

Electrostatic and Membrane system LIGHTNING PROTECTION DEVICE

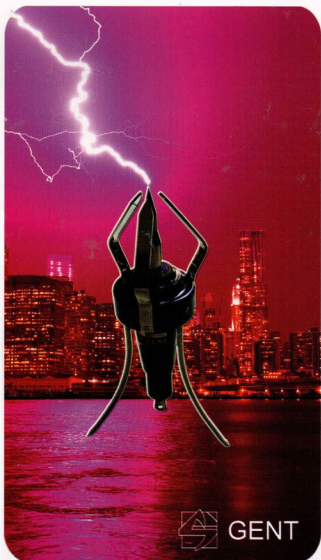


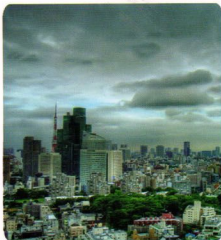
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GENT
LIGHTNING
PROTECTION
Electrostatic and
Membrane System
Device





INTRODUCTION

As know daily, lightning mainly occurring during rainy season, is a problem usually harming mankind and their environment.

In line with the progress of technology, such possibilities can be avoided by installing a good lightning arrester.

Lightning occurs following the changes of electrical load from the cloud to the surface of the ground. The negative loaded cloud will become the main source of lightning occurrence. If a lump of cloud moves, then the surface of the ground will have a positive load which will be equal to the shadow of the cloud.

Prior to the striking of lightning, first we will see the glowing lines called "step - leader" through its branching flash, the ladder will move towards the ground with a high speed.



If one of ends of the lightning leader has been close to the surface of the ground, a positive loaded current will emerge from the surface of the ground which will meet the negative loaded electrical current from the end of the lightning leader. If the positive loaded current from the surface of the ground has met the negative loaded one from the end of the lightning leader a LIGHTNING will, in a short and quick time, take place.

Lightning will chose its objects to the higher place cotaining electrical load. And in order to avoid the striking of lightning, a meaningful effort to arrest it should therefore be sought.



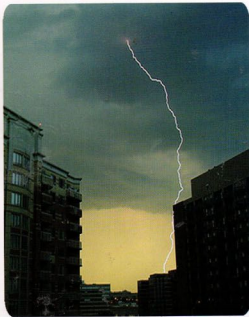


TYPE OF LIGHTNING PROTECTION DEVICE

1. Conventional (Faraday system) Lightning Arrester
2. Radioactive Lightning Arrester
3. Electrostatic and Membrane System Lightning Arrester.

ELECTROSTATIC AND MEMBRANE SYSTEM

GENT Electrostatic and Membrane System Lightning protection base on the electrostatic system, its application is suited with natural occurrence, where GENT Electrostatic and Membrane System will play a role as a Lightning catcher which flows the excess of electrical loaded current of the lightning to the ground.



WORK METHOD OF ELECTROSTATIC AND MEMBRANE SYSTEM

Based on the balance of the highest building location, the "GENT Electrostatic and Membrane System" will be capable to protect the surrounding buildings from the striking of lightning. The area protected by the lightning distributor is different according to the types of lightning arrester used.

The movement of lightning ladders towards the ground with a high speed and the branching flash will be balanced and arrested by this lightning arrester. Under this way, there will be no worries against the striking of lightning.

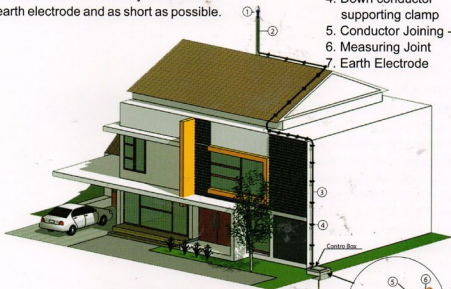




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CATCHING CONDUCTOR

Down conductor has the function as a distributor of surge current to the ground, therefore it should be directly connected to the earth electrode and as short as possible.



INSTALLATION

1. Catching point
2. Supporting post
3. Down conductor
4. Down conductor supporting clamp
5. Conductor Joining - Clamp
6. Measuring Joint
7. Earth Electrode

OTHER THINGS REQUIRING ATTENTION ARE :

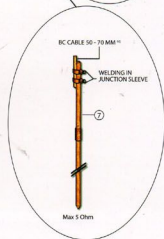
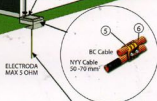
1. If the way of conductor has to turn, its corner should be above 90°
2. The turning should be in the form of a circle with minimum radius 20 cm
3. Joint is not allowed on conducting cable
4. Crossing in the minimum distance of 10 cm with installation of telephone, electricity and gutter is not allowed.

MEASURING CLAMP

This clamp is a stop point from down conductor to the earth electrode. It should be mechanically strong and fulfills the electric requirements and easily disassembled for measuring purposes.

SPECIALITY

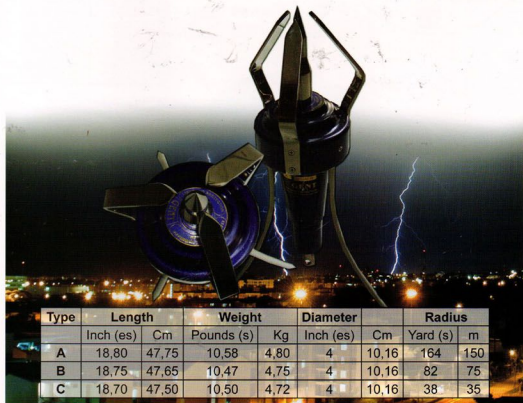
- Containing no radioactive
- Very large radius of protection
- Only used 1 (one) down conductor
- Easy maintenance





