



Powerline Equipment Identification Pocket Guide



In Accordance with
Public Resources
Codes 4292 & 4293



SOUTHERN CALIFORNIA
EDISON®

This Powerline Equipment Identification Pocket Guide was prepared by representatives of:



SOUTHERN CALIFORNIA
EDISON®

**CAL FIRE Utility Wildfire Mitigation Unit
Pacific Gas & Electric
Southern California Edison
San Diego Gas & Electric**

This document is produced for the California Department of Forestry and Fire Protection (CAL FIRE), Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas and Electric (SDG&E) as part of Utility Fire Prevention. This document may not be reproduced without written permission.

Foreword

This Pocket Guide contains photographs of power line equipment used by PG&E, SCE, SDG&E, and other California electric utilities. This Pocket Guide is only to be used as a ready-reference tool for identifying power line equipment in the field.

It is a companion to the complete Power Line Fire Prevention Field Guide, which is the document that reflects the most current updates to equipment exemptions, statutes, and minimum fire prevention standards necessary to minimize the risk of catastrophic wildland fires that may be caused by electrical power lines and equipment.

It is expected that all personnel who conduct inspections of power lines, or who prescribe hazard reduction work, or other fire prevention measures will be thoroughly familiar with the contents of the Power Line Fire Prevention Field Guide, which can be found at the Office of the State Fire Marshal website.

This Pocket Guide was developed as a mutual undertaking by CAL FIRE, PG&E, SCE, and SDG&E. Its purpose is to provide information to the personnel of the fire service agencies and electrical operators for identification of power lines and power line equipment within the areas of their respective jurisdiction and franchise responsibilities.

This Pocket Guide is not to be used as a substitute for proper training, but rather as a reference tool for personnel already familiar with power line inspections.

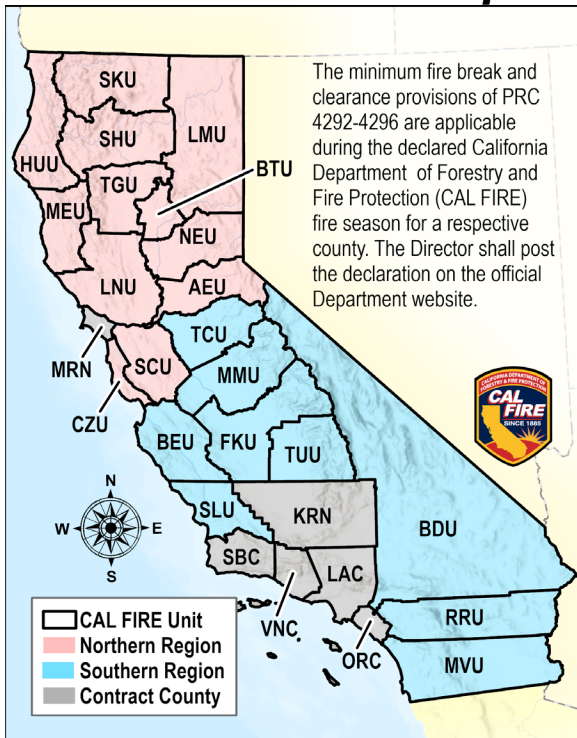
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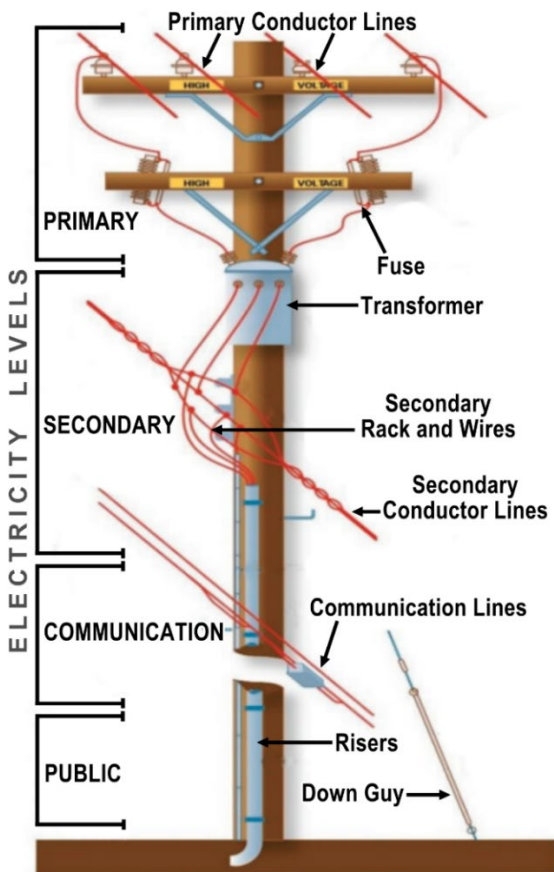
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CAL FIRE Unit Map

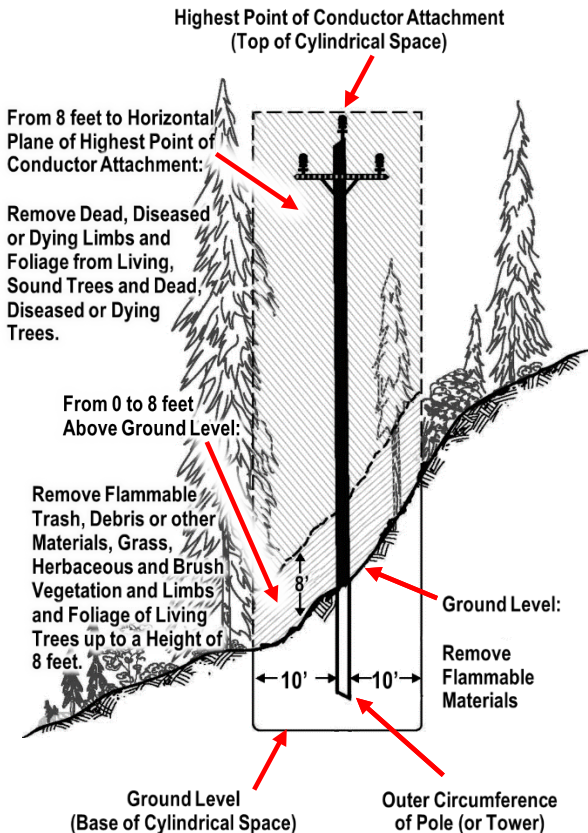


- | | | |
|---------------------------|-----------------------------|--------------------|
| AEU: Amador-El Dorado | MMU: Madera-Mariposa-Merced | |
| BEU: San Benito-Monterey | MVU: San Diego | TGU: Tehama-Glenn |
| BDU: San Bernardino | NEU: Nevada-Yuba-Placer | TUU: Tulare |
| BTU: Butte | RRU: Riverside | KRN: Kern |
| CZU: San Mateo-Santa Cruz | SCU: Santa Clara | LAC: Los Angeles |
| FKU: Fresno-Kings | SHU: Shasta-Trinity | MRN: Marin |
| HUU: Humboldt-Del Norte | SKU: Siskiyou | ORC: Orange |
| LMU: Lassen-Modoc | SLU: San Luis | SBC: Santa Barbara |
| LNU: Sonoma Lake Napa | TCU: Tuolumne-Calaveras | |

Electricity Levels



PRC 4292 Clearing Requirements



PRC 4292 Exemptions

California Code of Regulations

Title 14, Section 1255

Exemptions to Minimum Clearance Provisions – PRC 4292

The minimum clearance provisions of PRC 4292 are not required around poles and towers, including line junction, corner and dead-end poles and towers:

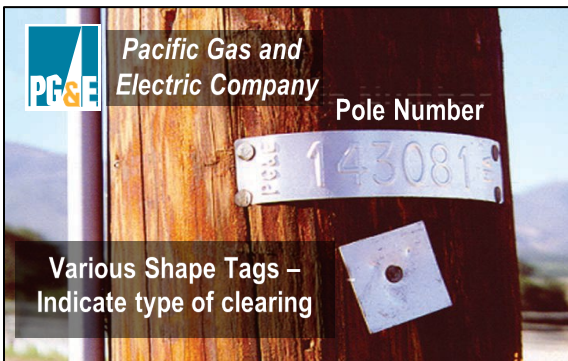
- (a) Where all conductors are continuous over or through a pole or tower; or
- (b) Where all conductors are not continuous over or through a pole or tower, provided, all conductors and subordinate equipment are of the types listed below and are properly installed and used for the purpose for which they were designed and manufactured;
 - (1) Compression connectors.
 - (2) Automatic connectors.
 - (3) Parallel groove connectors.
 - (4) Hot line tap or clamp connectors that were designed to absorb any expansion or contraction by applying spring tension on the main line or running conductor and tap connector.
 - (5) Fargo GA 300 series piercing connectors designed and manufactured for use with tree wire.
 - (6) Flat plate connectors installed with not less than two bolts.
 - (7) Tapered C-shaped member and wedge connectors.
 - (8) Solid blade single-phase disconnected switches and solid blade reclosers, sectionalizers and line regulators.
 - (9) Equipment that is completely sealed and liquid filled.
 - (10) Current limiting, non-expulsion fuses.
- (c) On the following areas, if fire will not propagate thereon;
 - (1) Fields planted to row crops.
 - (2) Plowed or cultivated fields.
 - (3) Producing or cultivated fields.
 - (4) Producing vineyards that are plowed or cultivated.
 - (5) Fields in nonflammable summer fallow.
 - (6) Irigated pasture land.
 - (7) Orchards of fruit, nut citrus trees that are plowed or cultivated.

- (8) Christmas tree farms that are plowed or cultivated.
- (9) Swamp, marsh or bog land.
- (d) Where vegetation is maintained less than 30.48 cm (12 inches) in height, is fire resistant, and is planted and maintained for the specific purpose of preventing soil erosion and fire ignition.

