AREAS OF
APPLICATION

INFRASTRUCTURE

TELECOMMUNICATIONS

MANUFACTURING INDUSTRY

WATER

ENERGY

EARTHING PRODUCTS

LIGHTNING PROTECTION SYSTEM

EARTHING PRODUCTS ACCESSORIES

OUR SERVICES

EARTHING

- PIL CHEMO GALVO / HOT
  EARTHING ELECTRODES
- PIL CHEMO PURE COPPER
  EARTHING ELECTRODES
- PIL QBOND
  COPPER BONDED EARTHING ROD
- PIL COPPER BONDED
  EARTHING ELECTRODES
- PIL READY CAPSULE PIC
  EARTHING ELECTRODES
- PIL EARTH ENHANCEMENT
  SOIL RESISTIVITY IMPROVEMENT POWDER
- PIL EARTHING RE-CHARGE SOLUTION
  POWER PLUS GEL

PIL CHEMO GALVO/HOT

EARTHING ELECTRODE

WHAT IS EARTHING?

Earthing is an electrical connection between metallic parts, structure or electric circuits to the ground through conductor,
Generally in any earth system (or earth pit) measures are taken to ensure the good conductivity with low earth resistance. for this purpose water / humidity retaining compound like salt, charcoal etc. are used in the earth pit with various metallic parts with salt and charcoal in an earth pit, the life of the metallic parts gets degraded due to corrosion.

CU / GI / HDGI CHEMO M.F. EARTHING ELECTRODE

CHEMO GALVO/HOT
HCC FILLED

EARTHING ELECTRODE

After lots of concentration & Experience in earthing field we have seen & Developed New Technology based Latest **"CHEMO M.F." HCC FILLED EARTHING ELECTRODE** is the innovative method of Dual Electrode technology having a compartment of outer shell, inner shell with the terminal on the top, fabricated in high quality ERW material and subsequent galvanization to streng then the flow/ dissipation of fault/ static current to its maximum safety, Annular space between Dual Electrodes is filled with a **HCC(HIGHLY CONDUCTIVE COMPOUND).**

TECHNICAL
SPECIFICATION

CHEMO MF EARTHING ELECTRODE IS DESIGNED AS PER IS 3043:1987 STANDARD (CODE OF PRACTICE FOR EARTHING) WITH FOLLOWING FEATURES AND BENEFITS.

- Multifaceted proactive Earthing protection.
- Earthing Electrodes to ensure maximum conductivity.
- Contains a highly conductive compound (HCC) to protect the main earth electrode in the soil.
- High rust resistive, good conductive & Corrosion free.
- Least variation in ohmic value.
- Large surface area to carry large fault current.
- Control Radio Hz Emissions & Electromagnetic interferences.
- Provide stable reference potentials for instrument accuracy.

PIL HOT SIP EARTHING ELECTRODE

Sr. No	Product Code	Secondary Electrode Pipe	Main Electrode Strip	MOC
1	PIL HOT SIP 482	48 mm	32x6 mm	HDGI
2	PIL HOT SIP 483	48 mm	32x6 mm	HDGI
3	PIL HOT SIP 582	58 mm	32x6 mm	HDGI
4	PIL HOT SIP 583	58 mm	32x6 mm	HDGI
5	PIL HOT SIP 892	89 mm	50x6 mm	HDGI
6	PIL HOT SIP 893	89 mm	50x6 mm	HDGI

PIL HOT PIP EARTHING ELECTRODE

Sr. No	Product Code	Secondary Electrode Pipe	Main Electrode Pipe	MOC
1	PIL HOT PIP 482	48 mm	21 mm	HDGI
2	PIL HOT PIP 483	48 mm	21 mm	HDGI
3	PIL HOT PIP 582	58 mm	26 mm	HDGI
4	PIL HOT PIP 583	58 mm	26 mm	HDGI
5	PIL HOT PIP 892	89 mm	48 mm	HDGI
6	PIL HOT PIP 893	89 mm	48 mm	HDGI

PIL CHEMO PURE COPPER

EARTHING ELECTRODE:

(AS PER IS 3043 STANDARD)

SOLID COPPER EARTHING ROD OR PURE COPPER EARTHING ELECTRODE IS MADE FROM 99.9% PURE ELECTROLYTIC COPPER. IT OFFERS GREAT RESISTANCE TO CORROSION. IT IS USED WHEN BETTER CONDUCTIVITY AND CORROSION RESISTANCE IS PREFERRED. IN THIS, HIGHLY CONDUCTIVE COMPOUND IS PRESSURIZED FILLED AND ENSURE HIGHEST CONDUCTIVITY TO WITHSTAND ANY LEAKAGE CURRENT.

- Used 100% Copper For Long Life.
- Design for Fast Fault Current Dissipation.
- Low Maintenance on Site.
- Easy and Fast Installation on Site.
- Moisture Booster Chemical Bags Provided for Low Earth Resistance.

To Achieve This, Maintenance free Earthing System is Highly Recommended by All The Latest Codes and Standards i.e., **IS 3043: 2018, IEEE 80: 2013, NBC 2016, UL 467.**

PURE COPPER EARTHING ELECTRODE				
Sr. No	**Product Code**	**Secondary Electrode Pipe**	**Main Electrode Strip**	**MOC**
1	PILQSIP 502	50 mm	32x6 mm	PURE COPPER
2	PILQSIP 503	50 mm	32x6 mm	PURE COPPER
3	PILQSIP 762	76 mm	50x6 mm	PURE COPPER
4	PILQSIP 763	76 mm	50x6 mm	PURE COPPER

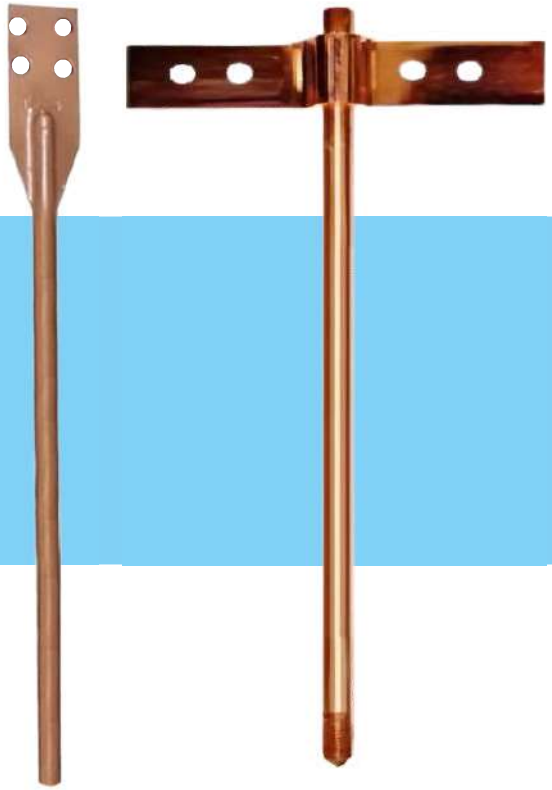
Sr. No	Product Code	Secondary Electrode Pipe	Main Electrode Pipe	MOC
1	PILQPIP 502	50 mm	25 mm	PURE COPPER
2	PILQPIP 503	50 mm	25 mm	PURE COPPER
3	PILQPIP 762	76 mm	50 mm	PURE COPPER
4	PILQPIP 763	76 mm	50mm	PURE COPPER

