

# Lightning protection for churches

Churches have always suffered from the effects of lightning. Although approximately 80% of Anglican parish churches are thought to have a lightning protection system, some 90% of these are of the tower only type, comprising a single Franklin rod leading from the top of the spire or tower to an earth stake buried in the ground.



Consideration should be given to the installation of surge protection equipment.

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 earth by earth electrodes. Most existing systems, however, predate the recommendations of BS 6651 and have changed very little over the last 100 years.

Most churches will benefit from a lightning protection system, and in many cases a tower only system should provide an acceptable level of protection. A tower only system will provide a theoretical zone of protection based on a 45-degree angle from the top of the tower or spire to the ground. The higher the tower or spire relative to the length of the building, the greater the area of the church protected.

## What are the chances that lightning will strike?

Statistics indicate that a church with no lightning protection is about five times more likely to suffer structural strike damage than one with lightning protection. Furthermore, the risk of damage to electrical systems and equipment in unprotected churches has increased by around 50%.

Paradoxically, a lightning conductor will make a building more rather than less liable to attract a strike. However, its purpose is to direct the energy within a strike to earth where it can

be discharged safely. A strike to an unprotected building may still discharge safely for example down a rain-wet masonry surface; however, because the discharge is uncontrolled, there is a greater risk of structural damage to an unprotected building. Earthed metalwork such as wiring systems and piped services that inadvertently form part of the discharge path may also be damaged.

## Typical lightning damage to churches

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 copings and pinnacles mostly on the tower or spire, however, there is also a risk of fire. 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 a shutdown, malfunction or the complete burnout of electronic systems such as alarms, boiler controls, sound reproduction systems, computers, telephones and electronic organs.

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 a loss of a facility such as a fire alarm system, computer or telephone system.

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

Approximately six out of ten insurance claims for lightning damage to churches are for damage to electrical wiring and equipment rather than structural damage.

**Consideration should be given to the installation of surge protection equipment.**

There is a range of devices tailored for the protection of 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) 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 (IET) Requirements for Electrical Installations, Current Edition.

**Installation of new systems**

It is usual for a church-appointed architect or building surveyor to take the lead in these matters and to liaise between church authorities and other bodies, including English Heritage where appropriate.

A suitably qualified specialist installer will need to be appointed and all relevant statutory regulations, including those under the Health & Safety at Work etc. Act 1974 must be followed.

**Ecclesiastical policy**

After a period of running in parallel, from the end of August 2008, BS 6651 has been replaced by BS EN 62305. The new standard incorporates hundreds of changes and 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 12 months, the maximum interval under the new standard is four years; it may be convenient to reduce this to two and a half years to fit the quinquennial inspection cycle, with an annual visual inspection by a church officer. An inspection and test is also advisable following a strike or suspected strike as some damage may have occurred. Records of all inspections and tests should be maintained.

Installing a lightning conductor system is not usually a policy condition where cover against lightning damage is provided. However, installing lightning protection, as part of a risk assessment strategy, together with its ongoing maintenance and testing, not only serves to protect the building for future generations to enjoy, but should help to reduce claims costs in the longer term.

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.

The question on, to bond or not bond a metal bell frame to the nearest lightning down conductor is complex and a bespoke approach is required for each location. Specialist advice should be obtained by Churches from a competent Lightning Engineer. It is important that the requirements of the current British Standard for lightning protection are followed.

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, such as members of the Association of Technical and Lightning Access Specialists (ATLAS).

### **Risk Management Advice Line**

If you would like to speak to someone about protecting your church, call our Risk Management Advice Line on

**0345 600 7531** (Monday to Friday, 09.00 to 17.00 - excluding Bank Holidays)

Or email us at **[risk.advice@ecclesiastical.com](mailto:risk.advice@ecclesiastical.com)**

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