Pole Clearing Example



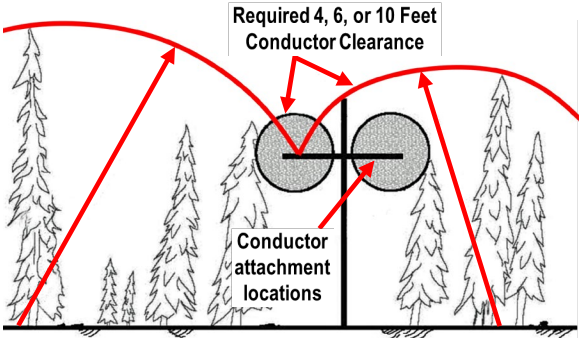
Pole Identification



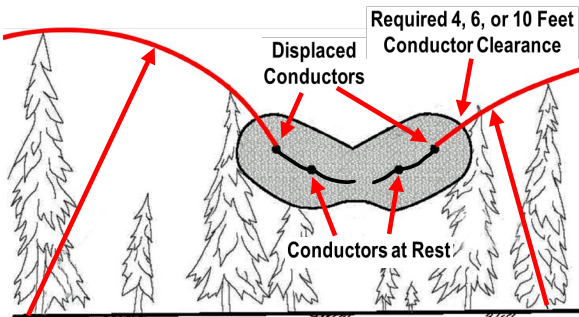
PRC 4293 & 14 CCR 1256

Conductor Clearance

Remove outward from the conductor for a distance of at least equal to the height of the tallest tree, dead trees, decadent or rotten trees, forked trees, trees weakened by decay or disease and trees or portions thereof that are leaning toward the conductor from the side or may fall on the conductor.



Elevation view (at pole or tower)



Elevation view (mid-span)

PRC 4293 Exemptions

California Code of Regulations

Title 14, Section 1257

(a) The minimum clearance provisions of PRC 4293 applicable in State Responsibility Areas are exempted:

(1) Where conductors are:

(A) insulated tree wire, maintained with the high density, abrasion resistant outer covering intact, or

(B) insulated self-supporting aerial cable, maintained with the insulation intact, or

(C) supported by sound and living tree trunks from which all dead or decadent branches have been removed.

(2) On areas described in 14 CCR 1255(c).

(3) For mature trees ("Exempt Trees") whose trunks and major limbs are located more than six inches, but less than the distance required for clearance by PRC 4293, from primary distribution equipment (conductor and energy carrying hardware, generally less than 35 kilovolts).

(A) Exempt Trees must meet all of the following criteria, as confirmed by a Certified Arborist or a Registered Professional Forester:

1. The tree or limb must be six (6) inches or more from the line at all times.

2. The size of the tree or limb at the conductor level must be at least six (6) inches in diameter.

3. The tree must not have "scaffold branches," below eight and one-half feet from the ground (so the tree cannot be easily climbed).

(B) All Utility Companies with primary distribution conductors in State Responsibility Areas (SRA) of California shall:

1. Inspect Exempt Trees annually to verify they continue to meet the criteria in 14 CCR 1257(a)(3).

2. Maintain a database of information about Exempt Trees that includes 1) location, using the format of latitude/longitude in decimal degrees 2) species; and 3) last date of inspection.

3. Report the information required pursuant to 14 CCR 1257(a)(B)(2) above, in an electronically searchable format, annually to CAL FIRE by July 1 of each year for the previous calendar year.

4. When constructing, installing, replacing, or maintaining primary distribution equipment, prevent the creation of new Exempt Trees, to the extent feasible.

(C) Where there are site specific indications that a conductor has or will come into contact with an Exempt Tree, or portion thereof as described above, the condition will be corrected either by altering the tree or by applying an engineering solution. The actions taken will be documented in that utility's Exempt Tree database.

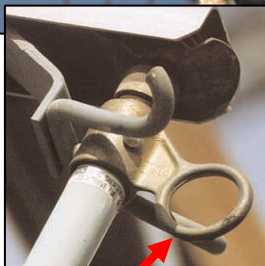
(b) These exemptions do not apply to "Hazard Trees" . . .

Non-Exempt Equipment

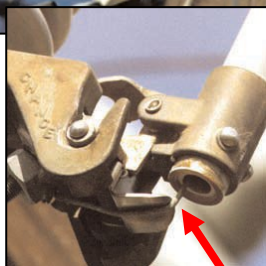


***Subject to
PRC 4292 clearance
Requirements***

Universal Fuse

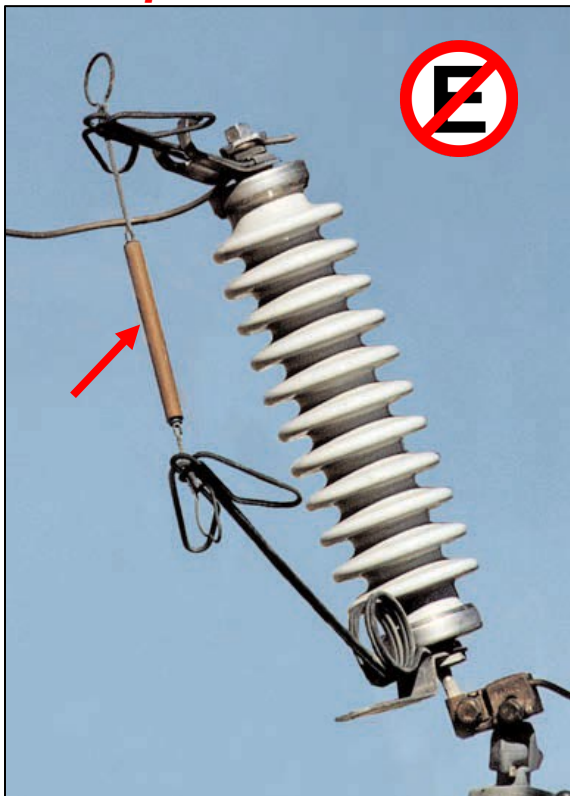


Round Pull Ring

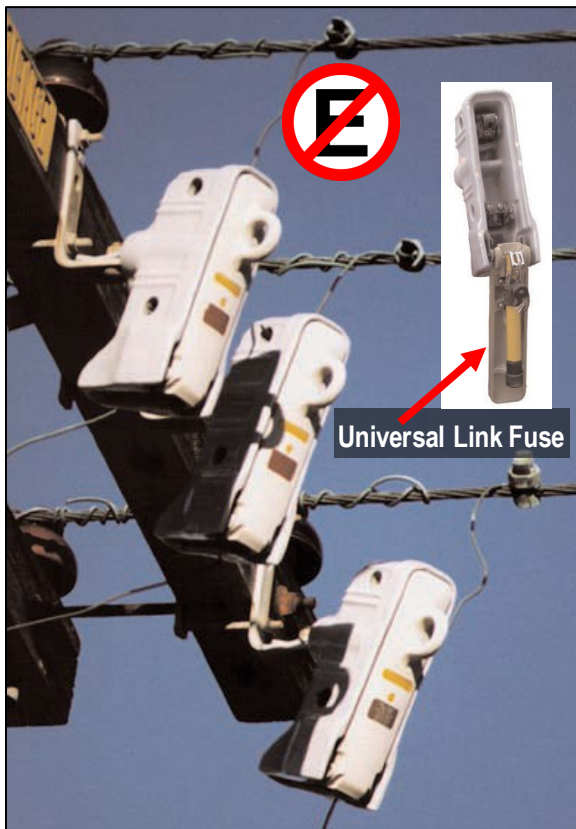


Fusible Link

Open Link Fuse



Enclosed Cutout 4kV

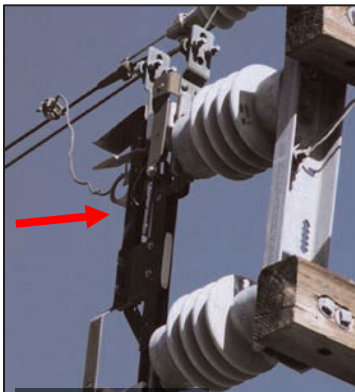


Solid Blade Disconnect



Note: Solid Blade Disconnects are exempt under certain circumstances. See Page 48.

