

Lightning Protection

Frequently Asked Questions

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Tree lightning protection systems have an excellent record of protecting trees. Trees with a system installed according to the ANSI A300 Standard and maintained on a regular basis are rarely damaged by lightning.

While much is known about lightning and lightning protection for trees, due to the high variability of lightning, some results may be different from what is expected. Here are some of the common questions and answers about lightning protection for trees.

Which trees should I protect?

There are three landscape settings where lightning protection is highly recommended.

- First, tall trees close to houses. These trees may attract lightning which then ‘side flashes’ to the house. Lightning is a leading cause of house fires.
- Second, trees in outdoor recreation areas such as golf courses, picnic areas, or other outdoor areas where people congregate.
- Third, high value and historic trees. In some areas, lightning is the leading killer of large trees.

Will protecting the tree close to my house protect the house as well?

You cannot count on a tree lightning protection system protecting an adjacent house. If you are concerned about house protection, the house should have a lightning protection system installed on it. To protect the electronics in a house from lightning damage, surge protectors or lightning arrestors should be installed by qualified electricians.

Will a lightning protection system increase the chance of a lightning strike to my tree or house?

Lightning protection systems do attract lightning in a relatively small area. If a lightning strike is coming down within a 50 to 100 foot radius of a protected tree, it is likely to be diverted to the tree’s lightning protection system. This is good because the lightning protection system is designed to direct the charge to ground without causing significant damage to the tree. If a tall tree is over a house, the strike may be diverted to the tree. This depends on the height of the tree, distance to the house and strength of the lightning.

I have three different species of trees around the house; they are all about the same height. I can only afford to protect one. Which one should I protect?

Tree species do vary in their susceptibility to lightning strikes. This is due to their bark and internal electrical resistance characteristics. There are lists of common species susceptibility (see the International Society of Arboriculture’s *Best Management Practice for Lightning Protection*). Tulip poplar and black locust are considered the most susceptible species, and therefore, are higher priority trees for lightning protection.

As part of my nightscaping, I have an outdoor electrical lighting system in my tree. Will this system attract lightning?

Any electrical wire in a tree may tend to attract lightning. One of the risk factors with outdoor lighting systems is that they are usually only grounded at the electrical panel in the house. If the tree were to get struck, there is a good chance that the charge would be directed into the house. It would also be expected that there would be more tree damage since the electrical wire is much smaller size than a lightning protection conductor and is installed lower in the tree than a lightning protection conductor. A lightning protection system will reduce the risk of damage to the tree when lights are present. Metal conduit should be attached or 'bonded' to the lightning protection system.

Will protecting the tree also protect the nearby irrigation system and water well?

No. Water filled pipes are excellent conductors of lightning and often provide a better path to ground than a lightning protection ground system. The electronics connected to these systems (e.g. irrigation controllers or pumps) are extremely susceptible to lightning damage.

Will the copper/bronze drive fasteners that hold the conductor to the tree cause copper toxicity in the tree?

No, they do not. You may have heard about driving copper nails into tree trunks in order to kill the tree, but this is more myth than reality. Trees are adapted to compartmentalize wounds and wall them off. When any sort of nail is driven into the tree, there is a response in the tree to limit the spread of damage that may have come with it. This response also limits the spread of what little copper may dissolve from the nail or drive fastener.

Will lightning follow the drive fastener into the tree?

It is very rare to see significant damage to a tree at a drive fastener, but occasionally it does occur. The damage is usually 2 inches (5 cm) diameter or less and

is limited to the outer bark. There has been speculation that this occurs when the soil is very dry so that the conductivity of the soil around the ground rod is very low.

I have a steel support cable in my tree which goes horizontally from one branch to another. Will this cable attract lightning to my tree?

No, horizontal cables should not make trees more susceptible to lightning since they do not reduce the electrical resistance to ground. However, if the tree is struck, it is more likely to be damaged since the lightning is easily conducted more deeply into the wood of the tree. It is recommended that steel support cable be attached or 'bonded' to a tree's lightning protection system to reduce the risk of tree damage.

Does the lightning protection system need any maintenance?

Yes, like any mechanical system in a tree, lightning protection systems do require periodic maintenance. This consists of annual visual inspections from the ground and a closer, in-tree, inspection about every five years or when ever the tree is being pruned. Main portions of the system that need maintenance are the: 1) Drive fasteners and conductors which can be over grown by the tree, 2) Air terminal which should continue to be extended upward as the tree grows upward, 3) Conductors which may be deteriorated or are severed, usually near the ground line. To schedule an inspection, call your Bartlett Arborist Representative.

When should a lightning protection system be refastened?

The best time to install new drive fasteners on a lightning protection system is when the tree bark touches the bottom of the clamp portion of the existing drive fasteners. At this point, the drive fastener can be opened up and the conductor removed from it without damaging the tree. The old conductor is then left in the tree and the new drive fastener is installed touching the old one.

Will a system with overgrown conductors still function?

Yes, the system will function when overgrown, however, there is a higher risk of tree damage if a worn or broken conductor heats up during a lightning strike. If a system is overgrown, it can be electrically tested to determine if it is still functional. If there are any internal breaks in the system or if it has high electrical resistance, it should be replaced.

I have an existing system that is made of aluminum; should I replace it?

Aluminum conductors have never been approved for use in trees. There are several reasons for this. Aluminum has a higher electrical resistance than copper and it is more susceptible to deterioration than copper. Due to the higher electrical resistance of aluminum, the system may be severely damaged by a lightning strike. In some cases, aluminum may only be able to conduct one strike. An aluminum system is not as good as a copper system, however, if it is intact and in a good state of repair it is better than no system.

My lightning protection system has been upgraded; portions of the old system were cut off and left inside the tree where a new conductor was spliced in. Is there any problem with leaving these old portions of conductor inside the tree?

No, the likelihood of lightning being conducted inside of the tree by the old conductor is very small. These remnants of the old system pose no serious problem to the tree.

I am having my old main conductor (½ inch diameter) extended to keep up with the growth of my tree. Should it be extended with the old style ½ inch conductor or with the new, smaller (¼ inch) conductor?

You can extend the old system with the new smaller conductor. However, any repairs that are made in the large conductor must be made with the same size. You can go from small to large, but you cannot go from large to small conductor as you progress down the tree.



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