

FACT SHEET

Tokai Bipolar Air Terminal (T-BAT)

Revolutionary, cutting edge technology to prevent the occurrence of lightning strikes



The Winner of
BrandLaureate
SME Corporate
Best Brand Award
2016-2017



Clearly, the superior choice

Tokai Bipolar Air Terminal is ideal for the following industries

- MRT / LRT / Railway system
- High Rise & Commercial Developments Buildings
- Oil & Gas Facilities
- Solar Farms
- Power Stations, Transmission Stations & Distribution Stations
- Petrol Stations
- Hospitals
- Data Control Centers
- Fire Stations
- Universities & Schools
- Airports and Port Authorities and many more!

Advancing **Safety**,
Protecting Critical **Assets**



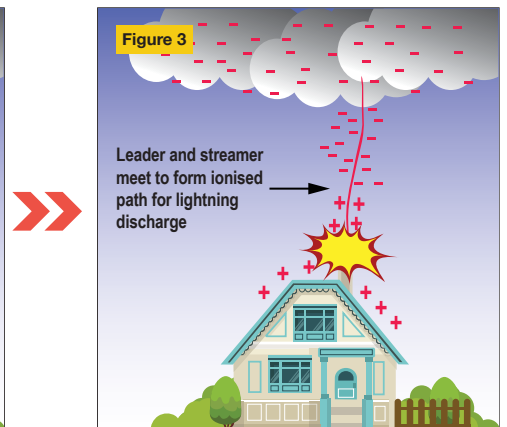
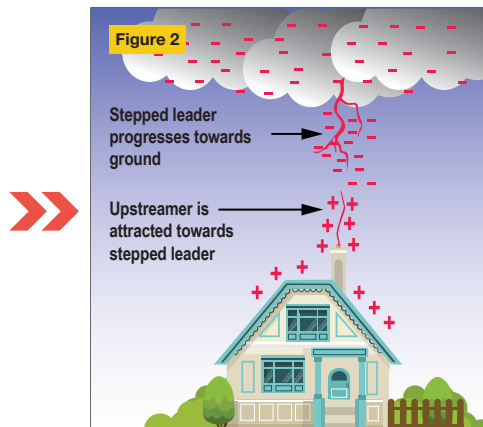
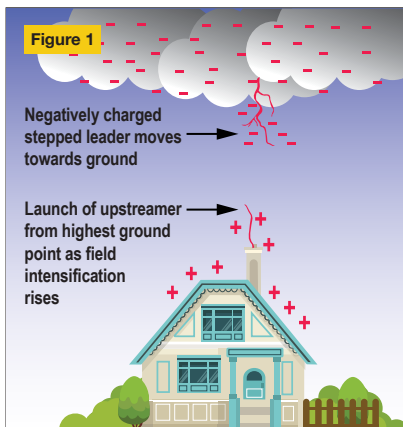
Introduction

For more than a quarter of a century, mankind has been relying on conventional air terminals, invented by Benjamin Franklin to protect buildings and homes from the devastating effects of a lightning strike. According to SIRIM, the Franklin rod acts as a device to attract and localize lightning thus, minimizing damages to the surrounding structures.

However, a direct lightning strike on a conventional air terminal can still result in structural damages as well as collateral damages in the form of electromagnetic induction. The result can be devastating as modern structures are reliant on sophisticated and sensitive electrical systems, computers and inter-connected networks, especially in smart buildings.