Solid Blade 600 AMP Disconnect

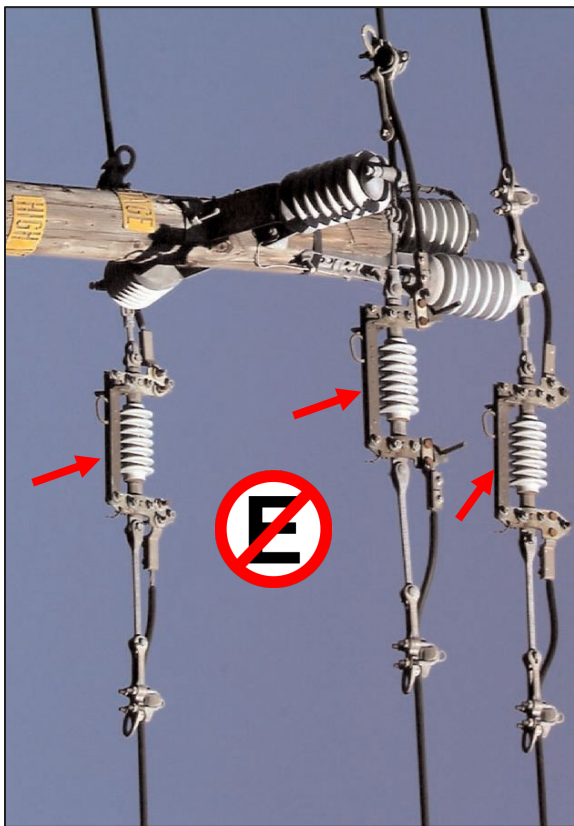


**600 AMP
Disconnect**

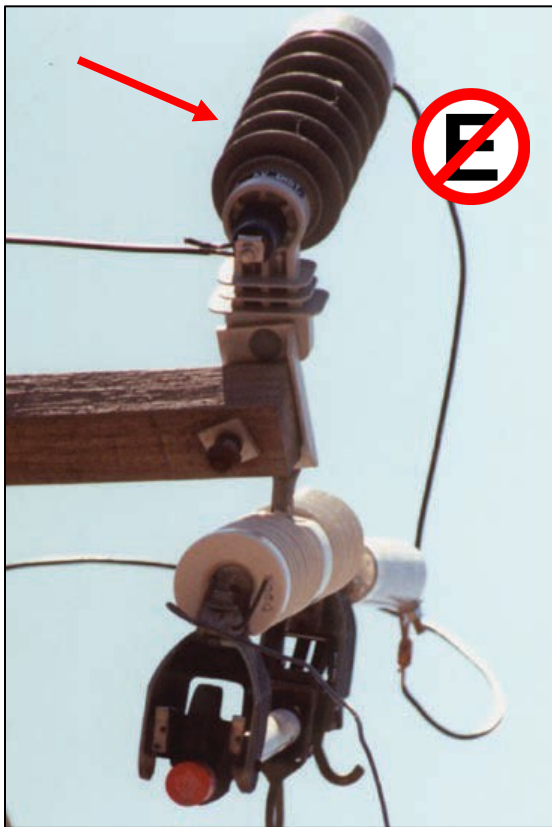


4kV Bayonet

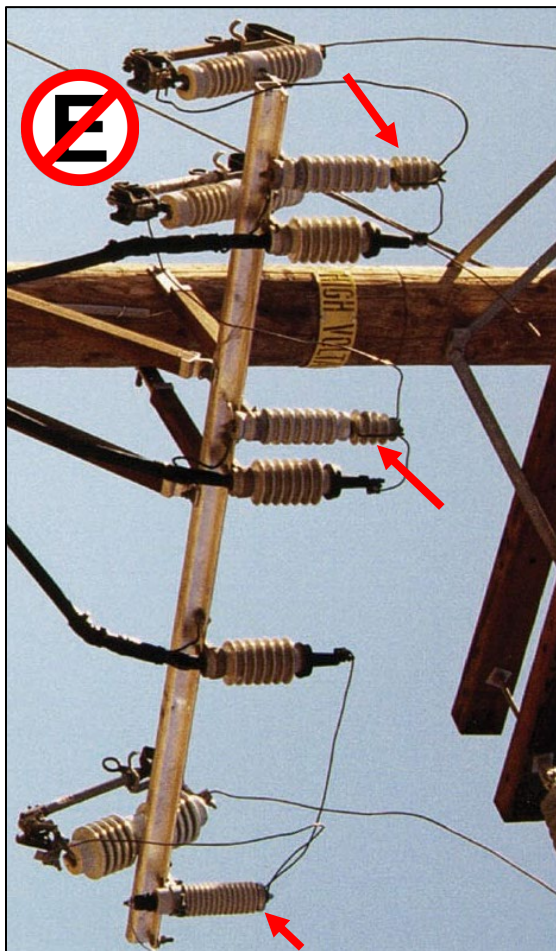
In-Line Disconnect



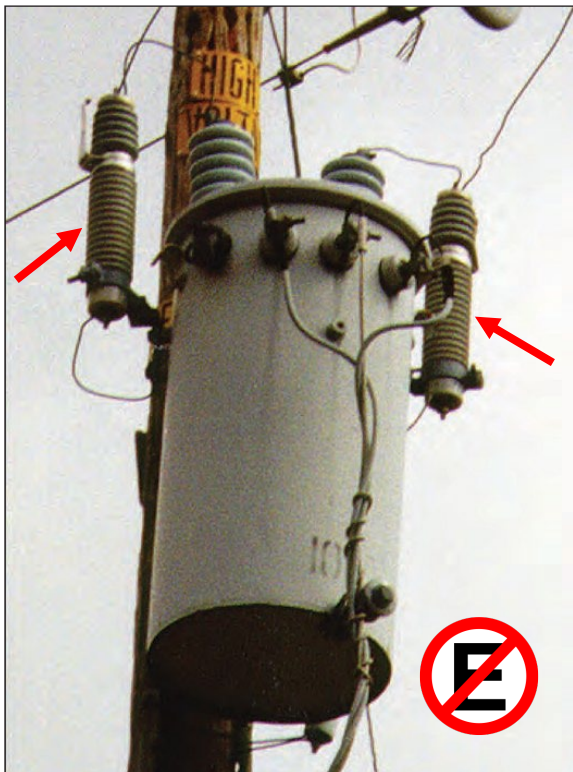
Non-Porcelain Lightning Arrester



Lightning Arrester



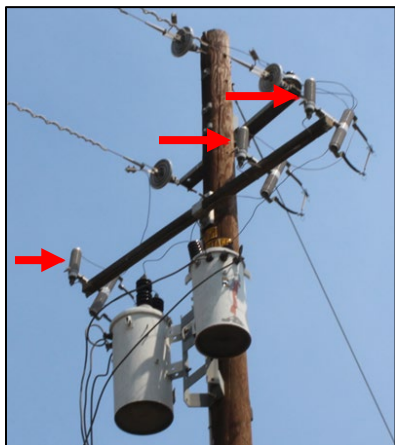
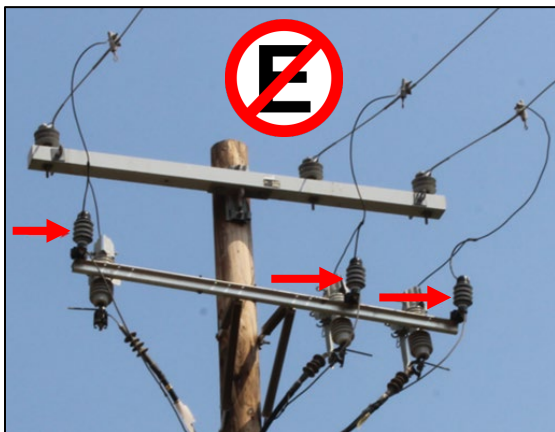
Lightning Arrester



Lightning Arrester



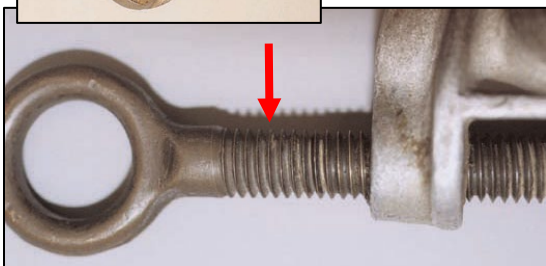
Surge Arrester



Hot Tap Clamps

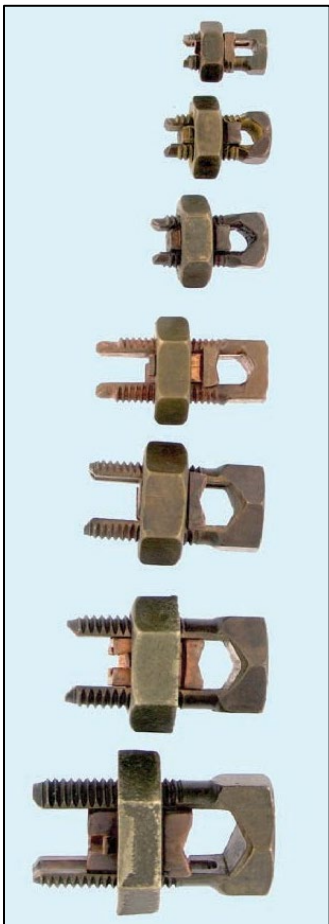


Note: Some hot tap clamps are exempt. See Page 58.

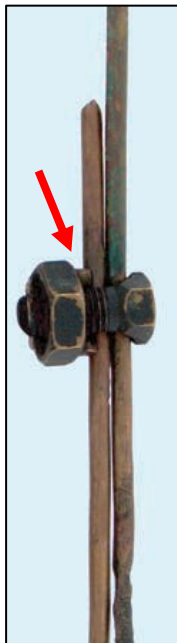


Threads and lack of "ears" are visual indicators of non-exempt hot tap clamps.

