

EvoDis[®]

Lightning Prevention System

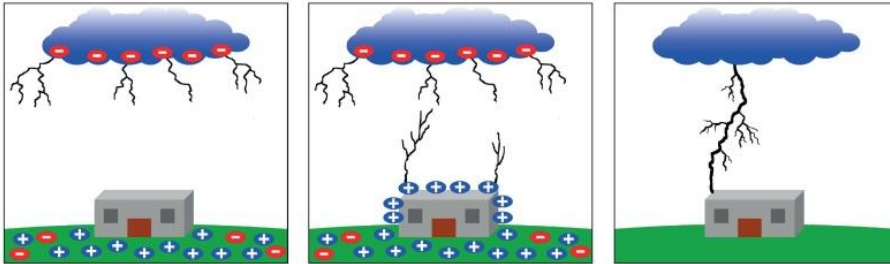
MARINE SERIES



**Lightning Protection for
Sailboats & Yachts**

What is Lightning ?

Lightning is simply nothing more than an electrical discharge between clouds and ground. Base of the storm cloud is negatively charged and this leads the positive charges of the ground climb on objects underneath the storm. As the storm grows, negative charges at the base of the cloud start moving downwards in form of streamers and positive charges are emitted by the objects on the ground towards the negative streamers.

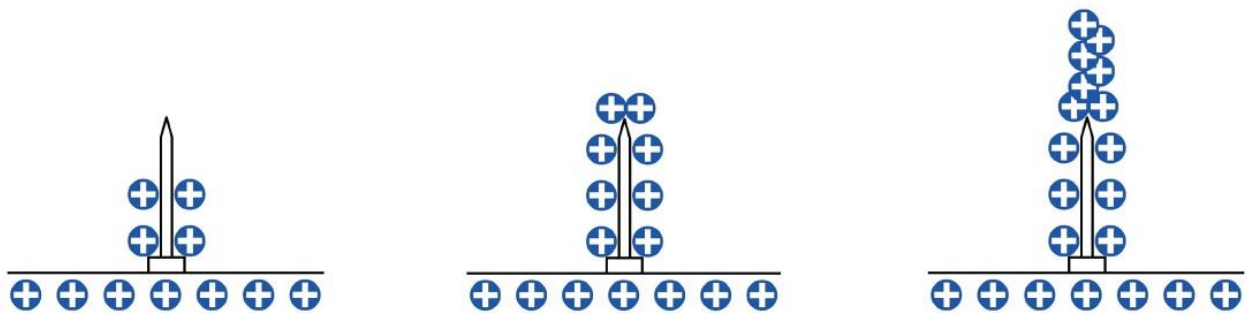


One of the positive upward streamers meets with one of the negative downward streamers and forms a conductive channel between cloud and the object on the ground. All current inside cloud flows down to ground through this channel which is called **"Lightning"**.

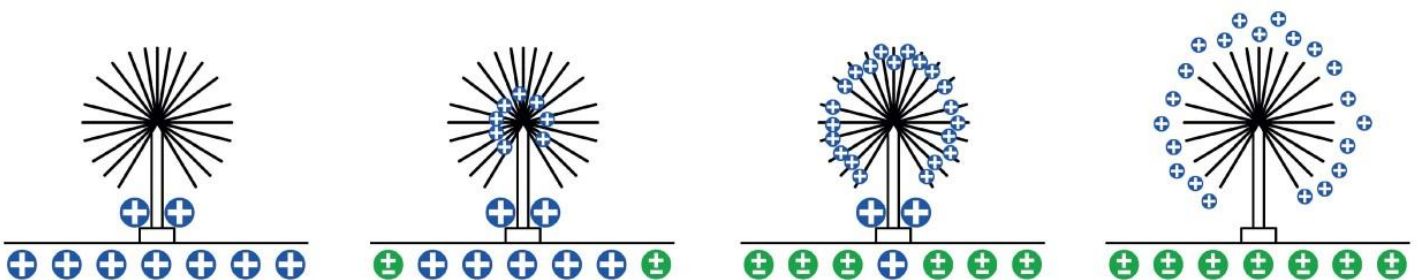


Charge Dissipation Principle

The goal of any lightning protection solution must be to isolate the protected structure from lightning and minimize the risk of getting hit by lightning strikes. Lightning hits the point from which the upward positive streamer is emitted and *Charge Dissipation Principle* keeps this point free of lightning strikes.

