LIGHTNING PROTECTION
Electrostatic and Membrane System

THOMAS NEW EMSY LIGHTNING PROTECTION IS BASE ON ELECTROSTATIC and MEMBRANE SYSTEM THAT GENERATED STREAMER WHEN A STORM IS THREATENING. THE MOST EFFICIENT LIGHTNING CONDUCTOR SYSTEM KNOWN AS.
THE LIGHTNING PROCESS

Rain consists of drops of water that fall from clouds. These clouds are formed as result of the rising of moist air in the atmosphere that condensate to become grains of water that float in the air, and are seen from below as clouds. The next process, these grains of water that float in the air, and are seen from below as clouds. The next process, these grains of water develop the weight and size until reaching the diameter of 0.5 - 5 mm and fall down as drops of rain.

When there is an accumulation of charges activity in the cloud, it generates a charge of opposite polarity that creates a large electric field between clouds and earth. The electric field will influence objects higher than the earth surface that discharge the positive ion and form channel like a ribbon of air moving towards ribbon of negative ion originated from cloud. If these two ribbons meet of one point in the air, then a flow of lightning current will discharge through the channel formed by these two ribbons to earth. A large critical potential difference of electrical voltage gradient (V/d) will exceed +10 kV/cm as result, electrons will leave the base of clouds that seems like luminescent trajectory called "Lightning Ladder".

![Lightning ladder process]

The lightning ladder progresses rapidly toward the earth through branching track. When one of the lightning ends is near to the earth, then a positive charge will discharge from earth that causing short circuit between earth and clouds that produce a large electric current. At the seem moment, the powerful explosion is called thunder will be heard.

Usually, the lightning will choose targets at places that contain enough electric charge and closer enough to the reach. Therefore in order to protect buildings electronic equipment or else, from the lightning strike, the lightning protection should be installed.
THOMAS NEW ENSY LIGHTNING PROTECTION ELECTROSTATIC and MEMBRANE SYSTEM is an external lightning protection that is very reliable to protect building strike. THOMAS NEW ENSY lightning protection electrostatic and membrane system operates based on the ionic from plasma that produces streamer to drive away the lightning strikes.

THE PRINCIPLE OF THOMAS NEW ENSY EXTERNAL LIGHTNING PROTECTION

THOMAS NEW ENSY LIGHTNING PROTECTION is a lightning protection electrostatic and membrane system that operates based on ions from plasma that produces by one electrode, and a potential difference between clouds and drive away the lightning strike. Down claw end, under electric field influence between clouds and earth, an electric discharge can be generated that creates positive potential. Between electrodes distance, an electric voltage will occur that might discharges electric spark. A generated plasma helps to enrich electrons and accelerate snow balling process, therefore the streamer forming process will be faster.

THOMAS NEW ENSY LIGHTNING PROTECTION SYSTEM consists of:

1. AIR TERMINATION SYSTEM.
   Performs as an arrester of lightning strike point to the earth in order to protect the protective zone from lightning strike hazards.

2. DOWN CONDUCTOR
   Only one down cable performs to conduct lightning current captured by air terminator to the earth.

3. EARTH TERMINATION SYSTEM.
   Performs to spread the electric current as a result of lightning to the ground, where the grounding electrodes are in connection with conductor.
DIFFERENT TYPE
OF THOMAS NEW ENSY LIGHTNING PROTECTION

Type 125

Type 60

Type 25

ADVANTAGES OF THOMAS NEW ENSY LIGHTNING PROTECTION
DOWN LEAD CONDUCTOR

Capacitor component C, is parallel to resistor R which is series to Inductance L.

\[ L = \frac{0.9x}{2.4x 4.0d} \]

where
- \( x \) = conductor length
- \( D \) = conductor distance
- \( \sigma \) = air permeability
- \( d \) = grounding conductor diameter

\( C = \) grounding conductor capacitance as follows:

- \( C = \frac{1}{3C'} \cdot x \) Farad
- \( C' = \frac{1}{1'} \cdot \frac{1}{v} \) Farad/m
- \( L' = \) velocity of light \( 3 \cdot 10^8 \) m/det

B.C. grounding has small capacitance. The voltage drop at earth surface:

\[ V = R \frac{I + L}{dt} \frac{di}{dt} \]

where
- \( V \) = voltage drop
- \( R \) = grounding conductor resistance (Ohm)
- \( I \) = lightning current peak value (Ampere)
- \( L \) = grounding conductor inductance (Henry)
- \( \frac{di}{dt} \) = lightning current gradient (Amp./detr.)

