



Church safety solutions

October 2007

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Coming soon:
Part Three: November—
Deterring theft and vandalism

Part Two of a three-part series . . .
Avoiding the "big three" preventable property losses:
water damage, fire, theft

Protecting your church from the devastation of fire

We read about fires in the news nearly every day, despite the fact that most people have been taught the basics of fire safety. In fact, fires and burns are the fifth most common cause of unintentional injury deaths in the United States (Center for Disease Control - 2005). While the number of fire-related fatalities and injuries has gradually declined over the past several years, preventable fires continue to pose a public health risk.

According to the Center for Disease Control, in 2005 . . .

- A fire related death occurred nearly every two hours.
- A fire related injury occurred every 29 minutes.
- Fire departments responded to 396,000 home fires in the United States.
- Most victims of fires die from smoke or toxic gases and not from burns.

Specifically for churches, fires account for significant losses, as can be seen by the following U.S. Fire Administration data:

- An average of 1,300 church fires are reported each year, causing \$38 million in property loss.



- Arson comprises 25 percent of church fires.
- Thirty percent of church fires result from mechanical failures relating to faulty wiring and improperly functioning heating systems.
- Sixty-five percent of churches that reported fires had no smoke alarms and 96 percent had no sprinkler system.
- Stoves account for an additional nine percent of equipment involved in church fires.

Protecting your church from the devastation of fire *(continued)*



How does a fire start?

Fire is a very rapid chemical reaction between oxygen and a combustible material, which results in the release of heat, light, flames and smoke. In order for a fire to start or burn, the following elements must be present at the same time:

- Oxygen to sustain combustion
- Heat to raise the fuel to its ignition temperature
- Fuel or combustible material

Fire prevention basics

Preventing fires in your church starts with the elimination or control of conditions or substances that could ignite or fuel a fire. Maintaining a clean and organized church is a key element of fire prevention. Church leadership should establish a fire prevention strategy, which includes at a minimum the following elements:

1. Preventive maintenance program for electrical systems:

Electrical systems and equipment, including wiring and switches, are major sources of fire ignition sparks or heating hazards. Overloaded, damaged or flawed electrical circuits generate heat in wiring that can reach a temperature sufficient to ignite adjacent materials. Churches should use only licensed and insured electricians to perform electrical work. Also, use electrical extension cords and power strips only for temporary power. You should also consider having your electrical panels scanned using infrared technology, where a thermographic camera is used to take pictures in an infrared spectrum. A good infrared survey can help determine "hot spots" in an electrical system that can lead to

overloading a system, tripping breakers and even fire. Contact a licensed and insured contractor to avoid costly and unanticipated repairs or potentially dangerous conditions.

2. Preventive maintenance program for mechanical systems such as heating and ventilation:

Heating and ventilating systems should be inspected by a licensed and insured contractor at least annually or more often depending upon the manufacturer recommendation. The inspections serve several purposes, but primarily will help ensure that the systems are running safely, efficiently and cost effectively.

3. Property fire inspection and corrective action program:

One simple strategy that can be used to prevent fires is a self-inspection of the interior and exterior of all church property, regardless of whether the property is owned or leased.

4. Sprinkler system testing and maintenance

How you test and maintain your sprinkler system, including frequency, depends largely



Annual inspection should be conducted by a licensed and insured contractor in accordance with the local municipality fire and building codes to ensure functionality of the system.

Fire prevention basics *(continued)*

on your exposure and local building and fire codes. Some functions can be conducted by church personnel, while others should only be performed by a licensed and insured contractor. Tests you or your contractor should be conducting include the following:

Inspectors fire alarm test to ensure that a signal is received by the central monitoring station when a sprinkler system has flowing water or a smoke alarm detects smoke (if monitored).

Two-inch drain (main drain) test to measure water pressures in the sprinkler system when the drain valve is open and flowing and when closed.

Weekly fire pump churn test to maintain the functionality of an installed fire pump. Fire pumps boost the volume of water that will flow through the sprinkler system. Not all properties have fire pumps.

Annual inspection should be conducted by a licensed and insured contractor in accordance with the local municipality fire and building codes to ensure functionality of the system.