How is lightning formed



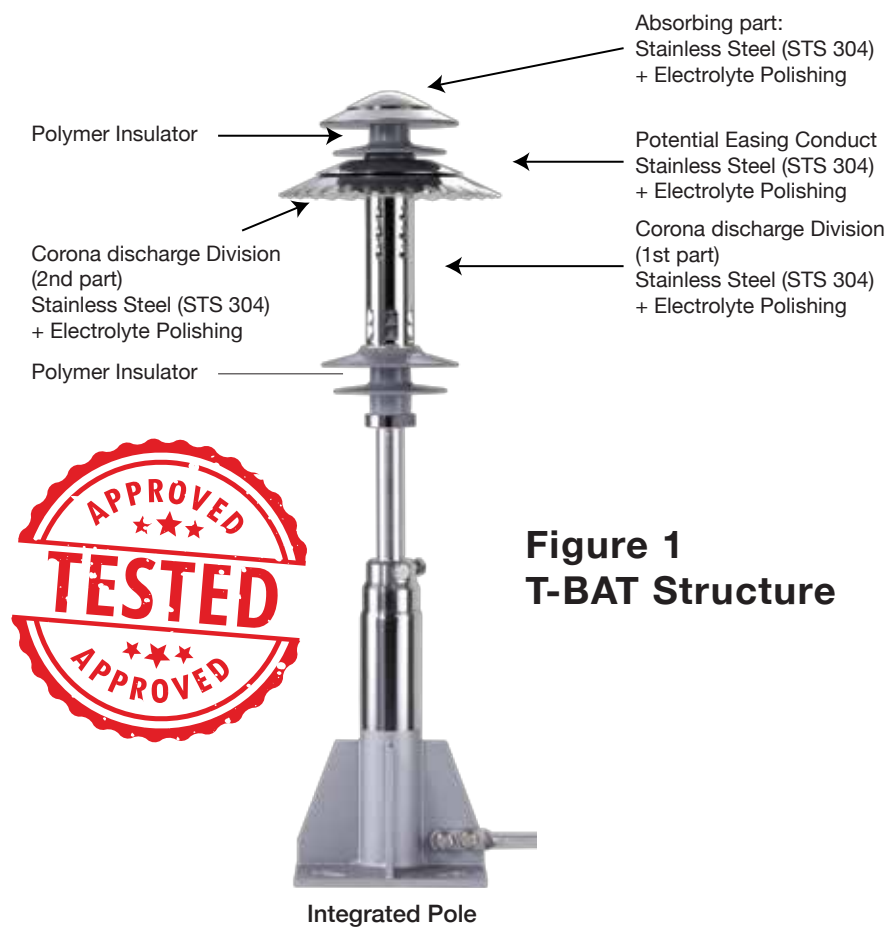
Limitations of the Franklin Lightning Rod

As seen from the pictorial gallery, the conventional air terminal or the Franklin lightning rod can still result in secondary damages such as physical and structural damages as well as electronic system damages. The advancement of smart buildings, increasing reliance on sophisticated and networked electronic devices means that the Franklin lightning rod is no longer the best solution to manage lightning strikes.



The Franklin Rod has become an inadequate means of protection in today's high-tech electronics system setup.

Tokai Bipolar Air Terminal (T-BAT)