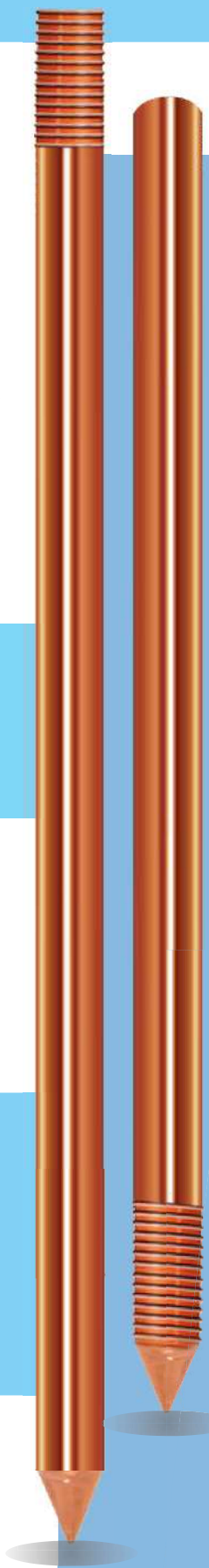
PIL-QBOND

COPPER BONDED EARTHING RODS

- Powertrac's Copper bonded Earthing Rods have a core of high tensile low carbon steel with each rod made by molecularly bonding 99.9% pure Electrolytic copper.
- Threads on the rods are normally formed by a roll threading process giving strength to the threads & eliminating risk of chipping of threads while driving the rod into the ground.
- These rods are tested in accordance to **UL 467 and IEC 62561-2 Standard.**

4 UP TO MTR LENGTH





FEATURES

- Uniform copper plating thickness
- It has high corrosion resistance quality.
- Convenient installation and very beautiful appearance.
- Purity of the copper is 99.9%. Thus the conduct ability is very good
- Magnetic conducting rate is low. Thus reducing the lightning induction.
- The anti-tension is for higher than that of copper cable.
- Good tensile strength, over 600N/mm2.
- Resist corrosion better than galvanized rods allowing for a 30-year service life in most soils
- State of the art manufacturing process ensures uniform plating thickness
- Average tensile strength & Exceed the requirements

MODEL &
SPECIFICATION

Item	Model	Cu Bonded Rods - 254µ	Wt. in Kg
1	PIL QBOND 1212 M250	1/2”x4’ : 12.7 x 1219mm	1.19
2	PIL QBOND 1215 M250	1/2”x5’ : 12.7 x 1524mm	1.49
3	PIL QBOND 1218 M250	1/2”x6’ : 12.7 x 1829mm	1.79
4	PIL QBOND 1224 M250	1/2”x8’ : 12.7 x 2438mm	2.39
5	PIL QBOND 1230 M250	1/2”x10’ : 12.7 x 3000mm	2.98
6	PIL QBOND 1412 M250	5/8”x4’ : 14.2 x 1219mm	1.49
7	PIL QBOND 1415 M250	5/8”x5’ : 14.2 x 1524mm	1.87
8	PIL QBOND 1418 M250	5/8”x6’ : 14.2 x 1829mm	2.24
9	PIL QBOND 1424 M250	5/8”x8’ : 14.2 x 2438mm	2.98
10	PIL QBOND 1430 M250	5/8”x10’ : 14.2 x 3000mm	3.73
11	PIL QBOND 1712 M250	3/4”x4’ : 17.2 x 1219mm	2.19
12	PIL QBOND 1715 M250	3/4”x5’ : 17.2 x 1527mm	2.74
13	PIL QBOND 1718 M250	3/4”x6’ : 17.2 x 1829mm	3.28
14	PIL QBOND 1724 M250	3/4”x8’ : 17.2 x 2438mm	4.38
15	PIL QBOND 1730 M250	17.2 x 3000mm	5.47
16	PIL QBOND 2030 M250	20mm x 3000mm	7.40
17	PIL QBOND 2430 M250	24mm x 3000mm	11.45
18	PIL QBOND 3830 M250	38mm x 3000mm	28.00

PIL COPPER BONDED

EARTHING ELECTRODES

Sr. No	Product Code	Secondary Electrode Pipe	Main Electrode Strip	MOC / 250 µ
1	PILQBONDSIP 482	48 mm	32 x 6 mm	COPPER BONDED
2	PILQBONDSIP 483	48 mm	32 x 6 mm	COPPER BONDED
3	PILQBONDSIP 582	58 mm	32 x 6 mm	COPPER BONDED
4	PILQBONDSIP 583	58 mm	32 x 6 mm	COPPER BONDED
5	PILQBONDSIP 762	76 mm	50 x 6 mm	COPPER BONDED
6	PILQBONDSIP 763	76 mm	50 x 6 mm	COPPER BONDED
7	PILQBONDSIP 892	88 mm	50 x 6 mm	COPPER BONDED
8	PILQBONDSIP 893	88 mm	50 x 6 mm	COPPER BONDED

Sr. No	Product Code	Secondary Electrode Pipe	Main Electrode Pipe	MOC / 250 µ
1	PILQBONDPIP 482	48 mm	21 mm	COPPER BONDED
2	PILQBONDPIP 483	48 mm	21 mm	COPPER BONDED
3	PILQBONDPIP 582	58 mm	26 mm	COPPER BONDED
4	PILQBONDPIP 583	58 mm	26 mm	COPPER BONDED
5	PILQBONDPIP 762	76 mm	48 mm	COPPER BONDED
6	PILQBONDPIP 763	76 mm	48 mm	COPPER BONDED
7	PILQBONDPIP 892	88 mm	48 mm	COPPER BONDED
8	PILQBONDPIP 893	88 mm	48 mm	COPPER BONDED

READY CAPSULE PIC EARTHING ELECTRODES

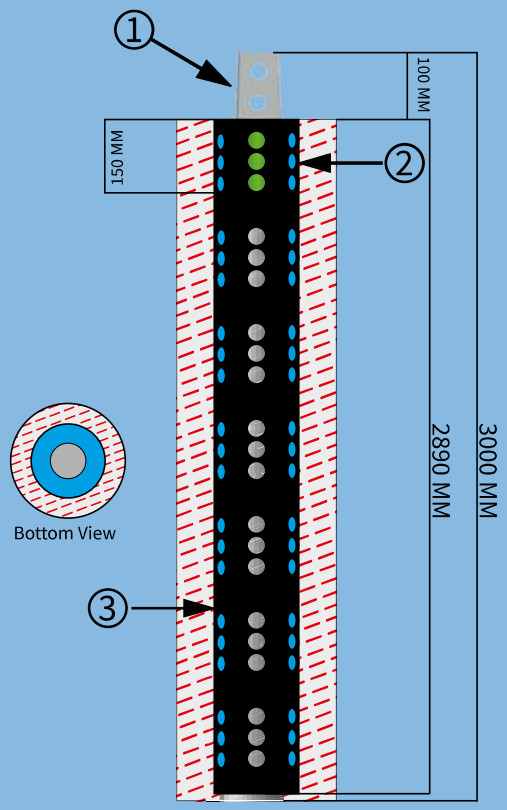
Ready Capsule Pipe in Cage Type Earthing Electrode is surrounding with enhancing material which bonding with electrode, and the cage are in pre-fabricated, ready to use form so that on-field mal-practice inform of less digging of earth pit, less Earth enhancement filling, improper watering at site can be overcome. This makes the quality check very convenient.

