



Lightning Protection...

Comfort in a

***TIME OF STORM***



## *THE POWER OF LIGHTNING*

Lightning is a unique and powerful form of electricity. A typical lightning bolt contains 30 million volts of destruction.

Lightning is responsible for deaths, injuries, and destruction equivalent in magnitude to those caused by all other natural disasters combined, including floods, hurricanes and tornadoes.

Today's buildings are more vulnerable to lightning damage due to increases in utilities, high cost electronic equipment, and metal building components.

## *LIGHTNING CONTROL*

Since the invention of lightning rods in the mid-18th century, the technology of lightning protection has evolved to afford proven protection against lightning loss. Today's Lightning Protection Systems are specifically designed to protect you and your family, using technology in compliance with U.S. Safety Standards.

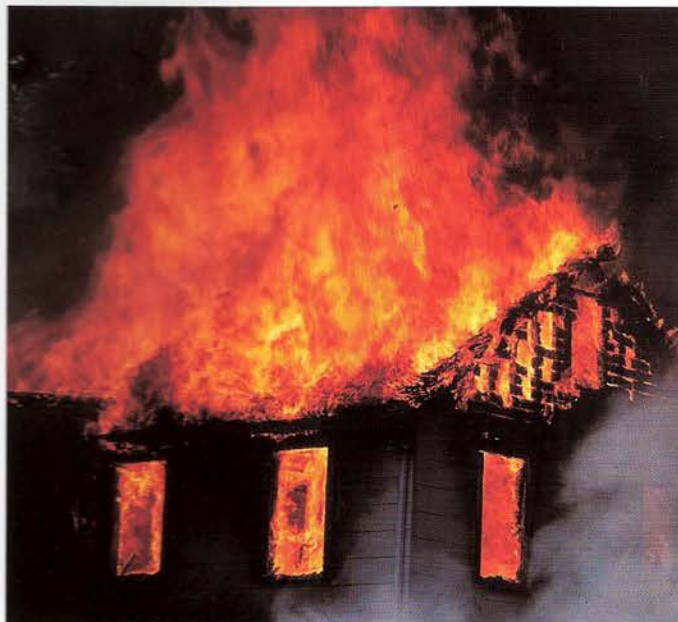
A Lightning Protection System may be complemented with surge suppression, custom tailored to your needs.

## *PLAN OF ACTION*

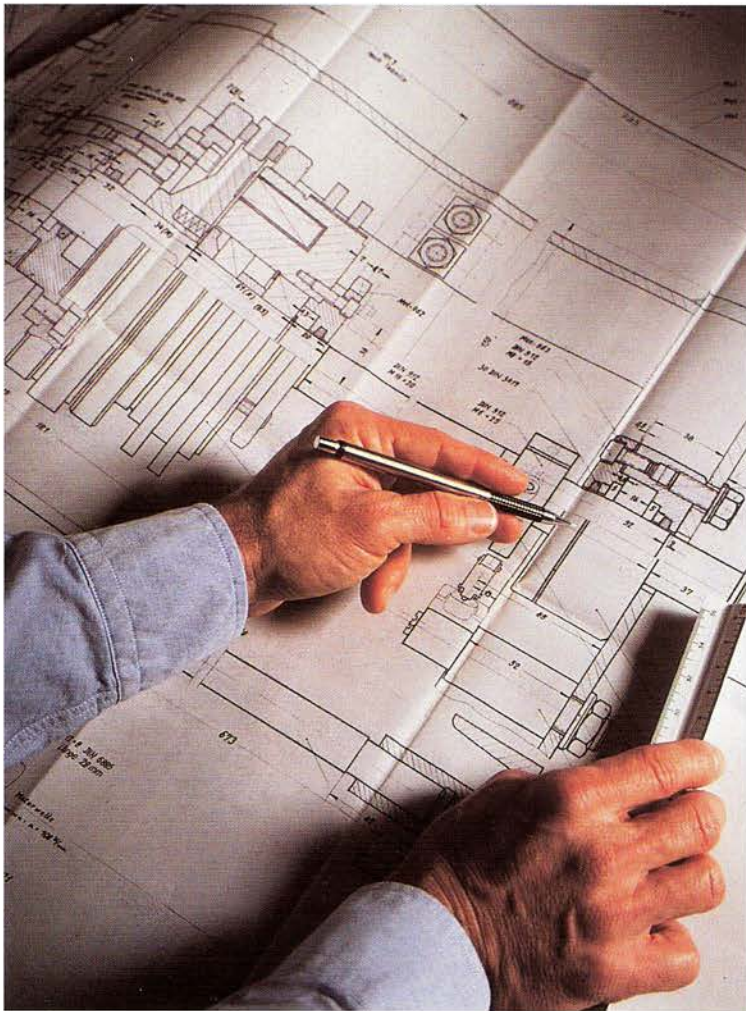
The Lightning Protection System is custom designed for each building prior to installation. It can be concealed during construction, or carefully semi-concealed on existing homes. Systems may be specifically designed to protect a wide range of architecture without compromising aesthetics.

