



**SSCT**

*"For Nation's Greater Heights"*

1.7.2. group/individual reports;



A WEBINAR ON  
LIGHTNING  
ARRESTER

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## INTRODUCTION

**Lightning arresters** or surge diverters are used to protect the earth screen and ground wires in an electrical system against direct lightning strokes. They conduct the high voltage surges to the ground without getting affected to the system. The lightning arrester provides a cone of protection which has a ground radius approximately equal to its height above the ground.

The **surge diverters** consist of a spark gap in series with a nonlinear resistor. The function of non linear resistor is very important. As the gap sparks over, due to the over voltage, the arc would get short circuited and may cause power flow current in the arrester. Since the characteristic of the resistor is to offer high resistance to high voltage, it prevents the effect of a **short circuit**. After the surge is over, the resistor offers high resistance to make the gap non-conducting.

One end of the **arrester** would be connected to the terminal of the equipment to be protected and other end would be grounded. The length of the spark gap is set in such a way that normal **line voltage** is enough to cause an arc across the gap but high voltage would break down the air insulation and form an arc.

## WORKING OF LIGHTNING ARRESTER

- The lightning arrestor protects the structure from damage by intercepting flashes of lightning and transmitting their current to the ground. Since lightning strikes tends to strike the highest object in the vicinity, the rod is placed at the apex of a tall structure. It is connected to the ground by low-resistance cables. In the case of a building, the soil is used as the ground, and on a ship, water is used. A lightning rod provides a cone of protection, which has a ground radius approximately, equal to its height above the ground.

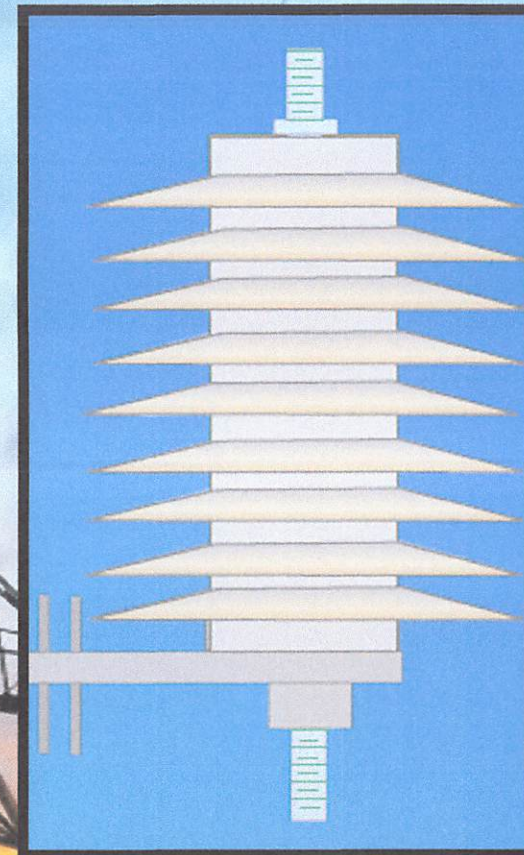
## CONCEPT OF LIGHTNING

- Lightning is an atmospheric discharge of electricity from the thunder ,which typically occurs during thunderstorms or during storms.
- The atmospheric discharge lightning can travel at a speed of 220,000 km/h.
- It can reach temperature approaching 30,000 degree Celsius.
- Figure shows the lightning strikes on efiel tower in 1902



