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<u>VOLUME 5 OF 5</u>

SOLICITATION NO: **W9127822R0008**
CADD NO: **MEF22002**

SPECIFICATIONS

FOR

BUILDING 73 LAB EXPANSION

EGLIN AIR FORCE BASE, FLORIDA

(OKALOOSA COUNTY)

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APPENDIX F

CHELCO STANDARDS

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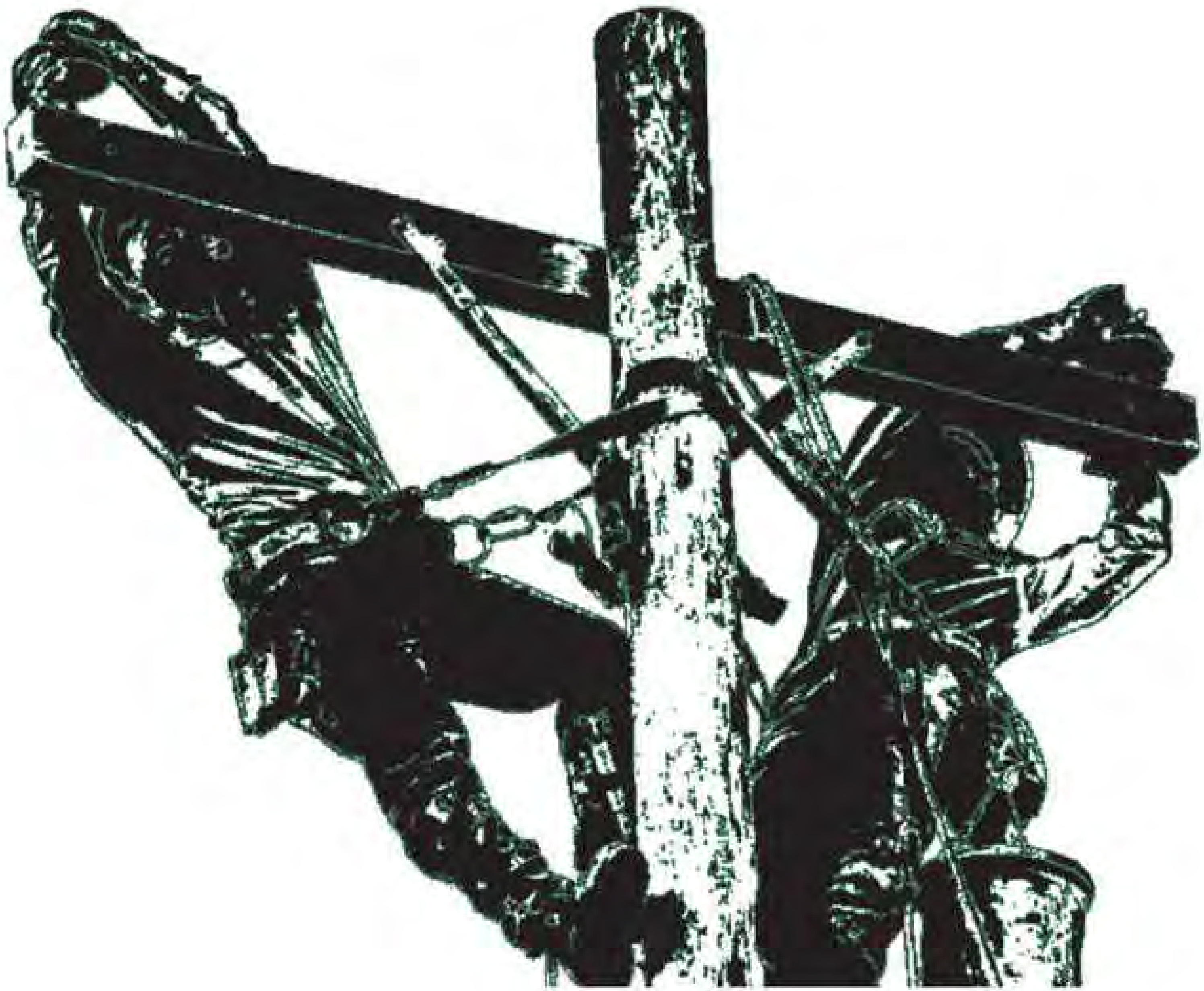
CHELCO

A Touchstone Energy® Cooperative

EGLIN AFB CONSTRUCTION STANDARDS



Choctawhatchee Electric Cooperative, Inc. (CHELCO)

December 1, 2008

CHELCO Design – Construction Standards

SUBJECT: Specifications and Drawings for 12.5/7.2 kV Line Construction

I. Purpose: To announce the issuance of CHELCO Specifications and Drawings for 12.5/7.2 kV and 14.4/25 kV Line Construction.

II. General: CHELCO primarily uses REA Bulletin 50-3(Standard D-804), (dated May 9, 1983), Specifications and Drawings for 12.5/7.2 kV Line Construction. However, CHELCO has added to and revised many of the construction standards to reflect a variation in some of the assemblies.

Changes include the addition of post insulator drawings and new drawings not in the REA Standard D-804. All drawings conform to the latest edition of the National Electrical Safety Code.

SPECIFICATIONS FOR CONSTRUCTION

1. General

   All construction work shall be done in accordance with the staking sheets, plans and specifications and the construction drawings.

   The 2012 or latest edition of the National Electrical Safety Code (NESC), ANSI C2, shall be followed except where local regulations are more stringent, in which case local regulations shall govern.

2. Distribution of Poles

   In distributing the poles, large, choice, dense poles shall be used at transformer, dead-end, angle, and corner locations.

3. Pole Setting

The minimum depth for setting poles shall be as follows:

Length of Pole (Feet)	Setting in Soil (Feet)	Setting in All Solid Rock (Feet)
20	4.0	3.0
25	5.0	3.5
30	5.5	3.5
35	6.0	4.0
40	6.0	4.0
45	6.5	4.5
50	7.0	4.5
55	7.5	5.0
60	8.0	5.0
65	8.5	5.5
70	9.0	5.5
75	9.5	6.0
80	10.0	6.0
85	10.5	6.5
90	11.0	6.5

"Setting in Soil" depths shall apply:

a. Where poles are to be set in soil.

b. Where there is a layer of soil of more than two (2) feet in depth over solid rock.

c. Where the hole in solid rock is not substantially vertical or the diameter of the hole at the surface of the rock exceeds approximately twice the diameter of the pole at the same level.

“Setting in All Solid Rock” depths shall apply where poles are to be set in solid rock and where the pole is substantially vertical, approximately uniform in diameter and large enough to permit the use of tamping bars the full depth of the hole.

Where there is a layer of soil two (2) feet or less in depth over solid rock, the depth of the hole shall be the depth of the soil in addition to the depth specified under “Setting in All Solid Rock” provided, however, that such depth shall not exceed the depth specified under “Setting in Soil.”

On sloping ground, the depth of the hole shall be measured from the low side of the hole.

Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and dead ends where the gains of the last two (2) poles shall be on the side facing the terminal or dead end. On unusually long spans, the poles shall be set so that the crossarm is located on the side of the pole away from the long span. Where pole top insulator brackets or pole top pins are used, they shall be located on the opposite side of the pole from the gain.

Poles shall be set in alignment and plumb, except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors are in line.

Poles shall be raked against the conductor strain not less than 1-inch for each 10 feet of pole length no more than 2 inches for each 10 feet of pole length after conductors are installed at the required tension.

Pole backfill shall be thoroughly tamped in full depth. Excess dirt shall be banked around the pole.

Poles which have been in storage for more than 1 year from the date of treatment shall be ground line treated when installed.

4. Grading of Line

When using high poles to clear obstacles such as buildings, foreign wire crossings, railroads, etc., there shall be no upstrain on pin-type or post-type insulators in grading the line each way to lower poles.

5. Guys and Anchors

Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the construction drawings.

All anchors and rods shall be in line with the strain and shall be installed so that approximately 6 inches of the rod remain out of the ground. In cultivated fields or other locations, as deemed necessary, the projection of the anchor rod above earth may be increased to a maximum of 12 inches to prevent burial of the rod eye. The backfill of all anchor holes must be thoroughly tamped the full depth.

After a cone anchor has been set in place, the hole shall be backfilled with coarse crushed rock for 2 feet above the anchor tamping during the filling. The remainder of the hole shall be backfilled and tamped with dirt.

6. Locknuts

A locknut shall be installed with each nut, eyenut or other fastener on all bolts or threaded hardware such as insulator pins and studs, upset bolts, double arming bolts, etc.

7. Conductors

Conductors must be handled with care. Conductors shall neither be trampled on nor run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks, or other injuries. Injured portions shall be cut out and the conductor spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on the pole or crossarm if necessary to prevent binding while stringing.

The neutral conductor should be maintained on one side of the pole (preferably the road side) for tangent construction and for angles not exceeding 20°.

With pin-type or post-type insulators, the conductors shall be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type and post-type insulators shall be tight on the pins and brackets, respectively, and the top groove must be in line with the conductor after tying.

For line angles of 0° to 5° in locations known to be subject to considerable conductor vibration, insulated brackets may be substituted for the single and double upset bolts used for supporting the neutral and secondary conductors.

All conductors shall be cleaned thoroughly by wirebrushing before splicing or installing connectors or clamps. A suitable inhibitor shall be used before splicing or applying connectors over aluminum conductor.

8. <u>Splices and Dead Ends</u>

Conductors shall be spliced and dead-ended as shown on the construction drawings. There shall be not more than one splice per conductor in any span and splices shall be located at least 10 feet from the conductor support. No splices shall be located in Grade B crossing spans and preferably not in the adjacent spans. Splices shall be installed in accordance with the manufacturer's recommendations.

9. <u>Taps and Jumpers</u>

Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not shown on the construction drawings, it will be provided by at least two (2) bends in a vertical plane, or one (1) in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.

All leads on equipment such as transformers, reclosers, etc., shall match the ampacity of the line conductor. Where aluminum jumpers are used, a connection to an unplated bronze terminal shall be made by splicing a short stub of copper to the aluminum jumper using a compression connector suitable for the bimetallic connection.

10. Hot-Line Clamps and Connectors

Connectors and hot-line clamps suitable for the purpose shall be installed as shown on the guide drawings. On all hot-line clamp installations, the clamp and jumper shall be installed so that they are permanently bonded to the load side of the line, allowing the jumper to be de-energized when the clamp is disconnected.

11. Arresters

The external gap electrodes of surge arresters, combination arrester cutout units, and transformer mounted arresters shall be adjusted to the manufacturer's recommended spacing. Care shall be taken that the adjusted gap is not disturbed when the equipment is installed.

12. Conductor Ties

Hand-formed ties shall be in accordance with construction drawings. Factory-formed ties shall be installed in accordance with the manufacturer's recommendations.

Conductor Size	Conductor Type	Tie Size	Tie Type
4HD	Copper Solid	8	Copper
6A	Copper Strand	8	Copper
6HD	Copper Solid	8	Copper
8A	Copper Strand	8	Copper
1/0	Copper Strand	6	Copper
2	AAAC	6	Aluminum
4	AAAC	6	Aluminum
1/0	AAAC	4	Aluminum
4/0	AAAC	4	Aluminum
394.5	AAAC	4	Aluminum
740.8	AAAC	4	Aluminum

13. Sagging of Conductors

Conductors shall be sagged in accordance with the conductor manufacturer's recommendations. All conductors shall be sagged evenly. The air temperature at the time and place of sagging shall be determined by a certified thermometer.

The sag of all conductors after stringing shall be in accordance with the engineer's instructions.

14. Secondaries and Service Drops

Secondary conductors may be bare or covered wires or multi-conductor service cable. The conductors shall be sagged in accordance with the manufacturer's recommendations.

Conductors for secondary underbuild on primary lines will normally be bare, except in those instances where prevailing conditions may limit primary span lengths to the extent that covered wires or service cables may be used. Service drops shall be covered wire or service cable.

Secondaries and service drops shall be so installed as not to obstruct climbing space. There shall not be more than one splice per conductor in any span, and splices shall be located at least 10 feet from the conductor support. Where the same covered conductors or service cables are to be used for the secondary and service drop, they may be installed in one continuous run

15. Grounds

Ground rods shall be driven full length in undisturbed earth in accordance with the construction drawings. The top shall be at least 12 inches below the surface of the earth. The ground wire shall be attached to the rod with a clamp and shall be secured to the pole with staples. The staples on the ground wire shall be spaced 2 feet apart, except for a distance of 8 feet above the ground and 8 feet down from the top of the pole where they shall be 6 inches apart.

All equipment shall have at least two (2) connections from the frame, case or tank to the multi-grounded neutral conductor.

The equipment ground, neutral wires, and surge-protection equipment shall be interconnected and attached to a common ground wire.

16. Clearing Right-of-Way

The right-of-way shall be prepared by removing trees, clearing underbrush, and trimming trees so that the right-of-way is cleared close to the ground and is the width specified, except that low growing shrubs which will not interfere with the operation or maintenance of the line shall be left undisturbed if so directed by the owner. The landowner’s written permission shall be received prior to cutting trees outside the right-of-way. Trees fronting each side of the right-of-way shall be trimmed symmetrically unless otherwise specified. Dead trees beyond the right-of-way which would strike the line in falling shall be removed. Leaning trees beyond the right-of-way, which would strike the line in falling and which would require topping if not removed, shall either be removed or topped, except that shade, fruit, or ornamental trees shall be trimmed and not removed, unless otherwise authorized.

17. Structures Exceeding 200 Feet in Height and Structures in the Vicinity of Airports

The Federal Aviation Administration (FAA) requires (14 CFR 77) that in cases where structures or conductors will exceed a height of 200 feet, or are within 20,000 feet of an airport, the nearest regional or area office of the FAA be contacted and FAA Form 7460-1 be filed if necessary.

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  - **C1PB** 12.5/7.2 kV Primary, 3 Phase, Narrow Profile Construction

- **C2** 12.5/7.2 kV Primary, 3 Phase, Crossarm Construction, Double Primary Support
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- **VC9** 25 kV Primary, 3 Phase, Crossarm Construction, Double Line Arm
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  - **M5-1, M5-2, M5-3H, M5-3V, M5-4, M5-5, M5-6, VM5-6** Miscellaneous Primary Assemblies
  - **M5-9, M5-9-300, M5-9L, M5-11** Miscellaneous Primary Assemblies
  - **M5-14, M5-16, M5-17, M5-20** Miscellaneous Primary Assemblies
  - **M5-23-12, M5-23-36, M5-23-36-30k, M5-23-72, M5-23-72-30k, M5-23-144** Miscellaneous Primary Assemblies
  - **M5-24, M5-25, M5-27, M5-28, M5-30, M5-34, M5-36, M5-38** Miscellaneous Primary Assemblies
  - **M5-SG, M42-11, M42-394 , M42-741** Miscellaneous Primary Assemblies

- **“M” Arrestor Assemblies**
  - **M56-1**, **M56-2, M56-3** 9kV Arrestor
  - **VM56-1, VM56-2, VM56-3** 18 kV Arrestor

- **“M” Voltage Regulator Assemblies**
  - **M7-11** 12.5/7.2 kV Primary, One Voltage Regulator, Pole Mounted
  - **VM7-11** 12.5/7.2 kV Primary, One Voltage Regulator, Pole Mounted
  - **M7-13** 12.5/7.2 kV, Three Voltage Regulators, Platform Mounted
  - **VM7-13** 12.5/7.2 kV, Three Voltage Regulators, Platform Mounted
  - **SEL-2431-CP** SEL Voltage Regulator Control Panel

- **“M” Capacitor Assemblies**
  - **M9-13** 12.5/7.2 kV, Three Phase Capacitor Bank, 300 KVAR
  - **VM9-13** 12.5/7.2 kV, Three Phase Capacitor Bank, 300 KVAR
  - **M9-13AS** 12.5/7.2 kV, Three Phase Capacitor Bank, Automatically Switched

    - **VM9-13AS** 12.5/7.2 kV, Three Phase Capacitor Bank**,** Automatically Switched
    - **M9-13-CP** Switched Bank Capacitor Control

- **“M” Recloser Assemblies**
    - **M23** 12.5/7.2 kV, Oil Circuit Recloser with Bypass Cutout
    - **VM23** 12.5/7.2 kV, Oil Circuit Recloser with Bypass Cutout
    - **M23-100** 12.5/7.2 kV, Oil Circuit Recloser with Bypass Switch
    - **VM23-100** 12.5/7.2 kV, Oil Circuit Recloser with Bypass Switch
    - **M23-Nova** 12.5/7.2 kV, 1 Nova Type, Electronic Recloser
    - **VM23-Nova** 12.5/7.2 kV, 1 Nova Type, Electronic Recloser
    - **M23-VXE** 12.5/7.2 kV, 1 VXE Type, Electronic Recloser
    - **VM23-VXE** 12.5/7.2 kV, 1 VXE Type, Electronic Recloser
    - **M23-VERSATECH** 12.5/7.2 kV, Single Phase Recloser with Bypass Cutout
    - **M24** 12.5/7.2 kV, 2 Oil Circuit Reclosers with Bypass Cutouts
    - **VM24** 12.5/7.2 kV, 2 Oil Circuit Reclosers with Bypass Cutouts
    - **M24-100** 12.5/7.2 kV, 2 Oil Circuit Reclosers with Bypass Switch
    - **VM24-100** 12.5/7.2 kV, 2 Oil Circuit Reclosers with Bypass Switch
    - **M25** 12.5/7.2 kV, 3 Oil Circuit Reclosers with Bypass Cutouts
    - **VM25** 12.5/7.2 kV, 3 Oil Circuit Reclosers with Bypass Cutouts
    - **M25-100** 12.5/7.2 kV, 3 Oil Circuit Reclosers with Bypass Switch
    - **VM25-100** 12.5/7.2 kV, 3 Oil Circuit Reclosers with Bypass Switch

- **“M” Three Phase Recloser Assemblies**
    - **M30-RE, M31-WE** 12.5/7.2 kV, 3 Phase, Electronic Recloser

- **M32P-VWE** 12.5/7.2 kV, 3 Phase VWE, Electronic Recloser
- **VM32P-VWE** 12.5/7.2 kV, 3 Phase VWE, Electronic Recloser
- **M32P-Nova** 12.5/7.2 kV, 3 Phase Nova, Electronic Recloser
- **VM32P-Nova** 12.5/7.2 kV, 3 Phase Nova, Electronic Recloser
- **M32P-Nova-Triple** 12.5/7.2 kV, Nova Triple Single Electronic Recloser
- **VM32P-Nova-Triple** 12.5/7.2 kV, Nova Triple Single Electronic Recloser
- **M32S-1-Nova, M32S-1-Nova800** 12.5/7.2 kV, Nova Electronic Recloser for Substation
- **M32S-2-Nova, M32S-2-Nova800** 12.5/7.2 kV, Nova Electronic Recloser for Substation
- **Cooper-F6-CP** Form 6 Control Panel
- **SCADA Radio Down-Line**