• Due to pre-fabricated, ready to use methodology, no on-field wastage of Earth enhancement material is done.

• Installation procedure is effective, convenient, less time consuming and cheaper.

• Transportation and storing of material, compare to separate component (i.e. electrode, Earth Enhancement compound, etc.) on field is convenient, cheaper and too easy to do.

• Quality assurance of this type of earthing can be carried out very effectively with minimum effort.



1. Connection terminal Connecting to earthing wire by two nuts & bolts Holes suitable for 12mm bolt.
2. Electrically insulated coting upto 150mm Electrode termination point.
3. Perforated cage with filling of earth enhancement material.

APPROVED BY GPRD & DISCOM

PIC EARTHING	PI-PIC-165/1.5	PI-PIC-165/2	PI-PIC-165/3
PERFORATED CAGE	150NB X 1380mm	150NB X 1890mm	150NB X 2890mm
PRIMARY ELECTRODE	48mm X 1500mm	48mm x 2000mm	48mm X 3000mm
TYPE TEST	20KA (GPRD-15)	20KA (GPRD-16)	25KA (GPRD-17)

EARTH ENHANCEMENT

SOIL RESISTIVITY IMPROVEMENT POWDER

(AS PER IEC 62561-2 &7)

SRIP : " Soil Resistivity Improvement Powder"

SRIP Compound is a Conductivity Improver and specially developed for good quality of highly conduciveness with following salient features and benefits.

Advantages of SRIP Compound:

- Non corrosive, absorbing & retaining the moisture and reduces the soil resistivity.
- Faster dissipation of fault current, least fluctuation of ohmic value and it eliminates the use of salt, charcoal.
- "SRIP" Ground minerals is moisture retainer compound & non soluble in water, Eco Friendly & Environmentally neutral

MODEL & SPECIFICATIONS:		
SR. NO	**MODEL**	**WEIGHT**
1	PIL MB SRIP 10	10KG
2	PIL MB SRIP 25	25KG
3	PIL CB SRIP 10	10KG
4	PIL CB SRIP 25	25KG

MB	MOISTURE BOOSTER	**CB**	CARBON BASED

EARTHING RE-CHARGE SOLUTION

POWER PLUS GEL

Power Plus Gel is the water soluble earthing chemical designed especially to reduce the high ground resistance without excavation of surrounding soil of Earth Electrode/Plate/Rod etc.

1. How POWERPLUS GEL work?
POWERPLUS GEL is manufactured in liquid form so it is easily penetrate in the soil as deep as possible. So liquid molecules of the POWERPLUS GEL creating bonding contact between soils and the electrode, then resistivity start to reduction very fast and effectively.

2. Consumption / Quantity of the POWERPLUS GEL require for one earth pit?
POWERPLUS GEL is the very effective liquid solution, so small amount of POWERPLUS GEL liquid in ground soil, makes large amount of reduction on ground resistivity of the soil. Minimum consumption around 2 kg / 5 kg depends upon nature of soil. But we suggest 20 liter of POWERPLUS GEL solution for single earth pit.

3. Life of POWERPLUS GEL solution ?
Once POWERPLUS GEL poured into the soil, so it will be remain effective for 18 months to 24 months or might be more. POWERPLUS GEL durability is depends upon geographical condition of the earth pit's soil.

LIGHTNING PROTECTION

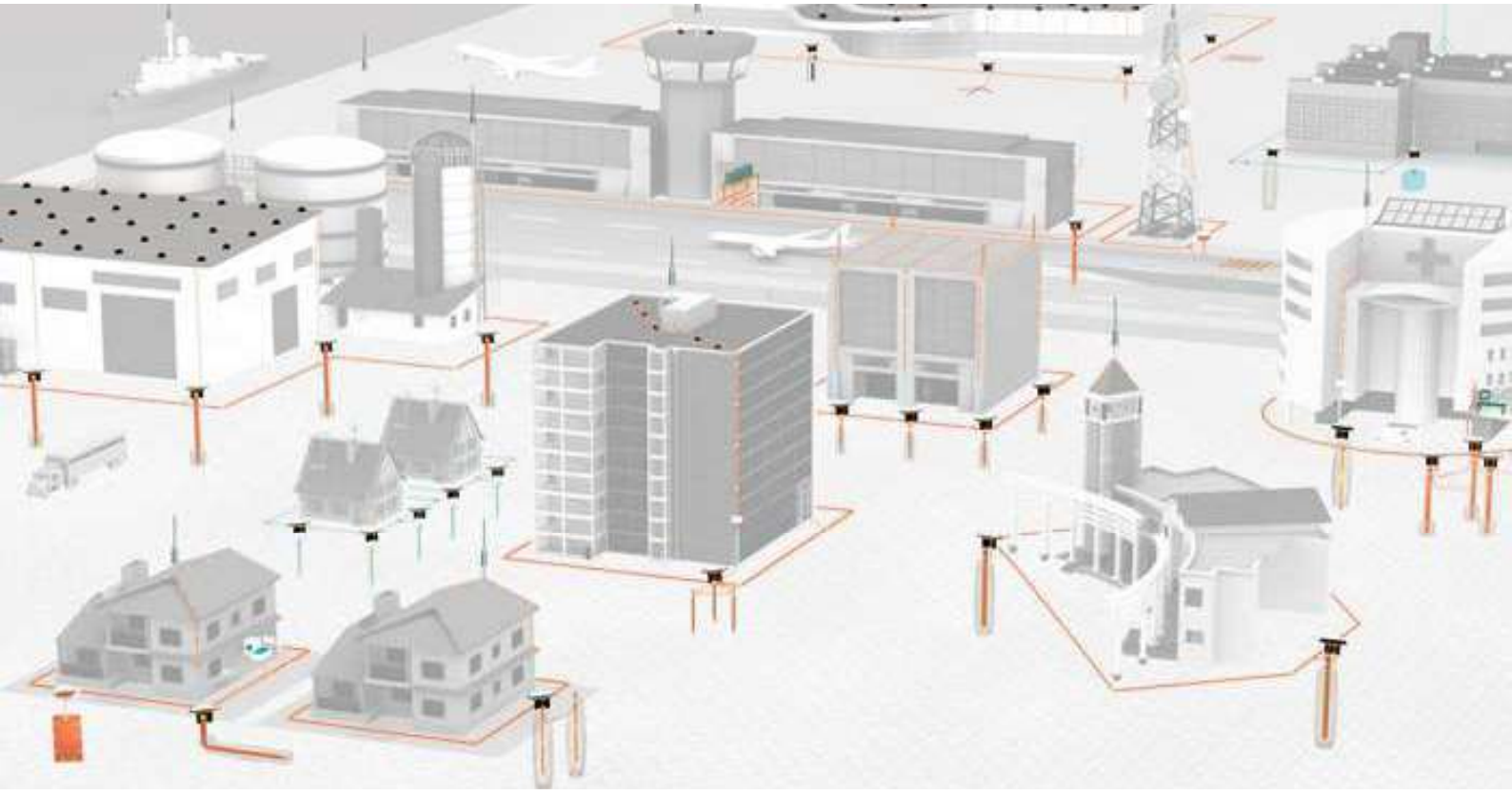
- CONVENTIONAL
  LIGHTNING PROTECTION SYSTEM
- ESEone
  LIGHTNING PROTECTION SYSTEM
- ADVANCE REMOTE
  LIGHTNING PROTECTION SYSTEM
- LOCAL
  STORM DETECTION
- LIGHTNING
  STRIKE COUNTER
- LIGHTNING
  PROTECTION SYSTEM ACCESSORIES

CONVENTIONAL LIGHTNING

PROTECTION SYSTEM

We provide all the appropriate materials and accessories for the installation of lightning protection systems according to **IEC 62305.**

System based on the sharing and dissipation of lightning discharge current through an arrangement of air terminals, down-conductors and earthing.