## *QUALITY ASSURANCE*

A Lightning Protection System gives you and your family peace of mind and increases the value of your home. A system which meets all U.S. Safety Standards and complies with all requirements for receipt of Underwriters Laboratories U.L. 96-A Master Label Certification, can be designed for your home.







**Q. Our home is grounded; doesn't that protect us?**

**A.** No; a house may be grounded to assure electrical safety; however, grounding is not intended to prevent lightning damage.

**Q. Our antenna is grounded; doesn't that protect us?**

**A.** No; an antenna is not designed to handle a lightning strike and, instead, allows dangerous current to enter the home.

**Q. Don't our trees protect our home?**

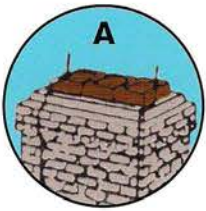
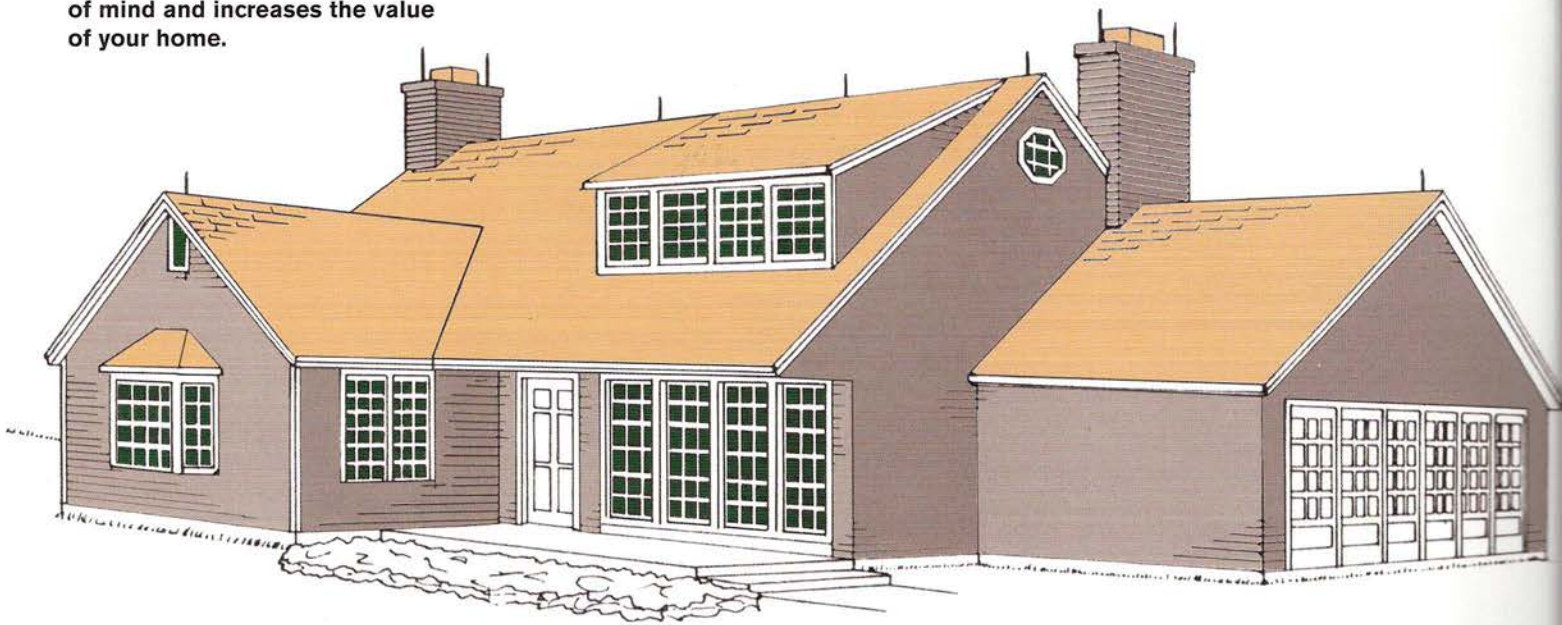
**A.** No; many times after trees are struck, the lightning sideflashes to the house.