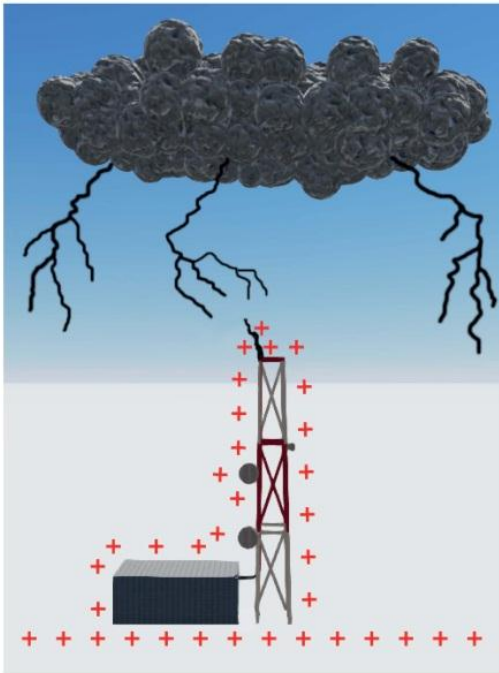


A single point arrester collects the positive charges at its tip and emits in the form of a streamer when they reach a level of concentration. This leads the lightning path to develop between the arrester and cloud.

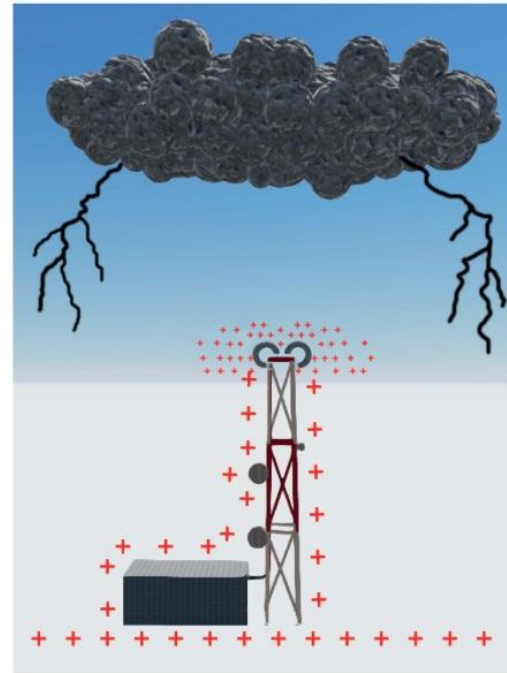


Applying multiple tiny sharp points on a structure emits the positive charges rapidly before forming a streamer. This process blocks the formation of a conductive channel between cloud and the structure and lightning acts as if the structure does not exist there.

MTO invented a unique lightning protection solution for metal towers and poles; **EvoDis® Lightning Prevention System**. By using the Charge Dissipation Principle, EvoDis® System dissipates the charges on the tower and makes it *“invisible”* to lightning. This process protects all equipment on the tower and inside the shelter nearby from lightning related damages.