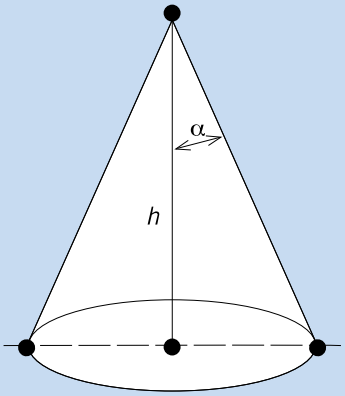
We are also one of the reliable manufacturer, supplier, and trader of Conventional Lighting Arrester. The arresters that we offered are developed by a team of diligent experts, following industry norms and guidelines.

These lightning arresters are hugely emanded in the market for its excellent weather lighting tracker system which provide insulation from natural lighting discharge. Further more, our clients can avail these arresters from us in varied shapes and size as per their requirement.

The volume protected by the air terminals can be determined using 2 methods:

1. ANGLE METHOD
2. MESH METHOD

ANGLE METHOD



According to this method the protection volume is given by a line which origin is at the air terminal, and which angle depends on the height and the protection level, according to the following chart and graphic:

Protection Level	h(m) / D(m)	20	30	45	60
		a	a	a	a
1	20	25	*	*	*
2	30	35	25	*	*
3	45	45	35	25	*
4	60	55	45	35	25

For structures higher than 60m, this method cannot be applied.

CONVENTIONAL LIGHTNING PROTECTION SYSTEM

MESH METHOD

According to this method, conductors forming a mesh should be placed on the structure.

The separation depends on the protection level:
Protection Level I: w = 5m
Protection Level II: w = 10m
Protection Level III: w = 15m
Protection Level IV: w = 20m

The mesh should initially be applied to the cover perimeter, especially edges and overhangs. For buildings higher than 60m, a mesh with the same size should also cover the upper 20% of the outer walls.

ESEone LIGHTNING

PROTECTION SYSTEM

GENERAL DESCRIPTION

ESEone is an Early Streamer Emission (ESE) air terminal based on the electrical characteristics of lightning formation. The air terminal triggers the continuous upward leader before any other object within its radius of protection. This feature is referred to in the regulations as the advance time of an ESE air terminal (ΔT). The earlier the upward leader is triggered, the larger is the distance where the downward leader is intercepted, thus protecting a greater area against lightning (standards limit it to ΔT≤60 µs).

Terminals Offer The Highest Performance Guarantees:

Regulation: UNE 21186:2011; NF C 17-102:2011; NP 4426:2013

REGULATION REQUIREMENTS*

In accordance with the standard NF C 17-102:2011 "Early Streamer Emission air terminals"	✓ Salt mist test ✓ Humid sulphurous atmosphere test ✓ Withstand current test: 100 kA (10/350 µs) ✓ Advance

TECHNICAL DATA

Peak, frame and shaft material	**Stainless steel AISI-304**
Isolation material	**Polypropylene**
Advance time	**60 µs**
Supported current	**100 KA - wave 10/350 µs**
Electrodes isolation system	**Yes**
Radius of protection for H = 6 m (*)	**Level II: 87 m** **Level III: 97 m** **Level IV: 107 m**
Maximum dimensions	290 mm x Ø 75 mm
Weight	**1,8 kg**
Function temperature range	**- 40°C ... + 130°C**
Metric thread	**Level I: 80 m**

MARKETED BY

ELECG®

MAXIMUM PROTECTION
Capable of protecting areas with a diameter of up to 214 meters.

ANTI-CORROSION GUARANTEE
Lightning rod made of carbon steel alloy for corrosion resistance.

ENERGY BLOCK
Quick loading system for short-term impacts.

TEST AND TRIALS

The ESEone lightning rod has successfully passed the following tests in accordance with the **UNE 21186, NFC 17102 and NP 4426 standards**:

- **Dimensional Analysis:** ensure that dimensions are based on standards.
- **Current Resistance:** certified 100 kA (10/350 µs) – Ensures operation in very energetic discharges.
- **Adverse Atmospheric Conditions:** certificate of resistance against saline fogs and humid sulfurous atmosphere.
- **Advance in Priming:** guarantees the protection radius.

PROTECTION LEVEL

The ESEone is a lightning protection device that intercepts lightning up to a distance of 107 meters. Its Priming Device actively captures the lightning, providing more safety than a traditional lightning rod. This system stores the electrical energy of the atmosphere, and releases it in the form of an ascending tracer, capturing the ray at a greater height.

These protection radius are calculated and tested based on the **CTE SU8, UNE 21186, NCF 17102 and NP 4426 standards.**

MODEL	LEVEL PROTECTION			
	I	II	III	IV
ESEONE	80	87	97	107
	Rp*			

*protection Radii In Meters For A Tip Height Of 6 Meters In Relation To The Plane To Be Protected.

ADVANCE REMOTE

LIGHTNING PROTECTION SYSTEM

DAT CONTROLER® PLUS may become a remote testable ESE air terminal at up to 100 m distance, when, at the customer's request, he air terminal comes with the AT-REMOTE TESTER device (reference AT-2510).

Ref.	Composition	Description
AT-2515	AT-1515 + AT-2510	DAT CONTROLER® PLUS 15 + AT-REMOTE TESTER
AT-2530	AT-1530 + AT-2510	DAT CONTROLER® PLUS 30 + AT-REMOTE TESTER
AT-2545	AT-1545 + AT-2510	DAT CONTROLER® PLUS 45 + AT-REMOTE TESTER
AT-2560	AT-1560 + AT-2510	DAT CONTROLER® PLUS 60 + AT-REMOTE TESTER

AT-REMOTE TESTER

- Range: 100 metres.
- Radiofrequency communication.
- Totally autonomous system thanks to its solar panels.
- Certified resistance to extreme environmental conditions (salt mist test and humid sulphurous mist test and humid sulphurous atmosphere treatment).
- Certified withstand current: 20 x 100 kA (10/350 µs).
- Insulation above 95% according to IEC 60060-1

AT-REMOTE TESTER continuously checks the state of the air terminal and emits a signal with the result. This verification will be done by authorized personnel using a specific analysis device.

DAT CONTROLER® PLUS +

AT-REMOTE TESTER

AT-REMOTE TESTER CERTIFICATIONS

Certificate of with stand Current, 20 Impact of 100KA (10/350µs), for the Remote Tester Device of DAT CONTROLER® PLUS AIR TERMINAL

Direct application of 20 current impulses (10/350 µs) with a peak current higher than 100 kA and specific energy over 2.5 MJ/Ω, according to EN 60060-1 and IEC 61083-1 to air terminals including the remote tester device (DAT CONTROLER® PLUS + AT-REMOTE TESTER)

AUTODIAGNOSE

AND CONNECTIVITY (IOT)

The REMOTE device allows the daily autodiagnosis of the ESE air terminal without the need to disassemble the terminal or the requirement of any means of auxiliary elevation. The result of the autotest is sent by M2M communication to a receptor device (phone, tablet, computer). The Information can be viewed from a website along with other personalized notifications, making the appropriate preventive and corrective maintenance much easier.

