# Electricity

Despite increasingly high standards of installation, fires caused by faulty electrical wiring and apparatus are still very common. All installations should be in accordance with British Standard BS 7671 'Requirements for Electrical Installations' 17th Edition of the Institution of Engineering and Technology (IET) Wiring Regulations.

## Installation

Installation should be to the above standards. It should be inspected and tested to verify that the requirements of the regulations have been met.

Only electrical contractors with full scope registration or membership to work on commercial installations with the National Inspection Council for Electrical Installation Contracting (NICEIC), The Electrical Contractors' Association (ECA), The Electricity Contractors' Association of Scotland (SELECT) or The National Association of Professional Inspectors and Testers (NAPIT) should be employed.

Electricians or electrical contractors who are only registered to undertake work on domestic installations under Part P of the Building Regulations are not acceptable.

## Periodic inspection and testing

There is no specific period laid down but this is generally determined by a number of factors consisting of:

- Type of installation
- Its use and operation
- Frequency of maintenance
- External influences to which it may be subjected

It is generally recognised that installations in commercial premises require inspection and testing by a qualified electrical engineer at five-yearly intervals. The inspection period for some premises may be more frequent depending on their occupation. The installation should be inspected when there is a change of occupation.

Domestic premises require inspection and testing every ten years.

Certification confirming the outcome of the inspection and test must be obtained and retained.

Following inspection and testing, if an installation is found to be in 'unsatisfactory' condition, any remedial works required to bring the system back to a 'satisfactory' condition should be completed as soon as possible. Any remedial work classified using codes C1 (Danger Present) in the 'Electrical Installation Condition Report' must be addressed without delay. Any remedial work classified as C2 (potentially dangerous) must be actioned as a matter of urgency.

## Temporary wiring

Temporary or extension wiring should only be allowed in exceptional circumstances. All temporary circuits should be physically disconnected from the mains when not in use (even where the mains switches are turned off).

Temporary wiring should always be installed in accordance with the 'Requirements for Electrical Installations' and be protected against physical damage by means of armoured cable or conduit.

## Main circuits

Wiring should be arranged so that as many circuits as possible can be isolated at the mains when buildings are not in use.

Residual current devices (RCDs) should be used to reduce the risk of electric shocks.

## Mechanical damage

Any evidence of damage to wiring, plugs, sockets or other fittings should be attended to immediately upon discovery. Any wiring installations should take into account the possibility of mechanical damage and be protected accordingly. Trailing wires and flexes should be avoided, or kept to an absolute minimum, and never be hidden under carpets as the risk of damage from sharp heels etc. is considerable.

## Electricity at Work Regulations 1989

The Electricity at Work Regulations have wide application and apply to any property where employees may be present. They require that electrical installations are safe and do not pose any danger. In order to achieve this, electrical installations must be regularly inspected by a professional electrician working to IET regulations. Under no circumstances should an untrained person attempt any electrical work.

## Portable electrical appliance testing

Portable appliances can be regarded as any electrical equipment capable of being carried and, in general, connected to the mains supply by a flexible lead and a plug. Once connected they are deemed to be part of the electrical 'system'.

There are two main classifications:

**Class I** appliances which rely on earthing of the conductive case and one layer of insulation covering live internal parts for protection against electric shock e.g. a kettle or heater

**Class II** appliances which are 'double insulated' and rely on two layers of insulation between the internal parts and protection against shock e.g. multi-media projectors.

The main difference as far as testing is concerned is that Class I appliances require an earth continuity/bonding test which is not required in the case of Class II appliances.

The requirement to inspect and test portable electrical appliances arises under a number of pieces of legislation. The Electricity at Work Regulations 1989 require all systems to be maintained so as to prevent danger. The Provision and Use of Work Equipment Regulations 1998 require work equipment (which would include portable electrical appliances) to be maintained in an efficient state, in efficient working order and in good repair. There are also general duties under The Health and Safety at Work etc. Act 1974, for employers to provide a safe place of work and plant and systems that are safe and without risks to health.

A competent person must carry out inspection and testing. This is someone with suitable electrical knowledge and experience, who understands the equipment to be worked on and the hazards which could arise, and can recognise if equipment presents a hazard. This does not have to be a qualified electrician. Successful completion of an appropriate course, such as a City and Guilds 2377 Portable Appliance Testing course, would demonstrate competence.

There is no statutory frequency for inspection and testing. The frequency should reflect the risk of the appliance causing damage or injury and this increases with the amount the appliance is used and the harshness of the working environment. For example a kettle in regular use and movement should be examined more frequently than a computer in permanent position. A simple visual check should be carried out by the user before each use to check for such things as damaged plugs, frayed cables and loose connections. A checklist is included on the following page.

