

FIRE RISK

Geraldine O'Farrell

FIRE MUST be considered the biggest risk to all buildings.

While all are at risk from fire to a lesser or greater extent, some are more vulnerable than others, and our historic churches are often among the more vulnerable, especially if left locked up and unsupervised during the day.

Like all hazards, fire can be mitigated but occurrences such as lightning storms, deliberate acts of arson and poorly supervised building works can often circumvent the most careful actions and systems put in place by the custodians of these heritage buildings.

In this article we will look at causes, preventative actions and methods of planning to minimise the resulting damage, should a fire occur.

MITIGATING THE RISK

Following any fire, the investigations carried out by the local fire and rescue service to determine the causation often discover varied and unpredictable reasons in addition to the more obvious. These can include:

- lightning strikes to the building without appropriate protective tape or surge systems
- faults in electrical wiring or equipment (heaters, Christmas lights and other temporary lighting systems, and organ blowers for example) caused by damage, lack of maintenance, infrequent servicing or overloading of the system
- unauthorised hot works during maintenance or refurbishment works
- portable LPG heaters or any form of supplementary portable heating.

A wide variety of combustible items can contribute to the fire load such as stacked chairs or pew cushions, runners, hassocks and kneelers that have not been treated to make them less flammable and are stored together, often in one unlocked or unsupervised location. Inappropriately stored flammable liquids, Christmas trees and other season decorations, votive candles and matches are also common.

Taking each of the above causes of a fire, here is what can be done to reduce risk.



The aftermath of the fire at St Mary's Beachamwell (Photo: Domenico D'Alessandro)

Lightning strikes

Without a lightning protection system (LPS) to protect a building's structure and mitigate the risk of a fire breaking out, churches and other buildings risk having their historic fabric severely disturbed or destroyed. Some believe the fire that broke out in York Minster in 1984, and badly damaged the transept roof, was caused by a lightning strike.

A guidance book and design and installation details on how best to protect a church or any historic building from damage can be found on the Historic England webpages, along with a recording of the Historic England 'Technical Tuesday' webinar on this topic (see <http://bc-url.com/hc23-gf1>).



A spark from welding caused the blaze at St Mary's church in Beachamwell, Norfolk (Photo: Norfolk Churches Trust)



Lightning above a rural church (Photo: Philippe Clément, Alamy)

Surge protection

This type of protection should be used in conjunction with an LPS. It is installed to prevent the electronic equipment within the building being damaged by surges of energy. Even if the building does not sustain a direct strike, a localised discharge to earth can still result in damage to sensitive electronics equipment such as fire alarm panels, PA systems, computers, lighting controls and dimmers. This is due to the very high voltages and currents involved in lightning storms that can travel through the ground, along metal pipework and cables, into a building from a remote strike location. A building is not protected from this sort of damage and potential for fire without surge protection. A common misconception is that an LPS will prevent this from happening.

In simple terms a surge protective device is a switch that senses and discharges the surge to earth. These devices can be installed in numerous places from the main incoming supply to the local socket outlet. Historic England's guidance can be found online (see <http://bc-url.com/hc23-gf3>) and by referring to the booklet referenced above.

Electrical wiring and equipment faults

Unfortunately, a lot of churches still have wiring installations that contain very old cabling, accessories and switchgear, which are still in use. This along with a lack of system maintenance and inspection is a disaster waiting to happen.

An electrical installation condition report (EICR) ought to be produced at least every five years

and any faults actioned according to the categorised severity:

C1 means that there is a danger present, a risk of injury and immediate remedial action is required

C2 means this part of the installation is potentially dangerous and further investigation is required without delay

C3 means that improvement is recommended.

In addition, anything plugged into a 13 amp socket outlet should be safety tested at least once a year. This includes all electrical equipment used in a church, from a computer to a refrigerator. Portable appliance testing or PAT, as it's known, checks to ensure there are no safety defects on the item in question. This can sometimes be done visually or by using specialised test equipment.

As with fixed wiring testing this must be done in accordance with British Standard BS 7671 and by a suitably qualified member of either the Electrical Contractors Association (ECA) or The National Inspection Council for Electrical Installation Contracting (NICEIC).