THUNDERSTORM

DETECTION NETWORK

ELECTROSTATIC FIELD SENSOR

Detection of thunderstorms forming over the target area by monitoring the increase in electrostatic field:

- **Tens of minutes for EARLY ALERT WARNINGS**

Electromagnetic field sensor

Detection of lightning in active thunder storms approaching the target area:

- **40KM RADIUS**

MAXIMUM EFFICIENCY

DETECTION DURING ALL PHASES OF A THUNDERSTORM
We monitor both the electrostatic and electromagnetic fields, enabling the maximum anticipation in the risk of a lightning event.

FULLY ELECTRONIC, WITH NO MOVING PARTS
Our equipment does not use moving mechanical parts, preventing blockages, wear and failures.

OPERATED BY SPECIALISTS THROUGH INTERNET OF THINGS (IOT)
The system is remotely operated, ensuring its proper functioning at all times.

EXPERT SYSTEM
Continuous improvement of its algorithms, increasing their adaptation to the monitored local characteristics.

RISK ALERTS VIA MULTIPLE CHANNELS
Our customers receive the risk alerts through multiple means: smartphone, tablet, private web portal, emails and remote activation of alert devices.

AD-HOC PROJECTS
We study each location and determine the best system configuration in terms of number and positioning of the detection units.

LOCAL STORM

DETECTION

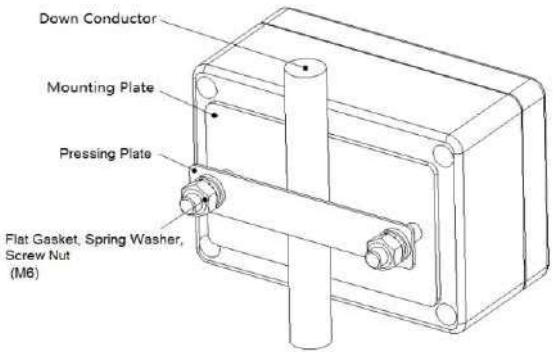
AREAS OF APPLICATION

- Health and Safety.
- Open-pit operations such as mining, shipyards or energy, etc.
- Potential risk sectors such as oil, gas, chemical, etc.
- Defence, military equipment, bases, communication sites, etc.
- Infrastructure operations such as airports, ports, etc.
- Outdoor activities and events: sports, cultural, tourism, etc.
- Public administrations responsible for open spaces such as parks, beaches, districts, etc.
- Environmental risk, disasters, civil protection, etc.
- Critical electronic environments: data centers, industry, medical centers, laboratories, etc.

LIGHTNING
STRIKE COUNTER (ANALOG)

Electro mechanical Lightning Strike Counter is designed for counting and recording lightning strikes arrested by Lightning Protection Systems. Durable and long-living components make a perfect complementary for lightning protection systems.

- Fully Compatible With Standards
- Displaying screen option 3 to 7 digits
- High Quality Plastic and Stainless Steel Material
- 20 years Warranty
- Water Resistance IP 67



LIGHTNING
STRIKE COUNTER (DIGITAL)

Digital Lightning Strike Counter (DLSC6) is an universal type lightning counter. Whenever a lightning discharge current flows (from the lightning rod to the ground) through the down conductor, DSLC6 which is connected to the lightning down conductor will start counting. DLSC6 works on the induction (electromagnetic coupling) principle and the counting is ensured whenever there is a lightning strike and discharge current flows through the system.

Digital Lightning Strike Counter (DLSC6) is suitable for all lightning rods (active & passive system), Surge Protection Device, etc. The in-built battery helps to restore the datas / counts and do not need any external power supply for the functional purpose.

AT LOGGER

AT LOGGER is a recorder of electrical activity in the lightning rod's down conductor which, in addition to counting the number of strikes, records the amplitude and polarity of the lightning, as well as the date and time the impact occurred.

- Smart lightning event counter that records the passage of lightning current, amplitude polarity, date and time of the discharge.
- The information can be collected with a specified device with use connection.
- Storage up to 40 events.
- Easy and friendly data management software.

AT LOGGER

- **SMART COUNTER**
- **RECORDS CURRENT, AMPLITUDE POLARITY AND DATE**

LIGHTING PROTECTION

SYSTEM ACCESSORIES

(ROOF MOUNTED)

1. HIGH-MAST-GI/HDGI/SS

(Refer Main Photo, High-Mast of 5Mtr. Length & 58mm Diameter with Flange at bottom for mounting)

2. GI TURNBUCKLE HOOK ADJUSTABLE CLAMP

(Used for tightening of rope as per requirement)

3. D-CLAMP

(Used to tie rope with adjustable clamp)

4. HOOK FASTENER

(Used for connecting the Adjustable clamp with ground)

5. GI ROPE – 6MM (4 SWG)
(Used to withstand the balance of high mast from wind velocity)

6. SS SCREW : 35X8 MM
(Used to Clamp UPVC pipe on wall)

7. WALL PLUGS / GRIP : 35X8 MM
(Used to support screw fitting)

8. SADDLE
(Used to fit UPVC Pipe or Cable on wall)

- **GI Saddle -25mm**
  Used to fit UPVC Pipe on wall
- **PVC Clip – 16mm**
  Used to fit cable on wall

9. UPVC CONDUIT PIPE : 25 MM
(Used to carry cable to ground)

10. COPPER/ ALUMINUM LUGS – 70SQ.MM

(Use to connect Copper cable with Earthing)

11. SS-NUT BOLT WITH DOUBLE WASHER : M12X25 MM

(Used to connect Earthing cable with Earthing)

12. ANCHOR FASTENER

(Used to keep the pole upright (Straight) on the Ground)

- **GI ANCHOR FASTENER: (M10X100MM**
- **CHEMICAL FASTENER WITH CHEMICAL & NOZZLE : RGM 12X160 & FIS V360**

13. CABLE TIE

(Used to tie cable with Pole)

- **PVC Cable Tie : 300 mm**
- **Steel Cable Tie : 300 mm**

LIGHTNING PROTECTION

EARTHING EQUIPMENTS ACCESSORIES

- EXOTHERMIC **WELDING**
- ROD TO **TAP CLAMP**
- U-BOLT **ROD E CLAMP**
- ROD TO **CABLE G CLAMP**
- EARTHING **PIT COVER**
- EARTHING **DISPLAY BOARD**
- STRIP **COPPER**
- STRIP **GI**

APLIWELD® SECURE+

THE EFFICIENT

EXOTHERMIC WELDING

PERFECT CONNECTIONS

CERTIFIED QUALITY

Earthing systems and their connections must last throughout the lifetime of an installation. The technology of the APLIWELD® Secure+ system ensures this is achieved by overcoming the result of other types of welding and traditional techniques such as mechanical connections.

c UL us LISTED

EASY TO USE.

METHODIC PROCESS AVOIDS
ERRORS AND MISUSE

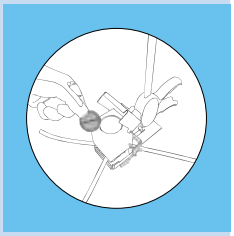
CERTIFIED
CONNECTIONS.