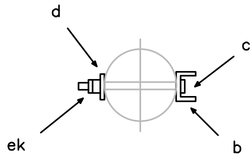
- **METERING**

  - Metering – Primary CT/PT
  - Primary Metering Guide, 12.5/7.2kV, Three Phase, 4 Wire WYE
  - PT Metering Schematic, Single Phase, Primary Metering
  - PT Metering Schematic, Three Phase, WYE Primary Metering

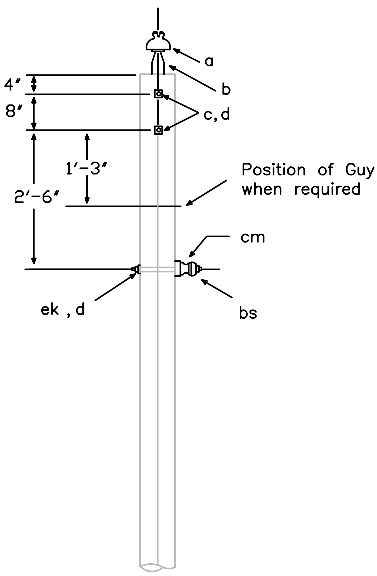
- **POLES**

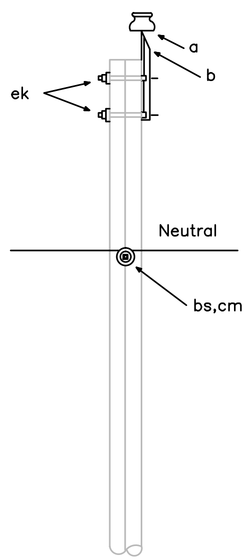
  - Poles – Wood & Concrete
  - Pole Framing Guide
  - Concrete Pole
  - Crossarm Drilling Guide
  - Tap Assembly Guides

- **ROW**
    - Right of Way Clearing
- **OH WIRE**
    - Overhead wire
- **CONDUCTOR RATINGS**
    - Conductor ratings



POLE TOP PIN ASSEMBLY



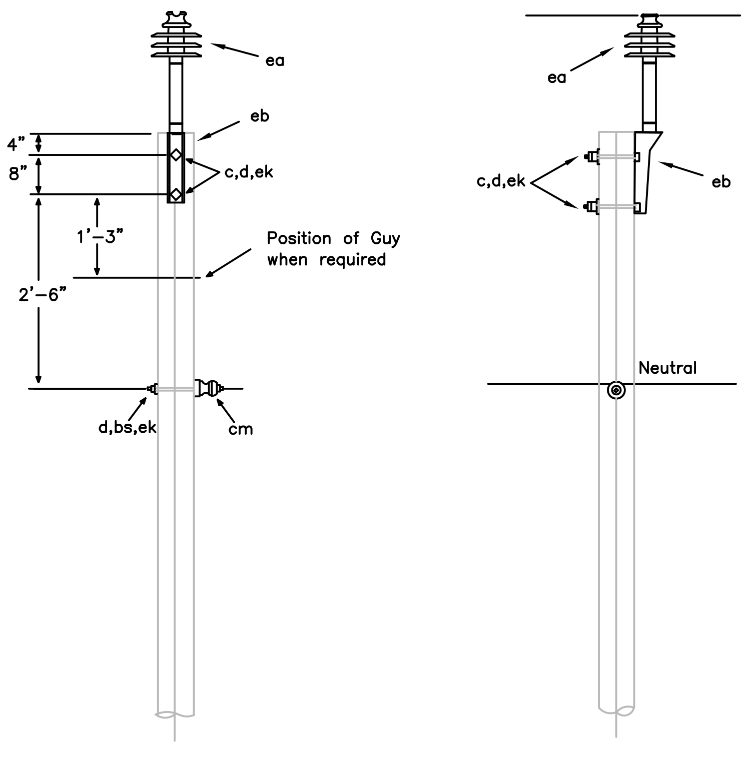


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kv	cm	1	Insulator, secondary spool
b	1	Pin, pole top 20" steel	ek	3	Locknuts, as required
c	2	Bolt, machine 5/8" x req'd length		1	Wraplock spool tie
d	3	Washer, square 2 1/4", as req'd		1	Wraplock top tie
bs	1	Bolt, single upset			

DESIGN LIMITS
Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 5°

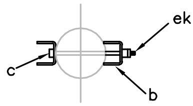
12.5/7.2 kV PRIMARY, 1 PHASE, SINGLE PRIMARY SUPPORT

DEC. 2008	CHELCO	A1

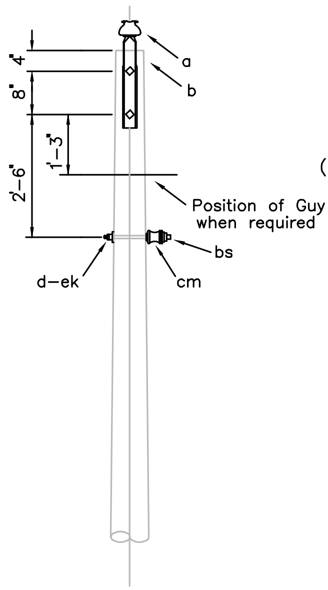


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req length	eb	1	Bracket, pole top for screw-on
d	3	Washer, square 2 1/4", as req'd	ek	3	Locknuts
bs	1	Bolt, single upset		10	Conductor, aluminum tie wire
cm	1	Insulator, secondary spool 3"		1	Wraplock spool tie
ea	1	Insulator, screw on polymer 25kV		1	Armor rods

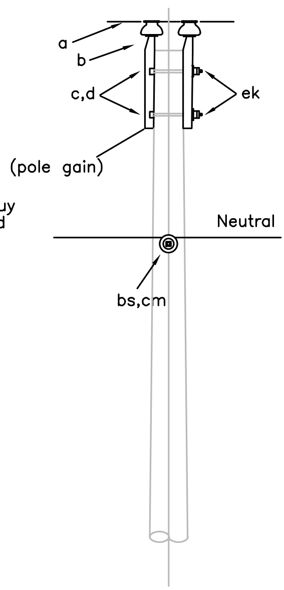
DESIGN LIMITS Max. transverse load: 500 lbs. per conductor Max. line angle within load limits: 5°	25 kV PRIMARY, 1 PHASE SINGLE PRIMARY SUPPORT		
	DEC. 2013	CHELCO	VA1



POLE TOP PIN ASSEMBLY



PLAN

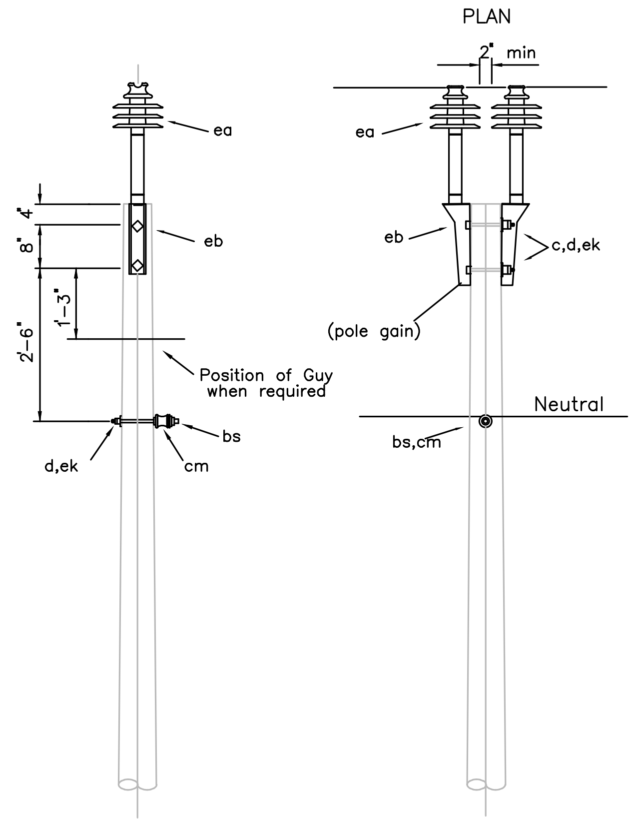


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	2	Insulator, pin type 15kV	cm	1	Insulator, secondary spool
b	2	Pin, pole top 20" steel	ek	3	Locknuts
c	2	Bolt, machine, 5/8" x req'd length		10	conductor, aluminum tie wire
d	1	Washer, square 2 1/4" as req'd		1	Wraplock spool tie
bs	1	Bolt, single upset		1	Armor rods

MAXIMUM LINE ANGLES:
5° – Small conductors
2° – Larger than #1/0
Max. transverse load:
500 lbs. per conductor

12.5/7.2 kV PRIMARY, 1 PHASE,
DOUBLE PRIMARY SUPPORT

DEC. 2008	CHELCO	A1–1



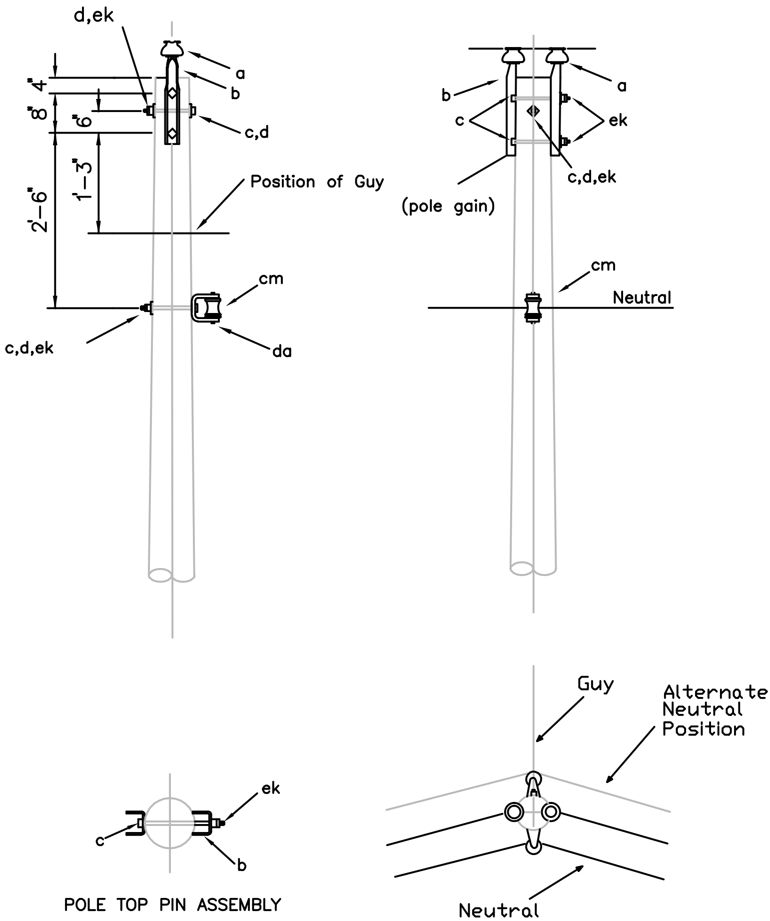
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req length	eb	2	Bracket, pole top for screw-on
d	3	Washer, square 2 1/4" as req'd	ek	3	Locknuts
bs	1	Bolt, single upset		1	Wraplock spool tie
cm	1	Insulator, secondary spool		1	Armor rods
ea	2	Insulator, screw on polymer 25kv			

MAXIMUM LINE ANGLES:

5° – Small conductors
2° – Larger than #1/0

25 kV PRIMARY, 1 PHASE
DOUBLE PRIMARY SUPPORT

DEC. 2008	CHELCO	VA1-1



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	2	Insulator, pin type 15kV	da	1	Clevis, secondary rigid
b	2	Pin, pole top 20" steel	ek	4	Locknuts, as required
c	4	Bolt, machine 5/8" x req'd length		2	Armor rods
d	3	Washer, square 2 1/4", as req'd		1	Wraplock spool tie
cm	1	Insulator, secondary spool		10	Conductor, aluminun tie wire

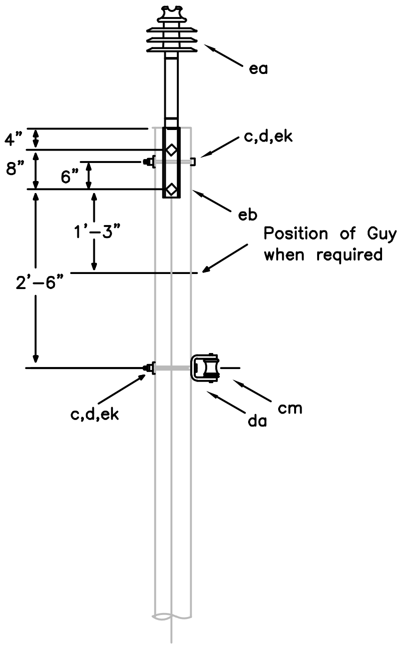
DESIGN LIMITS

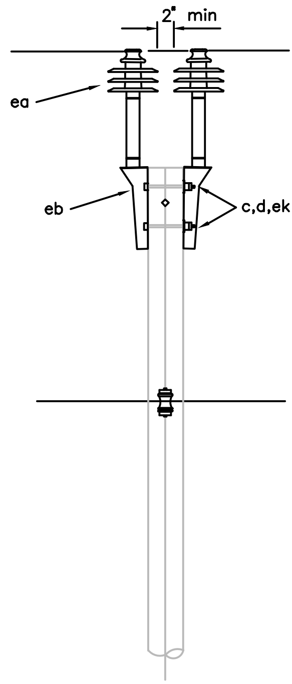
Max. transverse load: 1000 lbs per conductor

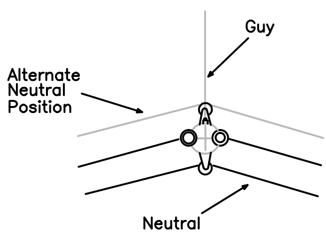
Max. line angle within load limits: 20°

12.5/7.2 kV PRIMARY, 1 PHASE, DOUBLE PRIMARY SUPPORT

DEC. 2013 | CHELCO | A2





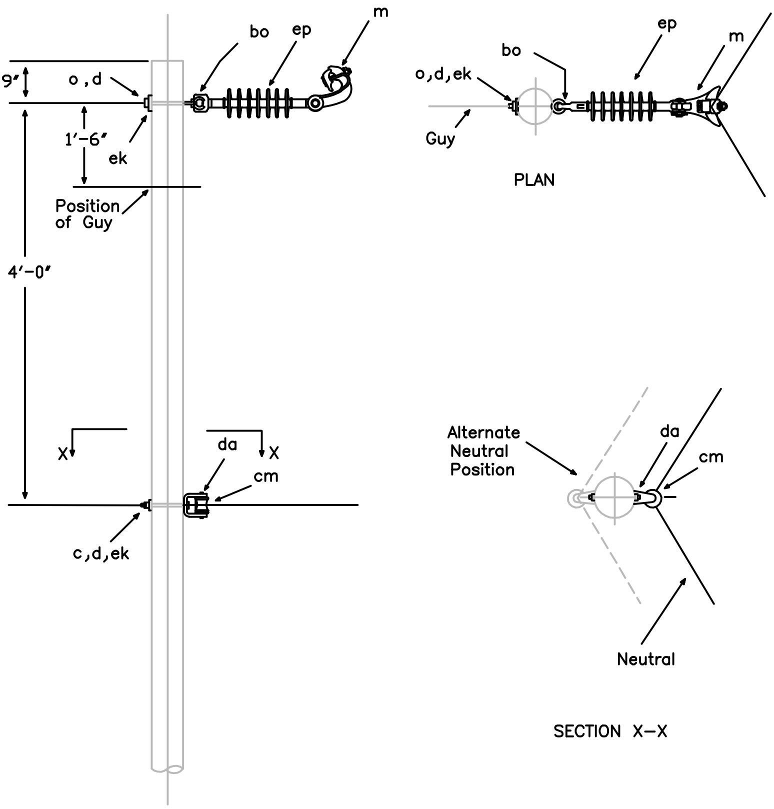


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	3	Bolt, machine, 5/8" x req length	eb	2	Bracket, pole top for screw–on
d	4	Washer, square 2 1/4", as req'd	ek	4	Locknuts, as required
cm	1	Insulator, secondary spool		1	Armor rod
da	1	Clevis, secondary rigid		1	Wraplock spool tie
ea	2	Insulator, screw on polymer 25kV			

DESIGN LIMITS
Max. transverse load:
500 lbs. per conductor
Max. line angle within
load limits: 5° to 30°

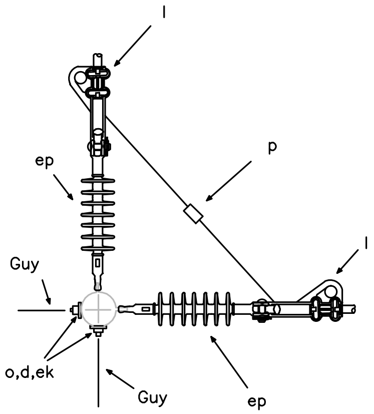
25 kV PRIMARY, 1 PHASE
DOUBLE PRIMARY SUPPORT

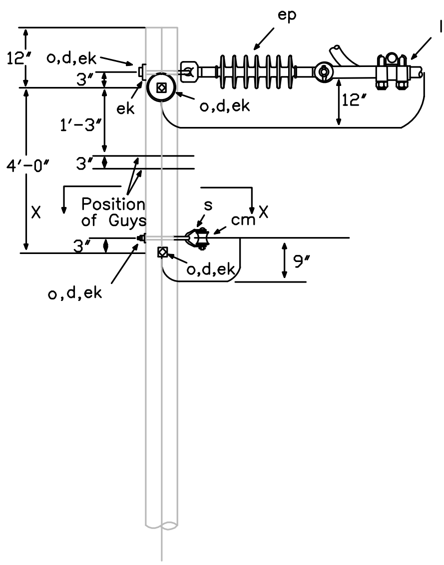
DEC. 2013	CHELCO	VA2

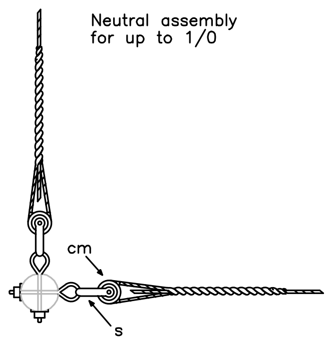


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 5/8" x req'd length	da	1	Clevis, secondary rigid
d	3	Washer, square 2 1/4", as req'd	ek	2	Locknuts, as required
m	1	Clamp, Susp 2 bolt #4-3/0	ep	1	Insulator, epoxilator 25kv
o	1	Bolt, oval eye, 5/8" x required length		1	Armor rods
bo	1	Shackle, anchor		1	Wraplock spool tie
cm	1	Insulator, secondary spool			

DESIGN LIMITS Max. transverse load: 4000 lbs. per conductor Angle: 20° – 60°	12.5/7.2 kV PRIMARY, 1 PHASE		
	DEC. 2013	CHELCO	A3