Installation, inspection and maintenance of fire extinguishers. The type, installation and placement of portable fire extinguishers depend largely on your type of exposures and local building and fire codes. For instance, if your church does not have an industrial kitchen that is used for large events, several well-placed 15-pound ABC type fire extinguishers may be adequate to meet local codes and protect your property. Contact your local fire department's non-emergency number or city building code department to find out what is required for your church.

Portable fire extinguishers apply an extinguishing agent (carbon dioxide or water) that will either cool burning fuel,

Preventing fires in your church starts with the elimination or control of conditions or substances that could ignite or fuel a fire.



Fire prevention basics *(continued)*

displace or remove oxygen (ABC powder), or stop the chemical reaction (Halon) so a fire cannot continue to burn.

When the handle of an extinguisher is compressed, the agent is sprayed out the nozzle. A fire extinguisher works much like a aerosol can. Portable fire extinguishers should be inspected every month to ensure that the tamper tie and safety pin is present and undisturbed and that the gauge indicating pressure is in the green or safe zone. Fire extinguishers should be inspected by a licensed and insured service company at least annually or after discharge. Typically, the fire extinguisher inspection tag indicates the expiration date is good for one year from the date punched or stamped. For more details about testing requirements, including the required six-year hydro-static test for certain types of extinguishers, talk to your local service provider.

Ideally, all church kitchens should consider installing an Underwriter Laboratory Listed 300 fire suppression system, particularly when the church cooks with a deep fat fryer or if you do stovetop frying or cooking more than once a week. Many new appliances require less energy because they are better insulated and help cooking oils retain heat longer. If fire occurs, however, this same feature can keep oils above the auto-ignition point longer than in older appliances. The oils also contribute to the increased fire hazard. Traditionally, animal fats were used as a cooking medium. Today, many cooking operations have changed to vegetable oils because they offer greater health benefits. These oils, however, are typically used at higher cooking temperatures. Auto-ignition temperature is higher as well, making fires more difficult to extinguish.

5. Installation, testing and maintenance of smoke detectors:

The requirements for the installation of smoke alarms/detectors may vary from city to city. Contact your local fire department's non-emergency number or city building code department to find out what is required for your church. Zurich Services Corporation recommends that all churches be protected with smoke detectors with off-site, third-party monitoring. A licensed and insured electrical contractor should perform the installation of a hard-wired detector. Once installed, the detector should be tested monthly or more frequently as required by the manufacturer. Install fresh backup batteries every year or more often if no signal is produced during testing. The amount of time that churches are left unoccupied combined with the combustibility of their typical contents makes them vulnerable to church fires