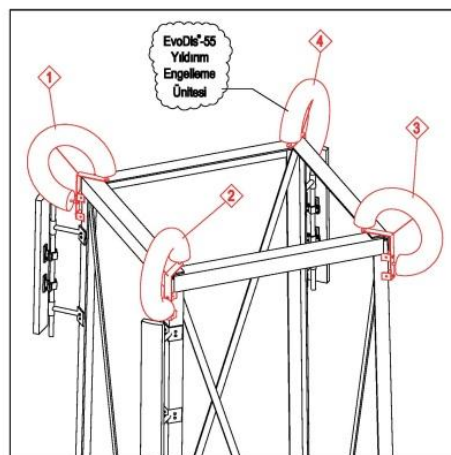
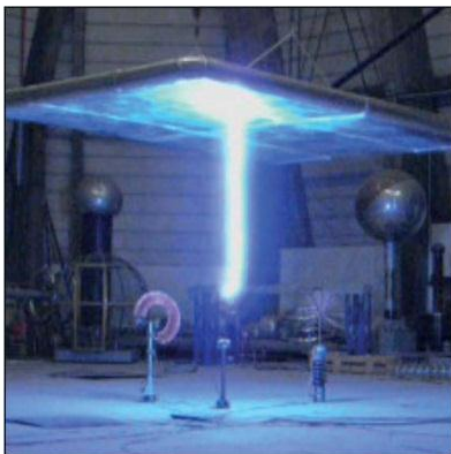
With the use of a traditional lightning rod, positive charges climb up on the tower and are emitted towards the cloud. Lightning hits the rod and the current runs through tower by damaging the equipment.



EvoDis® Lightning Prevention System dissipates the positive charges through thousands of tiny sharp points and blocks the formation of an upward streamer. Tower and equipment remain safe, site keeps on service.

EvoDis® Lightning Prevention System is a result of 5 years of research and development studies run by MTO. EvoDis® System is the only lightning protection solution which achieved 100% success on both high voltage laboratory tests and field tests. EvoDis® has been applied on hundreds of lightning prone towers worldwide with 100% success of over 10 years.

EvoDis® Lightning Prevention System does not require an additional conductor and directly installed on the structure. All EvoDis® units are delivered with 10 years of material warranty and do not require any maintenance after installation.

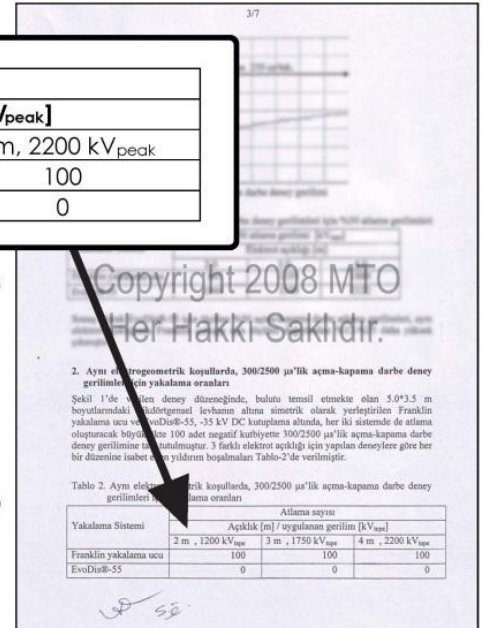


High Voltage Laboratory Tests

Protection System	Number of flashovers		
	Elektrod Spacing [m] / Voltage Applied [kV _{peak}]		
	2 m, 1200 kV _{peak}	3 m, 1750 kV _{peak}	4 m, 2200 kV _{peak}
Franklin Rod	100	100	100
EvoDis®-55	0	0	0

As a part of research and development studies, MTO put EvoDis® Lightning Prevention System on a laboratory test process at Istanbul Technical University. As per international high voltage test standards, the performance of EvoDis® prototypes observed and officially reported for current, voltage and strike rates simulations.

None of the 300 generated strikes hit EvoDis® unit and EvoDis® Lightning Prevention System has shown 100% success in the high voltage laboratory test process.



Field Tests

EvoDis® Lightning Prevention System was put on a tough field test process and applied on most lightning prone towers of telecommunication operators in Turkey. Lightning occurrence at test locations tracked by lightning detectors to observe the benefits of EvoDis® System on test towers and equipment.



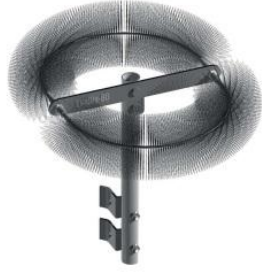
224 real lightning strikes detected in 0-50 meters distance from test towers and **none** of these strikes hit the towers protected by EvoDis® Lightning Prevention System. EvoDis® System isolated towers and equipment with 100% success.