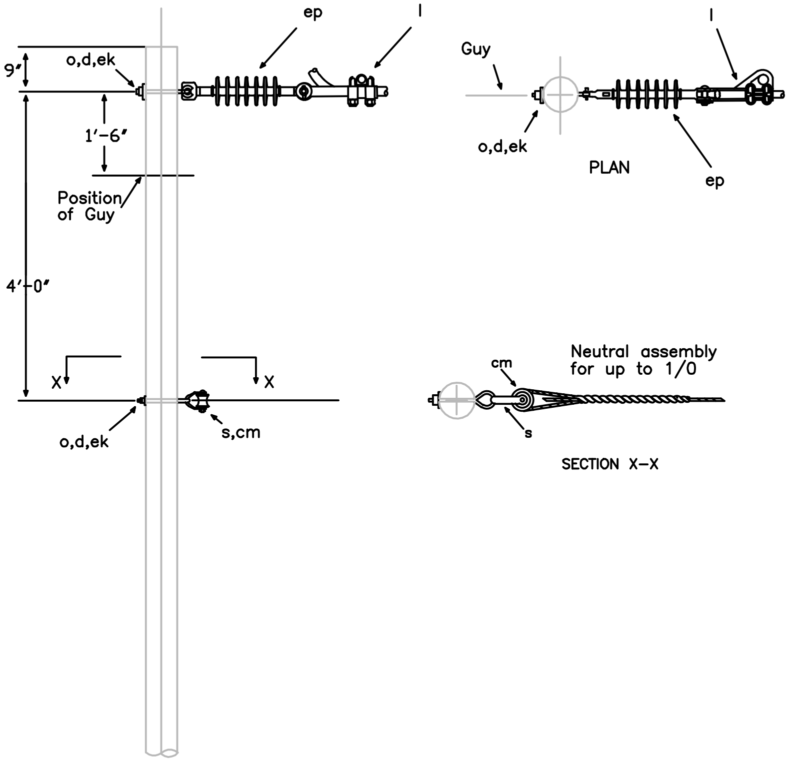


SECTION X-X

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
b	4	Bolt, oval eye, 5/8" x req'd length	cm	2	Insulator, secondary spool
d	4	Washer, square 2 1/4", as req'd	ek	4	Locknuts, as required
l	2	Clamp, deadend shoe	ep	2	Insulator, epoxilator 25kV
p	*	Connectors, as required		2	Deadend distribution grip
s	2	Clevis, secondary swinging			

12.5/7.2 kV PRIMARY, 1 PHASE
60° TO 90° ANGLE

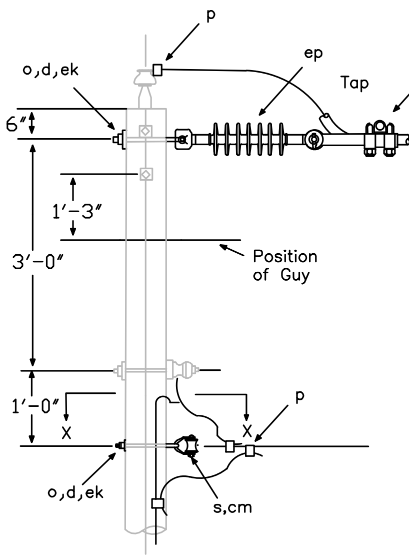
JUNE 2011	CHELCO	A4

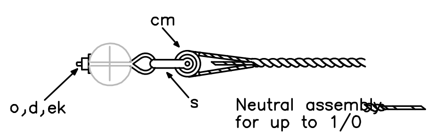


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	2	Washer, square 2 1/4", as req'd	cm	1	Insulator, secondary spool
l	1	Clamp, deadend shoe	ep	1	Insulator, epoxilator 25kV
o	2	Bolt, oval eye, 5/8" x required length	ek	2	Locknuts, as required
s	1	Clevis, secondary swinging		1	Deadend grip, neutral

12.5/ 7.2 kV PRIMARY, 1 PHASE
DEADEND (SINGLE)

DEC. 2013	CHELCO	A5





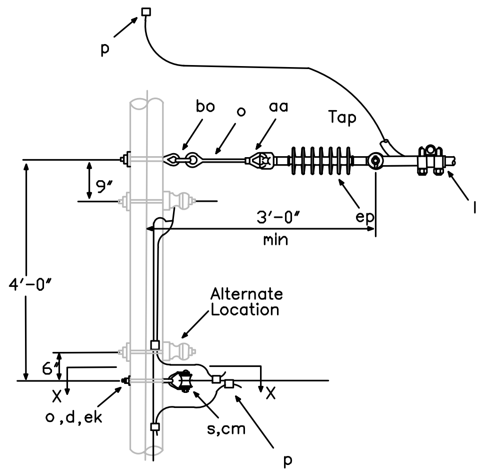
SECTION X-X

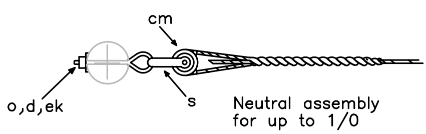
NOTES: A5-1 assembly may be used with drawings such as: A1,A1-1
A2

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	2	Washer, square 2 1/4", as req'd	cm	1	Insulator, secondary spool
l	1	Clamp, deadend shoe	ek	2	Locknuts, as required
o	2	Bolt, oval eye, 5/8" x req'd length	ep	1	Insulator, epoxilator 25kV
p	*	Connectors, as required		1	Deadend distribution grip
s	1	Clevis, secondary swinging			

12.5/7.2 kV PRIMARY, 1 PHASE TAP

DEC. 2008	CHELCO	A5-1





SECTION X-X

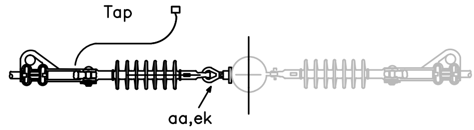
Specify A5-2A for tap
to existing eyebolt.

NOTES: A5-2 assembly may be used with drawings such as: B1, B2, B7, C1, C1-2, C1-3, C1-4. C2-1 C2-2, B2, B7, C1, C1-2, C1-3, C1-4. C2-1, C2-2,

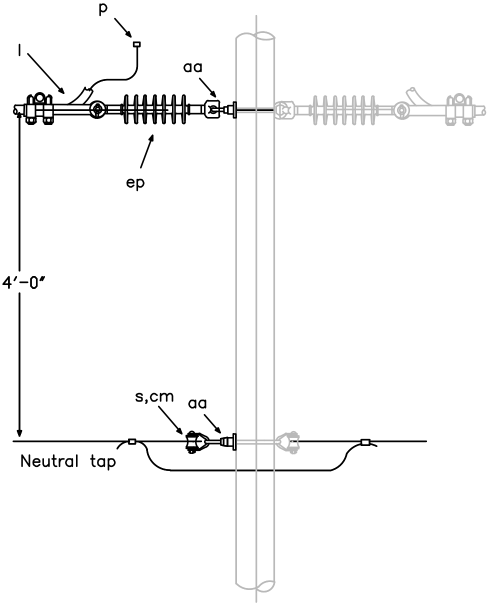
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	2	Washer, square 2 1/4", as req'd	bo	1	Shackle, anchor
l	1	Clamp, deadend shoe	cm	1	Insulator, secondary spool
o	3	Bolt, oval eye, 5/8" as required	ek	3	Locknuts, as required
p	*	Connectors, as required	ep	1	Insulator, epoxilator 25kV
s	1	Clevis, secondary swinging		1	Deadend distribution grip
aa	1	Nut, oval eye 5/8"			

12.5/7.2 kV PRIMARY, 1 PHASE TAP

DEC. 2008	CHELCO	A5-2



PLAN

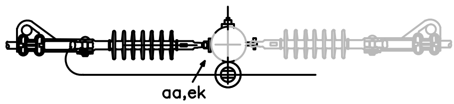


Notes: A5-3 assembly may be used with drawings such as A4, B4-1, and C4-1.

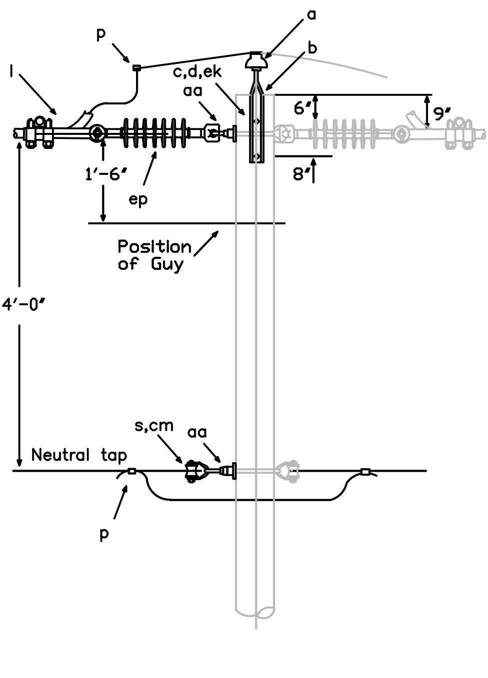
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
l	1	Clamp, deadend shoe	cm	1	Insulator, secondary spool
p	*	Connectors, as required	ek	*	Locknuts, as required
s	1	Clevis, secondary swinging	ep	1	Insulator, epoxilator 25kV
aa	2	Nut, oval eye, 5/8"		1	Deadend distribution grip

12.5/7.2 kV PRIMARY, 1 PHASE

DEC. 2008	CHELCO	A5-3



PLAN

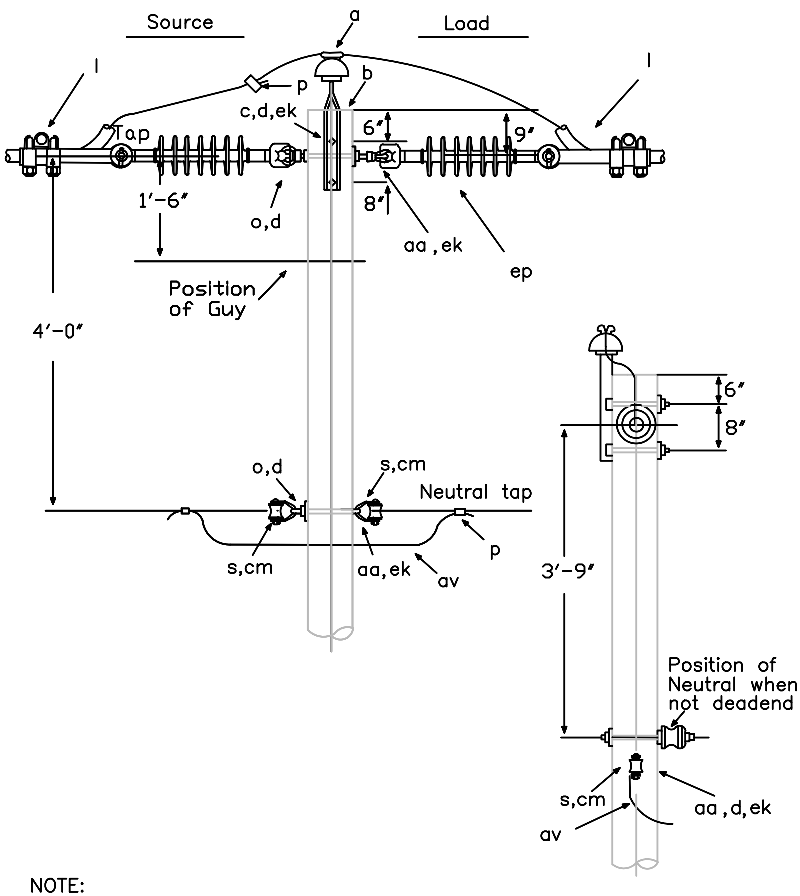


Notes: A5–4 assembly may be used with drawings such as A3, A5, B3, B5–1 and C5–1.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	s	1	Clevis, secondary swinging
b	1	Pin, pole top 20" steel	aa	2	Nut, oval eye, 5/8"
c	2	Bolt, machine 5/8" x req'd length	cm	1	Insulator, secondary spool
d	2	Washer, square 2 1/4", as req'd	ek	2	Locknuts, as required
l	1	Clamp, deadend shoe	ep	1	Insulator, epoxilator 25kV
p	*	Connectors, as required		1	Deadend distribution grip

12.5/7.2 kV PRIMARY, 1 PHASE

DEC. 2013	CHELCO	A5–4



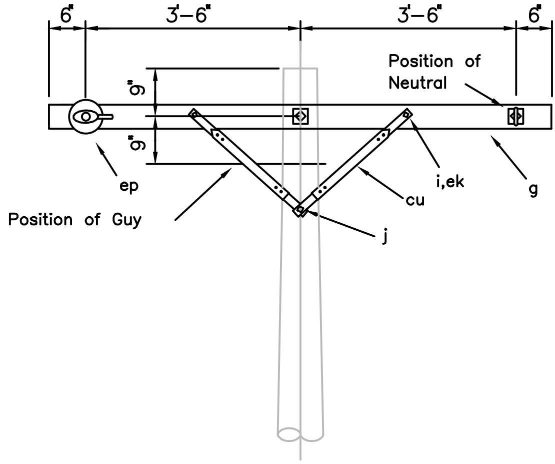
NOTE:

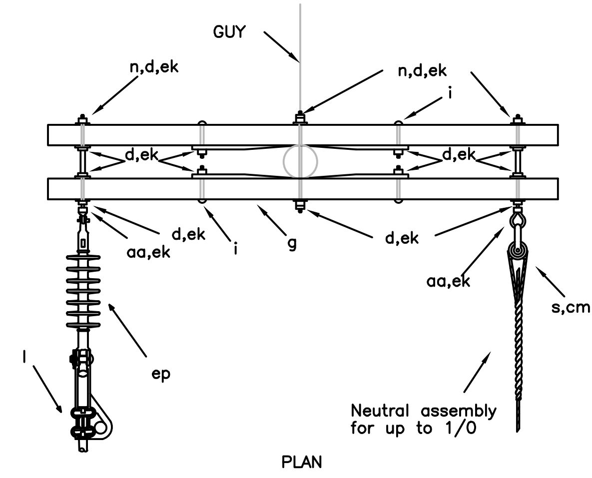
A6 may be used with drawings such as: M3–1A, M3–10, M3–41, M3–23, M5–1, M5–4, M5–2 (as shown).

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	aa	2	Nut, oval eye, 5/8"
b	1	Pin, pole top 20" steel	av	*	Jumpers, as required
c	2	Bolt, machine 5/8" x req'd lg	cm	2	Insulator, secondary spool
d	4	Washer, square 2 1/4" as req'd	ek	6	Locknuts, as required
l	2	Clamp, deadend shoe	ep	2	Insulator, epoxilator 25kV
o	2	Bolt, oval eye, 5/8" x req;d lg		2	Deadend distribution grip
p	*	Connectors, as required		1	Wraplock top tie
s	2	Clevis, secondary swinging			

12.5/7.2 kV PRIMARY, 1 PHASE, VERTICAL DEADEND (DOUBLE)

JUNE 2013 | CHELCO | A6

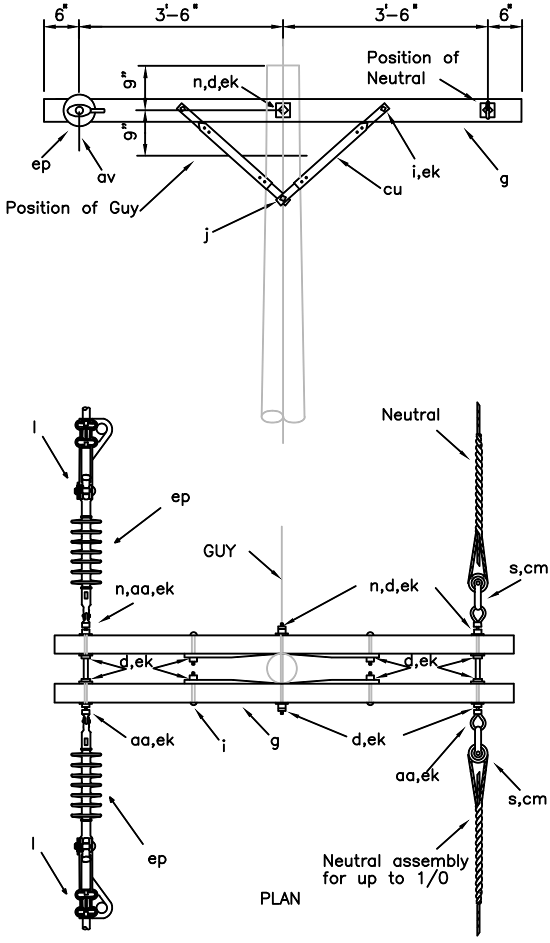




PLAN

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	10	Washer, square 2 1/4", as req'd	aa	2	Nut, oval eye 5/8"
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	cm	1	Insulator, secondary spool
i	4	Bolt, carriage 3/8" x 4–1/2"	cu	4	Brace x/arm 28" wood
j	2	Lag, screw 1/2" x 4"	ek	*	Locknuts, as required
l	1	Clamp, deadend shoe	ep	1	Insulator, epoxilator 25kV
n	3	Bolt, dble arming 5/8"x req'd lngth		1	Deadend distrubution grip
s	1	Clevis, secondary swinging			

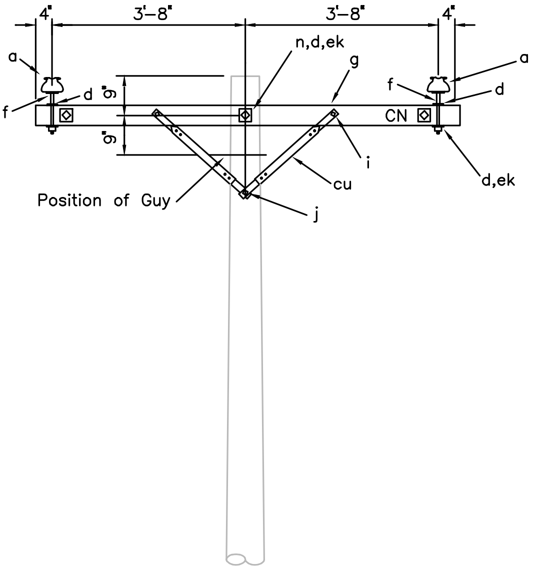
DESIGN PARAMETERS: PERMITTED UNBALANCED CONDUCTOR TENSION:	12.5/7.2 kV PRIMARY, 1 PHASE DEADEND ON CROSSARMS (SINGLE)	
	DEC. 2013	CHELCO	A7

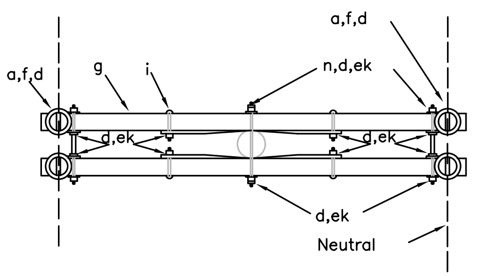


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	10	Washer, square 2 1/4", as req'd	aa	4	Nut, oval eye 5/8"
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	av	*	Jumpers, as required
i	4	Bolt, carriage 3/8" x 4-1/2"	cm	2	Insulator, secondary spool
j	2	Lag, screw 1/2" x 4"	cu	4	Brace x/arm 28" wood
l	2	Clamp, deadend shoe	ek	*	Locknuts, as required
n	3	Bolt, dbl arming 5/8"x req'd length	ep	2	Insulator, epoxilator 25kv
p	*	Connectors, as required		1	Deadend distrubution grip
s	2	Clevis, secondary swinging			