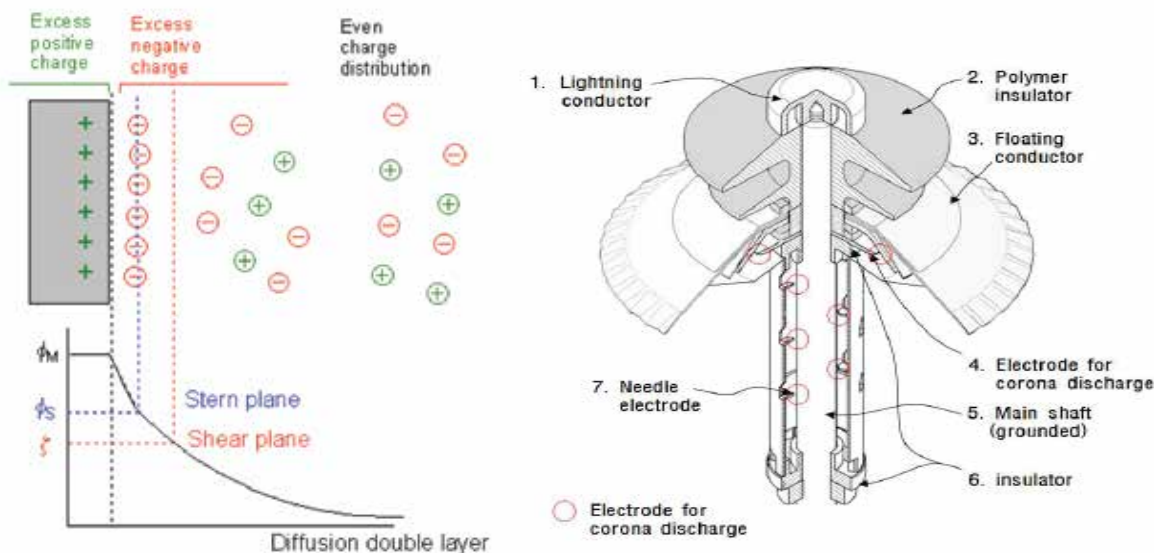
**Figure 1
T-BAT Structure**

Figure 1 shows the structure of T-BAT. As seen, T-BAT consists of a lightning conductor, a polymer insulator, floating conductors, pipe electrode and a mast.

Lightning occurs when charges from thundercloud breaks the insulation of the air and goes down; so an upward streamer is created at the structure on its earth (lightning rod) by the intensification of electric fields that induces the conditions for lightning.

T-BAT is designed to cut off the intensification of electric fields at the lightning conductor by continuous corona discharge to eliminate conditions for lightning, thus it reduces the probability of lightning.

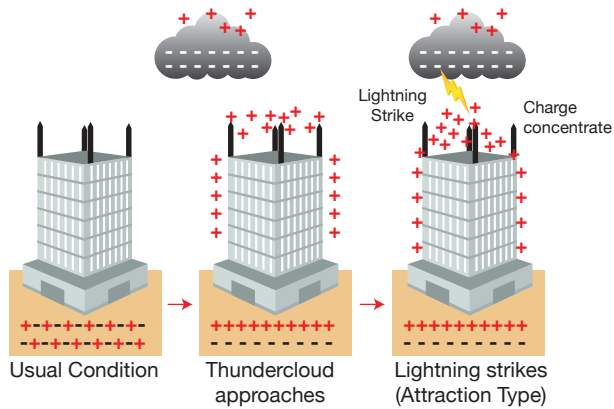
Double Electric Layer (DEL) Theory



**Figure 2:
The Corona
Discharge
Mechanism
of T-BAT based
on the
DEL Theory**

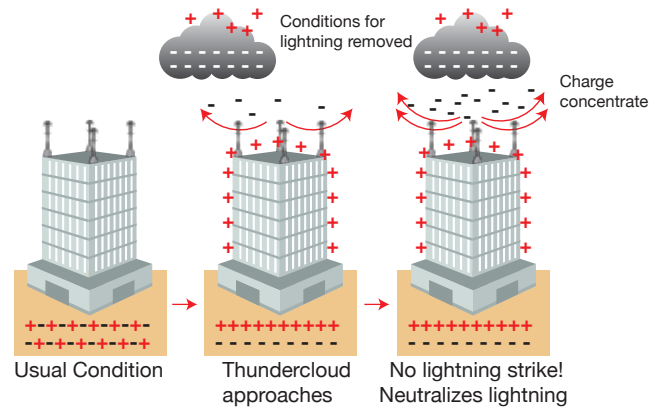
The operational principle of T-BAT with Corona Discharge is shown in Figure 2, which illustrates that when thunderclouds approach, charges opposite of the charges of thundercloud are concentrated. Thus, the pipe electrode and floating conductor get charged opposite of the charges of the grounding part; the same charges is created which mimics the negative polarity of the thundercloud. When the electric field between the pipe electrode and the floating conductor is increased, the corona discharge is then generated at the electrode. As Corona Discharge continues to keep the intensity of the electric fields at a certain value, and when that value is lower than the critical electric field, the probability lightning occurrence is then reduced significantly. For this reason, T-BAT minimizes lightning damages by protecting the structures from a direct lightning strike.

