



ALABAMA MUNICIPAL INSURANCE CORPORATION MUNICIPAL WORKERS COMPENSATION FUND, INC.



Loss Control Division

Lightning Protection for Your Municipality

Lightning Facts

Clouds store both positive and negative electrical charges. Updrafts in the clouds separate the charges. Positive charges accumulate at the top of the cloud. Negative charges accumulate in the lower portion of the cloud and interact with charges in the ground. When sufficient charges accumulate so that release is imminent, the condition creates a lightning bolt. A lightning bolt is a spark that carries the charges stored in the clouds. The separation of charges in the ground acts as an amplifier. It allows a release of charges and a lightning strike to the ground.

Many people believe a lightning strike is a single bolt; however, it is actually a string of several bolts. On average, up to 25 strokes may occur in a strike. Typical lightning strikes carry the equivalent of 2.9 billion kilowatts of power. This amount is six times the total generating electric capacity of the United States.

Lightning causes more deaths and property loss than tornadoes, hurricanes, and floods together. The National Center for Health Statistics estimates that each year lightning will cause the death of 240 Americans and injure another 1500. On average, lightning kills two Alabamians each year. Most injuries or losses happen to persons or objects located several hundred feet from a lightning strike.

The Lightning Protection institute conducted a study that demonstrates that:

- 32% of lightning strikes hit roofs and projections such as satellite dishes or chimneys;
- 29 % of lightning strikes hit overhead power lines and phone lines;
- 29% of lightning strikes hit television antennas; and
- 10% of lightning strikes hit trees near structures.

On average, lightning strikes cause 30% of the church fires and at least 18% of lumberyard fires in the United States annually. They also cause significant losses to more than 18,000 houses and 12,000 other buildings.

In addition to direct losses such as property damage to buildings, a lightning strike may result in the indirect losses that often accompany the destruction or damage of buildings and their contents. For example, municipalities rely upon the integrity of their structures as they provide services to their communities. A stroke of lightning to an unprotected building that houses the police or fire station may result in an interruption of vital services to the community. The consequences of such an interruption can range from the public's loss of confidence to a citizen's death when a department is unable to respond to an emergency call.

NFPA 780

Since lightning frequently causes property damage, municipalities should evaluate the need for lightning protection. They should consult the National Fire Protection Association Code 780 (NFPA 780) to determine the need for lightning protection for each municipal structure. NFPA 780 includes a Risk Assessment Guide (Appendix H) to assist in this determination. Municipalities should provide lightning protection for those structures having a risk index of four or greater according to the NFPA 780 Risk Assessment.

Municipalities located in geographic areas that are subject to frequent or to severe thunderstorms need lightning protection. Being in an area with few but extremely severe thunderstorms may be more significant than being in an area with more frequent, but milder storms. Other factors to consider are:

- Topography – that is, on flat land, on a hillside or hilltop, on a mountain top.
- Relative location – the structure's position in relation to taller buildings or short buildings in the area as well as to adjacent structures or terrain.
- Type of structure ~ that is, single family dwelling, municipal services building, library, etc.
- Building height, construction, and design.
- Occupancy – the building's use and how many people typically are in it.
- Contents- residential furnishings, flammable liquids or gases, historical contents, etc..
- The presence of highly-sensitive solid state electronics such as monitors, computers and fax machines.
- Special Risks such as the use, handling or storage of hazardous or flammable materials.

LIGHTNING PROTECTION

The theory of lightning protection is to provide a means by which a lightning discharge may enter or leave the earth without damaging the property protected. The three major components of a lightning protection system are air terminals, conductors, and grounding.

Lightning protection systems can be installed fully exposed on the exterior of a building, or partially concealed or fully concealed within the structure. A qualified contractor should design and install the system.

ELECTRICAL PROTECTION SYSTEMS

A lightning protection system installed to protect a structure from direct strokes does not protect against possible voltage surges on electric service conductors and TV or radio antenna systems. Municipalities should consider surge arresters or electrical protection systems to protect the electrical services to the buildings. Article 280 of NFPA 70, National Electrical Code, covers the installation of surge arresters on power and communication lines.

MAINTENANCE AND INSPECTION

Proper maintenance of lightning protection systems is essential to effective protection. Municipalities should give attention to ground connections, as rods may break or become corroded at or just below the ground level where the damage is not apparent. Damage may occur to the components of the system due to additions or repairs to the building. Roofers and other general contractors have been known to disable the protection unit during construction activities. Deterioration or mechanical damage to the components of the lightning protection system that go undetected and do not get repaired result in an unprotected structure.

NFPA 780 recommends periodic inspections of lightning protection systems to assure their integrity. At a minimum, municipalities should conduct inspections:

- After installation.
- Annually - Visual Inspection, including points and grounding connections.
- Every five years – Thorough inspection.
- Whenever the municipality alters the structure.
- After a known lightning discharge to the system.

The frequency of such inspections may vary and depends upon such factors as:

- classification of structure or area protected;
- the level of protection the systems affords;
- the immediate environment (corrosive atmospheres);
- the materials from which the components of the protection system are made;
- the type of surface to which system components are attached.

In addition, NFPA 780 recommends that inspections and testing take place at differing times of year to assure the effectiveness of the system during various seasons.

Suggested Municipal Structures to Evaluate:

Service buildings such as fire, police, water & sewer

Power generating stations

Playgrounds, picnic areas, ball parks & other open areas

Hangars

Libraries, museums, & historical structures Golf & other
recreational shelters

Water towers & cooling towers

Places of assembly such as schools & recreational facilities



Important Phone

Number Alabama Municipal

Insurance Corporation

334/262-2566

Note:

This document is not intended to be legal advice. It does not identify all the issues surrounding the particular topic. Public entities are encouraged to review their procedures with an expert or a competent attorney who is knowledgeable about the topic.