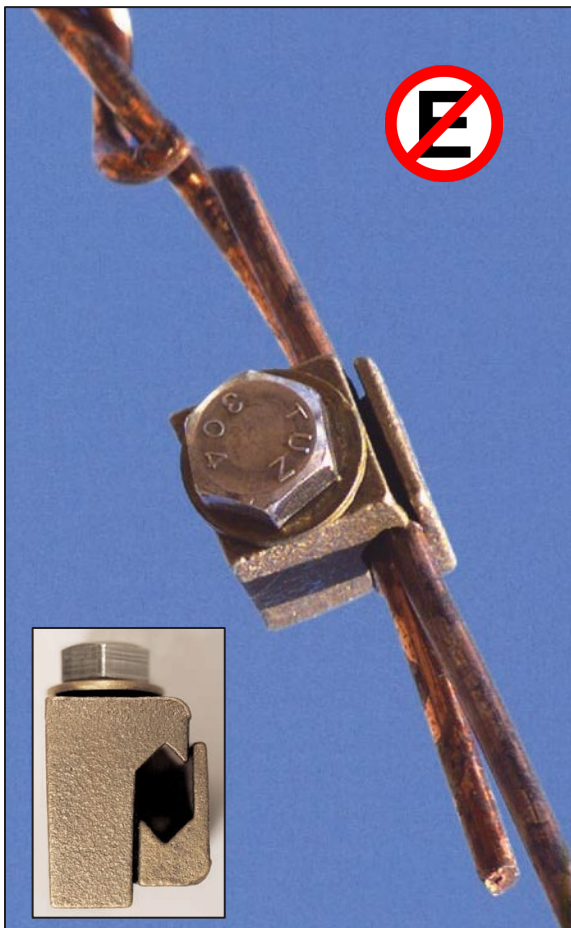
Split Bolt Connector



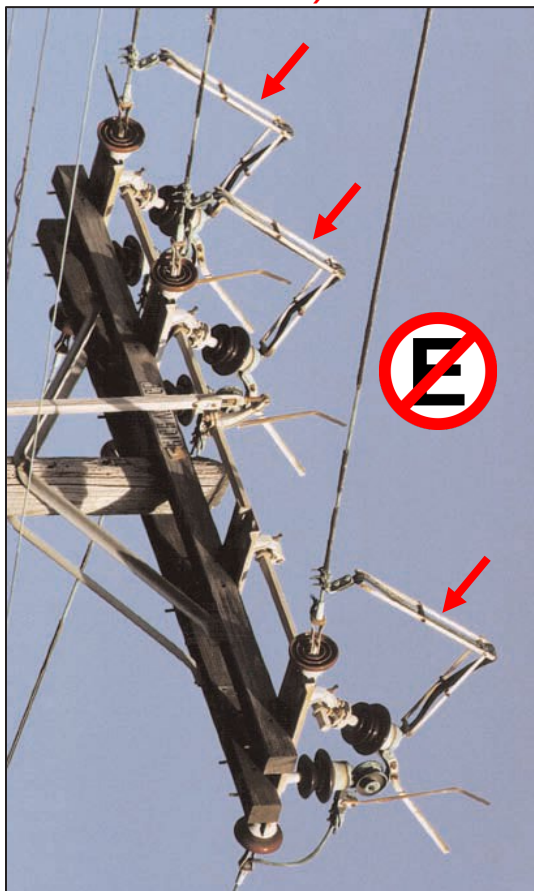
Note: Under certain conditions, split bolts are exempt. See Page 60.



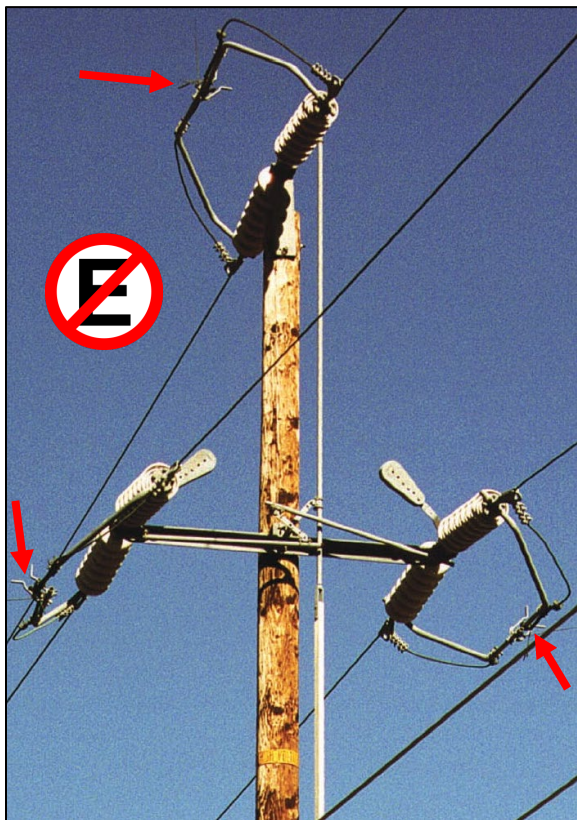
Vise Connector



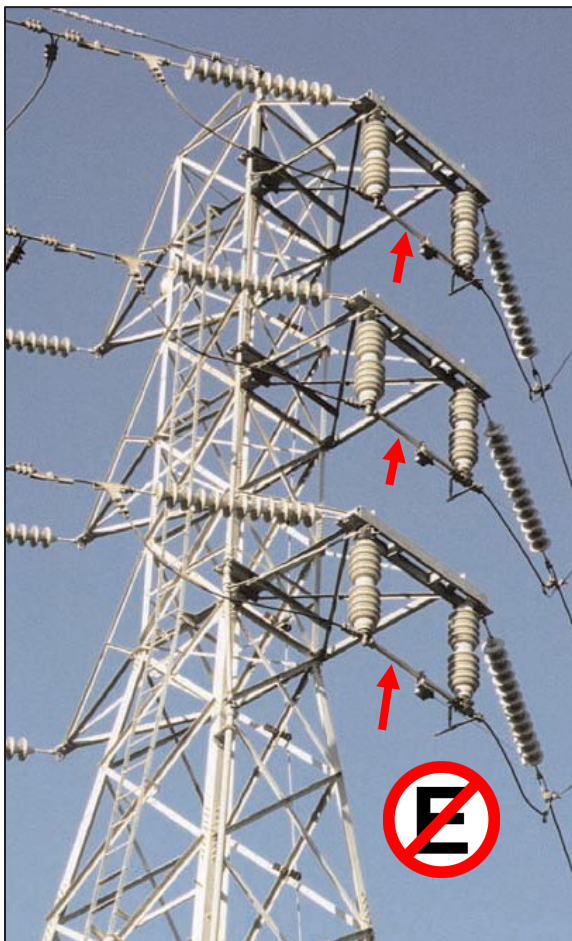
Tilting Insulator Switches (*Grasshopper Air Switch*)



Transmission Air Switch



Transmission Air Switch



Exempt Equipment



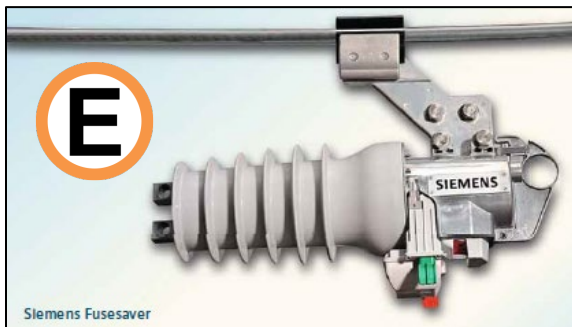
Temporary Exemption



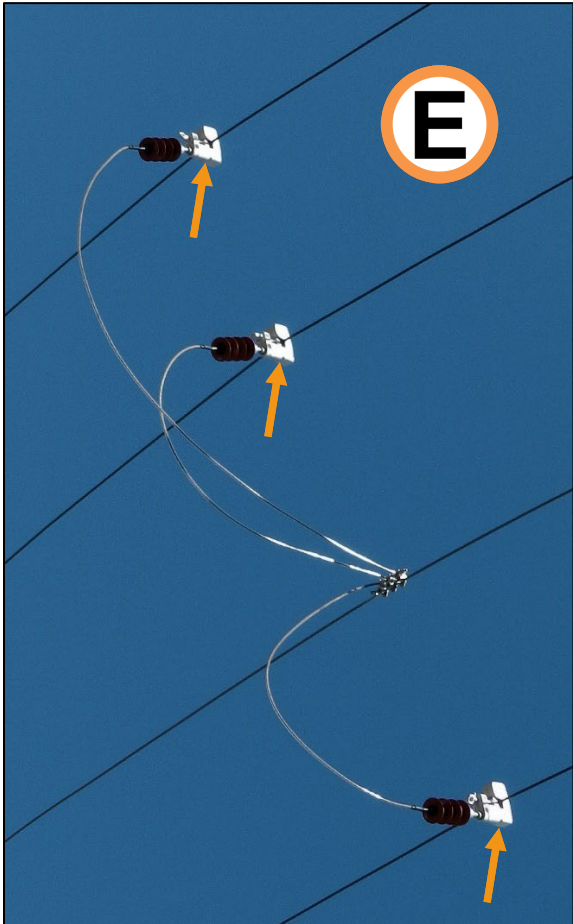
Permanent Exemption

**Not subject to
PRC 4292 clearance
requirements**

Fusesaver



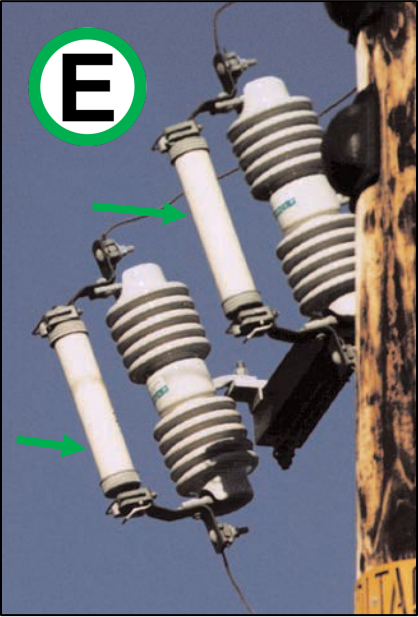
Monitoring Devices



Tripsaver



Non-Expulsion Fuse



Energy Limiting Fuse



Also fits "open link"
cutouts



Also fits "clip style"
cutouts



Available in 11.5" and 8" sizes

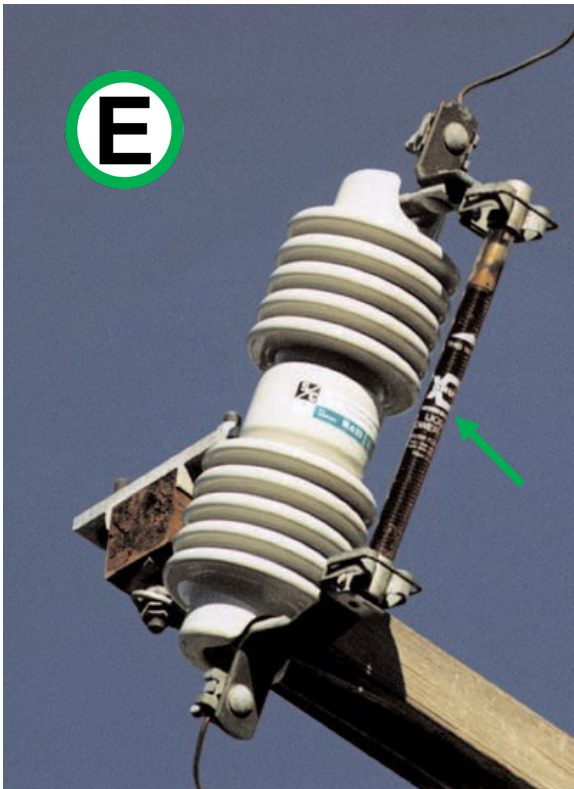


Orange band under blue cap becomes exposed when fuse operates.