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ELECTROSTATIC and MEMBRANE SYSTEM
LIGHTNING PROTECTION DEVICE



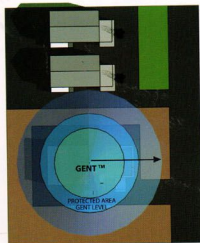
Type	Length		Weight		Diameter		Radius	
	Inch (es)	Cm	Pounds (s)	Kg	Inch (es)	Cm	Yard (s)	m
A	18,80	47,75	10,58	4,80	4	10,16	164	150
B	18,75	47,65	10,47	4,75	4	10,16	82	75
C	18,70	47,50	10,50	4,72	4	10,16	38	35



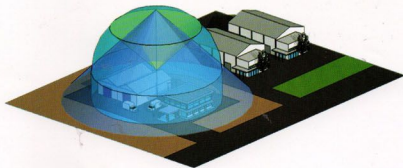
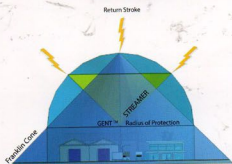


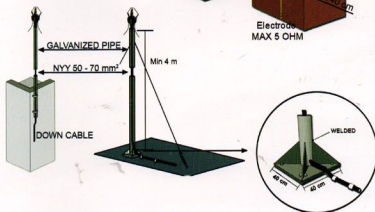
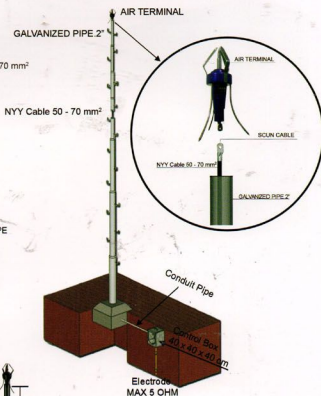
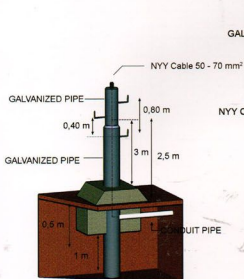
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DESIGN CONSIDERATION



SITUATION



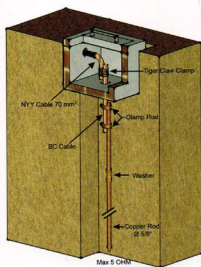




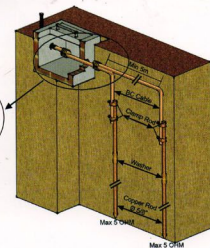
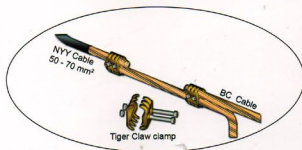
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GROUNDING CONNECTION

SINGLE GROUNDING

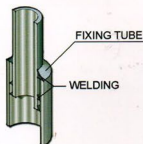


PARALEL GROUNDING

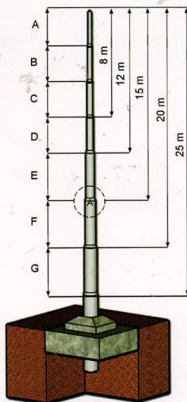




	2"	3"	4"	5"	6"	8"	10"
	A	B	C	D	E	F	G
8 m	2 m	4 m	5 m				
10 m	4 m	4 m	5 m				
12 m	4 m	3 m	3 m	5 m			
15 m	2 m	2 m	3 m	5 m	6 m		
20 m	2 m	2 m	3 m	5 m	5 m	6 m	
25 m	2 m	2 m	3 m	4 m	5 m	6 m	6 m



DETAIL A





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Coverage Area
of GENT™
Electrostatic and Membrane System
Lightning Protection

Direct Stroke



Nearby Stroke



$$r = \sqrt{(r_s^2 - (r_g - h)^2)} \quad (\text{equation 1})$$

Where r_s and r_g are the "striking distances", r_s is the structure striking distances, and r_g is the ground striking distances.

$$r_s = \alpha \cdot I_p^\beta \quad (\text{equation 2})$$

$$r_g = k \cdot r_s \quad (\text{equation 3})$$





Electrogeometrical Attractive radius expression	α	β	k
Armstrong and Whitehead	6.70	0.80	0.90
IEEE	10.00	0.65	0.55

As average bolt of lightning carries an electric current of 40 kiloamperes (kA), although some bolts can be up to 120 kA.

From equation 1,2 and 3 the radius of coverage area of GENT™ can be determined as:

$$r = \sqrt{(\alpha \cdot I_p^\beta)^2 - ((k \cdot (\alpha \cdot I_p^\beta)) - h)^2}$$

For the calculation, the value of electric current of lightning is 86 kA. And the value of α , β and k are empiric values from the IEEE.

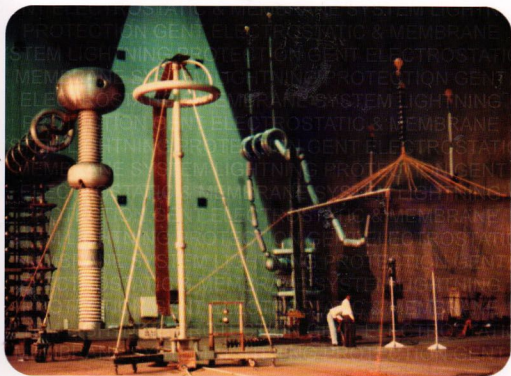
$$r = \sqrt{(10.86^{0.65})^2 - ((0.55 \cdot (10.86^{0.65})) - 20)^2}$$

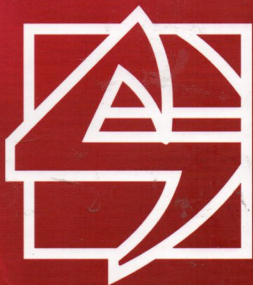
$$r = 151.07m$$





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