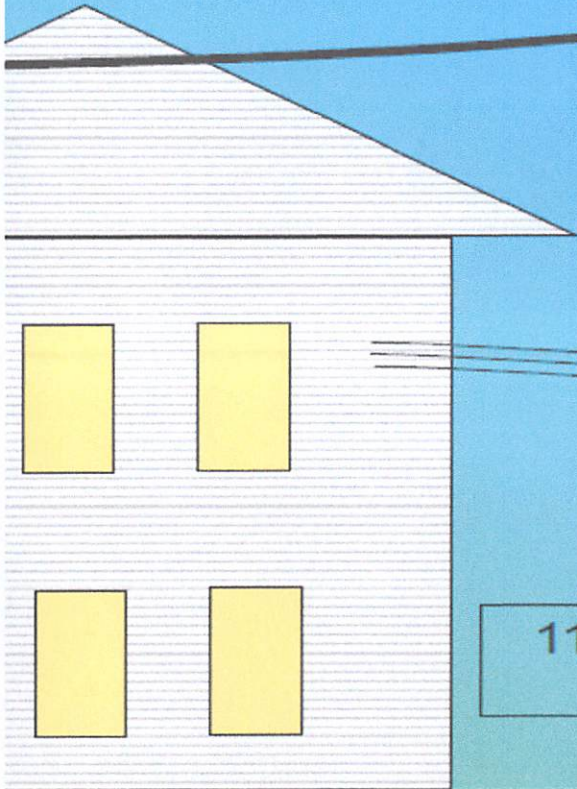
## CONCEPT OF LIGHTNING

- Surge arresters does not absorb the lightning.
- Surge arresters does not stop the lightning.
- Surge arresters divert the lightning to the ground.
- Surge arresters limit the voltage produced by lightning.





Typically  
8400 Volts



115 or 220 Volts

Impulse Sensitive  
Transformer

# System Without Arrester



Typically  
8400 Volts

Transformer

115 or 220 Volts

When  
Lightning  
strikes the  
system

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equipment  
is damaged  
and the  
lights go out