Automatic Lightning Protection  
2272 Falcon Crest Court  
Mosinee, WI 54455  
Ph: 800-532-0990

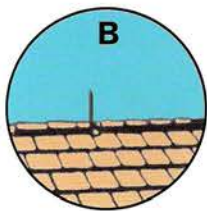
**Q. Don't lightning rods actually attract lightning?**

**A.** No; they neither attract nor repel lightning. In the event of a strike, a protection system simply creates a pre-determined path of low resistance to ground, facilitating a harmless discharge of the lightning strike.

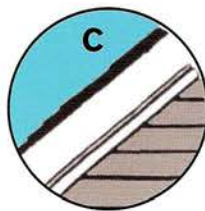
**A Lightning Protection System gives you and your family peace of mind and increases the value of your home.**



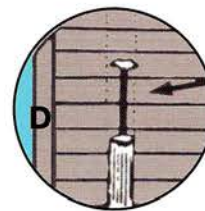
**CHIMNEY**  
Special inconspicuous chimney equipment is tailored to the exact contour of the chimney.



**AIR TERMINALS**  
Rear view of roof ridge showing course of conductor and air terminal on back side. Only slender 10" point is visible from front of home.



**SEMI-CONCEALED CABLES**  
Conductor cables are coursed semi-concealed on back side of ridges and on facer board at end of house.



**DOWNLEAD CABLES**  
Downlead cables are concealed *behind* downspouts.

Behind  
Downspout-  
Not  
Inside



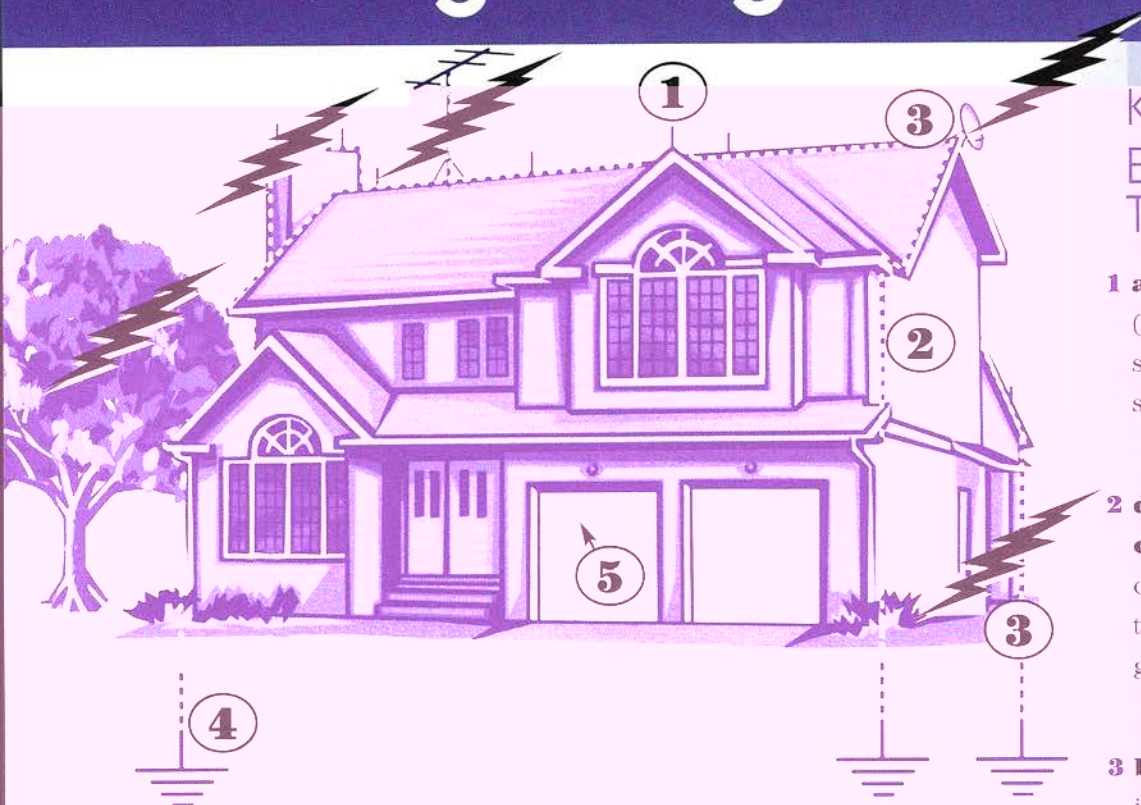
**GROUND**  
Cables are connected to 10' length ground rods out approximately 2'-5' from foundation.