Should the church have a conventional organ with a blower, it is essential that this piece of equipment is regularly serviced by a suitably qualified professional. As the name suggests, an organ blower is a fan which these days is usually electrically driven, although in the past they were hand-cranked. Most newer blowers have sealed bearings that require very little in the way of regular maintenance, but older units require annual oiling of the bearings to prevent overheating and occasional cleaning of the motor armature.

Overloaded electrical equipment and circuitry

As a lot of churches are insufficiently supplied with 13 amp sockets to deal with modern power requirements the use of multi-way adaptors often cause a circuit to become overloaded. In situations like this, the best and safest outcome is that the circuit breaker on the circuit affected will trip and shut off until the load is reduced or the fault rectified.

Should the power installation need modernisation there is a chance that the circuits are not protected by circuit breakers but by fuses. These are less sensitive and if they are of the rewirable type regularly used in the 1950s and 60s, then they could be fitted with incorrectly rated fuse wire. Either way, a common overload situation will not be dealt with as quickly by the fuse so there is the potential for a fire. There is also the inconvenience issue as when a fuse blows it must be replaced before power is restored. With a circuit breaker, once the reason for the trip has been established it is easy and quick to reset the device.

Temporary lighting, heating equipment and hot works

As happened with the major fire at Windsor Castle in 1992, when work of any description is being carried out within a building it is often necessary to use temporary lighting and heating.

Although far less likely to occur now with the predominance of LED lighting, in the past portable site lighting often employed lamps that would get very hot. As in the case of Windsor Castle, when lighting is left too close to flammable materials such as curtains it can cause a fire.

The same issues of vigilance must be applied to temporary heaters used on buildings sites. No temporary services equipment must be left unattended or in a location likely to cause a fire. Additionally, all these types of apparatus must be switched off and isolated at the end of the working day.

All projects involving what is known as ‘hot works’, such as the use of a blowtorch in lead working, must be risk assessed as a minimum and a hot works permit issued daily before any work is carried out. Historic England has produced an advice note – see <http://bc-url.com/hc23-gf4> – and the Lead Sheet Association and other bodies have introduced a policy of removing hot works from buildings wherever possible.

Portable heaters

Any types of portable heaters, such as Calor gas and electrical heaters, pose a risk. The former also carries the associated risk of carbon monoxide poisoning.

These forms of heating should never be left turned on and unattended. Also, they should never be located close to anything, especially if it is constructed of a flammable material such as furniture and curtains. If a portable heater is essential, then it should carry a British or European safety mark, secured wherever possible to a wall to prevent it falling over and never moved while it is turned on.

Another point to remember is that LPG heaters produce a lot of moisture as a by-product and long-term use of this can have a detrimental impact on delicate or susceptible historic artefacts. Storage of spare gas cylinders should not be within the main body of the church but in a separate and suitable lockable area.

All electrical heaters should be in good condition, with no obvious sign of damage to the lead and with a correctly fused plug top. They must be located where they cannot be accidentally covered.

REDUCING INTERIOR FIRE LOAD

Storage, or the lack of it, is a major issue for a lot of churches and so inappropriate storage areas are often used due to a lack of any other solution. As more and more churches move away from fixed pews to moveable chairs and a flexible internal space, storage for these types of furnishings can be potentially problematic and hazardous.

An example unfortunately occurred in 2001 at Peterborough Cathedral when an arsonist took advantage of the stacked plastic chairs located within the main

body of the building and not in a secure lockable cupboard. The fire was started by placing a votive candle within the chair stack. The chairs eventually caught fire, and had they not been located near a window that the local fire and rescue services were able to use to get fire hoses onto the blaze, the cathedral would likely have been destroyed or far more badly damaged than it was.

It is essential that internal fire loads be kept to a minimum and item storage is made secure and as far as possible, fitted with a lockable, fire resistant door.

Votive candles and ignition sources such as matches are an obvious way in which both accidental and deliberate fires can start, as at Peterborough Cathedral. They should never be available for use by visitors unless the church is supervised and for the rest of the time they should be locked away. During supervised hours and when services are held, the number of spare candles available within the church should be kept to a minimum.

Good general housekeeping will also help by keeping rubbish and waste to a minimum. The author’s own Victorian church was badly damaged by a fire which was a by-product of a burglary. It later transpired the wastepaper in the vestry bin was accidentally set alight by a discarded cigarette from one of the intruders.