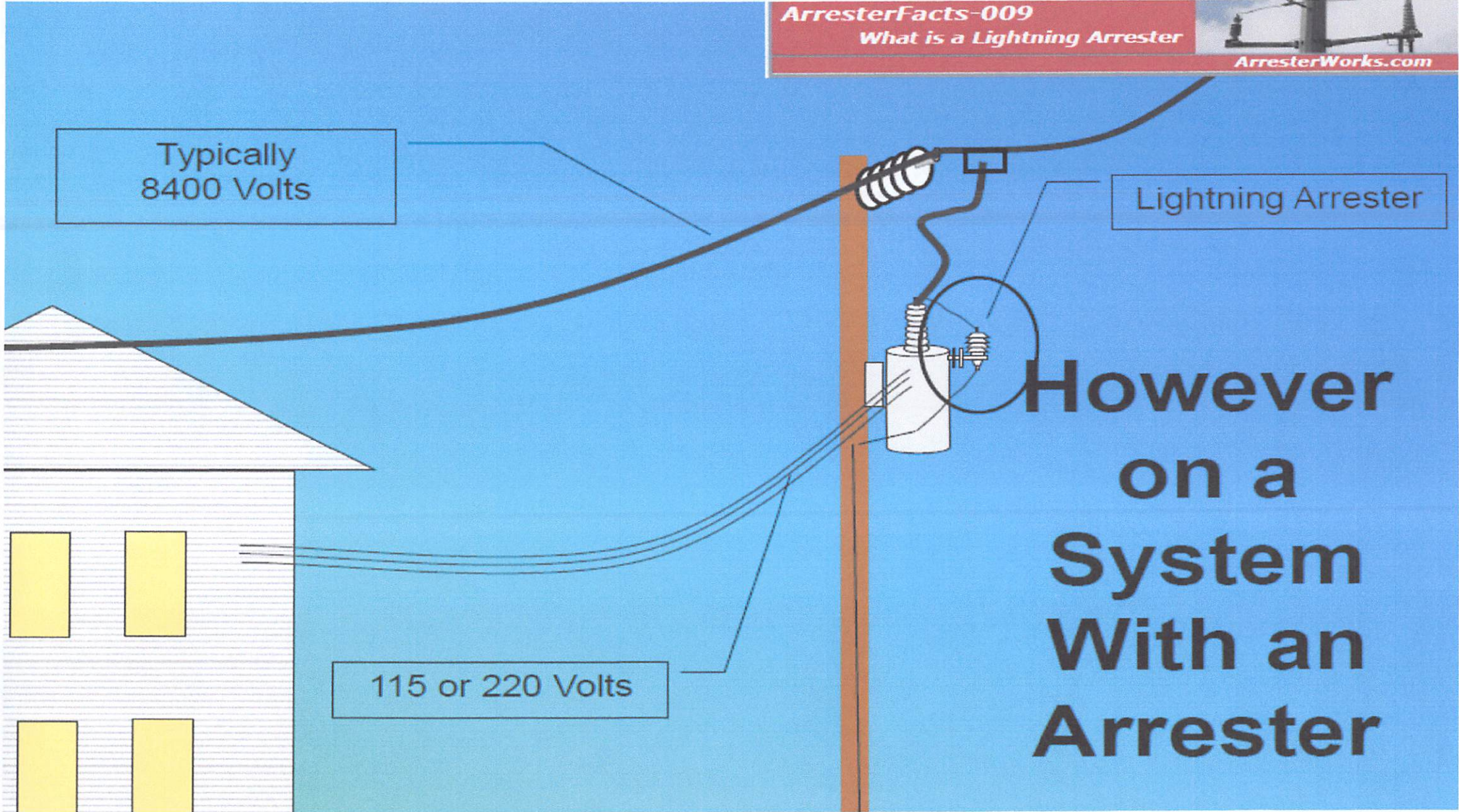


Typically  
8400 Volts

Lightning Arrester

115 or 220 Volts

**However  
on a  
System  
With an  
Arrester**





## TYPES OF LIGHTNING ARRESTERS

- Station class
- Intermediate class
- Distribution class
- Secondary class

## STATION CLASS

- ❑ Station class arresters are typically used in electrical power stations or substations and other high voltage structure and areas.
- ❑ These arresters protect against both lightning and over voltages, when the electrical device has more current in the system than it is designed to handle.