### **THE MAIN COMPONENTS ARE:**

- **AIR TERMINALS** (lightning rods) must be installed on roof ridges, dormers, chimneys, ventilators, and other structures as required.
- **MAIN CONDUCTORS** are cables which interconnect the air terminals to grounds.
- **GROUND TERMINATIONS** are typically copper or copper-clad rods driven into the earth a minimum of 10 feet in depth.
- **BONDING CONNECTIONS** are made to equalize the potential between grounded metal objects.
- **LIGHTNING ARRESTERS** protect wiring from lightning induced damage.
- **SURGE SUPPRESSORS** may be added to further protect valuable electronic equipment.

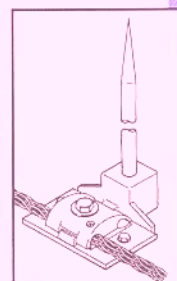


# The Nuts & Bolts of Lightning Protection

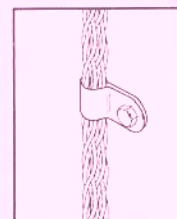


## Key Elements Of The System

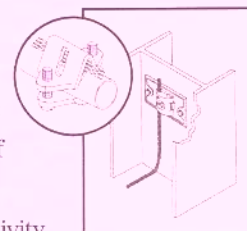
**1 air terminals**  
(lightning rods)  
spaced according to safety standards



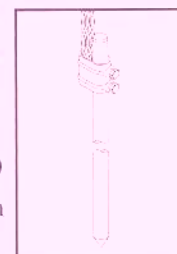
**2 down conductors**  
cables connecting the terminals to grounds



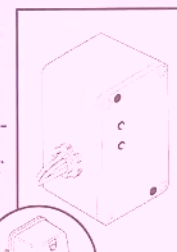
**3 bonding**  
joining metallic bodies and roof components to ensure conductivity



**4 grounds**  
minimum of two ground rods at least 10 feet deep into the earth



**5 surge arresters**  
installed at electrical panels and surge suppressors provided for in-house electronics



## How Lightning Enters

A single bolt of lightning can carry over 30 million volts of electricity.

⚡ A direct strike to a structure can rip through roofs and chimneys, explode brick and concrete and ignite fires.

⚡ An indirect or secondary lightning strike to a nearby tree or power line can induce unwanted surges into a home.

⚡ Lightning can also enter through phone, cable lines and computer modems, as well as roof projections such as weathervanes, antennas and satellite dishes.

⚡ Home extras like irrigation systems, invisible fences and electric gates can provide a low-resistance pathway for lightning's destructive energy.