12.5/7.2 kV PRIMARY, 1 PHASE
DOUBLE DEADEND ON CROSSARMS

DEC. 2013	CHELCO	A8





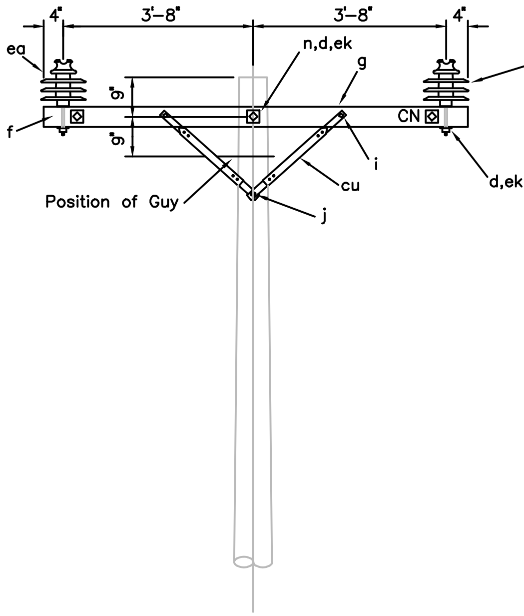
PLAN

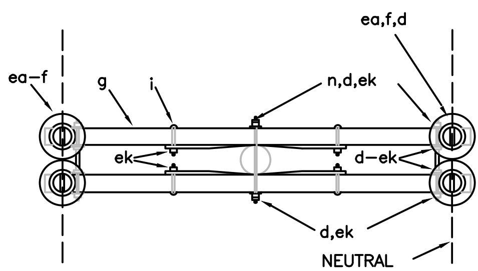
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator, pin type 15kV	n	3	Bolt, dbl arming 5/8" x req'd length
d	10	Washer, square 2 1/4", as req'd	cu	4	Brace x/arm 28" wood
f	4	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"		2	Armor rods
i	4	Bolt, carriage 3/8" x 4-1/2"		*	Conductor, aluminum tie wire
j	2	Lag screw 1/2" x 4"		4	Letters, 2 'C', 2 'N' with 1" nails

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor.
Max line angle within load limits: 20°

12.5/7.2 kV PRIMARY, 1 PHASE
DOUBLE SUPPORT ON CROSSARMS

DEC. 2008	CHELCO	A9



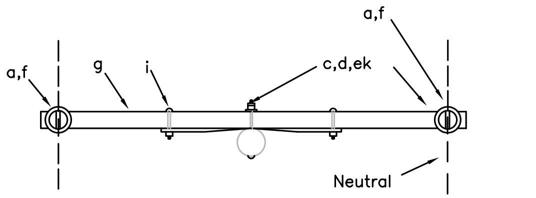


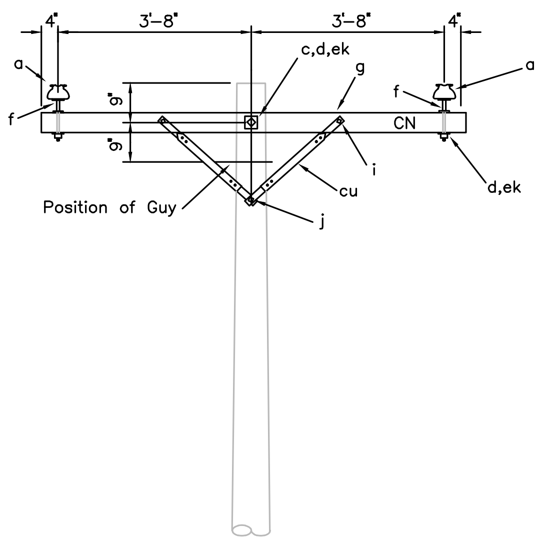
PLAN

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	*	Washer, square 2 1/4", as req'd	cu	4	Brace x/arm 28" wood
f	4	Pin, steel crossarm	ea	4	Insulator, screw on polymer 25kV
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	4	Bolt, carriage 3/8" x 4-1/2"		2	Armor rods
j	2	Lag screw 1/2" x 4"		*	Conductor, aluminum tie wire
n	3	Bolt, dbl arming 5/8" x req'd length		4	Letters, 2 'C', 2 'N' with 1" nails

25 kV PRIMARY, 1 PHASE
DOUBLE SUPPORT ON CROSSARMS

DEC. 2013 | CHELCO | VA9



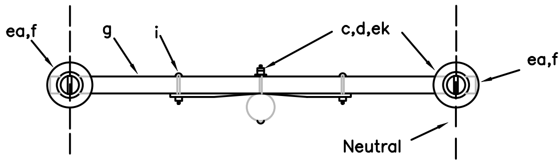


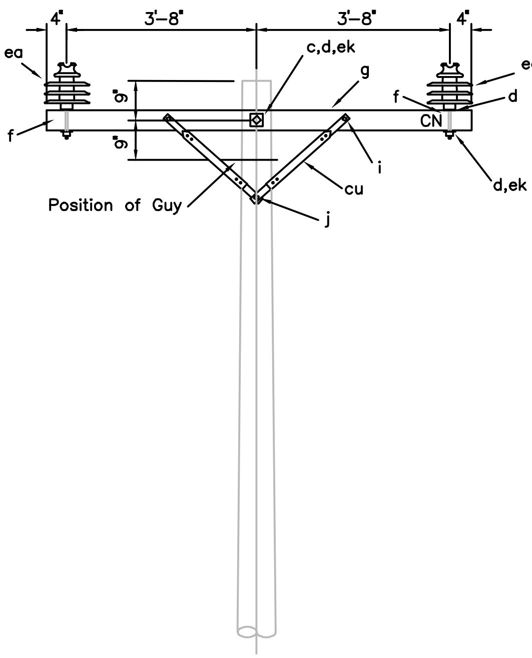
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	2	Insulator, pin type 15kV	j	1	Lag screw 1/2" x 4"
c	1	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 28" wood
d	*	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
f	2	Pin, steel crossarm		2	Wraplock top tie all sizes
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		4	Letters, 2 'C', 2 'N' with 1" nails
i	2	Bolt, carriage 3/8" x 4-1/2"			

DESIGN LIMITS
Max. transverse load: 500 lbs. per conductor.
Max line angle within load limits: 5°

12.5/7.2 kV PRIMARY, 1 PHASE
SINGLE LINE ARM CROSSARM

DEC. 2008	CHELCO	A9-1

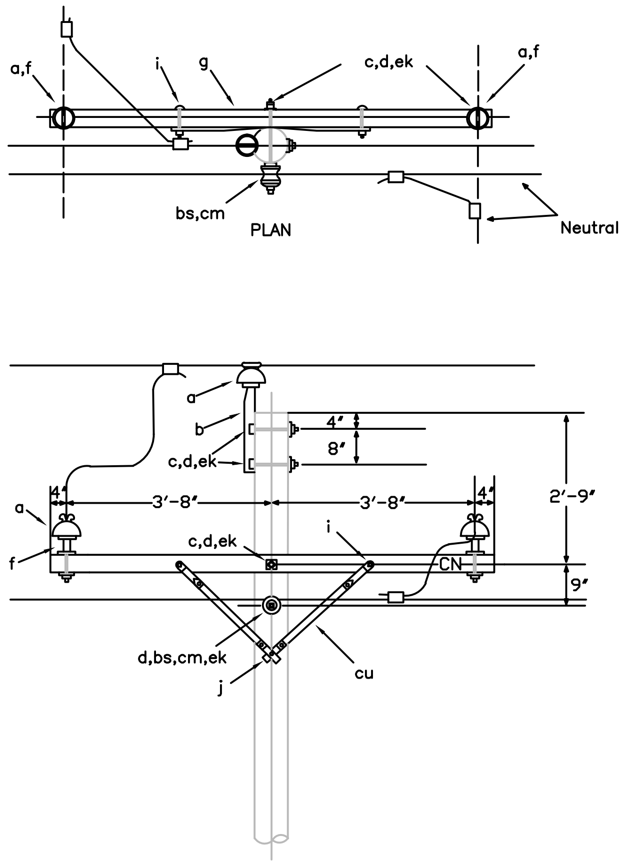




ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt machine 5/8" x req'd length	cu	2	Brace x/arm 28" wood
d	*	Washer, square 2 1/4", as req'd	ea	2	Insulator, screw on polymer 25kV
f	2	Pin, steel crossarm	ek	*	Locknuts, as required
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		2	Wraplock top tie
i	2	Bolt, carriage 3/8" x 4–1/2"		4	Letters, 2 'C', 2 'N' with 1" nails
j	1	Lag screw 1/2" x 4"			

25 kV PRIMARY, 1 PHASE
SINGLE LINE ARM CROSSARM

DEC. 2013	CHELCO	VA9–1

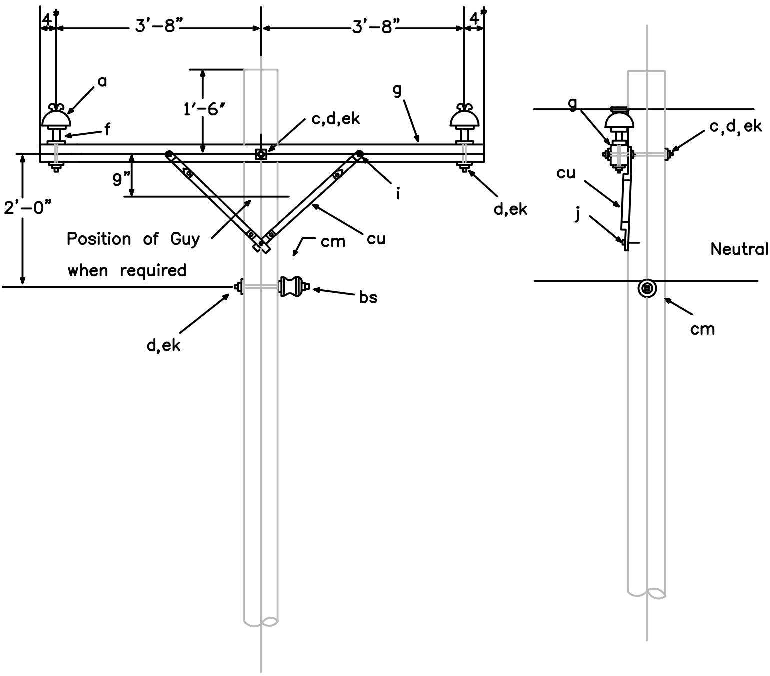


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	3	Insulator, pin type 15kV	bs	1	Bolt, single upset
b	1	Pin, pole top 20" steel	cm	1	Insulator, secondary spool
c	3	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 28" wood
d	*	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
f	2	Pin, steel crossarm		3	Wraplock top tie
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		1	Wraplock spool tie
i	2	Bolt, carriage 3/8" x 4-1/2"		4	Letters, 2 'C', 2 'N' with 1" nails
j	1	Lag screw 1/2" x 4"			

DESIGN LIMITS
Max. transverse load: 500 lbs. per conductor.
Max line angle within load limits: 5°

12.5/7.2 kV PRIMARY
1 PHASE CROSSARM CONSTRUCTION
1 PHASE JUNCTION

DEC. 2013	CHELCO	A22

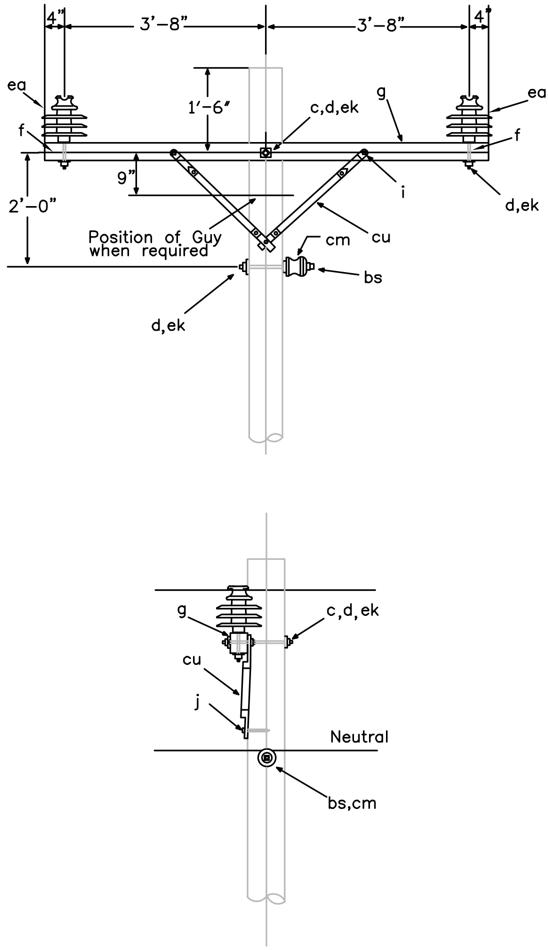


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	2	Insulator, pin type 15kV	bs	1	Bolt, single upset
c	1	Bolt, machine 5/8" x req'd length	cm	1	Insulator, secondary spool
d	3	Washer, square 2 1/4", as req'd	cu	2	Brace x/arm 28" wood
f	2	Pin, steel crossarm	ek	*	Locknuts, as required
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		1	Wraplock spool tie
i	2	Bolt, carriage 3/8" x 4–1/2"		2	Wraplock top tie
j	1	Lag screw 1/2" x 4"			

DESIGN LIMITS
Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 5°

12.5\7.2 kV PRIMARY
2 PHASE CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT

DEC. 2013	CHELCO	B1



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt machine 5/8" x req'd length	cm	1	Insulator, secondary spool
d	2	Washer, square 2 1/4", as req'd	cu	2	Brace x/arm 28" wood
f	2	Pin, steel crossarm	ea	2	Insulator, screw on polymer 25kV
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	2	Bolt, carriage 3/8" x 4-1/2"		1	Wraplock spool tie
j	1	Lag screw 1/2" x 4"		2	Wraplock top tie
bs	1	Bolt, single upset			

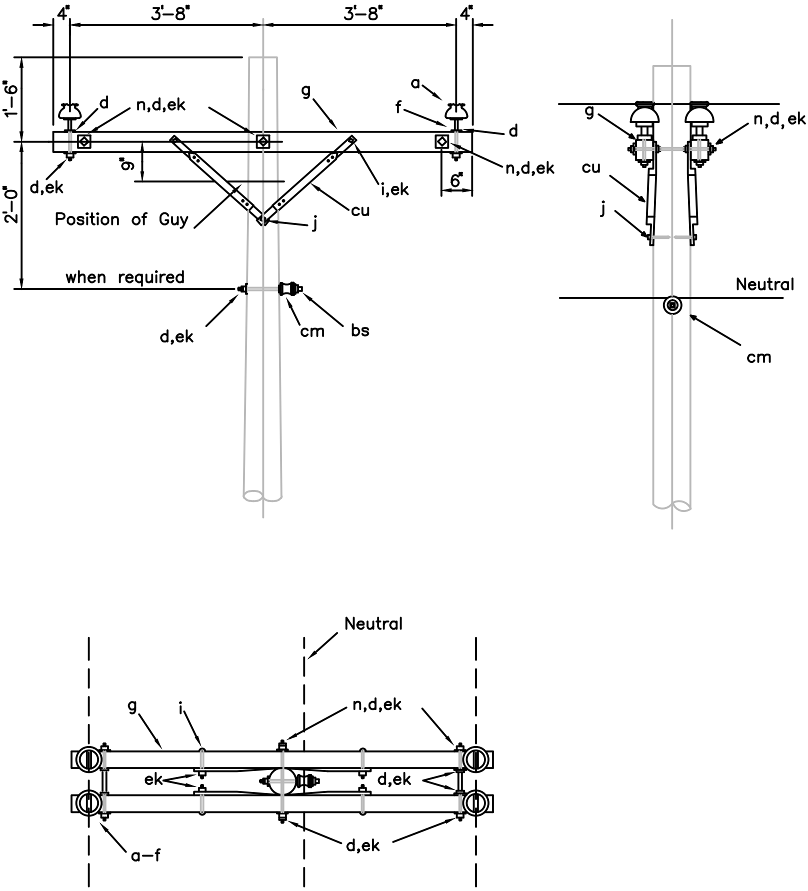
DESIGN LIMITS

Max. transverse load: 500 lbs. per conductor

Max. line angle within load limits: 5°

25 kV PRIMARY
2 PHASE CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT

DEC. 2008	CHELCO	VB1

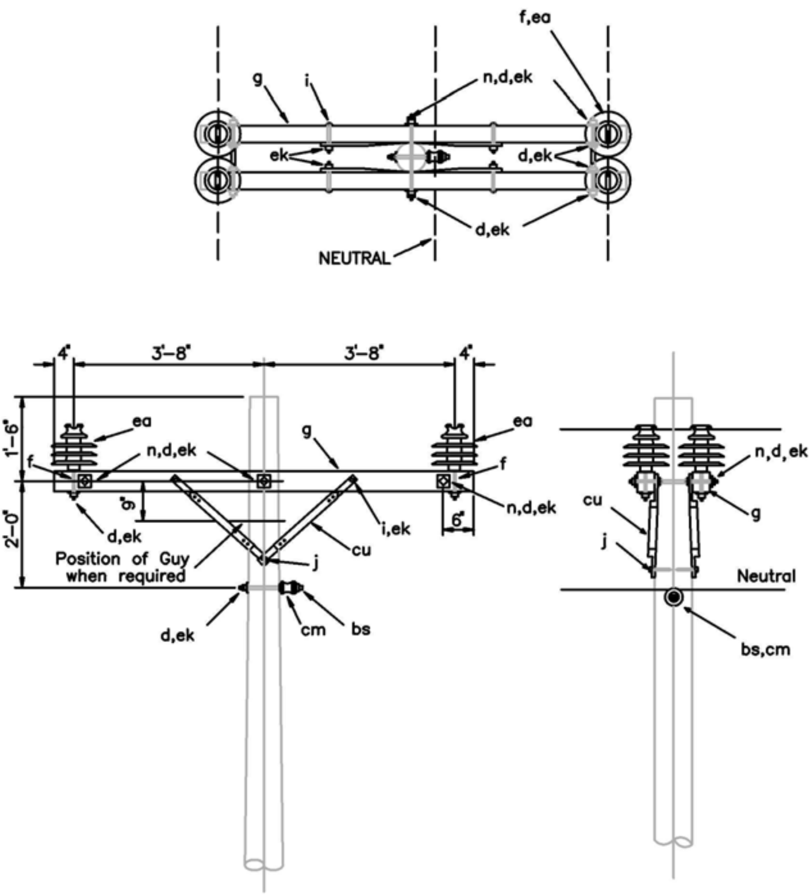


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator, pin type 15kV	bs	1	Bolt, single upset
d	11	Washer, square 2 1/4", as req'd	cm	2	Insulator, secondary spool
f	4	Pin, steel crossarm	cu	4	Brace x/arm 28" wood
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	4	Bolt, carriage 3/8" x 4-1/2"		2	Armor rods
j	2	Lag screw 1/2" x 4"		25	Conductor, aluminum tie wire
n	3	Bolt, dbl arming 5/8" x req'd length		1	Wraplock spool tie

