

Lightning Protection

You work hard to build and maintain your business. That's why it's important to ensure you're protected from all potential losses – especially when they are beyond your control.

A lightning strike can result in damage ranging from power surges to fire or even death. Understanding the risks lightning poses and following the proactive steps provided in this guide can help you improve safety measures, reduce costly repairs and protect your property.



The facts of lightning

Lightning is an electric current, existing within a cloud where small bits of ice are bumping into each other as they swirl around in the air. All these little collisions create electrical charges within the cloud, with a positive charge at the top of the cloud and a negative charge closest to the earth.

Since opposites attract, the negative charge within the cloud causes a positive charge to build up on the ground below. The ground's electrical charge concentrates around objects that point up, such as buildings, chimneys, trees, and even people. The charge streaming up from these points eventually connects with the charge reaching down from the cloud, resulting in a lightning strike. The intense energy concentrated in the lightning bolt causes the surrounding air to ionize creating the boom we call thunder. It's this concentrated energy which can destroy anything that gets in its way.

The following are common types of lightning which may cause damage:

Direct Strike

A direct strike happens when lightning attaches to an object directly. The impact generates hundreds of thousands of volts and amps causing severe damage such as destroying brickwork, frying wires or starting fires.

Side Flash

As a lightning bolt travels along an object (conductor), the high energy ionizes the surrounding air. If another object (metal, tree or masonry material) is close enough when this happens, the lightning may jump the gap from its conductor to the other object before reaching the ground.

Induced Voltage (Nearby Strike)

A nearby strike can be very destructive, as a massive "electromagnetic pulse" (EMP) is generated when the lightning energy passes to the ground. EMP's are particularly damaging to electronic equipment and operations. An induced lightning surge on overhead electrical distribution wires can deliver as much as 100,000 volts. Lightning surges can also enter buildings via other metal conductors, water lines, telephone lines, unshielded computer network CAT cable, cable television cables, etc.

Protect your property

Consider hiring a professional lightning protection installer* to help protect your property from lightning damage.

Note: Some provinces require installers to be licensed and the installation inspected by the Office of the Fire Marshall while in other provinces electricians may do installations to standard.

Your installation checklist:

- ✓ *Lightning Rods (Air Terminals):*
 - Install rods on the building structure, bonded together and tied to the ground.

✓ *Grounding/Bonding*

- Earth grounds should be made by driving “ground rods” (minimum of 3.5 metres in length and 18 mm diameter) into the earth. These provide a low resistance path to ground if multiple ground rods are tied together to form a ring around the building. In some cases, specific ground plates may be used. On bedrock, a horizontal ground radial system may be the best.
- Ensure all electrical and lightning grounding systems are tied together to form a single unified ground system. This will reduce the potential for damage due to high differential voltages which could develop if the grounding systems are not connected.
- Use copper cable or ribbon as a conductor for grounding systems as copper has the best electrical conductivity, corrosion resistance, and thermal/mechanical stability. *Note:* secure copper to keep it away from thieves or you could be unprotected!

✓ *Building Protection*

- In Ontario, PEI and NB, systems must be installed by a licensed and insured professional (which will protect you if the system fails to perform as designed). In other provinces, a qualified electrician should be hired as portions of lightning protection fall under the electrical code as well as the building code.
- Wood frame buildings: a purpose built lightning protection (faraday cage) system may be needed.
- Masonry buildings: focus on bonding and grounding, especially for buildings with towers or metal domes (e.g. heritage buildings, churches, mosques)

- Modern steel structures: the building’s structural steel frame is usually part of the grounding system but you should review the design with your architect to ensure there is proper bonding and low earth to ground conductivity.

✓ *Radio – TV – Telephone Network Protection*

- Connect any cables entering your building (TV, telephone) to a surge arrestor specifically designed for that service. All service cables should enter the building in proximity to the electrical service entrance and the arrestors should be solidly grounded and bonded together to the service ground.
- All internal wiring should be “shielded” (e.g. telephone or CAT cable should have an outer metal jacket which can be grounded) or placed inside a grounded metal conduit.

✓ *Fire and Security Alarm Systems Protection*

- Protect alarm systems by ensuring the panel has surge protection installed by design. As well, all power leads should incorporate surge protection and communication cabling. Cabling for sensors should be shielded and grounded.

Long term protection

These measures will help keep your property safe from lightning damage. However, you must perform an annual visual inspection of your system, and we recommend to have the system inspected and ground conductivity tested every 5 years at a minimum.

References

- CSA Standard CAN/CSA_B72-M87 Installation Guide for Lightning Protection Systems
- NFPA - NFPA 780: Standard For The Installation Of Lightning Protection Systems – 2011

Lightning protection installation companies

- Dominion Lightning Rod
www.dominionlightningrod.ca
- Burchell Lightning Protection
www.burchelllightning.com
- Western Lightning Protection
www.westernlightningprotection.com
- Simpson Lightning Rods
www.lightning-rods.ca

Provincial Legislation

- Ontario: The Ontario Lightning Rods Act R.S.O. 1990 Chapter L.14 – enforced by the Office of the Ontario Fire Marshall
- PEI: The Lightning Rod Act, Chapter L-12 R.S.P.E.I. 1974 - enforced by the Chief Electrical Inspector
- New Brunswick: The Electrical Installation and Inspection Act (O.C. 82-934) under New Brunswick regulation 82-215.
- All other provinces: refer to provincial electrical codes, provincial fire safety regulations, the Canada Building Code, NFPA, and CSA

*Provinces such as Ontario and New Brunswick require installers to conform to standards set out in CSA Standard CAN/CSA_B72 -M87 - Installation Guide for Lightning Protection Systems, and provincial legislation also requires installers to be licensed and insured against liability. Most other provinces and territories simply follow CSA standard CAN/CSA-B72-M87. In addition, the National Building code asks for compliance with the CSA standard in the absence of any applicable provincial legislation.

For further information on this topic, please contact your independent insurance broker.

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