Patents and Certificates





EvoDis® -65



EvoDis® -60



EvoDis® -55



EvoDis® -45



EvoDis® -40



EvoDis® -35



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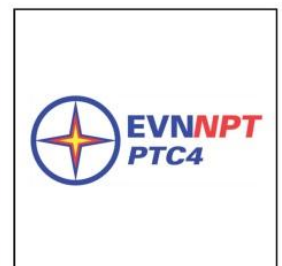


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Fields of Use

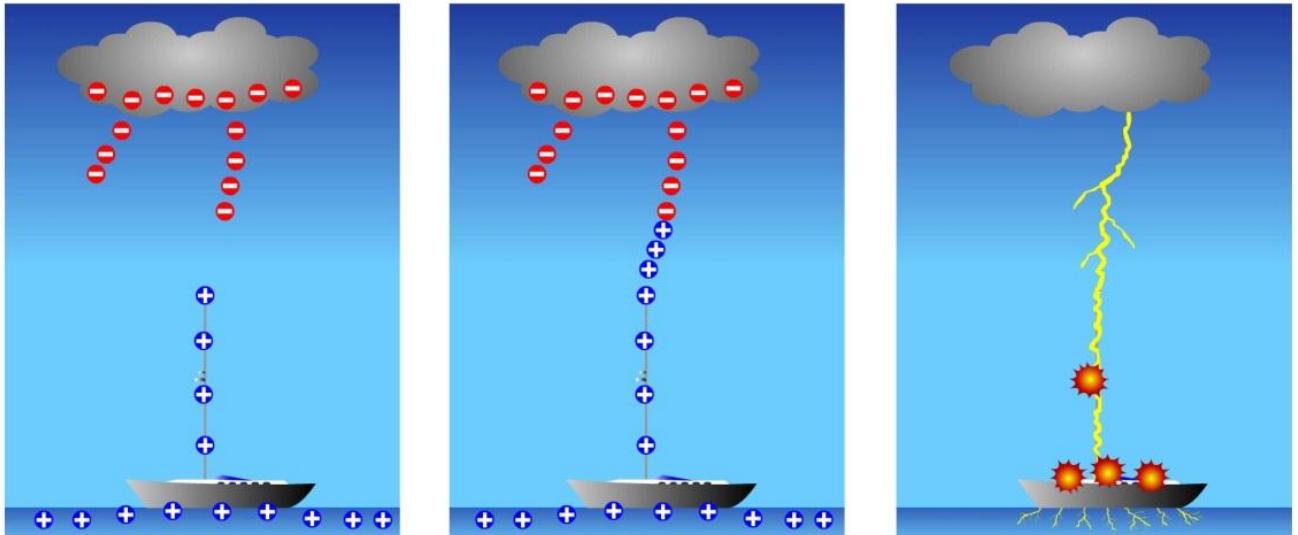
- Telecommunication Towers
- Radio and TV Broadcast Towers
- Tower Cranes
- High Voltage Power Transmission Lines
- Security Camera Poles
- Boats and Yachts
- Weather Stations
- Wind Observation Towers
- Wind Turbines
- Mosques and Churches