SAFE AND

EASY PROCEDURE

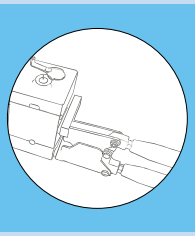
APLIWELD® -T
Welding compound
in tablets

Insert the tablets
APLIWELD® -T



APLIWELD® -E
Electronic starter

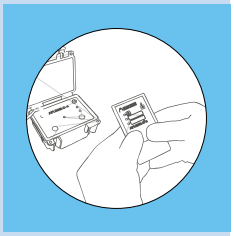
Place and connect
the electronic starter
APLIWELD® -E



KIT APLIWELD® -E
Electronic starting
device

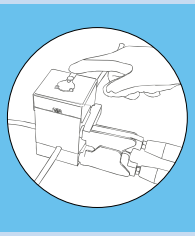
Press both push-buttons
on ignition device or the
Bluetooth remote control

on ignition device or the
Bluetooth remote control



RESULTS
Final weld

Remove the completed
joint from the **GRAPHITE MOULD**



LOM

NON-FLAMMABLE
NON-EXPLOSIVE

ROD TO

TAPE A CLAMP

Earth clamp for connection between copper tape and copper or copperbond earth rods.

Range			
EARTH ROD	TAPE	MATERIAL	WEIGHT (G)
Ø12 - 20 mm	25 x 3 mm - 26 x 12 mm	Gunmetal	150
Ø16 - 20 mm	30 x 2 mm - 40 x 12 mm	Gunmetal	240
Ø16 - 20 mm	50 x 6 mm - 51 x 12 mm	Gunmetal	300

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982

U-BOLT

ROD E CLAMP

Range			
EARTH ROD	TAPE	MATERIAL	WEIGHT (G)
Ø16 mm	25 x 3 mm	Gunmetal	260
Ø20 mm	25 x 3 mm	Gunmetal	260

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982

Earth clamp for connection between copper tape and earth rods or metal re-bars.

ROD TO

CABLE G CLAMP

Earth clamp for connection between cable or round bar and earth rod.

Range			
Earth rod	Round	Material	Weight (g)
Ø16 mm	16 - 50 mm^2	Gunmetal	60
Ø16 mm	16 - 70 mm^2	Galvanized steel	60
Ø20 mm	35 - 95 mm^2	Gunmetal	60

Complies with IEC 62305, IEC 62561, UNE 21186, NF C 17-102, BS EN 1982

EARTHING

PIT COVER

- GIVE HIGH LEVEL OF SAFETY TO EARTHING ELECTRODE
- SAVE COMPLETELY CIVIL WORK COST AND POSSIBLE TO RELOCATE.
- EASY TO MAINTAIN FOR LONGER LIFE
- CORROSION AND RUST FREE STRUCTURE

1. CI CHAMBER COVER

Technical Specifications

SR. NO	FRAME SIZE	COVER SIZE	CLEAR OPENING	WEIGHT	FRAME HEIGHT
1	10" x 10"	8.75" x 8.75"	8" x 8"	2.5 Kg	15mm
2	12" x 12"	10.25" x 10.25"	9.25" x 9.25"	5 Kg	20mm
3	15" x 15"	13.25" x 13.25"	12" x 12"	7 Kg	20mm
4	18" x 18"	16" x 16"	14.5" x 14.5"	10 Kg	20mm
5	22" x 22"	20" x 20"	18" x 18"	16 Kg	20mm
6	24" x 24"	21.75" x 21.75"	18" x 18"	35 Kg	45mm
7	22" x 16"	20" x 14.5"	18.5" x 13.5"	11 Kg	20mm
8	24" x 18"	22.5" x 17"	20" x 15"	13 kg	20mm
9	27" x 21"	25" x 19"	23" x 17"	21 Kg	25mm
10	28" x 22"	26" x 20"	24" x 18'	35 Kg	35mm
11	24" x 24"	22.5" x 22.5"	20" x 20"	22 Kg	25mm

2. RCC CHAMBER COVER

Technical Specifications

SR.NO.	DESCRIPTION	OBTAINED VALUE
1	Frame Size	15"x15"
2	Cover Size	12"x12"
3	Thickness	2"
4	Material of Construction	RCC

3. HEAVY DUTY EARTH PIT COVER

Technical Specifications

SR.NO.	DESCRIPTION	OBTAINED VALUE
1	Height	260 mm / 320 mm
2	Width	300 mm / 500 mm
3	Length	300 mm / 500 mm
4	Load Bearing Capacity	Upto 5.5.MT
5	Material of Construction	HDPE

4. POLY-PLAST CHAMBER COVER

Technical Specifications

SR. NO	TOP DIA	BOTTOM DIA	HEIGHT	MOC
1	155mm	205 mm	230mm	POLY-PLAST
2	254mm	330 mm	260 mm	POLY-PLAST
3	254mm	345 mm	260 mm	POLY-PLAST
4	440mm X 330mm	530mm X 400 mm	315 mm	POLY-PLAST
5	563mm X 403mm	673mm X 495 mm	315 mm	POLY-PLAST

EARTHING

DISPLAY BOARD

- INDICATE THE RECORD DATA i.e. INSPECTION AND DUE DATE
- RECORD ALL REQUIRE DATA IN SINGLE BOARD

TECHNICAL SPECIFICATIONS

SR.NO.	DESCRIPTION	OBTAINED VALUE
1	Width	254 mm
2	Length	380 mm
3	Height	610 mm
4	Support Stand	FRP COATED

STRIP

COPPER / GI

1. COPPER STRIP

WIDTH INCH	THICK MM	WEIGHT K.G.GMS.
25	3	0.761
25	5	1.200
25	6	1.522
32	3	0.952
32	6	1.903
50	3	1.533
50	6	3.044
75	6	4.567
75	10	7.100

2. GI STRIP

WIDTH INCH	THICK MM	WEIGHT K.G.GMS.
25	3	0.600
25	6	1.200
32	3	0.750
32	6	1.500
50	6	2.500
50	10	3.930
75	6	3.530
75	10	5.890
75	12	7.070

PIL-PLATE

TYPE EARTHING

1. GI PLATE EARTHING

SIZE MM	THICK MM	WEIGHT K.G.GMS.
300X300	5	3.53
600X600	5	14.13
600X600	6	16.96

2. COPPER PLATE EARTHING

SIZE MM	THICK MM	WEIGHT K.G.GMS.
150X150	3	0.671
225X225	3	1.458
300X300	6	2.685
450X450	6	5.832
600X600	3	10.740
600X600	6	21.480

TESTING/ AUDIT

- LIGHTNING RISK **ASSESSMENT**
- EARTHING **AUDIT**

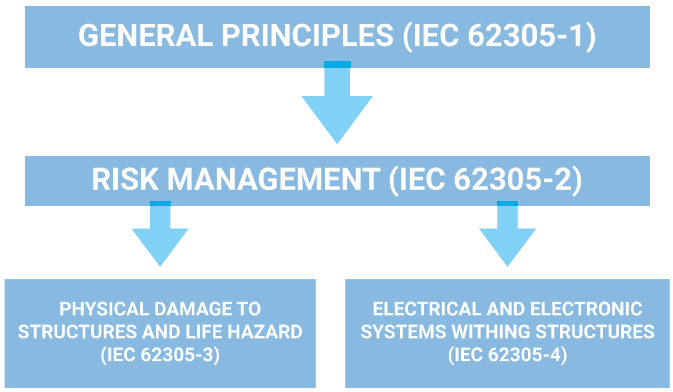
LIGHTNING RISK ASSESSMENT

1. GENERAL DEFINITION OF RISKS

The definition of the concept of risk is not an easy task and it differs in each specialty. Regarding buildings, the external impacts affecting the normal operation can be concretely identified (e.g. earthquake, lightning strikes, etc.). We may consider the occurrence of external impacts damaging buildings and the likelihood of the occurrence of negative events as risks. In another approach, by risk we understand the "Effect of uncertainty on objectives".