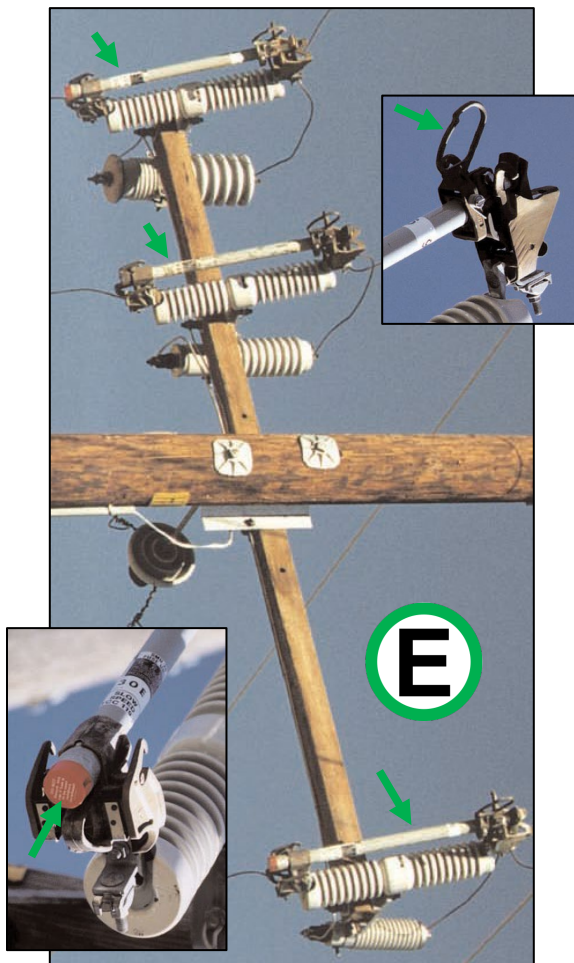


Liquid Filled Fuse

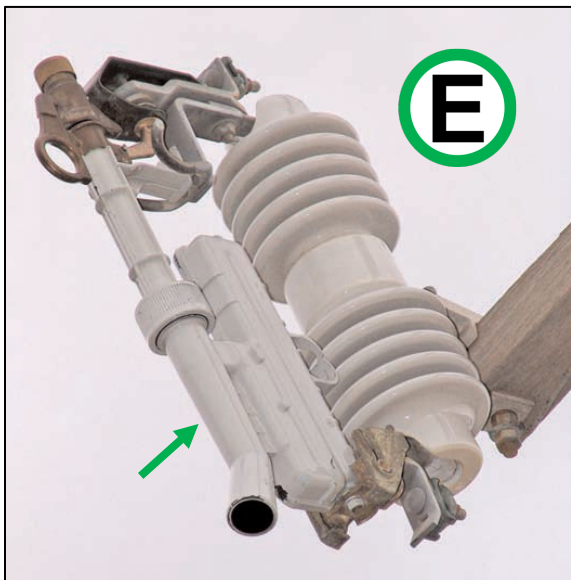
E



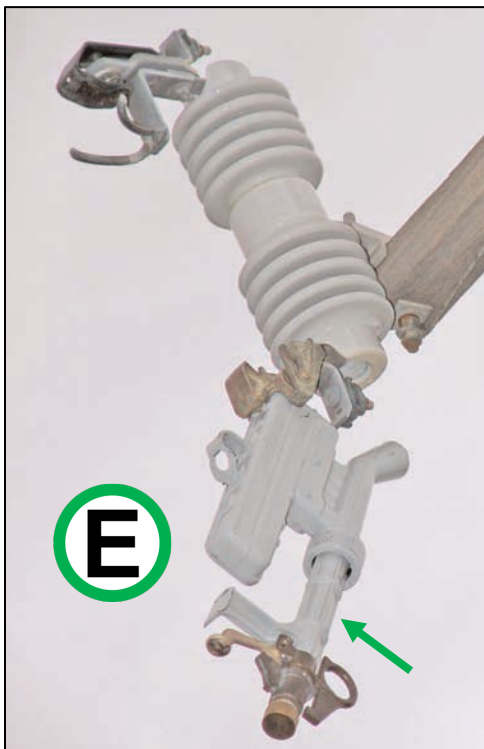
SMU-20 Fuse



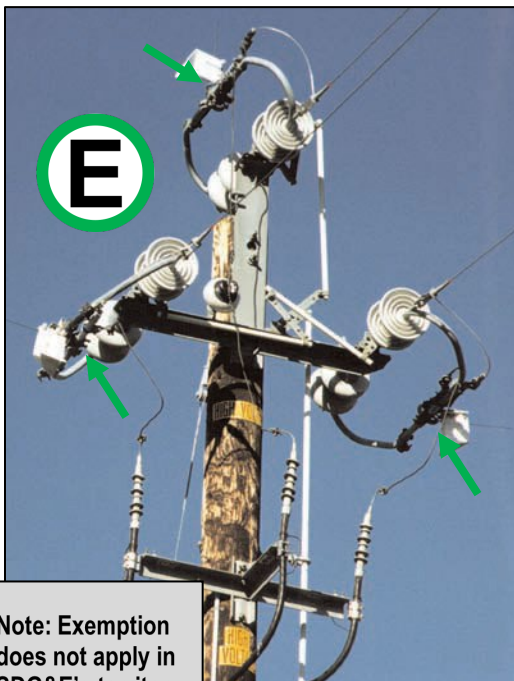
S&C Fault Tamer Fuse (Closed)



Fault Tamer (Open)



600 AMP KPF Air Switch



Note: Exemption does not apply in SDG&E's territory.