DESIGN PARAMETERS:
Max. transverse load:1000 lbs per conductor.
MAXIMUM LINE ANGLES:
5°-Small Conductors

12.5/7.2 kV PRIMARY
2 PHASE, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2013	CHELCO	B1-1



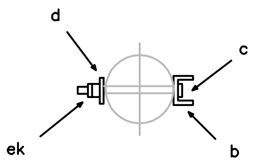
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	11	Washer, square 2 1/4", as req'd	cm	1	Insulator, secondary spool
f	4	Pin, steel crossarm	cu	4	Brace x/arm 28" wood
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ea	4	Insulator, screw on polymer 25kV
i	4	Bolt, carriage 3/8" x 4–1/2"	ek	*	Locknuts, as required
j	2	Lag screw 1/2" x 4"		2	Armor rods
n	3	Bolt, dbl arming 5/8" x req'd length		25	Conductor, aluminum tie wire
bs	1	Bolt, single upset		1	Wraplock spool tie

DESIGN PARAMETERS:

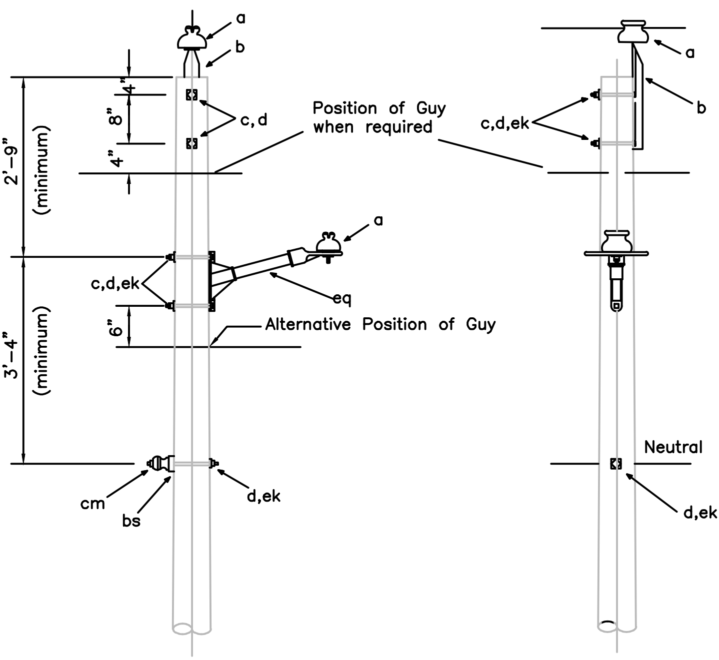
MAXIMUM LINE ANGLES:
5°–Small Conductors
2°–Larger than #1/0

25 kV PRIMARY
2 PHASE, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2013	CHELCO	VB1–1



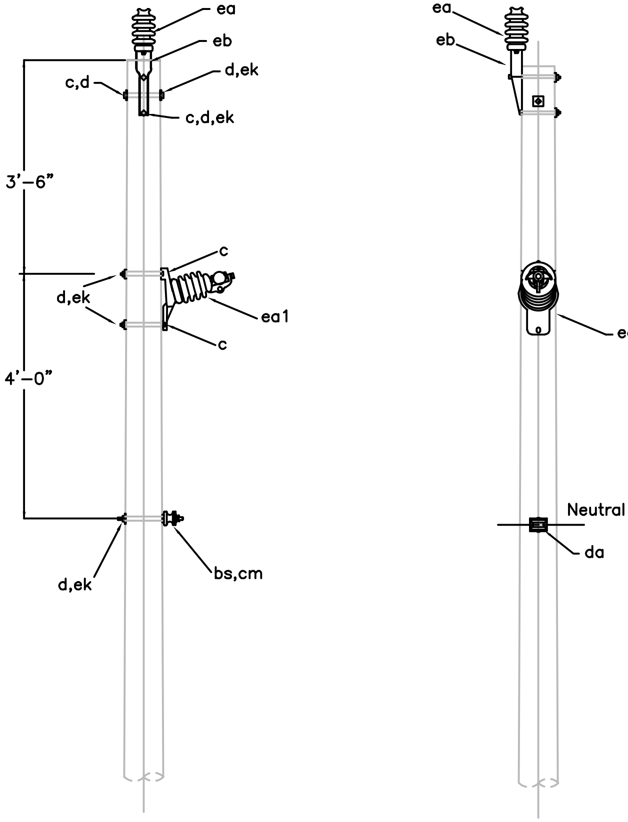
POLE TOP PIN ASSEMBLY



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	2	Insulator pin type 15kV	cm	1	Insulator secondary spool
b	1	Pin, pole top 20" steel	ek	*	Locknuts, as required
c	4	Bolt machine 5/8" x req'd length	eq	1	Bracket insulator, standoff
d	5	Washer, square, 2 1/4" as req'd		1	Wraplock spool tie
bs	1	Bolt, single upset		2	Wraplock top tie

12.5/7.2 kV PRIMARY
2 PHASE, NARROW PROFILE, FIBERGLASS
DOUBLE PRIMARY SUPPORT

DEC. 2013	CHELCO	B1FR



NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

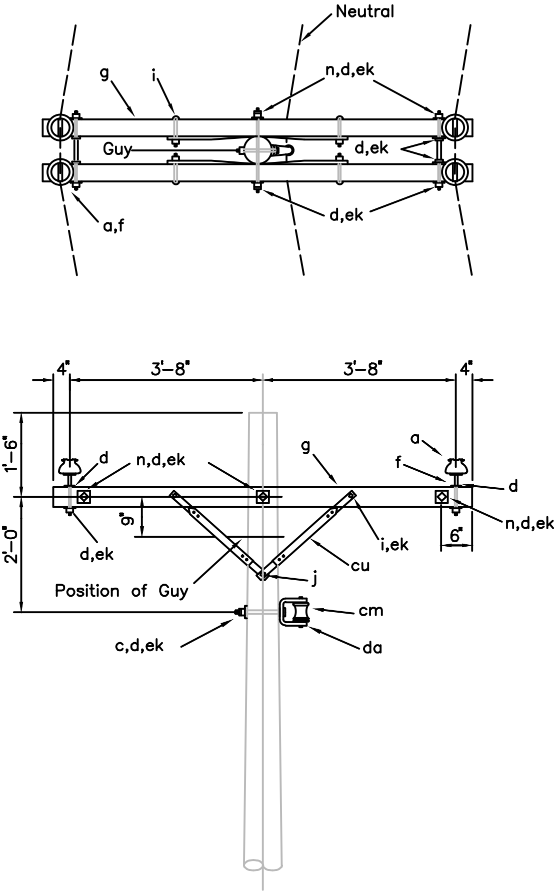
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt machine 5/8" x req'd length	ek	*	Locknuts, as required
d	5	Washer, square, 2 1/4" as req'd		1	Clamp for post insulator
bs	1	Bolt, single upset		2	Armor rods
cm	1	Insulator, secondary spool		*	Conductor, alminum tie wire
ea	1	Insulator, post screw on type		1	Wraplock spool tie
ea1	1	Insulator, horizontal post		1	Wraplock top tie
eb	1	Bracket, pole top for screw–on			

Up to 1/0AAAC

Up to 5°

12.5/7.2 kV PRIMARY
2 PHASE, NARROW PROFILE, POST
DOUBLE PRIMARY SUPPORT

DEC. 2013	CHELCO	B1P

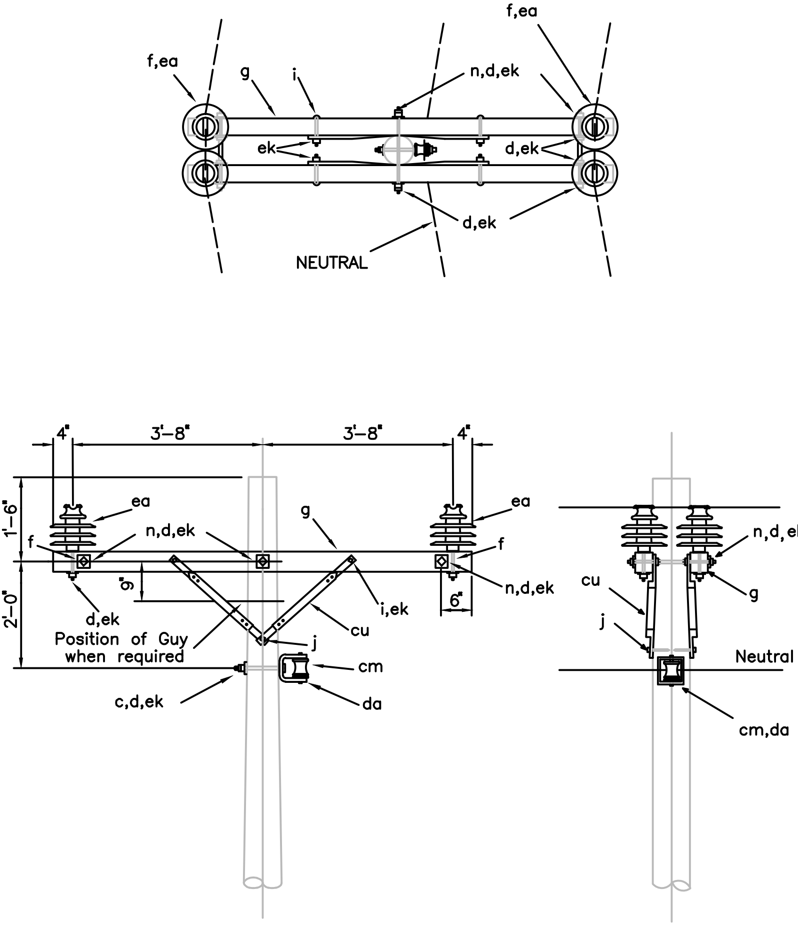


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator pin type 15kV	cm	1	Insulator, secondary spool
c	1	Bolt machine 5/8" x req'd length	cu	4	Brace x/arm 28" wood
d	*	Washer, square 2 1/4", as req'd	da	1	Clevis, secondary rigid
f	4	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"		2	Armor rods
i	4	Bolt, carriage 3/8" x 4-1/2"		*	Conductor, aluminum tie wire
j	2	Lag screw 1/2" x 4"		*	Wraplock spool tie
n	3	Bolt, dbl arming 5/8" x req'd length			

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 20°

12.5/7.2 kV PRIMARY
2 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2013	CHELCO	B2



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 5/8" all	cm	1	Insulator, secondary spool
d	11	Washer, square 2 1/4", as req'd	cu	4	Brace x/arm 28" wood
f	4	Pin, steel crossarm	ea	4	Insulator, screw on polymer 25kV
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	4	Bolt, carriage 3/8" x 4–1/2"		2	Armor rods
j	2	Lag screw 1/2" x 4"		25	Conductor, aluminum tie wire
n	3	Bolt, dbl arming 5/8" x req'd length		1	Wraplock spool tie
da	1	Clevis, secondary rigid			

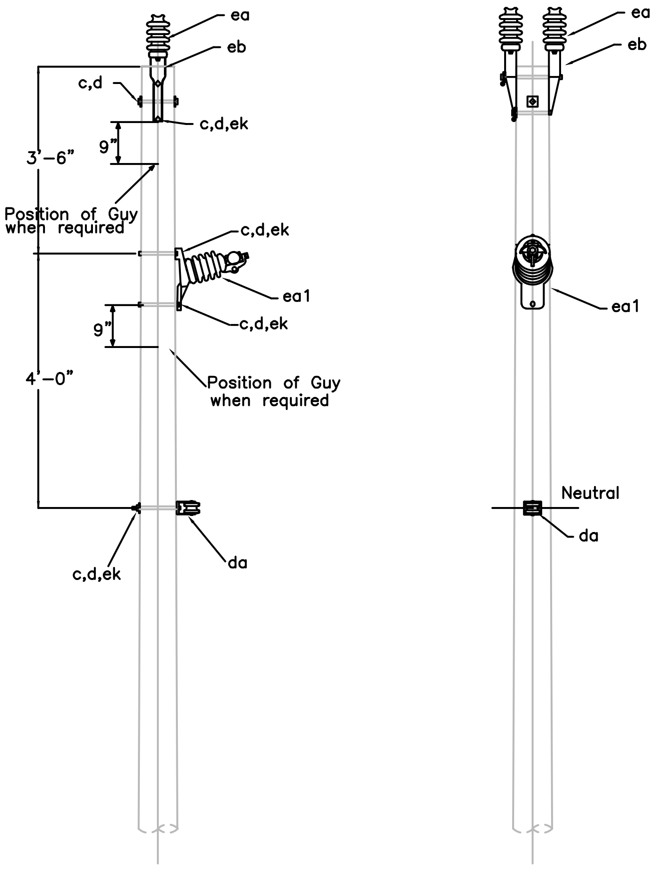
DESIGN PARAMETERS:

Max. transverse load: 750 lbs. per pin

Max. line angle within load limits: 5°–20°

25 kV PRIMARY
2 PHASE, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

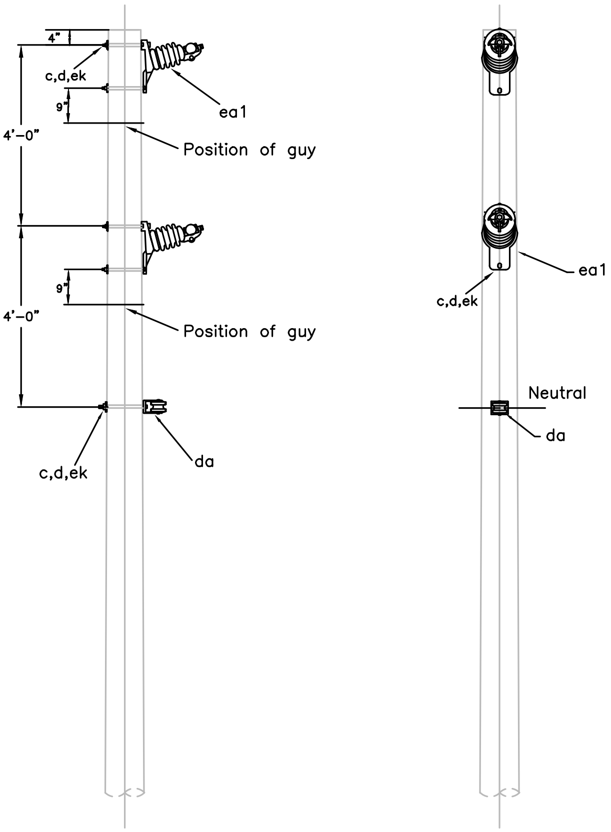
DEC. 2013	CHELCO	VB2



NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt machine 5/8" x req'd length	eb	2	Bracket, pole top for screw-on
d	6	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
cm	1	Insulator secondary spool		1	Clamp for post insulator
da	1	Clevis, secondary rigid		2	Armor rods
ea	2	Insulator, post screw on type		*	Conductor, alminum tie wire
ea1	1	Insulator, horizontal post		1	Wraplock spool tie

UP TO 1/0AAAC 5° - 20°	12.5/7.2 kV PRIMARY 2 PHASE, NARROW PROFILE, POST DOUBLE PRIMARY SUPPORT		
	DEC. 2013	CHELCO	B2P



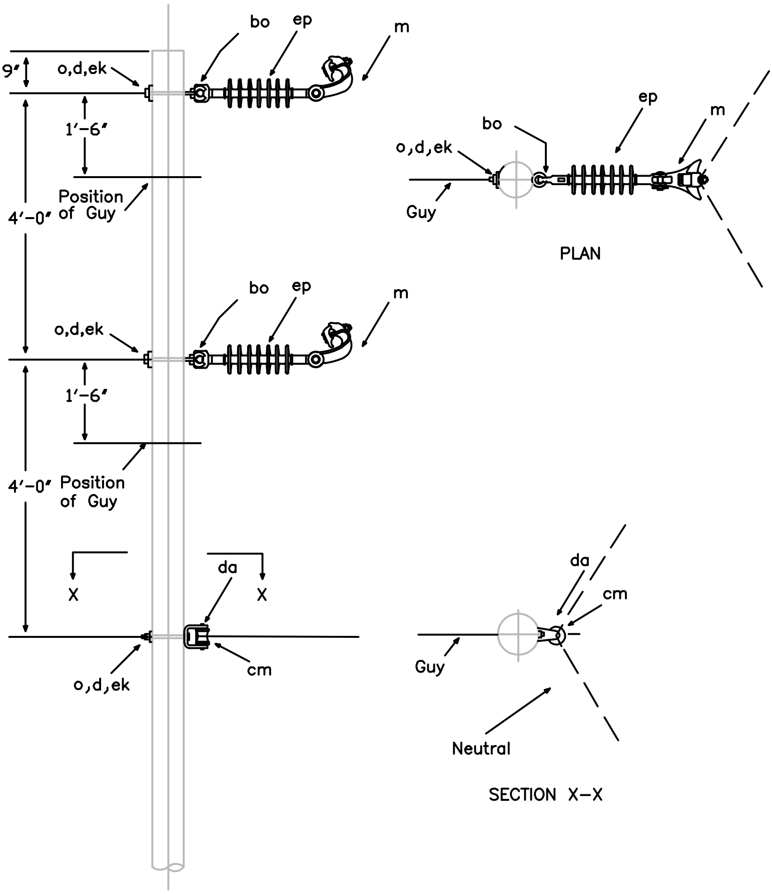
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt machine 3/4" x req'd length	ek	*	Locknuts, as required
d	5	Washer, square, 2 1/4" as req'd		3	Clamp for post insulator
cm	1	Insulator secondary spool		2	Armor rods
da	1	Clevis, secondary rigid		*	Conductor, alminum tie wire
ea1	2	Insulator, horizontal post		1	Wraplock spool tie

HEAVY CONSTRUCTION

4/0 AAAC – 741 AAAC
5° – 12°

12.5/7.2 kV PRIMARY
2 PHASE, NARROW PROFILE, POST
DOUBLE PRIMARY SUPPORT

MAY 2014 | CHELCO | B2PRC



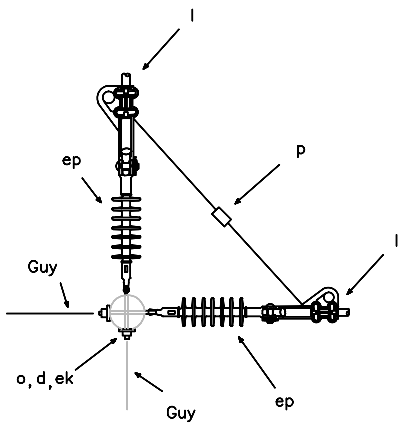
NOTE:
If future conversion is likely, allow space at top of pole for middle phase. Designate as B3A for this construction.