2. SPECIFIC DEFINITION OF RISK AND THEIR TYPES BASED ON THE IEC 62305 STANDARD SERIES

Standard series IEC 62305 at the moment consists of four parts (see Fig. 1). Risk assessment calculations are found in the document IEC 62305-2. The standard defines four possible risks at lightning strike incidents:



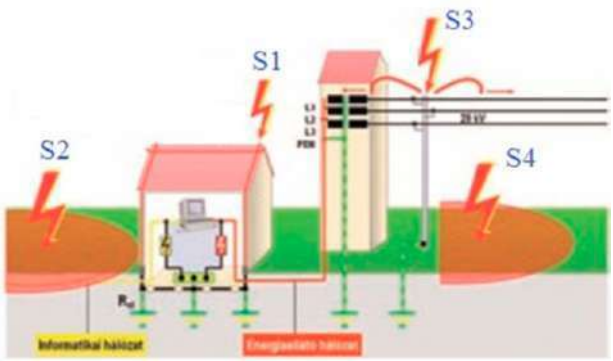
- RISK OF LOSS OF HUMAN LIFE (R_1)
- RISK OF LOSS OF SERVICE TO THE PUBLIC (R_2)
- RISK OF LOSS OF CULTURE HERITAGE (R_3)
- RISK OF LOSS OF ECONOMIC VALUE (R_4)

FIG. 1. STANDARD SERIES

Out of these four risks according to my standpoint, I consider the risk management of the loss of human life, its calculation and analysis (R1) as the basis of my further research.

3. POSSIBLE SOURCES OF DAMAGE CAUSED BY LIGHTNING STRIKE (SX)

We consider the source of damage as the point where the lightning may strike. The standard defines four possible points of strike (see Fig. 2)



- FLASHES TO THE STRUCTURE (S1)
- FLASHES NEAR THE STRUCTURE (S2)
- FLASHES TO A CONNECTED SERVICE (S3)
- FLASHES NEAR TO A CONNECTED SERVICE (S4)

FIG. 2 POSSIBLE SOURCES OF LIGHTNING

4. TYPES OF DAMAGE

The Standard Defines Three Types Of Damage:

- Injury of living beings due to step and touch voltages (D1)
- Physical damage due to lightning current effects (D2)
- Failure of electrical and electronic systems due to Lightning Electromagnetic Impulse (LEMP) (D3)

5. RELATIONSHIP OF SOURCES AND TYPES OF DAMAGE

Table 1. shows that the possible sources of lightning strike (see S1-S4) may cause several types of damage (see D1-D3) simultaneously.

TABLE 1. RELATIONSHIP OF SOURCES AND TYPES OF DAMAGE AND OWN EDITING

Source	Damage
S1	D1, D2, D3
S2	D3
S3	D1, D2, D3
S4	D3

6. CONCEPTUAL OUTLINE OF RISK ASSESSMENT

The standard contains the procedure of risk management and its calculation. Based on the definition in the standard, the building is protected when the calculated risk level (RX) is lower than the given reference value in the standard (RT). There is an exception in case of the risk of loss of service to the public (R2), where the National Fire Codes & Standards in Hungary (OTSZ) defines a stricter reference value for RT. The risk assessment calculation takes into consideration the building's and its installations' (e.g. lightning protection installations, cables, flooring etc.) parameters. The calculation method gives an estimate if the inspected building is protected against lightning strikes or not. The process of the calculation can be found on Fig. 3.

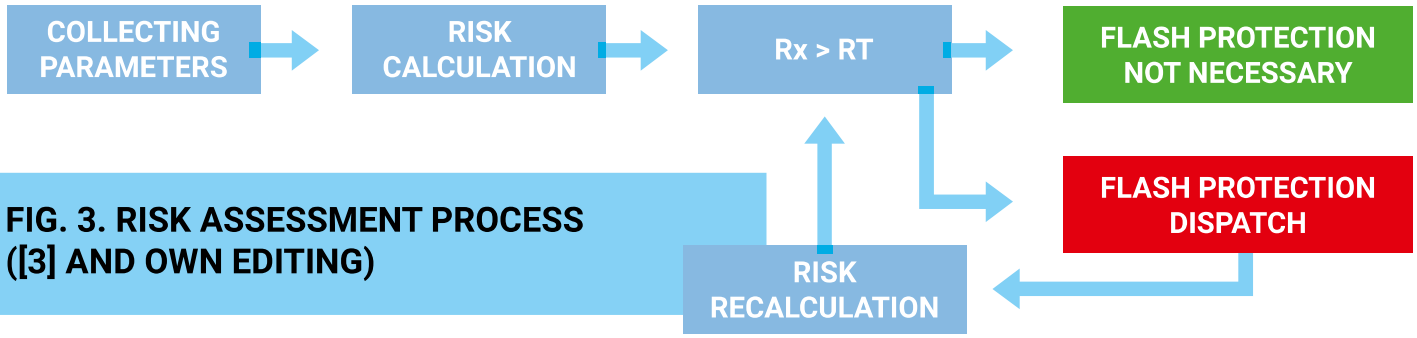


FIG. 3. RISK ASSESSMENT PROCESS ([3] AND OWN EDITING)

7. SOME ECONOMIC IMPACTS OF LIGHTNING STRIKES

Damage to property happens due to lightning strike's inflammatory and inductive effects, which together with collateral costs make up the material damage. Such additional costs might be e.g. cultural heritage conservation, professional restauration, logistics costs, etc. Inflammatory and inductive effects may generate other harmful incidents, so-called explosive incidents, the protection against which is the separate field of expertise of electric surge and explosion protection. In case of the primary lightning strikes, the flashes reach the given structure directly.

There can be damages to the roof structure, walls may move, and often furniture or exhibits inside the building might be damaged. According to one of the insurance companies' data (2016), 90% of the lightning strike damages was caused by secondary effects of lightning . In the technical jargon there is a well-known saying:

" WHAT DID NOT BURN WAS FLOODED BY THE FIREMEN. "

This saying also indicates that lightning strikes may generate very large damages directly and indirectly . To avoid these incidents, buildings need to be provided with adequate protection.

80% OF flat owners agree that their immovables are their most valuable properties, on the protection of which they need to spend. This is especially important when extreme weather causes huge losses across the country."

8. SECONDARY EFFECTS OF LIGHTNING STRIKES

In case of lightning strikes, not only our immovables (house, apartment, etc) might be in danger, but our electric devices as well.