Records must be kept of all inspections, examination and maintenance carried out.

## Portable electrical appliances – visual inspection checklist

### Plug

- Cracked casing
- Bent pins
- Pins not insulated
- Incorrectly rated fuse
- Incorrectly connected wires
- Loose connections
- Loose cable clamp
- Outer insulation not held by clamp or cut short
- Should be marked BS 1363.

### Mains lead

- Cuts
- Fraying
- Brittle
- Kinked
- Coiled
- Taped joints
- Signs of burning or singeing
- Not secured by grommet/clamp on appliance.

### Appliance

- Damaged/faulty operation of on/off switch
- Damage to casing
- Loose parts
- Missing screws
- Evidence of overheating
- Evidence of moisture
- Accessible fuse holders
- Exposed cables.

## Lightning and surge protection

Compared with Europe and the rest of the world, the United Kingdom has a low rate of lightning strikes although any building will benefit from the installation of a lightning conductor system. The risk to people in or around buildings is extremely small and the primary function of a lightning protection system is the protection of property rather than of life.

There are two types of lightning damage, namely direct effects to the structure and indirect effects to the electrical wiring and equipment.

Direct effects are usually minor, damaging coping stones, finials etc, although there is also the possibility of secondary damage from falling masonry. Even minor damage, however, can be costly to repair where high level access is required.

Most indirect effects from lightning damage result from voltage surges causing shutdown, malfunction or the complete burnout of electronic systems.

Nearly all buildings will contain some form of electronic equipment, for example fire and intruder alarm systems, telephone systems, computers and associated data storage, audio-visual equipment.

All such equipment is at risk of damage from unwanted voltages known as surges, spikes or transients. These surges can be very damaging to electronic components such as printed circuit boards and may result in the loss of a facility such as a fire alarm, computer or telephone system.

The most common and the most damaging surges are those caused by lightning which produce voltage surges on overhead and underground cables, both power and communications.

Prior to August 2008, systems should have been installed to BS 6651, Code of Practice for Protection of Structures against Lightning. A typical system, generally described as a Faraday Cage system, comprises a mesh of conductors at intervals laid over the roof and down the walls of the building, and connected to the ground by earth-electrodes. Most existing systems, particularly in older buildings, however, pre-date the recommendations of BS 6651 and have changed very little over the last 100 years.

After a period of running in parallel, from the end of August 2008, BS 6651 was replaced by BS EN 62305. This standard is considerably larger and more complex. There are four main parts covering (1) General Principles, (2) Risk Management, (3) Physical Damage to Structures and Life Hazard and (4) Electrical and Electronic Systems within Structures. The protection of electronic equipment is now an integral part of the standard.

Whilst BS 6651 recommended that lightning protection systems should be inspected and tested at fixed intervals, preferably not exceeding twelve months, the maximum interval under BS EN 62305 is four years, reducing to two years for Class I and Class II Lightning Protection Systems. A visual inspection of the system should, however, be undertaken on an annual basis. It is also advisable that an inspection and test is undertaken following a strike, or suspected strike, as some damage may have occurred.

There are a range of devices designed to provide surge protection for different types of equipment and it is essential that specialist advice is obtained before installation. Only electrical contractors with full scope registration or membership to work on commercial installations with the National Inspection Council for Electrical Installation Contracting (NICEIC), The Electrical Contractors Association (ECA), The Electrical Contractors' Association of Scotland (SELECT) or The National Association of Professional Inspectors and Testers (NAPIT) should be employed.

Mains surge protection devices should always be installed in accordance with BS 7671, the Institution of Engineering and Technology Requirements for Electrical Installations 17th Edition.

This is only a brief summary of a very complex subject. Specialist advice must always be sought before installing any electrical equipment and installation must only be undertaken by competent persons.

Advice from a lightning protection specialist should be sought where external electrical equipment, including its cabling, is to be installed within one metre of lightning conductors (including earth conductors) to determine if there is adequate separation or whether bonding is required.

The design of a lightning protection system should be carried out by a specialist such as a consulting engineer, preferably a member of the Association of Consulting Engineers, with experience in lightning protection systems.

Only specialist contractors with experience in this kind of work should be employed for the installation, maintenance and periodic testing of lightning protection systems, such as members of the Association of Technical Lightning and Access Specialists (ATLAS).

For details of ATLAS certified members in your area visit their website www.atlas.org.uk/find-a-member.asp

## Need to contact us?

For further advice Ecclesiastical customers can call our risk advice line on **0345 600 7531** (Monday to Friday 9am - 5pm, excluding bank holidays) or email us at **risk.advice@ecclesiastical.com** and one of our experts will call you back within 24 hours.

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