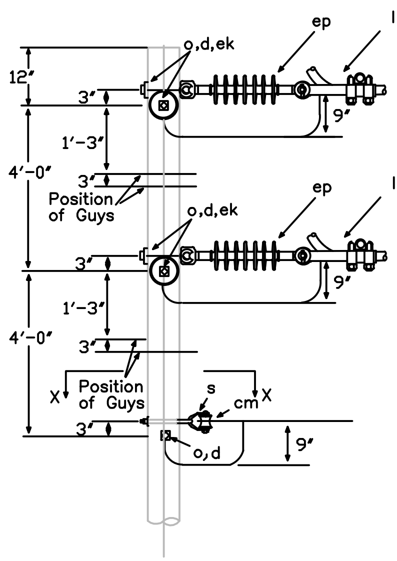
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 5/8" x req'd length	da	1	Clevis secondary rigid
d	3	Washer, square 2 1/4" as req'd	ek	*	Locknut, as required
m	2	Clamp, Susp 2 bolt #4–3/0	ep	2	Insulator, epoxilator 25kV
o	2	Bolt, oval eye, 5/8" x required length		2	Armor rods
bo	2	Shackle, anchor		1	Wraplock spool tie
cm	1	Insulator secondary spool			

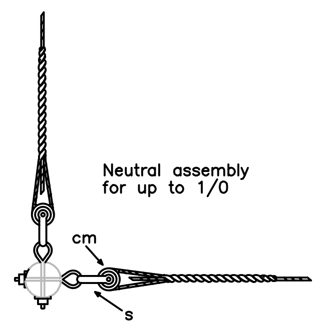
DESIGN LIMITS
Max. transverse load: 4000 lbs. per conductor
Angle: 20° to 60°

12.5/7.2 kV PRIMARY, 2 PHASE

DEC. 2013	CHELCO	B3







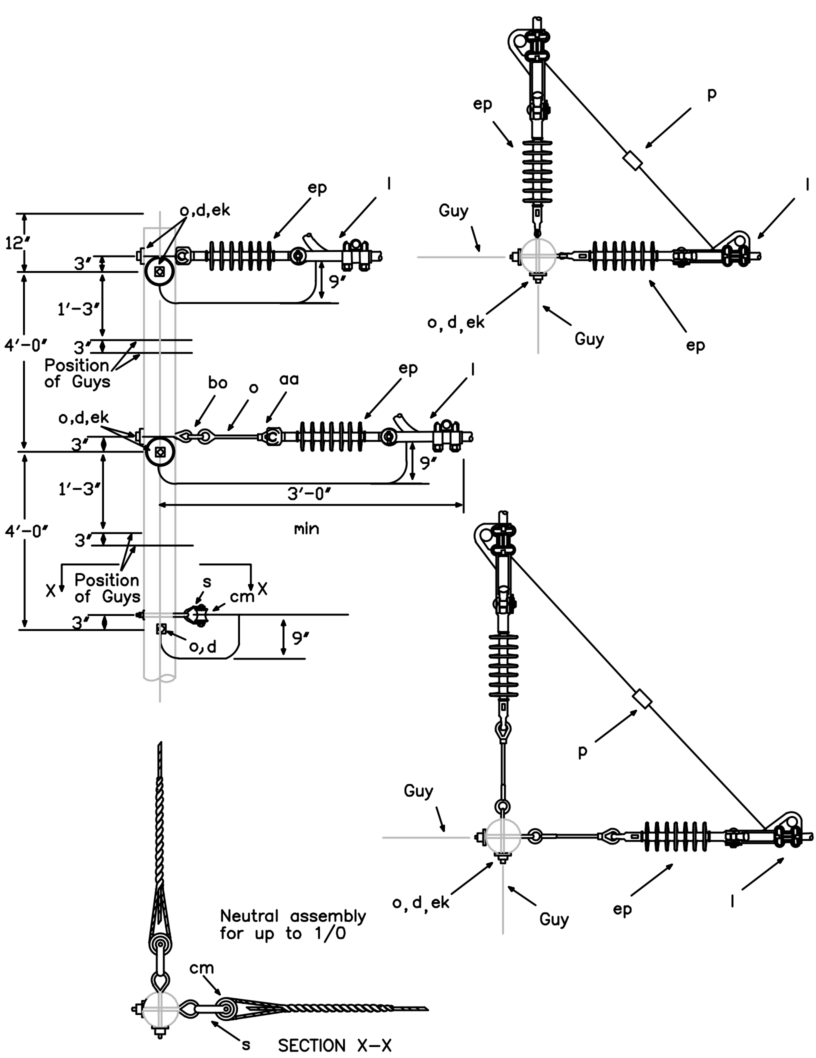
SECTION X–X

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	6	Washer, square 2 1/4" as req'd	cm	2	Insulator, secondary spool
l	4	Clamp, deadend shoe	ek	*	Locknuts, as required
o	6	Bolt, eye, 5/8" x required length	ep	4	Insulator, epoxilator 25kv
p	*	Conectors, as required		2	Deadend distribution grips
s	2	Clevis, secondary swinging			

Angle: 60° TO 90°

12.5/7.2 kV PRIMARY, 2 PHASE

JUNE 2013	CHELCO	B4



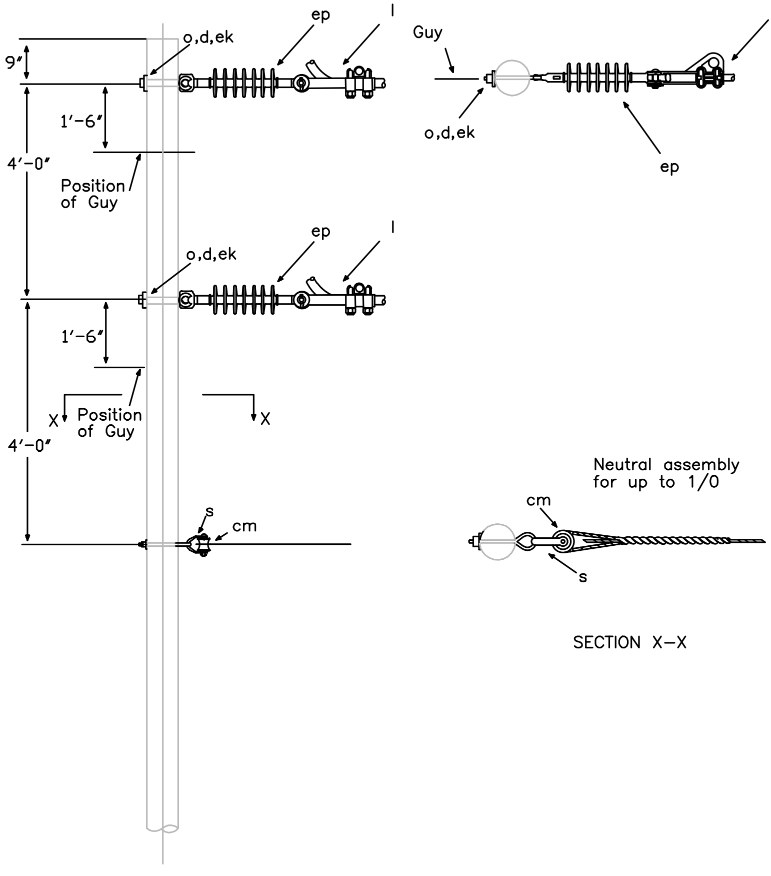
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	*	Washer, square 2 1/4" as req'd	bo	2	Shackle, anchor
l	4	Clamp, deadend shoe	cm	2	Insulator, secondary spool
o	8	Bolt, oval eye, 5/8" as required	ek	*	Locknuts, as required
p	*	Connectors, as required	ep	4	Insulator, epoxilator 25kV
s	2	Clevis, secondary swinging		2	Deadend distribution grip
aa	2	Nut, oval eye 5/8"			

DESIGN LIMITS

Angle: 60° – 90°

12.5/7.2 kV PRIMARY, 2 PHASE

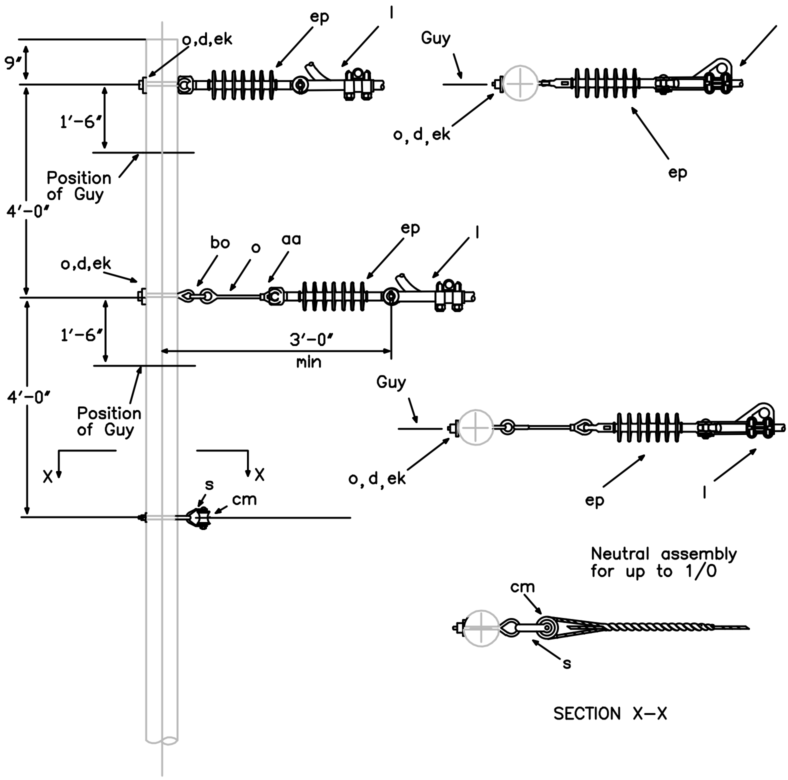
JUNE 2013	CHELCO	B4-1



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	3	Washer, square 2 1/4" as req'd	cm	1	Insulator, secondary spool
l	2	Clamp, deadend shoe	ek	*	Locknuts, as required
o	3	Bolt, eye, 5/8" x required length	ep	2	Insulator, epoxilator 25kv
p	*	Connectors, as required		1	Deadend distribution grip
s	1	Clevis, secondary swinging			

12.5/7.2 kV PRIMARY, 2 PHASE
DEADEND CONSTRUCTION

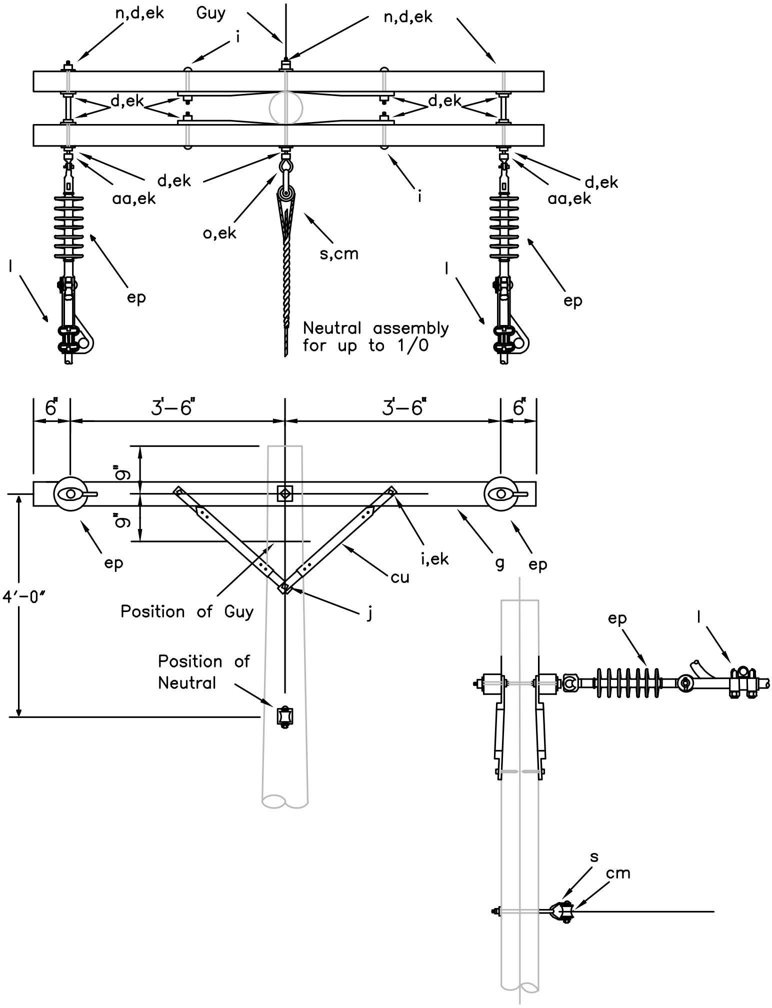
DEC. 2008	CHELCO	B5



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	*	Washer, square 2 1/4" as req'd	bo	1	Shackle, anchor
l	2	Clamp, deadend shoe	cm	1	Insulator, secondary spool
o	4	Bolt, oval eye, 5/8" as required	ek	*	Locknuts, as required
s	1	Clevis, secondary swinging	ep	2	Insulator, epoxilator 25kV
aa	1	Nut, oval eye 5/8"		1	Deadend distribution grip

12.5/7.2 kV PRIMARY
2 PHASE DEADEND CONSTRUCTION

DEC. 2008	CHELCO	B5-1

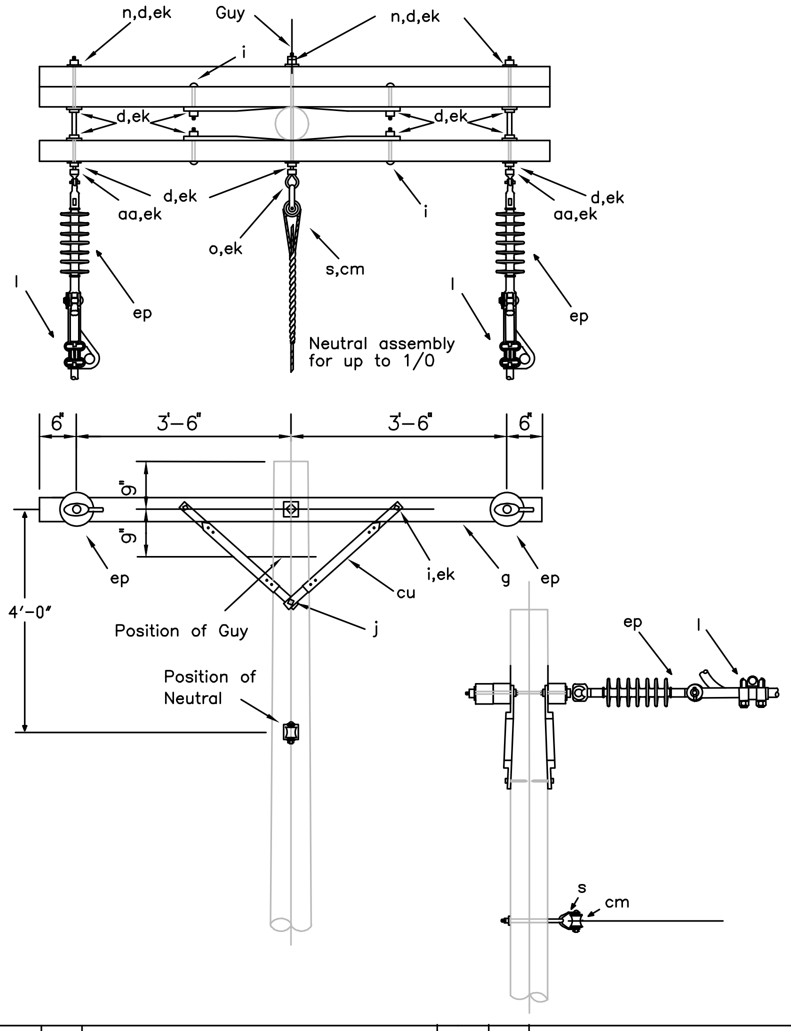


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	11	Washer, square 2 1/4", as req'd	s	1	Clevis, secondary swinging
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	aa	2	Nut, oval eye 5/8"
i	4	Bolt, carriage 3/8" x 4-1/2"	cm	1	Insulator, secondary spool
j	2	Lag, screw 1/2" x 4"	cu	4	Brace x/arm 28" wood
l	2	Clamp, deadend shoe	ek	*	Locknuts, as required
n	3	Bolt, double arming 5/8"x req'd length	ep	2	Insulator, epoxilator 25kv
o	1	Bolt, oval eye 5/8" x required length		1	Deadend distrubution grip

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
2 PHASE, CROSSARM CONSTRUCTION
DEADEND(SINGLE)

DEC. 2008	CHELCO	B7

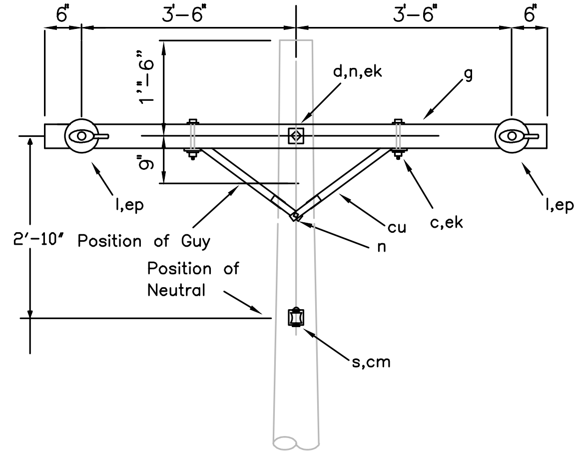


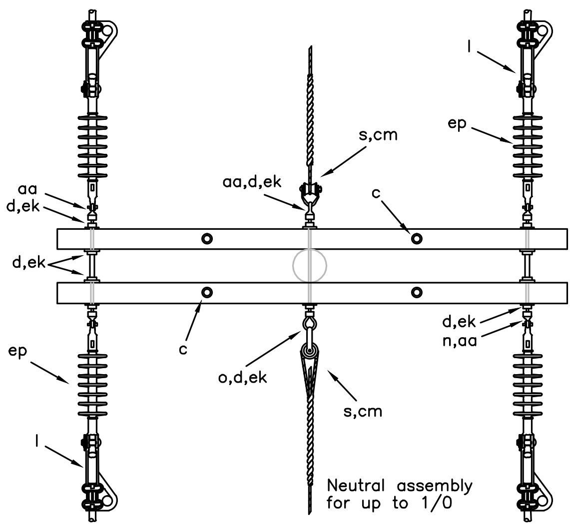
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	11	Washer, square 2 1/4", as req'd	s	1	Clevis, secondary swinging
g	3	Crossarm, 3 3/4" x 4 3/4" x 8'0"	aa	2	Nut, oval eye 5/8"
i	4	Bolt, carriage 3/8" x 4-1/2"	cm	1	Insulator, secondary spool
j	2	Lag, screw 1/2" x 4"	cu	4	Brace x/arm 28" wood
l	2	Clamp, deadend shoe	ek	*	Locknuts, as required
n	3	Bolt, double arming 5/8"x req'd length	ep	2	Insulator, epoxilator 25kv
o	1	Bolt, oval eye 5/8" x required length		1	Deadend distrubution grip