The electrical system analogy:

The electrical field intensity is equal to the maximum value of the voltage gradient to the distance.

\[ E = \frac{V}{x} \]
Protection of house with THOMAS NEW ENSY Lightning Protection System
INSTALLATION OF THE
THOMAS NEW ENSY LIGHTNING PROTECTION SYSTEM

THOMAS NEW ENSY

MAST Ø 1 1/2"

DOWN CABLE NYA 70 mm²

ELECTRODE MAX 5 OHM

CU CABLE NYA 70 mm²

CLAMP

R = 20

WALL

0.60 M
INSTRUCTION FOR THE INSTALLATION OF
THE THOMAS NEW EASY LIGHTNING PROTECTION SYSTEM

CENTRAL CONDUCTOR

NYA 70 mm²

CONNECTOR KIT T.P
TYPE OF MASTS
for Winds no faster
that 125 Km/h

<table>
<thead>
<tr>
<th>Ø mast</th>
<th>1½&quot;</th>
<th>2&quot;</th>
<th>2½&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
<th>5&quot;</th>
<th>6&quot;</th>
<th>7&quot;</th>
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</thead>
<tbody>
<tr>
<td>8 m</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10 m</td>
<td>4</td>
<td>3</td>
<td>4</td>
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<tr>
<td>12 m</td>
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<td>3</td>
<td>3</td>
<td>4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>15 m</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
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</tr>
<tr>
<td>20 m</td>
<td>3</td>
<td>2½</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>25 m</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
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</table>

 Diagrams of mast sections for different lengths:
- 25 m: h g f e d c b a
- 20 m: g f e d c b a
- 15 m: e d c b a
- 12 m: d c b a
- 10 m: c b a
- 8 m: b a
SPECIFICATION OF THOMAS NEW LIGHTNING PROTECTION AND MEMBRANE SYSTEM

<table>
<thead>
<tr>
<th>SPECIFICATIONS</th>
<th>Dimensions</th>
</tr>
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<tbody>
<tr>
<td>Size (approx)</td>
<td>38.5 cm (15.4&quot;)</td>
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<tr>
<td>Weight in Kg</td>
<td>3850 gr (8.5 lb)</td>
</tr>
<tr>
<td>Length</td>
<td>38.5 cm (15.4&quot;)</td>
</tr>
<tr>
<td>Wide</td>
<td>10.16 cm (4&quot;)</td>
</tr>
<tr>
<td>Plate</td>
<td>3 x 2 cm (0.8&quot;) x 0.5 cm (0.2&quot;)</td>
</tr>
<tr>
<td>Cage</td>
<td>3 x d 4 mm² (d 0.16&quot;)</td>
</tr>
<tr>
<td>Colour</td>
<td>Black &amp; Chromed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Point protecting a building</th>
<th>Point protecting a ground surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual height of the point on the roof</td>
<td>Action radius at roof level standard point</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td>4</td>
<td>6.9</td>
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<tr>
<td>6</td>
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<td>8</td>
<td>13.8</td>
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<td>10</td>
<td>17.3</td>
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<td>12</td>
<td>20.7</td>
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<tr>
<td>15</td>
<td>26</td>
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</table>
Figure 1: UNIDIRECTIONAL WAVESHAPES (A) OPEN-CIRCUIT VOLTAGE WAVEFORM (B) DISCHARGE CURRENT WAVEFORM

Figure 2: THE PROPOSED 0.5 μS - 100 kHz RING WAVE (OPEN CIRCUIT VOLTAGE)

<table>
<thead>
<tr>
<th>LOCATION CATEGORY</th>
<th>WAVEFORM</th>
<th>MEDIUM EXPOSURE PEAK AMPLITUDE</th>
<th>TYPE OF LOAD</th>
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<tbody>
<tr>
<td>A. Long Branch circuits and power outlets</td>
<td>0.5μS - 100 kHz</td>
<td>6 KV 200 A</td>
<td>high impedance low impedance</td>
</tr>
<tr>
<td>B. Major feeders short branch circuits, and load centre</td>
<td>1.2/50μS 8/20μS</td>
<td>6 KV 3000 A</td>
<td>high impedance low impedance</td>
</tr>
<tr>
<td></td>
<td>0.5μS - 100 kHz</td>
<td>6 KV 500 A</td>
<td>high impedance low impedance</td>
</tr>
</tbody>
</table>