References



Lightning Threat on Sailboats

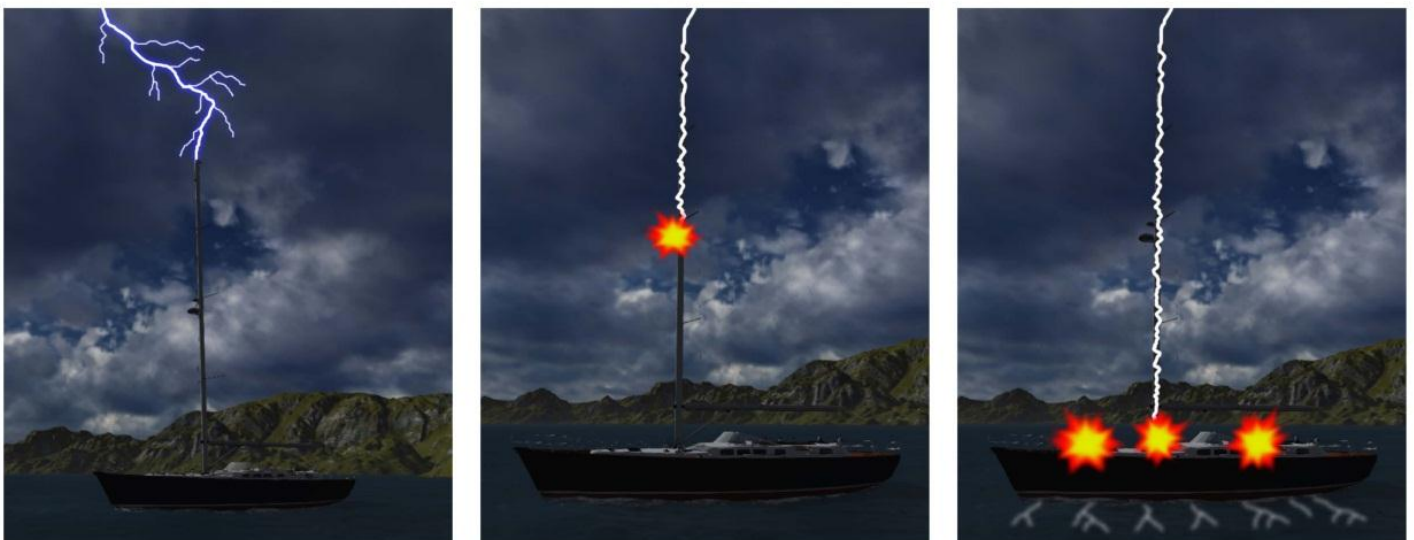
Sailboat masts are the sharpest and tallest objects on water. Depending on the size and structural properties, the risk of getting hit by a lightning strike varies, but if you are the only one under thunderstorm cloud at that moment, you are most likely to experience lightning damage on your boat. During a storm, ground charges(charged ions on water) accumulate on boat and climb up to top of the mast. As these ground charges reach to a level of concentration, they are emitted towards the opposite charged streamers of cloud and develop the lightning channel between cloud and the boat.



All current inside cloud flows through this channel and reach to water through the mast and boat body while damaging all sensors on mast; destroying antennas, radios and cables; damaging batteries inside and finally breaking down the engine and causing fire. While discharging from the bottom, lightning current can damage the body of the boat and leave holes underneath.

Use of Lightning Arresters

Lightning arresters are used to emit more charges on themselves in order to attract lightning before any surrounding object. With the use of a lightning arrester on a boat mast, the arrester collects all lightning strikes with the purpose of transferring lightning current to the grounding system safely. However, lightning current must reach the ground(water) through the shortest and fastest way which is still the mast itself. Even if a conductor cable is installed between lightning arrester and grounding system, lightning current prefers to follow larger surfaces instead of a conductor cable and flows through mast surface.



Lightning must be kept away from boats.

Lightning Protection with EvoDis[®] System

EvoDis[®] Lightning Prevention System dissipates the ground charges on boat mast by its thousands of tiny sharp pins and blocks a possible streamer emission towards storm cloud. This process makes the boats “invisible” to lightning and prevents possible lightning strikes on the masts.

Since that lightning acts as if the boat does not exist there, EvoDis[®] prevents any possible lightning related damage on electronics and sensors and save the boat.



EvoDis[®] units are installed directly on the mast without a need for conductor or an upgrade in the existing grounding system of the mast. Installation details are highlighted in Installation Guides and EvoDis[®] units are delivered with elevation rods and flat bases for vertical or horizontal application options.

EvoDis[®] System is a maintenance-free solution and all EvoDis[®] units are delivered with 10 years of product warranty.

***Best way of lightning protection is to stay away from lightning.
EvoDis[®] Lightning Prevention System keeps lightning away from you.***