## How the System Works:

A lightning protection system provides a specified path on which lightning can travel. The destructive power of the lightning strike is directed safely into the ground, leaving the home and occupants unharmed. A properly installed lightning protection system dissipates the dangerous electrical discharge to eliminate the chance of fire or explosion of nonconductive materials (wood, brick, mortar, tile, etc.).

All materials must bear the UL-listing mark for lightning protection installation in accordance with nationally recognized safety standards.



## Common Misconceptions!

1. "Lightning will strike a tree instead of my house."
2. "My home is safe because it is grounded."
3. "My home stands lower than my neighbors or other objects."
4. "My home is safe since it has never been struck before."
5. "I have plug-in suppressors for protection."
6. "My home is insured."
7. "Lightning never strikes twice."
8. "My neighbor has lightning protection and it will hit him before it hits me."
9. "My home is protected by overhead powerlines."
10. "Lightning rods attract lightning." (THEY DON'T!)
11. "IT WILL NEVER HAPPEN TO ME!"

## Do's and Don'ts for Lightning Safety.

1. Go inside. Take shelter in a home, large building or large metal frame building, all preferably protected with a UL Master Labeled lightning protection system.
2. Avoid areas where you will be the highest object. If caught in an open field, and your hair begins to stand on end (an indication that lightning is about to strike) drop down and crouch with hands on knees, rocking up on the balls of your feet. (The idea is to make as little contact with the ground as possible.) Never lie down flat or place your hands on the ground.
3. Certain locations are extremely hazardous during thunderstorms. Avoid lakes, beaches or open water, fishing from a boat or dock, riding on golf carts, farm equipment, motor cycles or bicycles. Take shelter in tunnels, subways, even ditches or caves if necessary, never under a tree!
4. If caught on high ground or in an open area, seek shelter in a low area and stay away from trees. A small grove of bushes or shrubs is preferable to lone trees.
5. To avoid side flashes (voltage from a nearby struck object) stay clear of fences or isolated trees. Keep away from telephone poles, power lines, pipelines or other electrically conductive objects.
6. Stay off the telephone! In your home, don't stand near open windows, doorways or metal piping. Stay away from the TV, plumbing, sinks, tubs, radiators and stoves. Avoid contact with small electric appliances such as radios, toasters and hairdryers.

## Is Your Property At Risk?

1. Does your computer have a phone line? Have you ever lost data from your hard drive due to a power surge? Are your phone lines and cable TV grounded?
2. Can your insurance fully compensate you for damaged property, lost possessions, personal injury or lifestyle inconvenience due to a fire or surge damage?

## The Bad News:

*Lightning losses in the homeowner sector are in excess of one billion dollars annually, representing five percent of all residential claims.*

*source: Insurance Information Institute*

## The Good News:

*Lightning is the only force of nature for which affordable and reliable protection is available.*

3. Do you currently have smoke alarms or a security system in your house? Do these make you feel safer and give you peace of mind?
4. Do you or someone in your household/business know CPR in the event someone is struck by lightning?
5. Do lightning and thunder scare you or your family. Does your pet sense the danger and hide during a storm?
6. How fast can the Fire Department respond to an emergency at your residence or business?
7. Are you certain that lightning hasn't already caused damage to your property? (Orange County Utilities in Florida recently learned that copper plumbing pipes are routinely struck by lightning, which can cause gradual pinhole damage.)

*To learn how you can protect your family, home or business, contact ULPA for a qualified representative near you.*



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<http://www.ulpa.org>





# LIGHTNING PROTECTION

SECURITY FOR TODAY'S RESIDENTIAL PROPERTIES







Direct strikes to buildings will commonly result in a fire that starts on the roof or in the attic. In this photo a brick home received a direct lightning strike to the roof resulting in a fire that caused \$600,000 in damage.