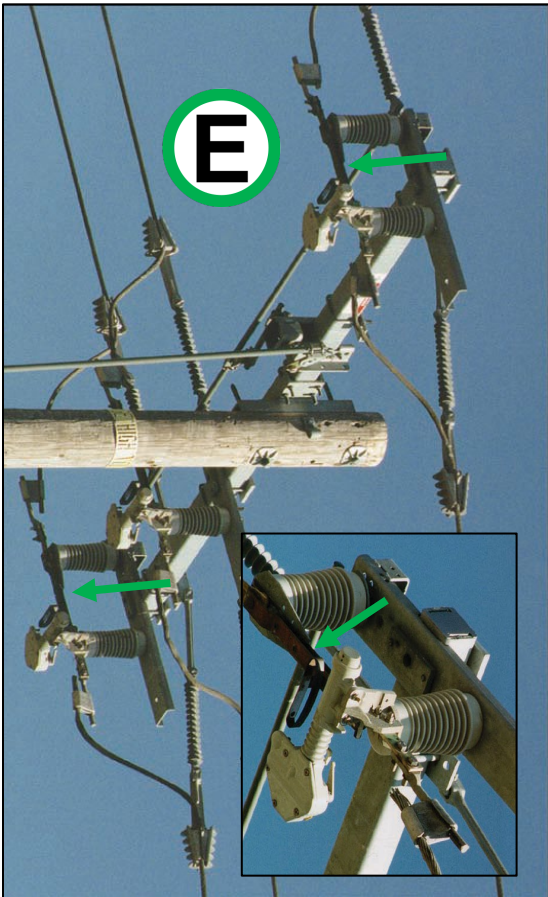


SDGE

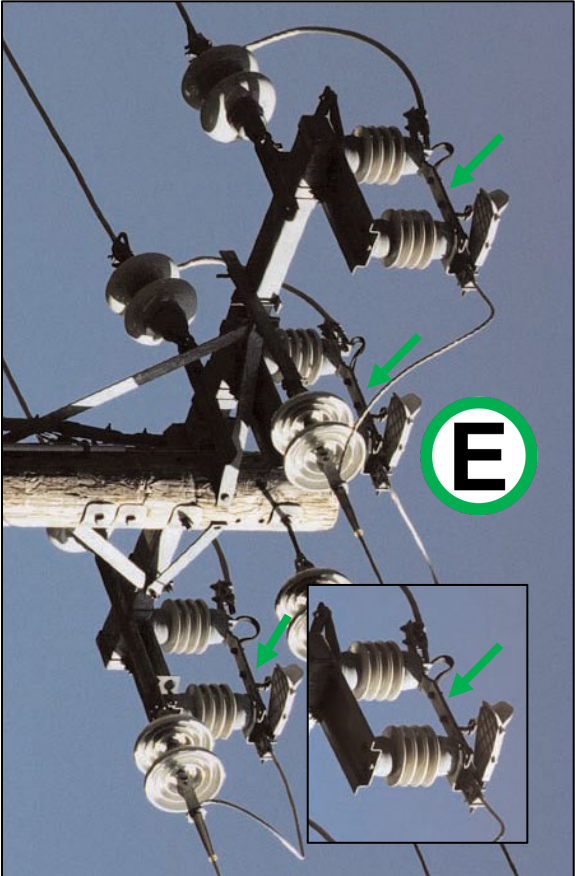
A Sempra Energy utility®



S&C Underarm Sidebreak Switch



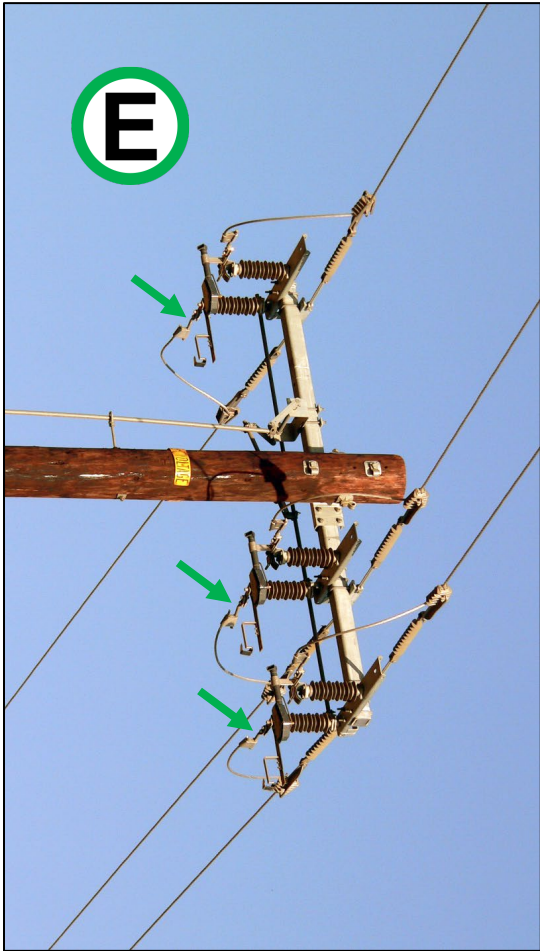
S&C Omni-Ruptor Switch



S&C Scada-Mate Switch



Inertia Sidebreak Switch



Siemens Arrester APS (Arc Prevention System)

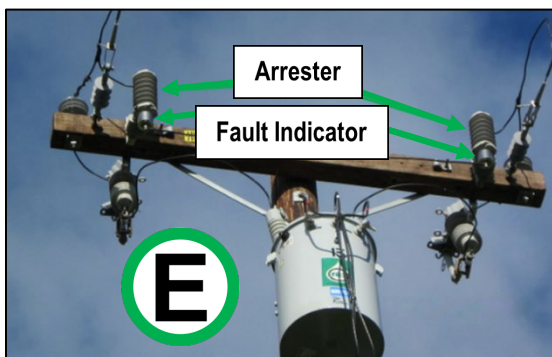
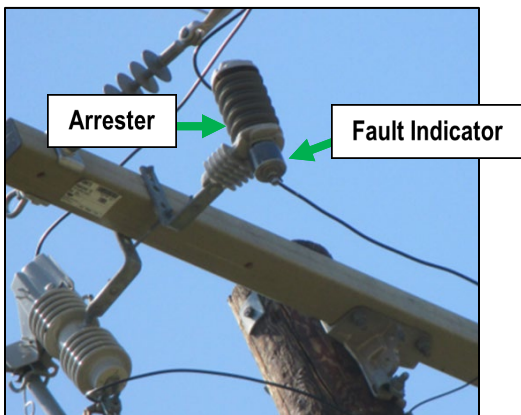
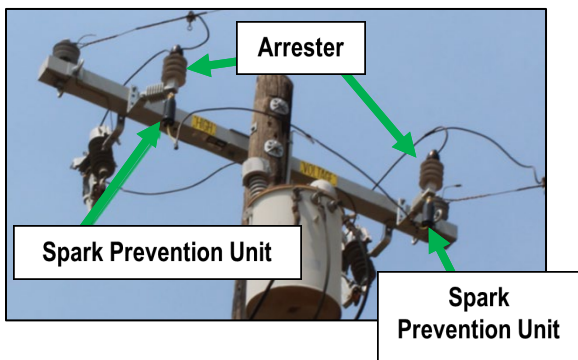
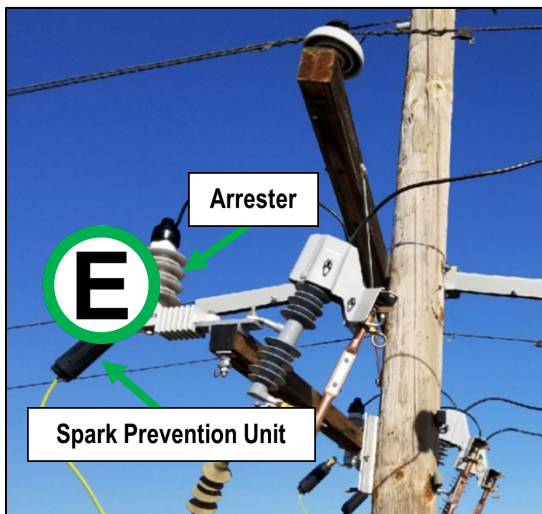
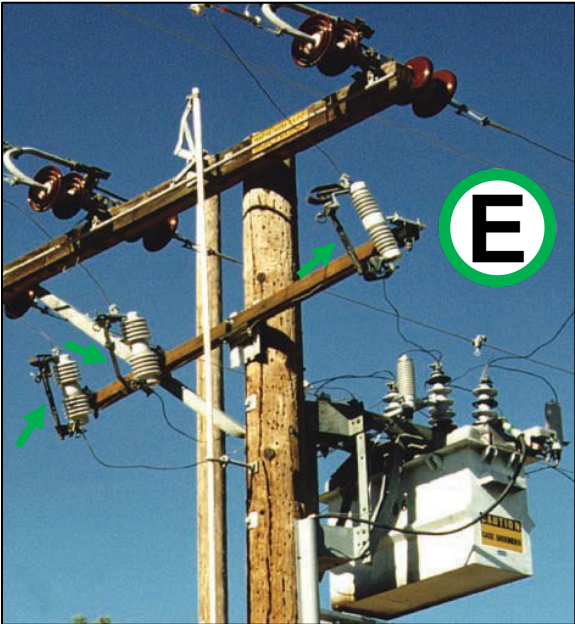


ABB Arrester SPU (Spark Prevention Unit)

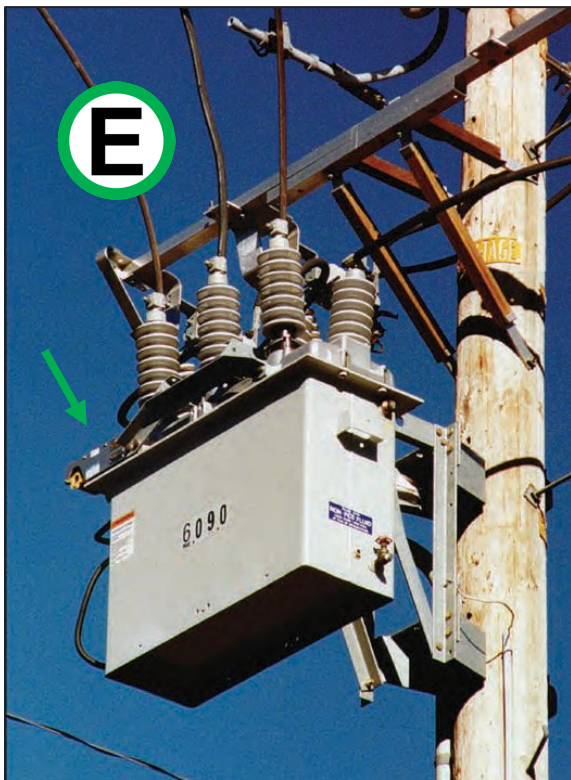


Solid Blade Disconnects

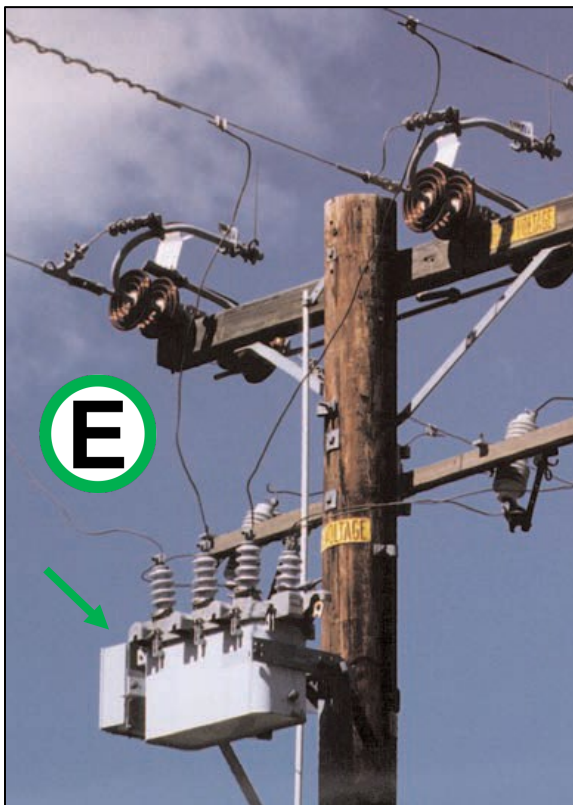
*(when used with reclosers,
sectionalizers, or voltage regulators)*



