently reside in BS 7671:2008. As can be seen, much of the proposed content of IEC 60364-7-713 is already in BS 7671:2008.

Current requirements for furniture in the UK

Currently in the UK, BS 6396:2008, Electrical systems in office furniture and educational furniture –

Proposed requirement of IEC 60364-7-713	Current requirements in BS 7671:2008
713.51 Common rules Electrical equipment and accessories for the wiring system of furniture shall be selected and erected in accordance with the environmental situation, in particular mechanical stress and fire risk.	512.2 External influences 421 Protection against fire caused by external influences
713.521.06 Methods for erection of wiring system Cables and cords shall be suitably protected against damage. They shall be securely fixed to the furniture or located in cable ducting, cable trunking, conduit, articulated systems for cable guiding, or a channel formed during the construction of the furniture. Cables and cords shall be protected against tension or torsion. Strain relief devices shall be provided at points of entry into the furniture and in proximity to connections	522.6 Impact 522.8 Other mechanical stresses
713.522.016 Selection of wiring system The wiring system for connecting the furniture to electrical installations shall be: – rigid cable according to IEC 60502, IEC 60227-3 or IEC 60245-1, if connected by fixed wiring; – rubber-insulated flexible cables and cords according to IEC 60245-4; or – PVC-insulated flexible cables and cords according to IEC 60227-5 if connected by means of a plug and socket-outlet, or by an installation coupler according to IEC 61535. Any wiring within the furniture which may be subject to movement shall be a flexible cable or cord according to IEC 60245-4 or IEC 60227-5.	521.9 Use of flexible cables or cords 522 Selection and erection of wiring systems in relation to external influences 522.8 Other mechanical stresses 553.1.7 Plugs and socket outlets
713.526.05 Connection between the fixed installation of buildings and furniture The connection between the fixed installation of a building and the wiring system of furniture shall be a fixed connection or plug and socket-outlet connection, or connection by an installation coupler according to IEC 61535.	553.1.7 Plugs and socket outlets 553.2 Cable couplers
713.559 Luminaires and lighting installations 713.559.011.1 Where the power dissipated by electrical equipment is liable to produce temperatures within a closed space which may lead to a fire, a switch controlled by the closing of the door shall be installed in such manner that the equipment is reliably switched off when the door is closed. This is the case, for example, for luminaires installed in a foldaway bed.	421 Protection against fire caused by electrical equipment 510.2 Common rules - General 511 Compliance with standards

Table 1: Proposed requirements of IEC 60364-7-713 and current requirements in BS 7671:2008



Specification, covers some areas of the proposed IEC 60364-7-713 but not all. The Scope of the standard specifies requirements for the safe provision and assembly of electrical power, data and telecommunications distribution systems in office furniture, educational furniture and office screens. Requirements are specified for furniture for general use and for furniture for use with specific equipment, parts of which may be built-in during manufacture. The standard applies to single-phase electrical power distribution systems operating at rated voltages up to 250V a.c. that are connected to the fixed wiring of the permanent installation of the building by a 13 A fused plug and socket outlet arrangement conforming to BS 1363.

The standard makes provision for the routing of cables through the furniture. This standard does not apply to electrical appliances used with or within an article of office furniture or educational furniture, for which appropriate standards are available. The standard does not apply to power distribution systems that are permanently connected to the building installation.

Beyond the scope of BS 6396, installers may want to install electrical equipment in purpose made cupboards, shop displays or lecterns, for example and supply from a plug and socket arrangement; for this type of installation, no current standard exists. Taking a view of this, one could apply the practices of BS 7671.

The Scope of BS 6396 was widened in 2008 to include educational furniture at the request of the BSI Educational Furniture Committee. This was to provide an equal level of safety for schools, colleges and other educational facilities as were enjoyed by offices.

Other considerations

In the UK, BS 7671 covers the fixed electrical installation from the origin to the end of the final circuit and/or the point of connection to current using equipment. The equipment is installed and operated in accordance with manufacturer's instructions and guidance on the testing requirements for electrical equipment can be found in the IET's Code of Practice for In-service Inspection and Testing of electrical equipment. Operationally, this leaves a gap.

Looking under a desk, there's often a spaghetti-mess of cables – electrical cables supplying computer workstations, laptops, monitors, printers, personal phone chargers, lamps, data cables connecting IT equipment to the LAN and telephony equipment connecting to the telephone network. It is also likely that multi-gang extension leads are used to supply equipment as there may not be a sufficient number of conveniently located socket-outlets in the location. In addition, the flexible cables supplying electrical equipment are likely to be intertwined with data cables beneath the desk. Add to this mix the movement of chairs and the stretching of the legs and feet beneath the desk across the cabling. Often data cables are only rated for the extra-low voltage circuits they carry, i.e. up to 50V and not mains 230V a.c.