Christmas trees and decorations

Unfortunately, seasonal decorations are known to cause fires so they must be located carefully so as not to block or interfere with exit routes out of the church. Festive lights must also be in good working order with correctly fused plug tops and

should never be left switched on when the church is not occupied.

It is also advisable not to allow visitors to the church to gain access to the Christmas tree or its decorations. Barriers or locations where the tree is out of the public’s reach should be used. If the tree is artificial then it must be made of suitable fire rated materials. If natural then it must be kept moist and all pine needles that have dropped must

The front page of an electrical installation condition report



A carbon dioxide extinguisher for electrical fires stationed next to the organ in St Mary’s, Tisbury (Photo: Jonathan Taylor)



A smoke-blackened consumer unit in the parish church of Bibury, Oxfordshire (Photo: Dan McNaughton)

be regularly cleared away to prevent these building up and creating another potential fire load.

MITIGATING DAMAGE AND LOSS

The installation of fire detection and extinguishing systems will diminish any damage and loss in a fire situation, as will the creation of emergency or salvage plans, including arrangements and directions for fighting fire and rescuing important items such as paintings and historic artefacts.

Fire detection and extinguishing systems

Detection systems come in a variety of complexities and should be designed to suit the types of services (for example, is incense involved?) and the non-ecclesiastical uses to which the church is put. The main advantages of installing a fire detection system are as follows. It gives out-of-hours protection and warning of an incident when the building is unoccupied. It provides protection for both the building and the people using it (life safety), including bell ringers and organists who may practice out of hours or have audibility issues. And it provides information on where the fire has broken out (if an addressable system is installed) to aid the local fire and rescue service.

Historic England's website and their 'Technical Tuesday' series of online webinars have further guidance on fire alarm systems and their individual components – see *Historic England guidance* below. In addition, all churches should have at least two portable fire extinguishers; one with water for putting out organic material fires and a carbon dioxide extinguisher for electrical fires. These should be checked and refilled annually. It is important that this equipment is easy to find and that people know how to use it.

Emergency salvage planning

Creating an emergency salvage plan gives the church the opportunity to liaise with the local fire and rescue service before any incident occurs. Doing this will ensure that the fire service is familiar with the church, the best access routes, where water hydrants or supplies are located, and which artefacts are to be removed.

Ideally the salvage plan should include clear individual descriptions of each item, a photograph of each artefact, a location map of where it is normally kept and the best way to safely remove it.

As a lot of historic churches contain paintings, hatchments, manuscripts and other key religious and historic artefacts,



All Saints' in Mackworth, Derby which was almost completely destroyed by arson in 2020 (Photo: Leon Walsh)

it is important that an order of priority is established so that the most important are removed first. Importance can be based upon monetary value or heritage or both.

The plan can also include a list of all people to be contacted in the case of an emergency and their contact details. It is important that this is checked regularly to ensure it is kept up to date. Guidance on how to construct a plan can be found on the Historic England webpages.

Although it is recognised that heritage churches have a limited scope for adaptation and alteration, there is much that a parochial church council can do to mitigate risk and opportunities for malicious acts. Although the risk of fire is small it is always advisable to take as many precautions as possible to prevent accidents and arson taking place. Good housekeeping and sensible safety measures will greatly help in reducing potential hazards.

Historic England guidance

Fire Alarms for Historic Buildings,
<http://bc-url.com/hc23-gf5>
Designing, Installing and Maintaining a Fire Detection and Protection System,
<http://bc-url.com/hc23-gf6>
Webinar on Fire Alarm Systems in Historic Buildings:
Installation and Design,
<http://bc-url.com/hc23-gf7>
Emergency Planning Advice,
<http://bc-url.com/hc23-gf8>
Emergency Response Plans,
<http://bc-url.com/hc23-gf9>

GERALDINE O'FARRELL

DipConHistEnv(RICS) BA(Hons) CEng FCIBSE FIET FSLL is one of Historic England's senior building services engineers. She has worked for HE for 24 years and in the construction industry for over 50. She is the author of HE's guidance on lighting, lightning and surge protection, fire protection and battery storage.