

# When You Say Grounding.....



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## Utility Transmission Lines

- Lightning concerns are addressed by shield wires and some surge arresters. The concern is flashover at the tower and at mid-span.
  - Tower insulator flashover is controlled by grounding at the tower,
  - Midspan flashover is controlled by line spacing at mid-span.
- 60 Hertz fault detection is controlled by the number of ground rods per mile.

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## Utility Substations

- Lightning concerns are addressed by shield wires and station class surge arresters. The concern is flashover on the bus conductors and insulation failure within the equipment.
- 60 Hertz fault detection is controlled by the number of ground rods and size of the ground grid.
- Ground potential rise (step and touch) is controlled by the number of ground rods and size of the ground grid.

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- Telephone interface protection is controlled by the use of

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## Utility Distribution Lines

- Lightning concerns are addressed by distribution class surge arresters. The concern is flashover along the line and at supports.
- 60 Hertz fault detection is controlled by the number of ground rods per mile.

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## **Your Service Entrances**

- Lightning concerns are addressed by service entrance MOV surge arresters. The concern is lightning induced voltages entering the building wiring.
- 60 Hertz fault detection is controlled by the two (2) ground rods per service entrance.
- Telephone/CATV protection is often not addressed. You should use surge protection at the service entrance.

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## **Your Building Interiors**

- Lightning concerns are addressed by sub-panel MOV surge arresters. The concern is lightning induced voltages propagating on the building wiring. Voltage doubling and reflections are also a concern.
- 60 Hertz fault detection is controlled by NEC grounding.
- Telephone/CATV protection is often not addressed. You should use surge protection at points where Telephone/CATV/LAN come together at each piece of equipment.

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## **Your Tall Towers**

- Lightning concerns are addressed by service panel MOV surge arresters and grounding.
- Bonding of all metallic items below the tower is extremely important. (Bird on a wire)
- Earth ground connections and ground wire impedance are important.

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## **Lightning Prevention**

- There are two basic theories about lightning protection. The standard NFPA guidelines on bonding, grounding and lightning rods.
- The other theory that you can discharge clouds and prevent strokes. (Multi-point discharge devices)
- NFPA lightning code has been discontinued since neither method of protection could be proven to be effective in a scientific manner.

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## **Grounding Conductors**

- For 60 Hertz NEC safety grounding- See NEC code book for minimum size conductor.
- For surge arrester connections on line and ground side use #10 AWG copper or larger on higher power systems.
- For surge arrester connections in power panels, use what the manufacturer supplied with the unit. Use short leads and do not run in metallic conduit.

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## **Grounding Conductors**

- For electronic systems bonding and grounding flat copper strap or large diameter wires provide low impedance connections.
- For home protection I use heating ducts and water pipes.

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