## LIGHTNING FACTS

# 20 Million

*The United States receives 20 million lightning strikes annually.*

# 50,000

*A lightning strike can generate temperatures in excess of 50,000 degrees Fahrenheit.*

# 15%

*Lightning is the cause of 15% of all fires in wood shingle buildings.*

# 28%

*The cost of insurance claims for lightning damage increased 28% from 2004-2008.*

**"AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE"**

*Ben Franklin, inventor of lightning protection*



## Why risk?

# A LIGHTNING STRIKE TO AN UNPROTECTED HOME CAN BE CATASTROPHIC.

A single bolt of lightning can carry over 30 million volts of electricity. Lightning can rip through roofs, explode brick and concrete and ignite fires. In addition to causing structural damage, a single bolt of lightning can wreak havoc with computers, electronic equipment and appliances.

Every year in the United States the number of homes struck by lightning increases. According to the Insurance Information Institute, residential lightning losses exceed a billion dollars annually and represent close to five percent of all residential insurance claims.



A lightning protection system is intended to last the life of the structure it protects and typically only requires maintenance if a home is changed structurally

or mechanically. Such changes might include a new roof, an addition, a new electrical service or the installation of a satellite dish.

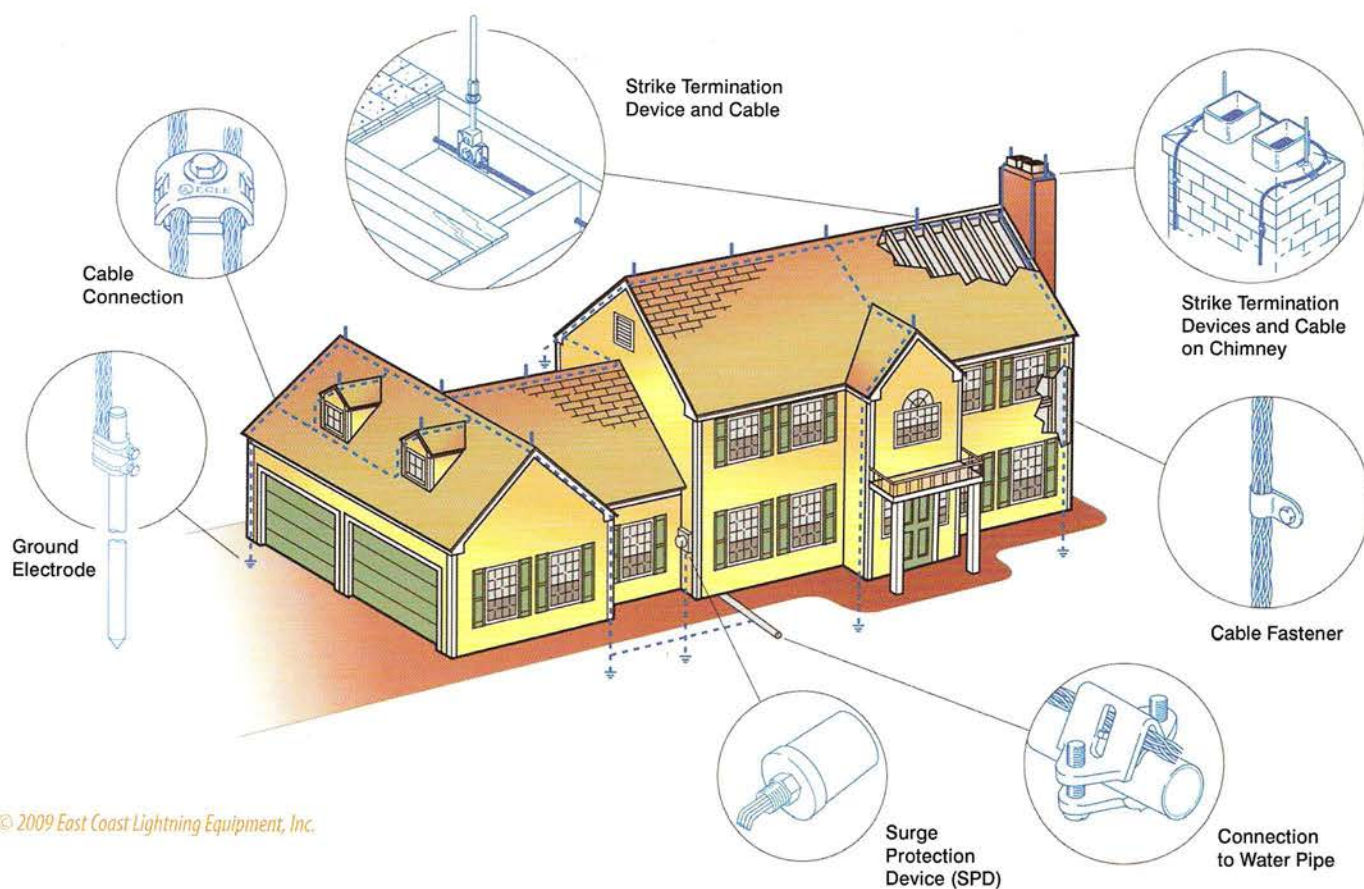
# TODAY'S HOMES ARE ESPECIALLY VULNERABLE TO LIGHTNING.