Recloser



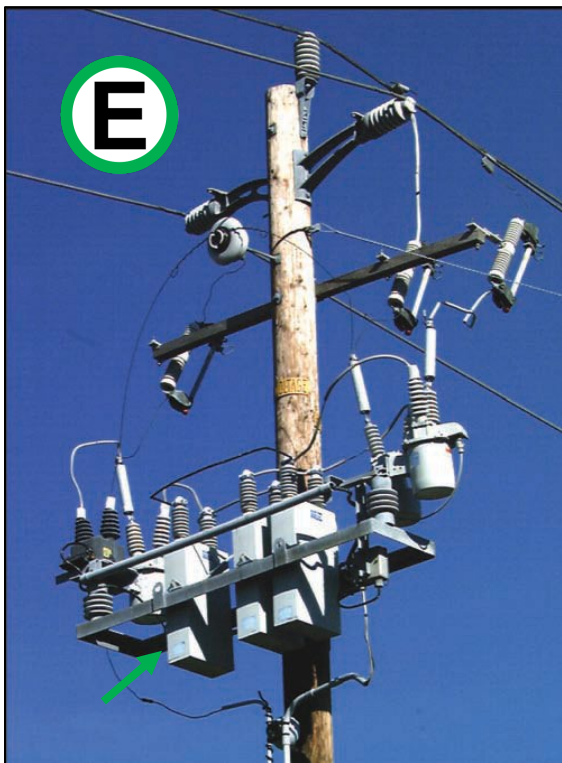
Sectionalizer



Voltage Regulator

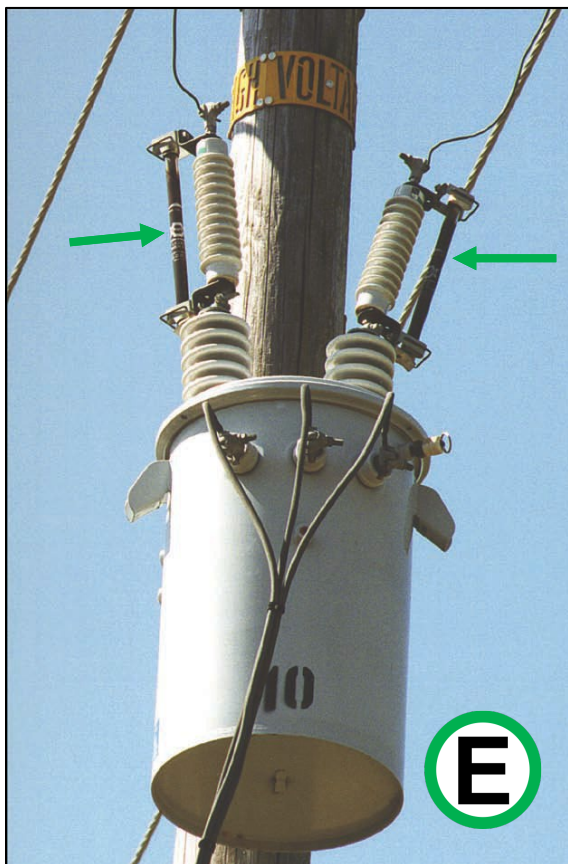


Capacitor Bank

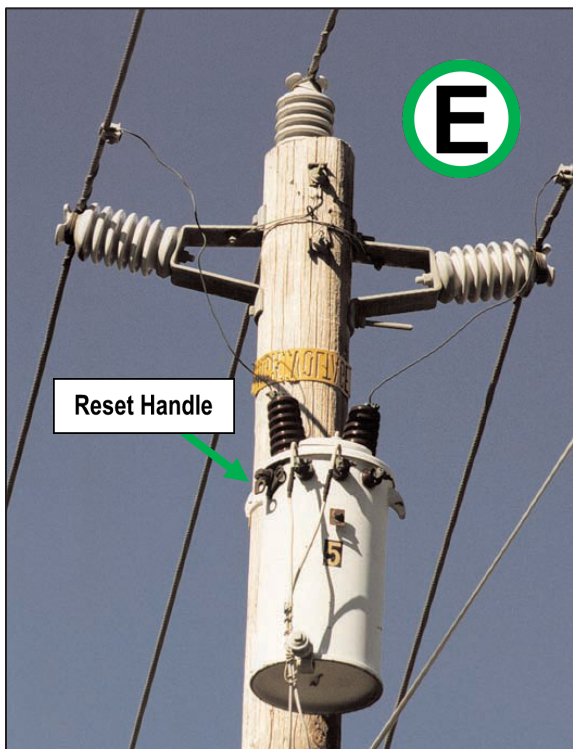


Overhead Transformer

(With Liquid Filled Fuses)



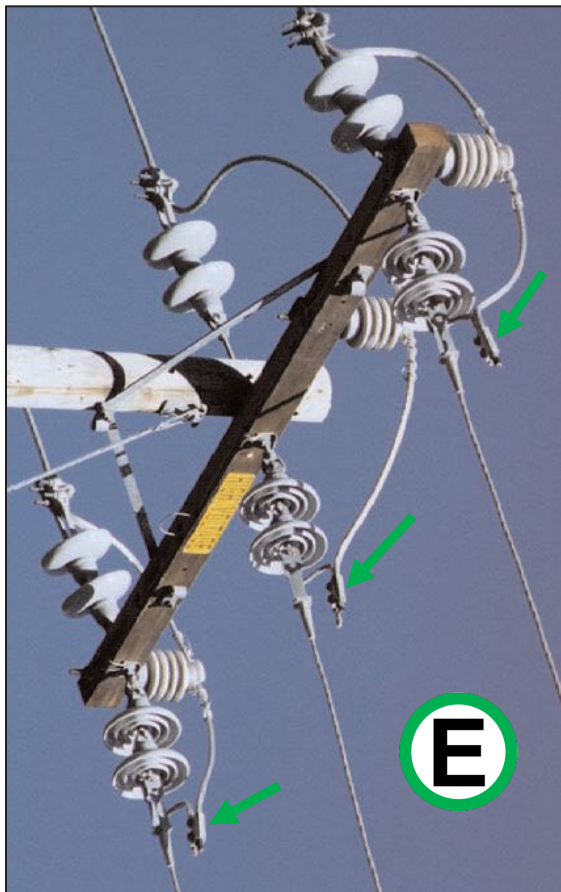
Self-Protected Transformer



Parallel Groove Connectors



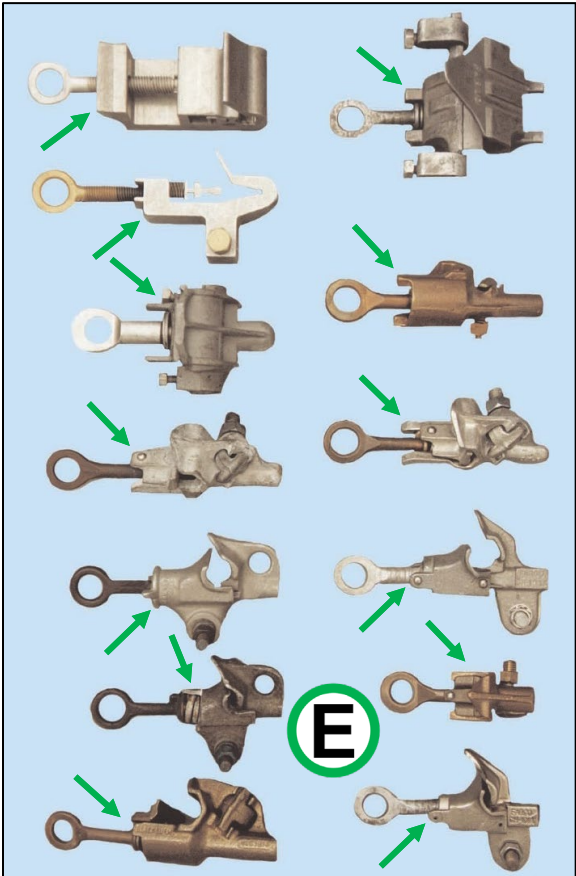
Parallel Groove Connectors



GA-9000 Series Parallel Groove Connectors

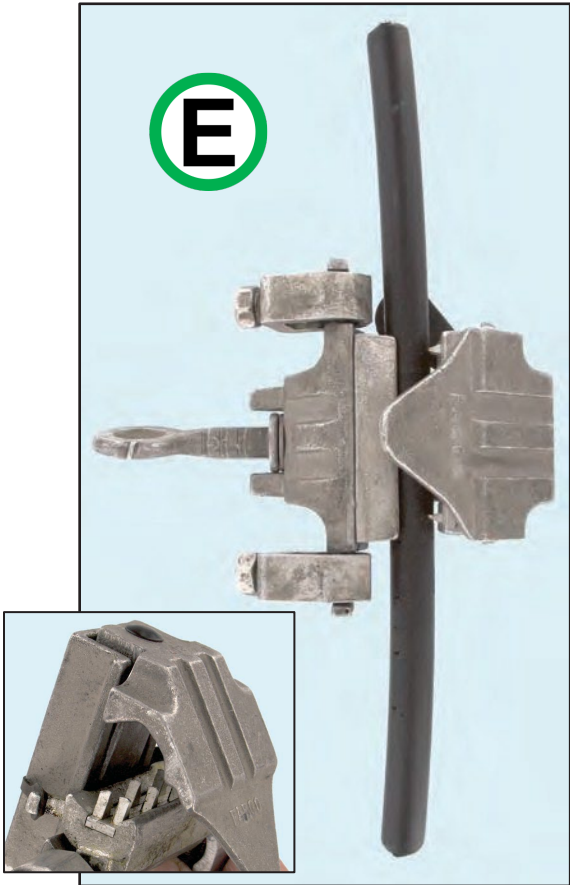


Hot Tap Clamps

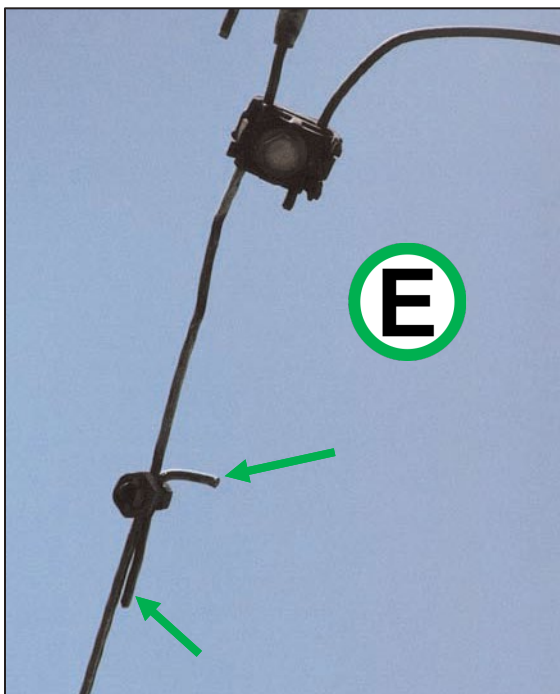


Arrows above show locations of ears on each type of clamp.
Note: Some hot tap clamps are non-exempt. See page 24.