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
2 PHASE, CROSSARM CONSTRUCTION
DEADEND(SINGLE)

DEC. 2008	CHELCO	B7-1

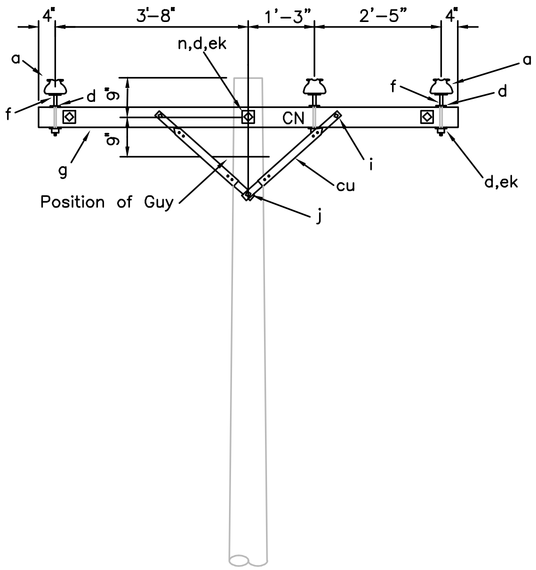


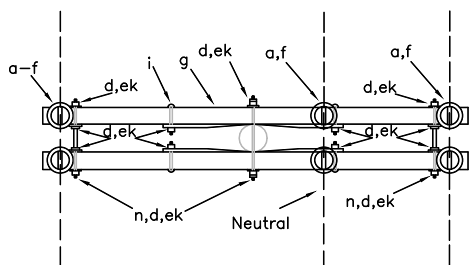


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	aa	5	Nut, oval eye 5/8"
d	15	Washer, square 2 1/4", as req'd	cm	2	Insulator, secondary spool
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	cu	2	Brace, heavy duty x/arm 60", wood
l	4	Clamp, deadend shoe	ek	*	Locknuts, as required
n	3	Bolt, dbl arming 5/8"x req'd length	ep	4	Insulator, epoxilator 25kv
o	1	Bolt, oval eye 5/8" x req'd		2	Deadend distrubution grip
s	2	Clevis, secondary swinging			

12.5/7.2 kV PRIMARY
2 PHASE DOUBLE
DEADEND ON CROSSARMS

DEC. 2008	CHELCO	B8





PLAN

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator, pin type 15kv	n	3	Bolt, dbl arming 5/8" x req'd length
d	10	Washer, square 2 1/4", as req'd	cu	4	Brace x/arm 28" wood
f	6	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"		3	Armor rods
i	4	Bolt, carriage 3/8" x 4-1/2"		*	Conductor, aluminum tie wire
j	2	Lag screw 1/2" x 4"		4	Letters, 2 'C', 2 'N' with 1" nails

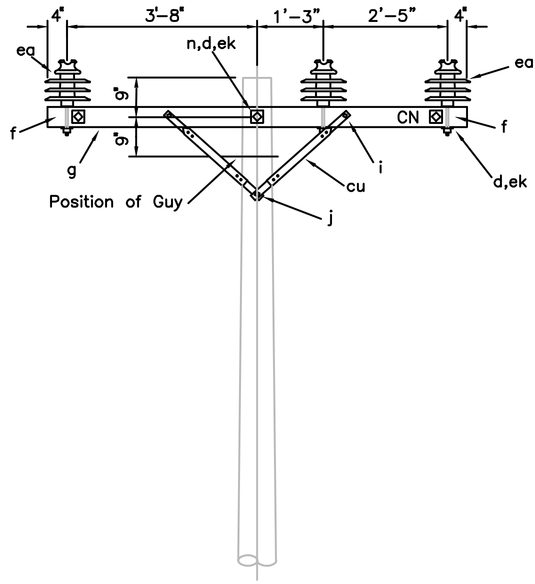
DESIGN LIMITS

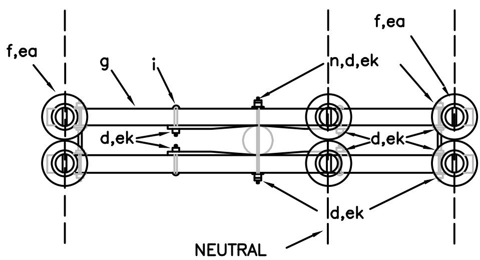
Max. transverse load:1000 lbs. per conductor

Max. line angle within load limits: 20°

12.5/7.2 kV PRIMARY, 2 PHASE
DOUBLE SUPPORT ON CROSSARMS

DEC. 2008	CHELCO	B9





PLAN

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	10	Washer, square 2 1/4", as req'd	cu	4	Brace x/arm 28" wood
f	6	Pin, steel crossarm	ea	6	Insulator, screw on polymer 25kV
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	4	Bolt, carriage 3/8" x 4-1/2"		3	Armor rods
j	2	Lag screw 1/2" x 4"		*	Conductor, aluminum tie wire
n	3	Bolt, dbl arming 5/8" x req'd length		4	Letters, 2 'C', 2 'N' with 1" nails

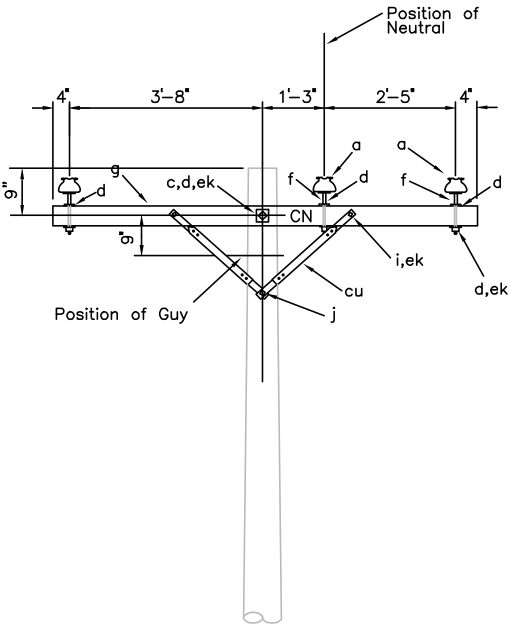
DESIGN LIMITS

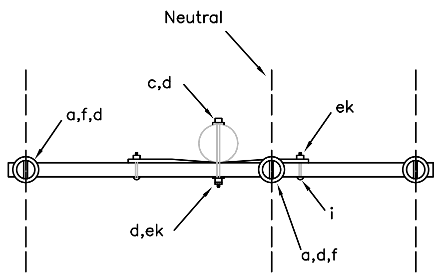
Max. transverse load:1000 lbs. per conductor

Max. line angle within load limits: 20°

25 kV PRIMARY,
2 PHASE
DOUBLE SUPPORT ON CROSSARMS

DEC. 2013	CHELCO	VB9





PLAN

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	3	Insulator pin type 15kv	j	1	Lag screw 1/2" x 4"
c	1	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 28" wood
d	*	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
f	3	Pin, steel crossarm		3	Wraplock top tie
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		4	Letters, 2 'C', 2 'N' with 1" nails
i	2	Bolt, carriage 3/8" x 4-1/2"			

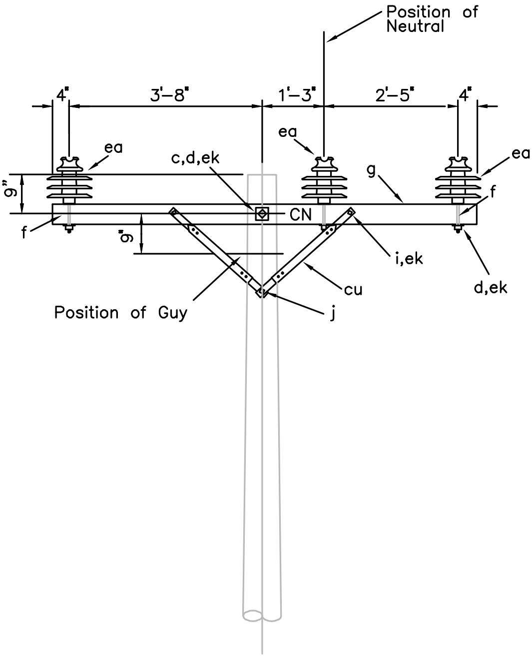
DESIGN LIMITS

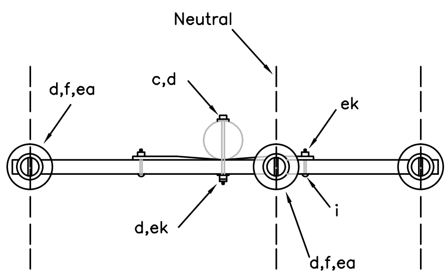
Max. transverse load: 500 lbs. per conductor

Max. line angle within load limits: 5°

12.5/7.2 kV, PRIMARY
2 PHASE CROSSARM CONSTRUCTION
DOUBLE LINE ARM

DEC. 2008	CHELCO	B9-1





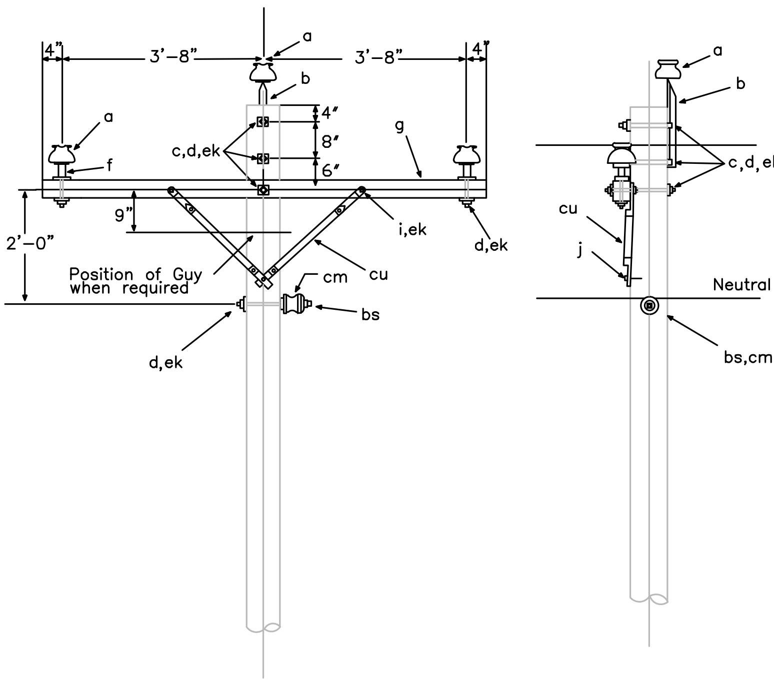
PLAN

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 28" wood
d	*	Washer, square 2 1/4", as req'd	ea	3	Insulator, screw on polymer 25kV
f	3	Pin, steel crossarm	ek	*	Locknuts, as required
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		2	Wraplock top tie
i	2	Bolt, carriage 3/8" x 4-1/2"		4	Letters, 2 'C', 2 'N' with 1" nails
j	1	Lag screw 1/2" x 4"			

DESIGN LIMITS
Max. transverse load: 500 lbs. per conductor.
Max line angle within load limits: 5°

25 kV PRIMARY,
2 PHASE CROSSARM CONSTRUCTION
SINGLE LINE ARM

DEC. 2008	CHELCO	VB9-1



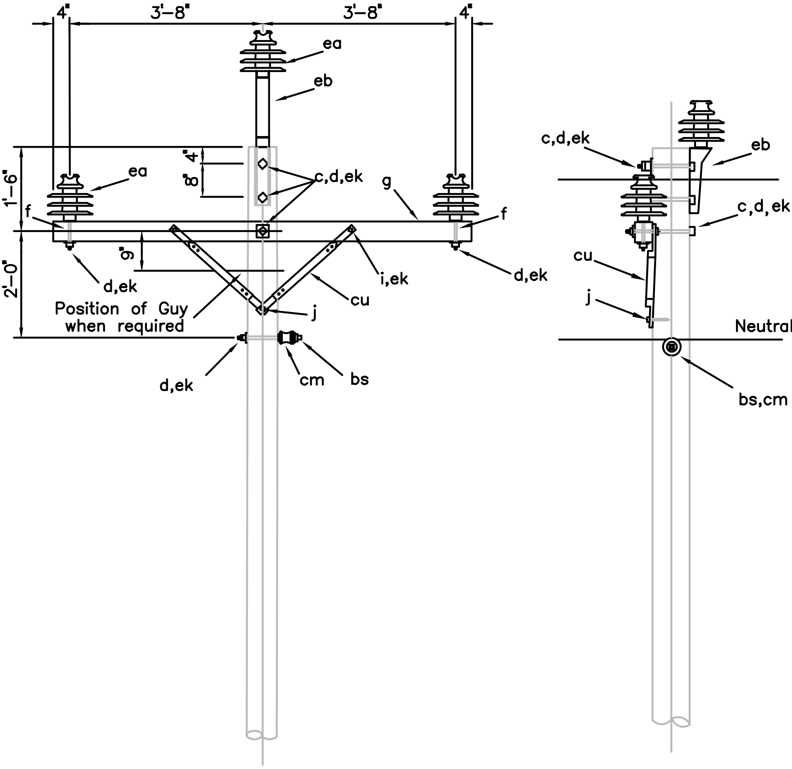
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	3	Insulator, pin type 15kV	j	1	Lag screw 1/2" x 4"
b	1	Pin, pole top 20" steel	bs	1	Bolt, single upset
c	3	Bolt, machine 5/8" x req'd length	cm	1	Insulator, secondary spool
d	6	Washer, square 2 1/4", as req'd	cu	2	Brace x/arm 28" wood
f	2	Pin, steel crossarm	ek	*	Locknuts, as required
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		1	Wraplock spool tie
i	2	Bolt, carriage 3/8" x 4–1/2"		3	Wraplock top tie

DESIGN LIMITS

Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 5°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT

DEC. 2008	CHELCO	C1



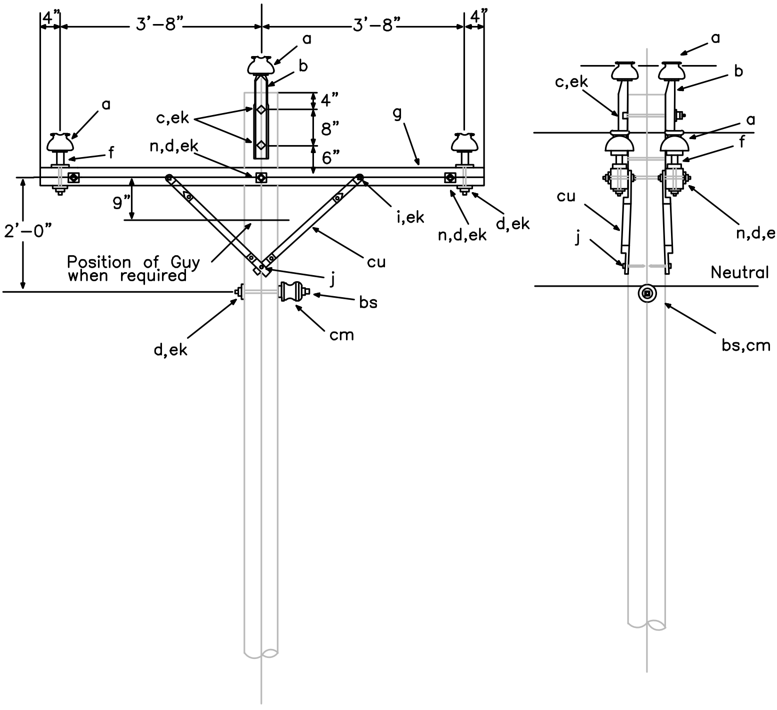
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	3	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 28" wood
d	11	Washer, square 2 1/4", as req'd	eb	1	Bracket, pole top for screw-on
f	2	Pin, steel crossarm	ea	3	Insulator, screw on polymer 25kV
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	2	Bolt, carriage 3/8" x 4-1/2"		3	Armor rods
j	1	Lag screw 1/2" x 4"		25	Conductor, aluminum tie wire
bs	1	Bolt, single upset		1	Wraplock spool tie
cm	1	Insulator, secondary spool			

DESIGN LIMITS

Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 5°

25 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
SINGLE PRIMARY SUPPORT

FEB 2014	CHELCO	VC1



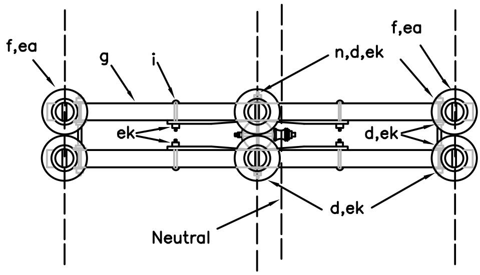
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator, pin type 15kV	n	3	Bolt, dbl arming 5/8"x req'd length
b	2	Pin, pole top 20" steel	bs	1	Bolt, single upset
c	2	Bolt, machine 5/8" x req'd length	cm	1	Insulator, secondary spool
d	11	Washer, square 2 1/4", as req'd	cu	4	Brace x/arm 28" wood
f	4	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"		3	Armor rods
i	4	Bolt, carriage 3/8" x 4-1/2"		30	Conductor, aluminum tie wire
j	2	Lag screw 1/2" x 4"		1	Wraplock spool tie

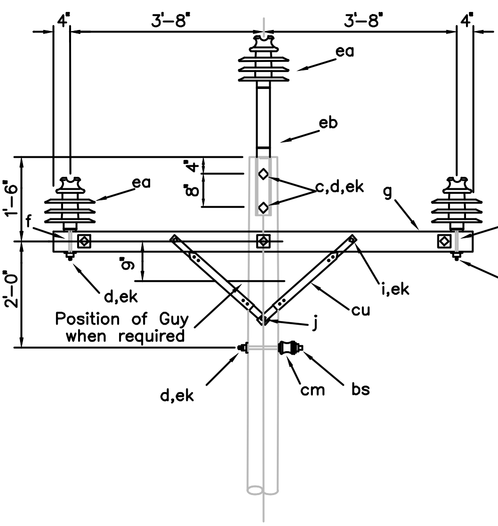
DESIGN LIMITS

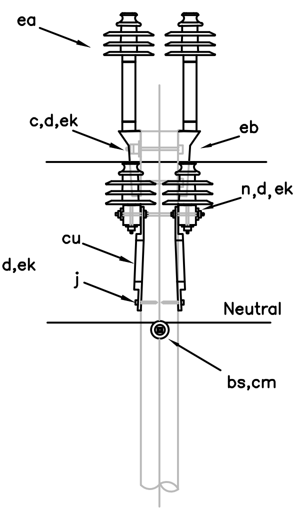
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2008	CHELCO	C1-1