Metal building components, irrigation and security systems, invisible and electric fences, computers and sensitive electronic appliances are common in homes today. These lightning vulnerable features can increase a homeowner's potential for

serious lightning damage. A properly installed lightning protection system minimizes the threat of lightning related damage. The security and peace of mind that a lightning protection system offers is a big return on a small investment.



# TYPICAL RESIDENTIAL LIGHTNING PROTECTION SYSTEM.



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## The System

A lightning protection system performs a simple task. It provides a specified path on which lightning can travel. When a home is equipped with a lightning protection system, the destructive power of the lightning strike is directed safely into the ground, leaving the home, family members and personal belongings unharmed.

## The Primary Components

A lightning protection system should include all of the following elements, which work together to prevent lightning damage.

- Strike termination devices (rods)
- Conductor (cable)
- Bonds with metallic bodies
- Ground electrodes
- Surge suppression devices (SPD's)

## Electronic Protection

Modern homes are especially vulnerable to the havoc that lightning can wreak on sensitive electronic equipment. To assure the highest level of protection, UL-listed lightning surge protection devices are installed on electrical service panels and other incoming lines. Surge protection devices (SPD's) are the first line of defense against harmful electrical surges that can enter a structure through power lines. For additional protection, UL-listed transient voltage surge suppressors can be installed to protect specific electronic components. A qualified lightning protection specialist can make recommendations for surge protection that is tailored to your specific needs.

## Quality Counts

It is essential that lightning protection systems are installed by trained, qualified lightning protection specialists. For quality assurance all materials and methods should comply with nationally recognized safety standards as established by Underwriters Laboratories and the National Fire Protection Association.







## Lightning Safety Alliance Corporation

24 Lanson Drive • Winsted, CT 06098  
Phone (860) 379-9072 Fax (860) 738-1326  
[www.lightningsafetyalliance.org](http://www.lightningsafetyalliance.org)

June 2007

# Safety Alert!



Gas related damage to a home in Texas. This is the type of damage that can result when lightning arcs and travels on CSST

### Lightning Fires Linked to Problem Gas Tubing

A recent class action lawsuit against four manufacturers of a relatively new type of fuel gas tubing has uncovered a serious fire risk that can be mitigated by installing a lightning protection system. The tubing, called CSST (corrugated stainless steel tubing) is a type of flexible piping that has been widely used in homes and commercial fuel gas applications in recent years. Unlike traditional, heavy-walled gas pipes, CSST is extremely thin and therefore susceptible to damage from lightning. Lightning traveling on the CSST can burn holes in the tubing and allow gas leakage and fire. In worst-case scenarios, such leaks have led to catastrophic gas explosions. The CSST piping has been found to be susceptible to damage from direct and even nearby lightning strikes.

CSST piping is popular with some contractors because it is easy to install. According to the National Fire Protection Association (NFPA) however, no tests on the effects of lightning on CSST were conducted prior to its approval for use. One CSST manufacturer has



# Safety Alert!

*(Continued from page 1)*

acknowledged that the installation of a lightning protection system in structures at the time the CSST gas piping is installed helps to mitigate the lightning hazard associated with CSST; unfortunately, homes with CSST piping are rarely equipped with lightning protection systems. Lightning strikes the United States more than 25 million times each year. A single bolt of lightning can carry over 100 million volts of electricity, making the hazard to homes outfitted with CSST piping a serious concern.