- ❑ These arresters are designed to protect equipment above the 20mVA range.

## INTERMEDIATE CLASS

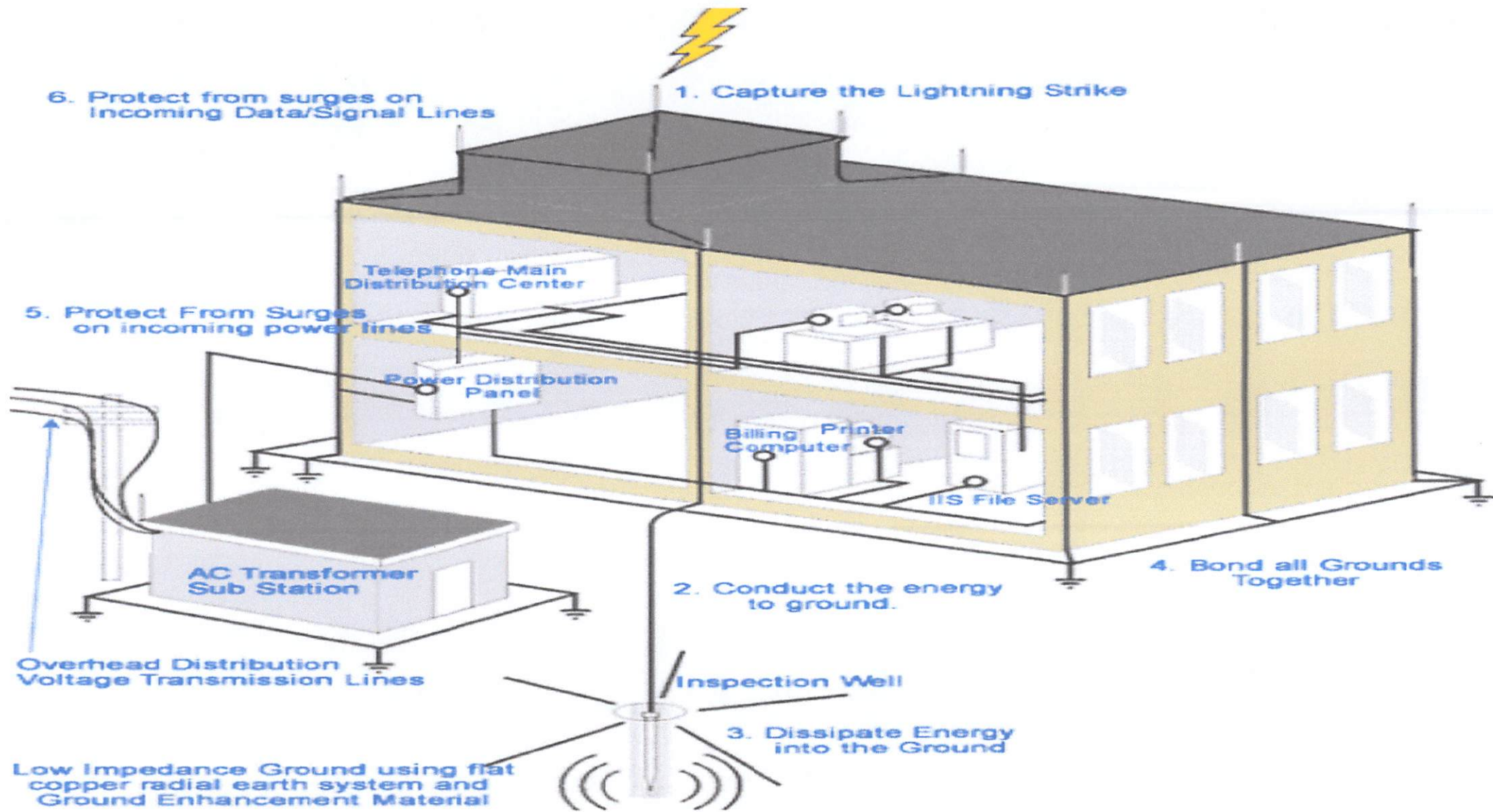
- ❑ Like station class arresters, intermediate class arresters protect against surges from lightning and over voltages ,but are designed to be used in medium voltage equipment areas,such as electrical utility stations,substations,transformers or other substation equipment.
- ❑ These arresters are designed in the range of 1 to 20mVA.