Lightning Strikes Have Two Kinds Of Effects:

- Direct (or primary) effect, when lightning hits the building directly. Lightning conductor is used to protect against it (not compulsory for private houses)
- Indirect (or secondary) effects, when not the lightning strike itself causes damage, but the surge voltage generated as a consequence. The standard calculates with a 2 – 2 km side distance from e.g. the connected service lines.

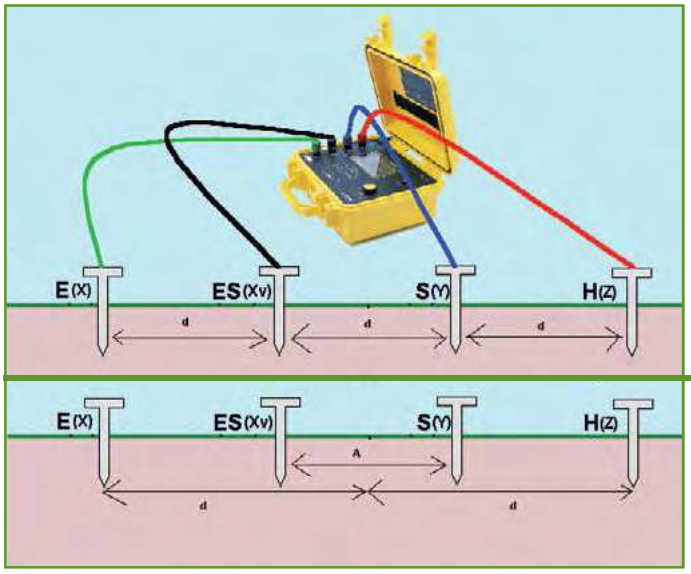
OBLIGATION FOR THE INSTALLATION OF THE PROTECTION AGAINST PRIMARY EFFECTS OF LIGHTNING IN HUNGARY

Protection against primary effects of lightning strikes may be developed with the installation of a lightning protection system. In case of some buildings, there is an obligation by law or due to standards to build, regularly review and maintain a lightning protection system. These are for example:

- **EDUCATIONAL INSTITUTIONS**
- **HOTELS**
- **HOSPITALS**
- **FACTORY HALLS**
- **BIGGER CONDOS**
- **BIGGER PLACES OF ENTERTAINMENT**
- **INDUSTRIAL FACILITIES WITH EXPLOSION RISK**

EARTHING AUDIT

SOIL RESISTIVITY MEASUREMENT



Wenner method:
the distances between the 4 rods are identical:
(d) ρW=2. ?.d.RS-SE

Schlumberger method:
the distance between the 2 central rods S & ES is A
the distance between the 2 outer rods E & H is 2d
ρS = (ρ.(d²-A²/4).RS-SE) /4

• When it is possible to choose the position of the earth connection, resistivity measurements can be used to check the soil and determine where the earth resistance will be lowest (optimization of building costs).

• The C.A 6470N and C.A 6471 automatically calculate soil resistivity using the Wenner or Schlumberger methods as soon as the distances between the rods have been entered.

• The resistances of the rods RE, RES, RS and RH can also be measured.

EARTHING MEASUREMENTS

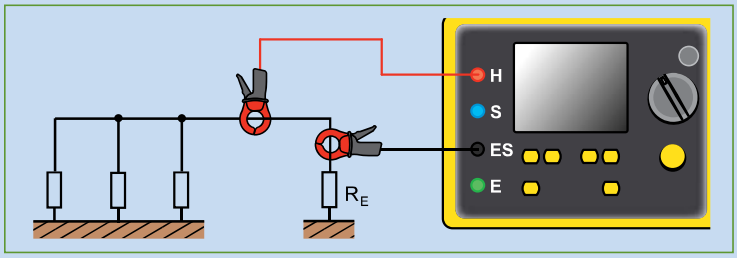
EARTH MEASUREMENT WITH 3P METHOD

• • The 3P method is the traditional method using rods to measure the resistance of an existing earth connection. The C.A 6470N & C.A 6471 can also be used to measure the resistances of the auxiliary rods RS and RH, as well as any disturbance voltages.

• Suitable for all types of measurement environments, even the most difficult, this method guarantees measurement of auxiliary-rod resistances up to 100 kΩ and disturbance voltages of 60 Vpeak.

4P AND SELECTIVE 4P EARTH MEASUREMENT

• • The 4P measurement method is particularly suitable for measuring very low earth resistances. If there are several resistances connected in parallel, it is possible to use the instrument with a clamp-on ammeter to carry out selective measurements, in order to avoid the effect of the parallel earth connections. **This "selective 4P" measurement method saves considerable time because it is no longer necessary to disconnect the earth resistance before measuring it.**



TOUCH AND STEP POTENTIAL

- Touch and step potentials at various locations in the grid area will be measured by injecting offgrid frequency current at a remote location and measuring the touch and step potentials in the grid area by using a tuned voltmeter which detects only the frequency current, set for injection by filtering other currents.
- The measured values of potentials for the injected current should be scaled to the bus fault current and corresponding values of touch and step potentials are to be noted.
- These values of touch and step potentials are to be verified by simulating the same fault current in the software.

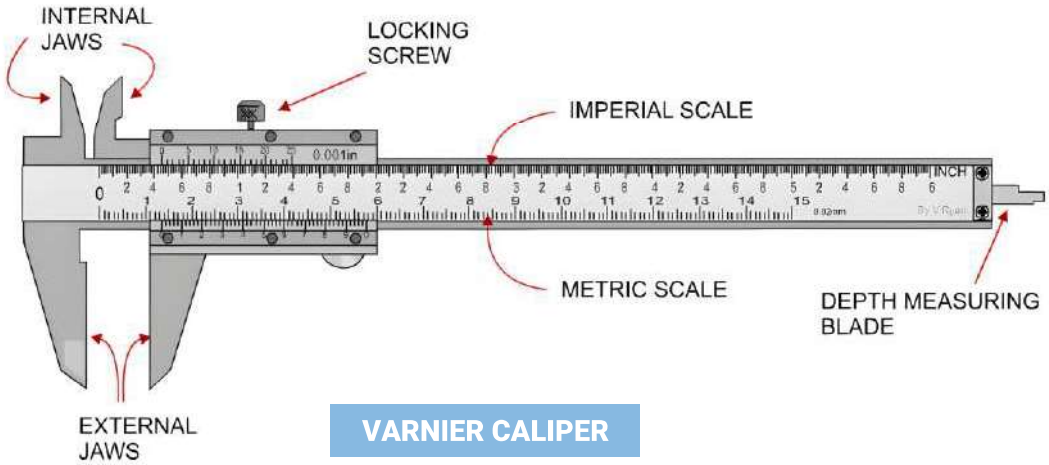
DIGITAL LOW RESISTANCE OHM METER

RISER INTERGRITY TEST / GRID INTERGRITYTEST

- The Riser/Grid intergrity test will be conducted by off grid frequency current injection method as per IEEE 81 2012 to check the intergrity of the riser connections.

EFFECT OF CORROSION

- At site, the buried conductors were excavated to check for the corrosion effects.
- The soil and rust were removed from the conductor by scrubbing
- The effective diameter/thickness of remaining metal of both riser and earth mat were measured with a Vernier scale



VARNIER CALIPER

- **CONCLUSION -**
- Earthing systems are considered healthy when all the above parameters are Within safe and prescribed limits. Such a healthy earthing system can offer low Resistance path to a fault current which in turn enables tripping of protective Devices in time to isolate the faulty circuit.