Piercing Tap Clamps

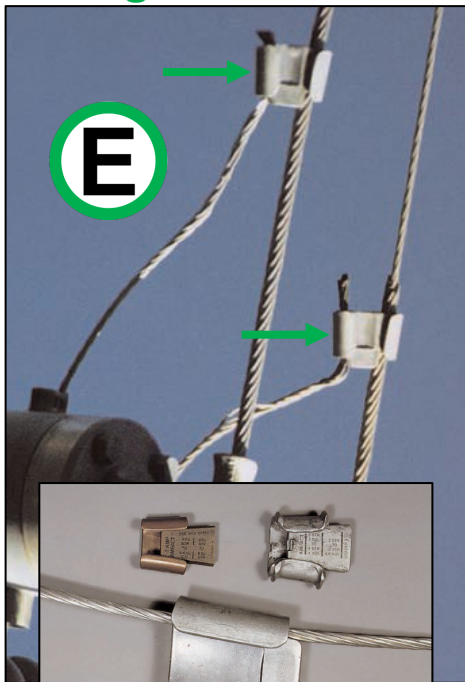


Idle Split Bolt Connectors



Note: Where the exempt connector replaces the split bolt connection, the split bolts are left “idle” on the line to avoid damage to the connector. When this is the case, there is no current flow, and the split bolts no longer function as a connection. See page 25 for non-exempt split bolts.

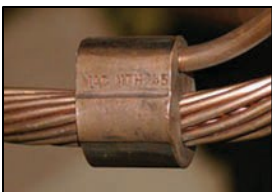
Wedge Connectors



Compression Connectors



E



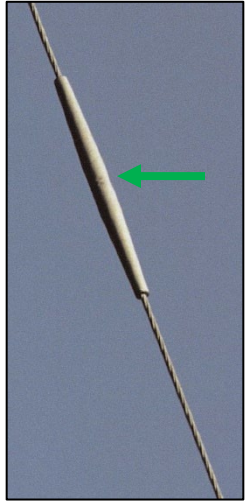
Automatic Deadend



Line Splices



Automatic Splices

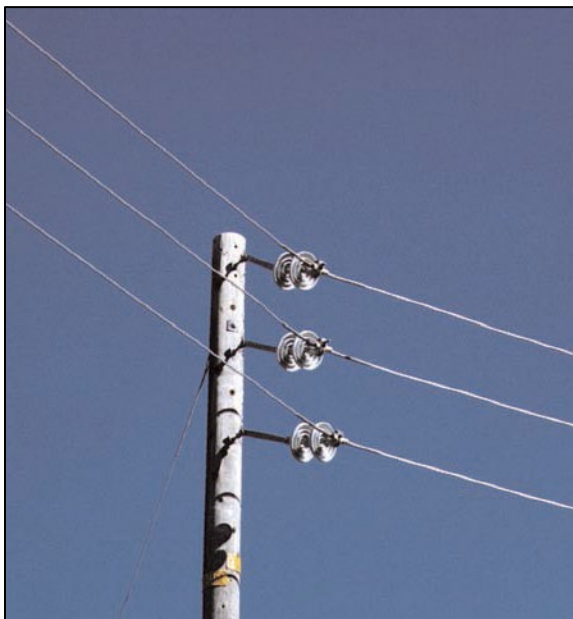


Shunts

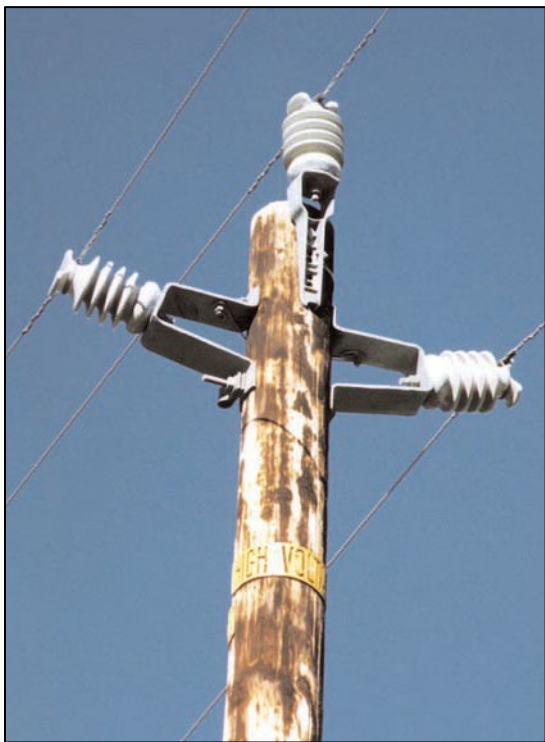


Distribution Construction

Vertical Construction



Triangular Construction



Alley Arm Construction



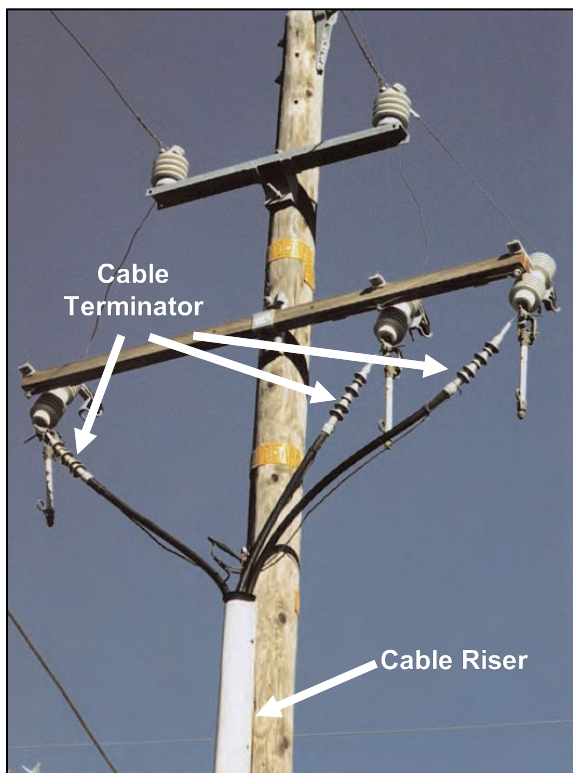
Crossarm Construction



Line and Buck



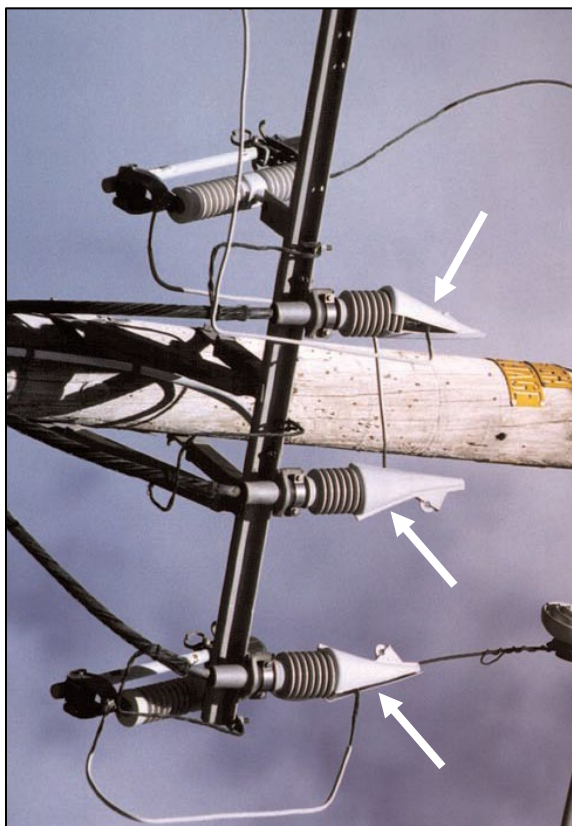
Cable Riser with Cable Terminator



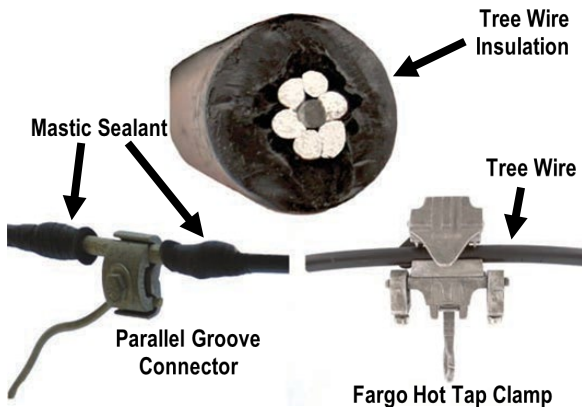
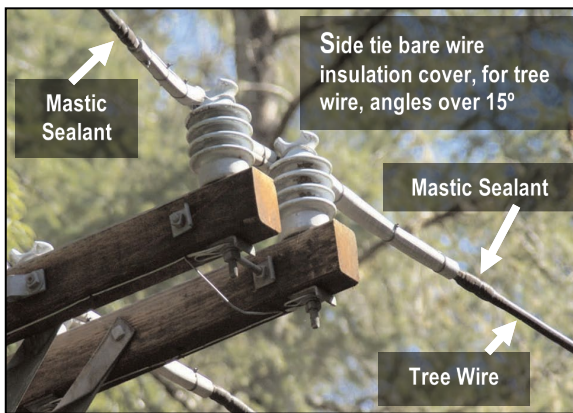
Animal Protection: Raptor Perch



Animal Protection: Squirrel Guard



Covered Conductor/Tree Wire



Covered Conductor/Tree Wire Tie Wire