Regulation 528.1 of BS 7671:2008 requires that Band I and Band II circuits are segregated or that the cables are rated for the highest voltage present. Surprisingly, up to now, beyond the scope of BS 6396, there are no Regulations or requirements covering this issue.

The IET's COP ISITEE advises that the use of standard and multi-gang extension leads is for temporary periods and is not a long term solution. There should always be sufficient outlets available to meet the activities at the desk and employers should not allow *ad hoc* solutions to be created by the unskilled user. Where it is apparent that there is an insufficient number of socket-outlets, the advice is to install more socket-outlets to cater for all foreseen eventualities.

The Building Regulations – England and Wales

As stated earlier, BS 7671:2008 has requirements from the origin of the installation to the end of the final circuit and/or the point of connection to current using equipment and not equipment supplied from a plug and socket arrangement. Approved Document P defines an electrical installation as “fixed electrical cables or fixed electrical equipment located on the consumer's side of the electricity supply meter”, and states that the installation of fixed equipment is within the Scope of Part P (Approved Document P 2006 - Additional Notes item H) even where the connection is by a 13A plug and socket arrangement.

This is a consideration for contractors and DIY installers when building-in equipment or furniture of locations in dwellings, such as kitchens, bathrooms or externally to the property.

The Building (Scotland) Regulations

Scottish Ministers are responsible for Building Standards in Scotland with the key purpose of protecting the public interest, creating Building Regulations and preparing technical guidance to ensure buildings are safe, efficient and sustainable for all.

The former Scottish Building Standards Agency was disbanded on 1 April 2008 and its functions to administer the Building Standards system in Scotland were transferred back to the Scottish Government. Technical Handbooks are provided for guidance on achieving the standards set in the Building (Scotland) Regulations 2004 and are available in two volumes, for Domestic buildings and for Non-domestic buildings. The current 2009 edition of the Technical Handbooks apply from 1 May 2009 and incorporates changes introduced 1 January 2009.

The latest editions of the Technical handbooks (both Domestic and Non-Domestic) include guidance on standard 4.5 and confirm that Building Standards apply to fixed installations in buildings and defines an installation as consisting of “the electrical wiring and associated components and fittings including all permanently secured equipment, but excluding portable equipment and appliances”.

The Law

The Electricity at Work Regulations 1989 came into force on 1 April 1990. The purpose of the Regulations is to require precautions to be taken against the risk of death or personal injury from electricity in work activities.

Regulation 4 of The Electricity at Work Regulations 1989 requires that:

1. All systems shall at all times be of such construction as to prevent, so far as is reasonably practicable, danger.
2. As may be necessary to prevent danger, all systems shall be maintained to prevent, so far as is reasonably practicable, such danger.
3. Every work activity, including operation, use and maintenance of a system far as is reasonably practicable, to danger.
4. Any equipment provided under these Regulations for the purpose of protecting persons at work on or near electrical equipment shall be suitable for the use for which it is provided, be maintained in a condition suitable for that use, and be properly used.

Therefore, where parts of an installation are not covered by a British Standard, there is still a requirement to ensure that the system is safe.

From the point of view of an installation in use in a dwelling or domestic setting, the Building Regulations require that reasonable provision is made during the design stage to protect persons from injury. A duty of care exists.

Conclusion

Much of the content of the proposed IEC 60364-7-713 Furniture can already be found in BS 7671:2008 which, in turn, has its origins in IEC 60364. In the UK, BS 6396:2008 has requirements for electrical installations to and within office furniture. Where non-standard installations take place, the installer still has a responsibility to install a safe system for use by those who need it and that the law requires that users are protected against danger so far as is reasonably practicable.

Further reading

BS 7671:2008 Requirements for Electrical Installations, 17th Edition of the IEE Wiring Regulations
BS 6396:2008 Electrical Installations in Office & Educational Furniture.
IET Guidance Note 1 – Selection and Erection
The Electricity at Work Regulations 1989 – free download www.hse.gov.uk
Electrical Equipment (Safety) Regulations 1994
CEN (*Comité Européen de Normalisation*) – www.cen.eu
CENELEC – www.cenelec.org
IEC – www.iec.ch

Building Regulations – England and Wales – www.labc.uk.com
Scotland – www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards
Northern Ireland – no scheme currently exists

Thanks

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