## DISTRIBUTION CLASS

- Distribution class arresters are most commonly found on transformers, both dry- type and liquid filled.
- These arresters are found on equipment rated at 1000kVA or less.
- These arresters are sometimes found on exposed lines that have direct connections to rotating machines.

## SECONDARY CLASS

- ❑ Secondary class lightning arresters are designed to protect most homes and business from lightning strikes, and are required by most electrical codes.
- ❑ These arresters cause high voltage overages to ground, though they do not short all over voltage from a surge. Secondary class arresters offer the least amount of protection to electrical systems

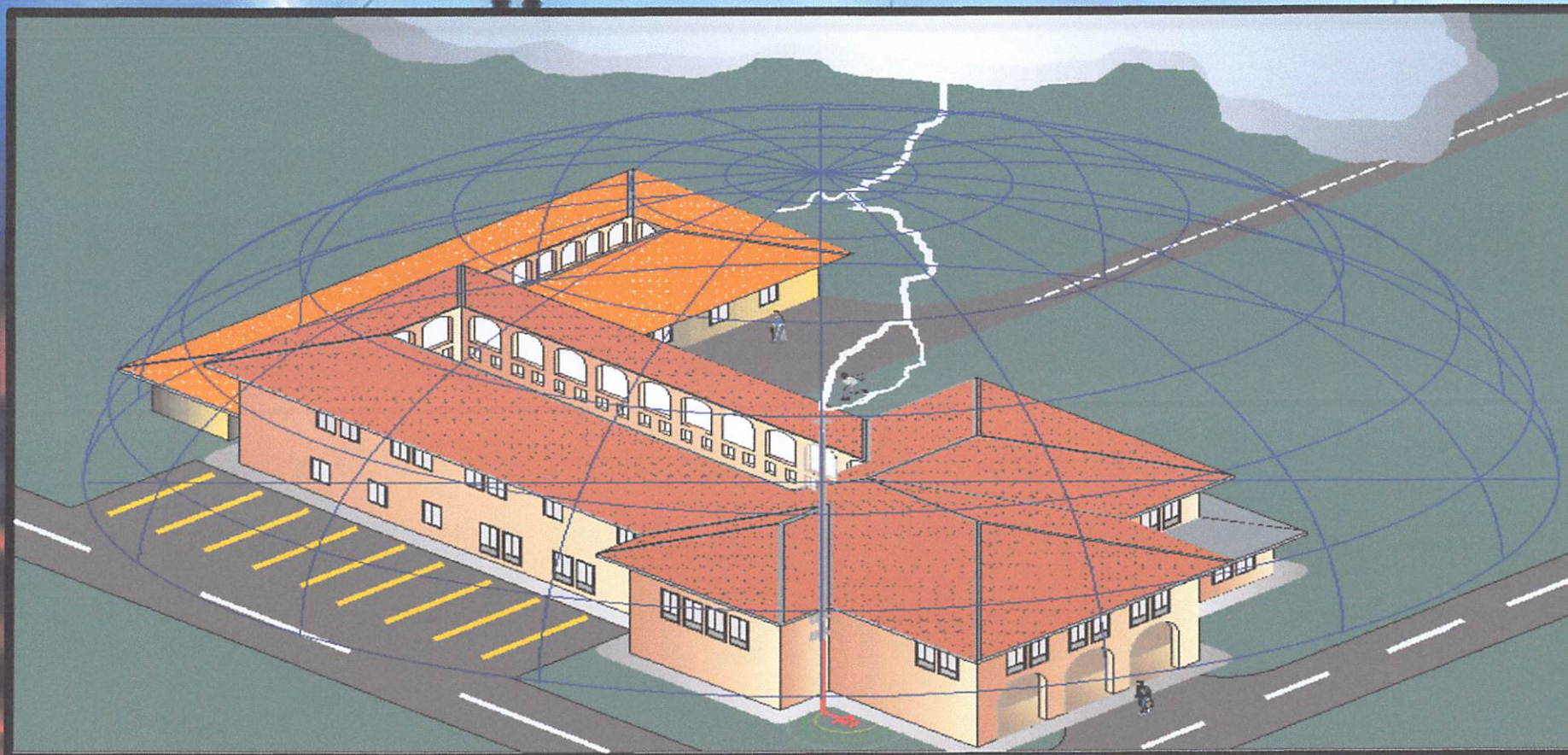


HOUSE WITHOUT PROTECTED WITH LIGHTING ARRESTER





## HOUSE PROTECTED WITH LIGHTNING ARRESTER



The background of the slide is a photograph of a dramatic sky at sunset or sunrise. The sky is filled with dark, heavy clouds, and a bright orange and red glow is visible near the horizon. A power line tower is visible in the lower part of the image. A bright lightning bolt is visible on the left side of the sky. The overall scene is dark and moody, with a strong contrast between the dark clouds and the bright light near the horizon.

## **SURGE DIVERTERS ARE AVAILABLE DEPENDING ON THE PURPOSE**

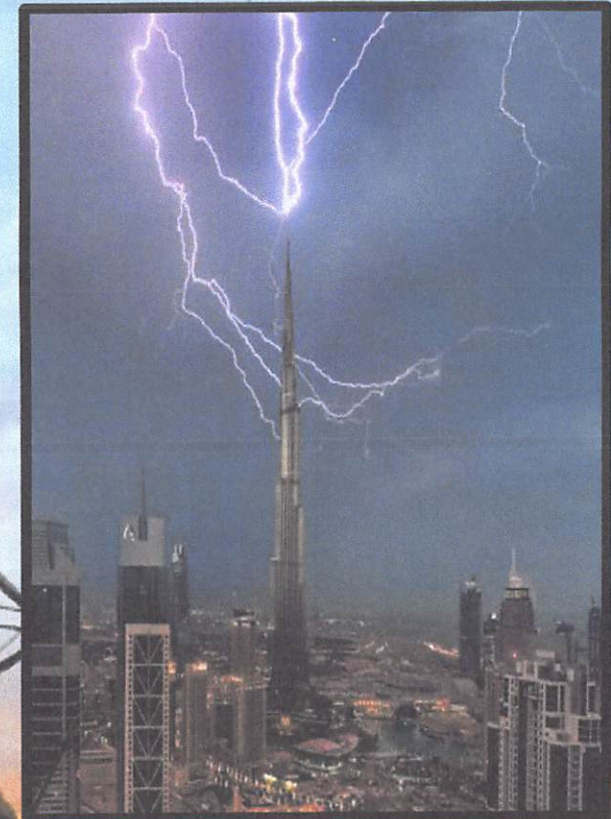
1. Rod gap arrester
2. Expulsion type lighting arrester
3. Valve gap arrester

## APPLICATIONS

- Lightning arresters are used on tall buildings to prevent lightning from causing physical damage to infrastructure.
- It is used on power lines to protect the cables from lightning.
- Lightning arresters are used power outlets to protect electronic devices from surges of electricity.

## CONCLUSION

All electrical equipment in an electrical system needs to be protected from voltage surges. The rating of the arrester, the class of arrester and location of the arrester all play a part in the surge protection. In **tall buildings**, ground is used to discharge and in ships water is used to discharge the voltage. In protection of substation we use different class of lightning arresters to protect the electrical equipment.



SO MUCH!



THANK YOU

## STUDENT REPORTING