6. Installation and maintenance of lightning rods:

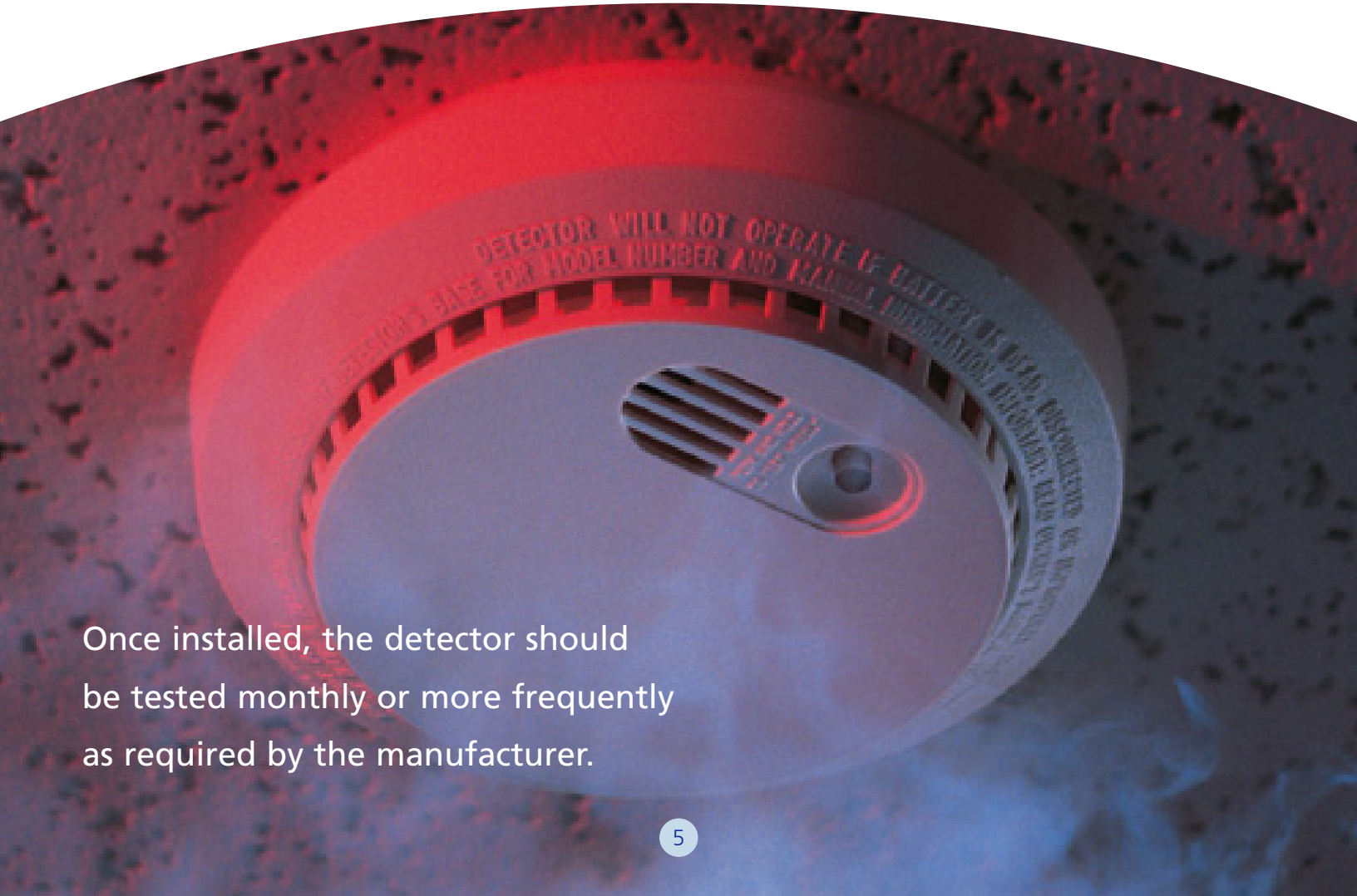
Lightning rods, now known as air terminals, are used to conduct electrical current generated by storms through a path of least resistance where it will terminate safely into the ground, away from the property, internal structures and mechanical/electrical equipment (breakers, computers, phones, HVAC). Grounding equipment should be installed by a licensed and insured contractor. Ground conductors should not be painted as this will decrease the rod's ability to direct the current. If you are in a lightning prone area, Zurich Services Corporation recommends that the system carries the UL Master Label and installed per the NFPA code #780 or to the Lightning Protection Institute's certification requirements.

Fire prevention basics *(continued)*

7. Fire extinguisher training for key church personnel and volunteers:

Church leaders should decide whether church personnel should be directed to fight a small fire with a portable fire extinguisher or simply evacuate the building. A well-trained employee with a portable fire extinguisher can often quickly extinguish small fires at their early stages. However, to do this safely, the employee must understand the use and limitation of a portable fire extinguisher and the hazards associated with fighting fires. Evacuation plans that designate or require some or all of the employees to fight fires with portable fire extinguishers increase the level of complexity of the plan and the level of training that must be provided employees.

If you decide to make fire extinguishers available for employee use, it is the church leadership's responsibility to educate employees on the principles and practices of using a fire extinguisher and the hazards associated with fighting small or developing fires, as directed by the Occupational Safety and Health Administration (OSHA) code [29 CFR 1910.157(g)(1)]. This education must be provided annually and when a new employee is first hired OSHA [29 CFR 1910.157(g)(2)].



Once installed, the detector should be tested monthly or more frequently as required by the manufacturer.

Sample fire inspection

Fire safety inspections can be effective in preventing fires on church properties. No one form can be designed to fit all conditions, so we urge you to use this sample as a guide in developing your own form. The suggested frequencies are recommended minimums. Some situations will call for more frequent inspections. Additionally, all floors and areas of the church should be considered when conducting the inspection.