"Lightning does not have to strike a building directly in order for the CSST to be affected," explains Guy Maxwell, president of the Lightning Safety Alliance. "The reports of CSST-related fires that I have seen have involved strikes that were away from the structure."

In March 2007 the four defendants in the class action suit filed in the Circuit Court of Clark County Arkansas reached a Settlement. Under the guidelines of the Settlement, owners of structures in the US in which CSST was installed prior to September 2006 may obtain vouchers to defray part of the cost of mitigating the CSST hazard. The remedies identified by the settling parties include installing a lightning protection system and/or making bonding and grounding connections to certain systems in a structure.

"Unfortunately, there hasn't been a lot of publicity given to this situation which is estimated to affect a million or more homes," explained Bud VanSickle, executive director of the Lightning Protection Institute in Maryville, MO. "Property owners have just a few short months to take advantage of these vouchers. Whether property owners take advantage of the Settlement vouchers or not these folks have a serious fire risk in their homes that needs to be addressed."

Despite the problems with CSST piping and lightning, the thin gas tubing is still being installed in new homes. Some CSST installation practices, although technically in conformance with current building code requirements, make it difficult to fully mitigate the lightning threat. For example, lightning experts note that the practices of mounting gas manifolds in attics with multiple CSST gas pipes leading downward to different appliances and of running CSST gas piping with many turns and direction changes make it more likely for lightning to arc to and from the gas pipes. If CSST gas piping continues to be installed, the bonding and grounding requirements for CSST in the current National Electric Code and National Gas Code need to be examined and likely augmented to take lightning into account.

The deadline to enter a claim under the CSST Settlement is September 5, 2007. For more information call 1-800-420-2916 or visit the website at [www.csstsettlement.com](http://www.csstsettlement.com).



## **Lightning Safety Alliance Corporation**

24 Lanson Drive • Winsted, CT 06098  
Phone (860)379-9072 Fax (860) 738-1326  
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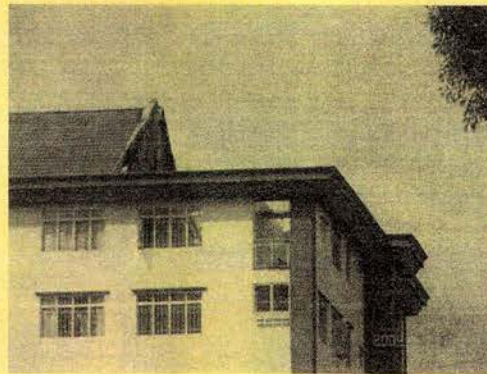
## ESE System Failures



Early Streamer Emission (ESE) lightning protection systems made the news twice this Spring, when they failed to protect the structures they were installed on. Both failures were in Malaysia and both situations involved structural damage and/or fire after lightning struck well within the claimed enhanced zone of protection offered by these non-standard rods. On April 11 lightning caused a fire at the Putrajaya Hospital in Kuala Lumpur. The hospital was equipped with an ESE system, even though ESE systems do not comply with the local lightning protection standard – MS-IEC62305.

Then on Tuesday, May 5<sup>th</sup> a lightning strike damaged three condominium units at the Amandari Condominium at

Segambut in Kuala Lumpur. The condo units were damaged by smoke, fire and structural damage all caused by the lightning. The condo units were equipped with an ESE terminal on a mast. The lightning strike was to a building corner located approximately 75 feet from the ESE mast.



## ESE Standard Withdrawn in Europe

According to an announcement issued in May 2009 on the International Conference on Lightning Protection (ICLP) website, various standards for Early Streamer Emission Lightning Protection maintained by individual European nations must be withdrawn.

CENELEC, the agency responsible for harmonization of standards within the European Union has concluded that national standards that conflict with approved European Union standards are no longer recognized and must be eliminated. This includes the ESE standards maintained by France, Spain and Portugal, which conflict with the official European Standard for lightning protection - EN62305. This standard mirrors the IEC lightning protection standard.

*(Continued on page 2)*