Comparison of outdated Franklin Rod with cutting edge T-BAT technology



Franklin Lightning Rod

VS



Tokai Bipolar Air Terminal

T-BAT

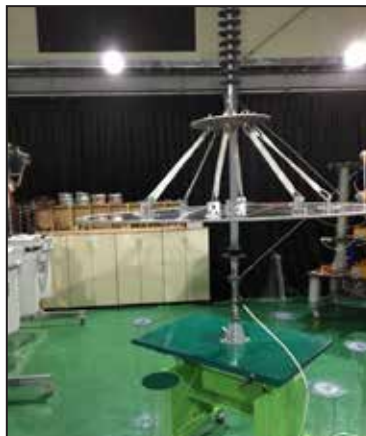
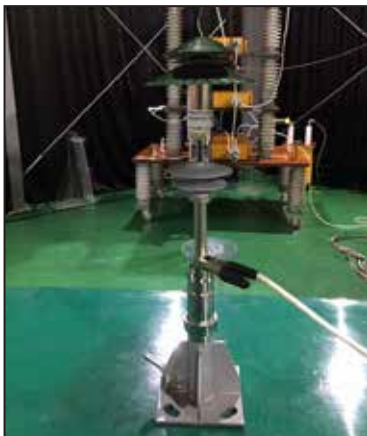
neutralizes the conditions that lead to lightning strikes.



The Corona Discharge exhibited on T-BAT

Stringent Laboratory Testing

The Tokai Bipolar Air Terminal is certified by SIRIM and has been fully type tested, approved and in compliance to International Standards in Lightning Protection IEC 62305, IEC 62561, IEC 61643-11 and UL Certified



- 1 Fully Type Tested to IEC 62561 10/350μs lightning impulse current of 30kA, 50kA and 100kA
- 2 In Full Compliance to IEC 62305 / BS EN 62305 Lightning Protection Standard and NFPA 780, The American National Fire Protection Association
- 3 Proven Ability to neutralize lightning based on the advance Bipolar Theory technology



Multiple Award-Winning System



Type tested & certified
by SIRIM QAS International

Installation Sites

T-BAT is fully certified by SIRIM, and is in full compliance to MS IEC 62305 and type tested to MS IEC 62561, to a maximum current of 100kA. In addition, T-BAT also complies with the NFPA-780 and is UL listed. One of T-BAT's notable site installation is the LOTTE WORLD TOWER, a 123-floor, 555-metre supertall skyscraper located in Seoul, South Korea.

Field Proven at over 10,000 sites in Asia!



Cloud-to-cloud lightning occurring over Lotte World Tower but does not strike the tower itself thanks to the state-of-the-art technology of T-BAT!



T-BAT Outstanding Features & Benefits

- Provides enhanced neutralizing performance over traditional lightning protection solutions
- Award winning product design
- Patented technology
- High-grade stainless steel construction
- Green Product and protects the environment
- Lightweight and easy to install
- Corrosion resistant
- Able to withstand 100kA lightning currents
- Type tested by SIRIM & Independent Accredited Laboratory
- Meets or exceed IEC 62561-1 & IEC 62305 standards
- UL listed with NFPA approval
- Numerous technical papers presented at IEEE & ICLP Conferences
- More than 10,000 units installed worldwide



Patented Technology:
Corona Discharge neutralizes lightning, ensuring a lightning free zone

About TOKAI

As the nation's leading lightning protection and security solutions provider, TOKAI is proud to provide quality products and services that protects your homes, buildings, lives and businesses. We are the only ISO certified lightning and security solutions provider in the nation. Our products are registered with Jabatan Kerja Raya and SIRIM. Tokai's Earthing & Lightning Protection Systems are in full compliance to IEC 62305 & BS EN 62305:2006 and are tested in accordance to IEC 62561-1 and IEC 62561-2.

An Award Winning Company with a solid track record and portfolio



and many more!



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