No.	Area/Condition to Observe	A = Acceptable U = Unacceptable	Corrective Action (Include Person responsible and anticipated date of correction)
1	All Exit Corridors are free of storage items and furniture allowing free access to exits.		
2	All Stairwells are free of combustible materials and storage items.		
3	All Fire Extinguishers are accessible, show a charge and have the inspection tag, security zip tie and pin installed.		
4	All Exits and directional signs are present and illuminated.		
5	Building Exit Doors are free of key operated deadbolts, open easily without special knowledge and allow free access to the exterior of the building.		
6	Office areas are organized and permit accessibility to fire exits.		
7	Kitchen areas are clean and allow free access to exits. Range hoods are cleaned regularly and free of grease build-up.		
8	All main electrical rooms are free of all storage and combustible materials.		
9	Consider having your electrical panels scanned using infrared technology tested annually.		
10	Three feet clearance is maintained in front of all circuit breakers.		
11	Laundry dryers are vented to the exterior of the building through metal conduit.		
12	The heating system and water heater are free of storage materials and are inspected by a licensed and insured contractor at least annually.		
13	Paint supplies and flammable liquids are stored in flame proof storage containers and/or cabinets.		
Automatic Sprinklers/Fire Pumps (where available):			
14	Sprinkler heads show no signs of damage, paint, or hanging storage.		
15	Inspectors fire alarm test – designed to ensure that a signal is received by the central monitoring station when a sprinkler system has flowing water or a smoke alarm detects smoke (if monitored).		
16	2-Inch drain (main drain) test – used to measure water pressures in the sprinkler system when the drain valve is open and flowing and when closed.		
17	Weekly fire pump churn test – used to maintain the functionality of an installed fire pump. Fire pumps boost the volume of water that will flow through the sprinkler system. Not all properties have fire pumps.		
18	Annual inspection – completed by a licensed and insured contractor in accordance with the local municipality fire and building codes to ensure functionality of the system. Churches should consider working pro-actively with their local fire department for planning assistance and fire evacuation/ response drills.		

Lessons of Loss

The following lessons of loss have been recreated from real events.
Certain details were changed to protect the anonymity of those involved.

Damaged electrical conduit causes church fire

A passerby observed smoke billowing from a church and called the local fire department. Fire fighters responded to the call, but were unable to save the building. Initial reports from the fire department indicated that the fire likely started at an electrical panel. Adjusters responded shortly after the fire had been extinguished and confirmed that the fire had caused a complete loss to the property and its contents.

Church leadership told investigators that several different electrical companies had completed work on the church over the past several years and most recently within the past three weeks. They also told investigators that they believed that they had purchased a service contract for central monitoring with an alarm company, but the fire department never received an alarm system call.

Zurich requested additional resources to determine if work performed by the electrical contractors had caused the devastation. Fire

investigation experts determined that the fire started at two junction boxes and conduit that supplied power to the HVAC, which had sustained heavy electrical arcing. Based on the arc damage discovered on the conduit, the electrical engineer surmised that the cause of the fire was an electrical failure in the conduit caused by either physical damage or by water getting into the conduit.

Church leaders hired a contractor to rebuild the church. The contractor found that the fire damage to the support beams of the building was too extensive to support renovation and had to demolish the remaining building before reconstruction could begin.

Lesson Learned: The fire alarm system should have been tested monthly, which could have ensured that the signal would have been received sooner. The church had hired several electrical contractors, but lost the records in the fire making it difficult to determine who serviced which part of the property. An inspection process that might have spotted the damaged conduit had not been established.

References

Zurich Risk Topics:

Maintenance and Testing of Fire Protection Systems – P1, September 1997

Fire Safety Inspection - 2-6.003, September 2000

Occupational Safety and Health Administration (OSHA):

http://www.osha.gov/SLTC/etools/evacuation/portable_relation.html

http://www.osha.gov/SLTC/etools/evacuation/portable_about.html#Operation

Center for Disease Control (CDC):

Fact Sheet - <http://www.cdc.gov/ncipc/factsheets/fire.htm>

U.S. Fire Administration TOPICAL FIRE RESEARCH SERIES:

<http://www.usfa.dhs.gov/downloads/pdf/tfrs/v2i7-508.pdf>

http://www.usfa.dhs.gov/citizens/all_citizens/home_fire_prev/alarms/

If you have any questions or if you would like to receive electronic copies of any of the referenced materials above, please write to us via e-mail at: churchsafety.solutions@zurichna.com

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