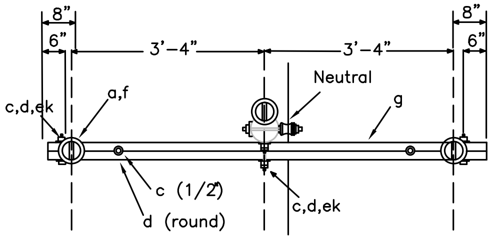
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length	cm	1	Insulator, secondary spool
d	16	Washer, square 2 1/4", as req'd	cu	4	Brace x/arm 28" wood
f	4	Pin, steel crossarm	ea	6	Insulator screw on polymer 25kV
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	eb	2	Bracket, pole top for screw on
i	4	Bolt, carriage 3/8" x 4-1/2"	ek	*	Locknuts, as required
j	2	Lag screw 1/2" x 4"		3	Armor rods
n	3	Bolt, dbl arming 5/8" x req'd length		25	Conductor, aluminum tie wire
bs	1	Bolt, single upset			

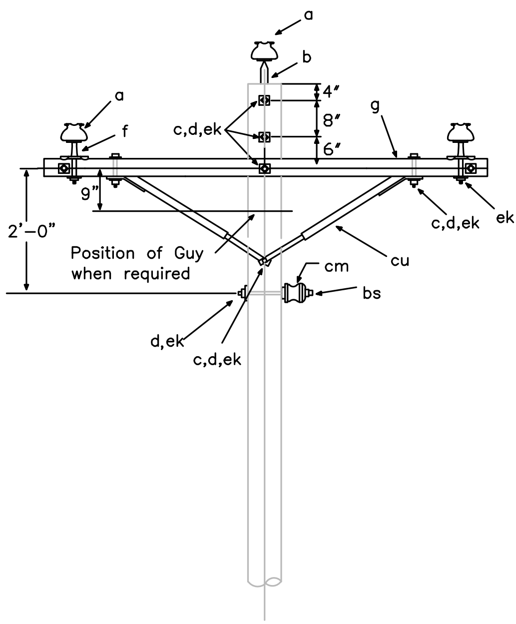
DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

25 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2008	CHELCO	VC1-1





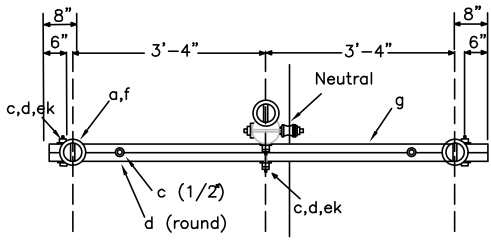
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	3	Insulator, pin type 15kV	g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"
b	1	Pin, pole top 20" steel	bs	1	Bolt, single upset
c	6	Bolt, machine 5/8" x req'd length	cm	1	Insulator, secondary spool
c	2	Bolt, machine 1/2" x req'd length	cu	2	Heavy Duty Brace x/arm 60" wood
d	10	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
d	2	Washer, rd 1 3/8"		1	Wraplock spool tie
f	2	Pin, crossarm saddle		3	Wraplock top tie

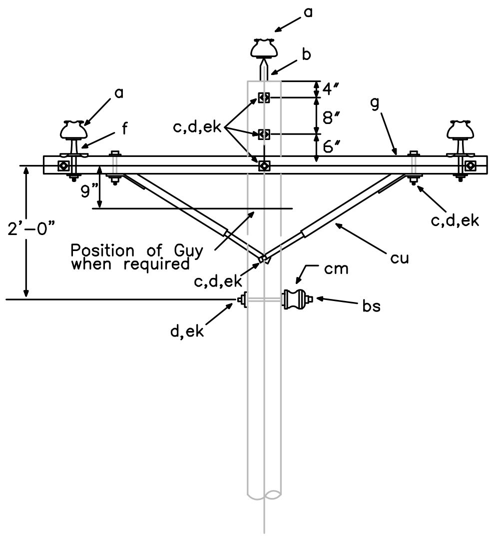
DESIGN LIMITS

Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 2°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

DEC. 2008	CHELCO	C1-2





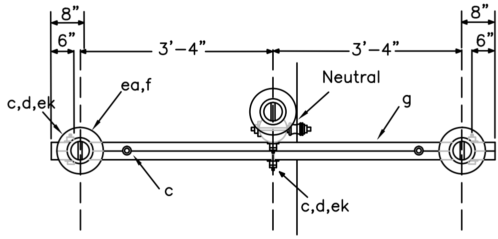
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	3	Insulator, pin type 15kV	g	1	Crossarm, 8'0" fiberglass
b	1	Pin, pole top 20" steel	bs	1	Bolt, single upset
c	6	Bolt, machine 5/8" x req'd length	cm	1	Insulator, secondary spool
c	2	Bolt, machine 1/2" x req'd length	cu	2	Heavy Duty Brace x/arm 60" wood
d	10	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
d	2	Washer, rd 1 3/8"		1	Wraplock spool tie
f	2	Pin, crossarm saddle		3	Wraplock top tie

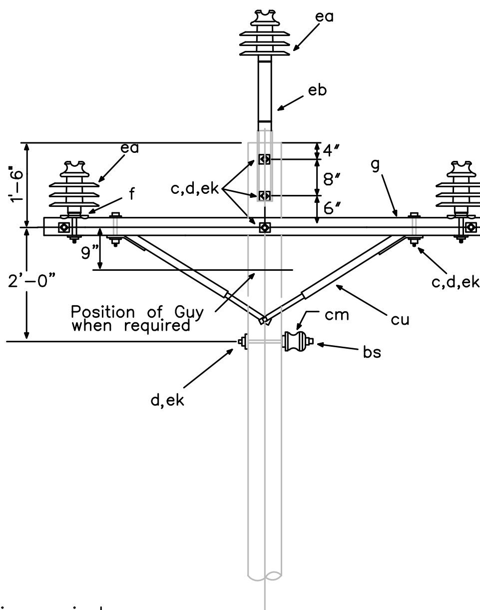
DESIGN LIMITS

Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 2°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

DEC. 2008	CHELCO	C1-2F

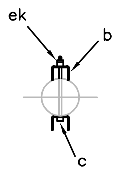




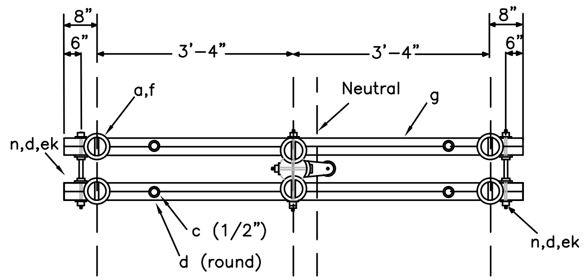
Note:
This construction required for all conductors having a breaking strength of more than 4,500 pounds

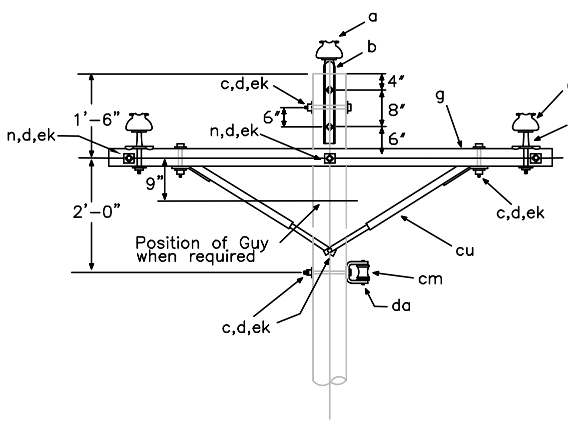
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 60" wood
d	10	Washer, square 2 1/4", as req'd	ea	3	Insulator screw on polymer 25kV
f	2	Pin, crossarm saddle	eb	1	Bracket, pole top for screw–on
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	2	Bolt, carriage 3/8" x 4 1/2"		3	Armor rods
bs	1	Bolt, single upset		25	Conductor, aluminum tie wire
cm	1	Insulator, secondary spool		1	Wraplock spool tie

DESIGN PARAMETERS: MAXIMUM LINE ANGLES: 5°–Small Conductors 2°–Larger than #1/0	25 kV PRIMARY 3 PHASE, CROSSARM CONSTRUCTION SINGLE PRIMARY SUPPORT		
	DEC. 2008	CHELCO	VC1–2



POLE TOP PIN ASSEMBLY





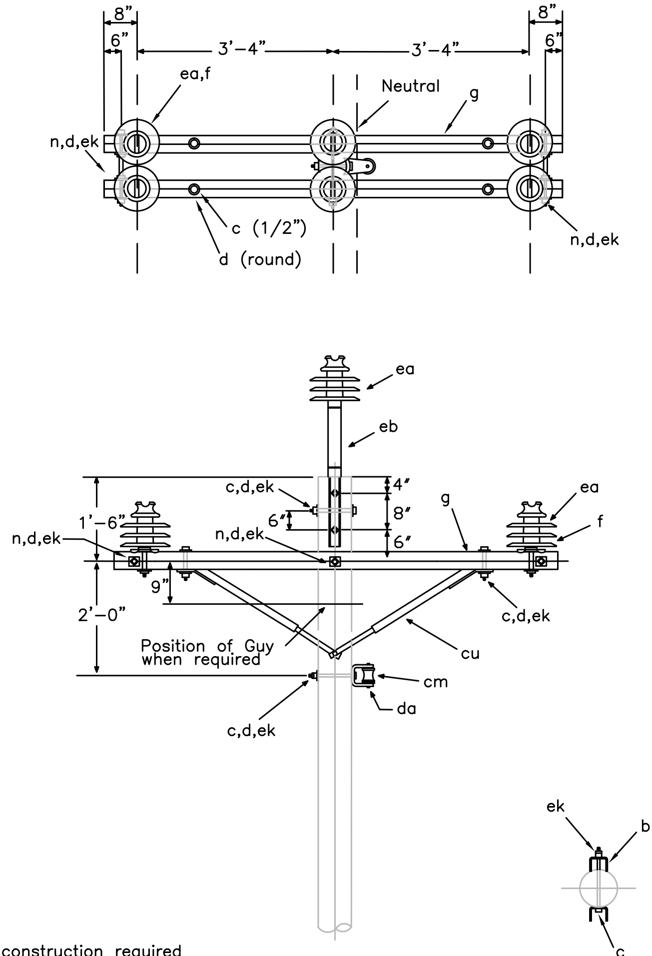
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator, pin type 15kV	n	3	Bolt, dbl arming 5/8" x req'd length
b	2	Pin, pole top 20" steel	cm	1	Insulator, secondary spool
c	4	Bolt, machine 5/8" x req'd length	cu	4	Heavy Duty Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	da	1	Clevis, secondary rigid
d	13	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
d	4	Washer, rd 1 3/8"		3	Armor rods
f	4	Pin, crossarm saddle		30	Conductor, aluminum tie wire
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"		1	Wraplock spool tie

DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT(LARGE CONDUCTORS)

DEC. 2008	CHELCO	C1–3



Note:
This construction required for all conductors having a breaking strength of more than 4,500 pounds

POLE TOP PIN ASSEMBLY

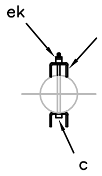
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
eb	2	Bracket, pole top for screw-on	cm	1	Insulator, secondary spool
c	4	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	da	1	Clevis, secondary rigid
d	13	Washer, square 2 1/4", as req'd	ea	6	Insulator, screw on polymer 25kV
d	4	Washer, rd 1 3/8"	ek	*	Locknuts, as required
f	4	Pin, crossarm saddle		3	Armor rods
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"		30	Conductor, aluminum tie wire
n	4	Bolt, dbl arming 5/8" x req'd length		1	Wraplock spool tie

DESIGN LIMITS

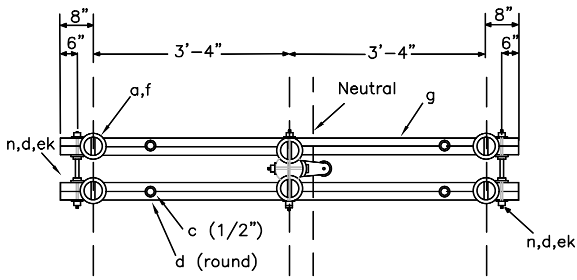
Max. line angle within load limits: 5°

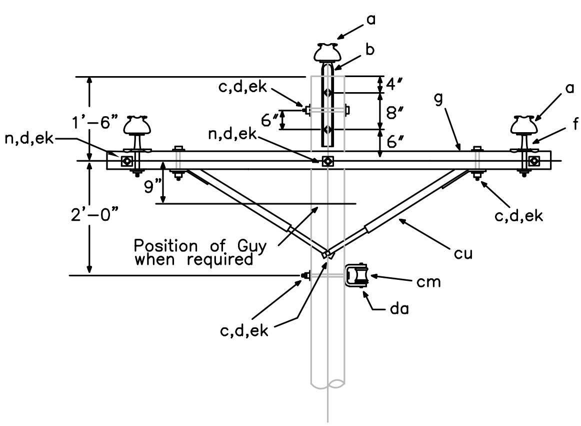
25kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT(LARGE CONDUCTORS)

DEC. 2008	CHELCO	VC1-3



POLE TOP PIN ASSEMBLY





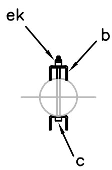
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator, pin type 15kV	n	3	Bolt, dbl arming 5/8" x req'd length
b	2	Pin, pole top 20" steel	cm	1	Insulator, secondary spool
c	4	Bolt, machine 5/8" x req'd length	cu	4	Heavy Duty Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	da	1	Clevis, secondary rigid
d	13	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
d	4	Washer, rd 1 3/8"		30	Conductor, aluminum tie wire
f	4	Pin, crossarm saddle		1	Wraplock spool tie
g	2	Crossarm, 8'0" fiberglass			

DESIGN LIMITS

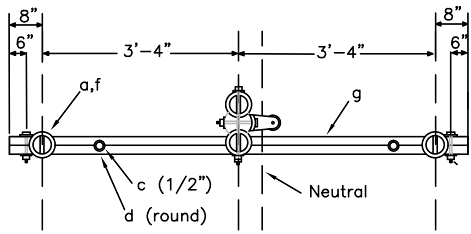
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

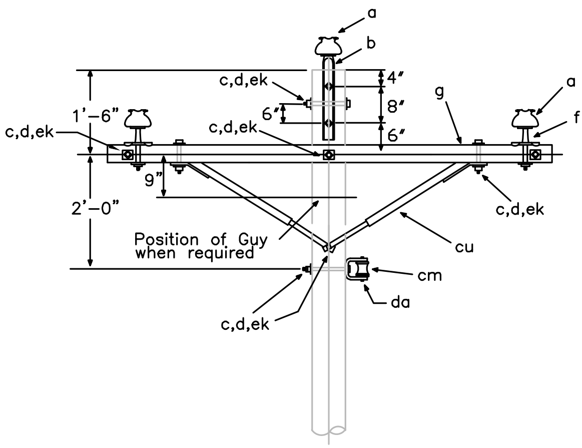
12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT(LARGE CONDUCTORS)

DEC. 2008	CHELCO	C1-3F



POLE TOP PIN ASSEMBLY





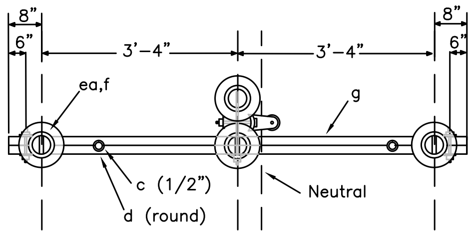
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator, pin type 15kV	cm	1	Insulator, secondary spool
b	2	Pin, pole top 20" steel	cu	2	Heavy Duty Brace x/arm 60" wood
c	8	Bolt, machine 5/8" x req'd length	da	1	Clevis, secondary rigid
c	2	Bolt, machine 1/2" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4", as req'd		1	Armor rods
d	2	Washer, rd 1 3/8"		1	Wraplock spool tie
f	2	Pin, crossarm saddle		2	Wraplock top tie
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		10	Conductor, aluminum tie wire

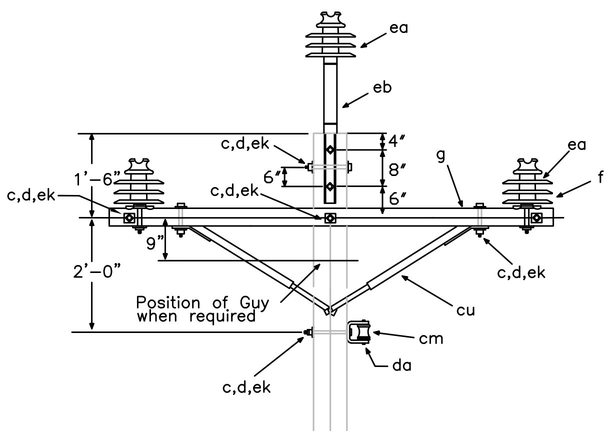
DESIGN LIMITS

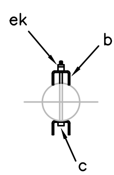
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

DEC. 2008	CHELCO	C1–4







Note:
This construction required for all conductors having a breaking strength of more than 4,500 pounds

POLE TOP PIN ASSEMBLY

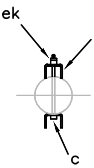
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	8	Bolt, machine 5/8" x req'd length	ea	4	Insulator, screw on polymer 25kV
d	10	Washer, square 2 1/4", as req'd	eb	2	Bracket, pole top for screw-on
f	2	Pin, crossarm saddle	ek	*	Locknuts, as required
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"		1	Armor rods
cm	1	Insulator, secondary spool		1	Wraplock spool tie
cu	2	Brace x/arm 60" wood		2	Wraplock top tie
da	1	Clevis, secondary rigid			

DESIGN LIMITS

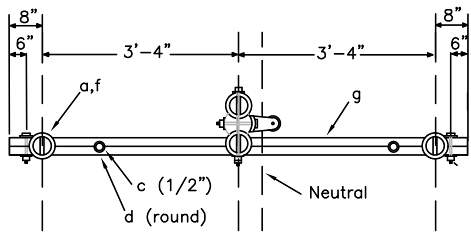
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

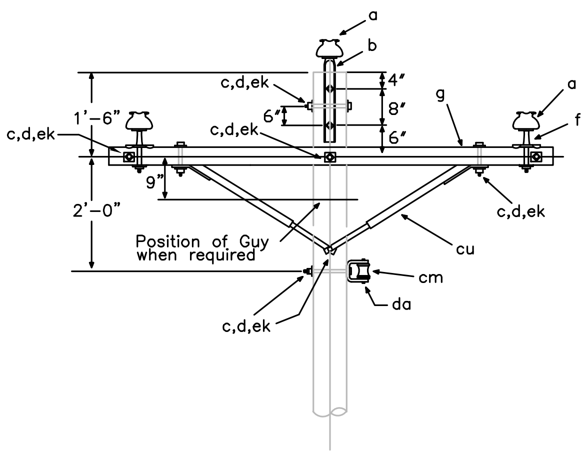
25 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

DEC. 2008	CHELCO	VC1-4



POLE TOP PIN ASSEMBLY





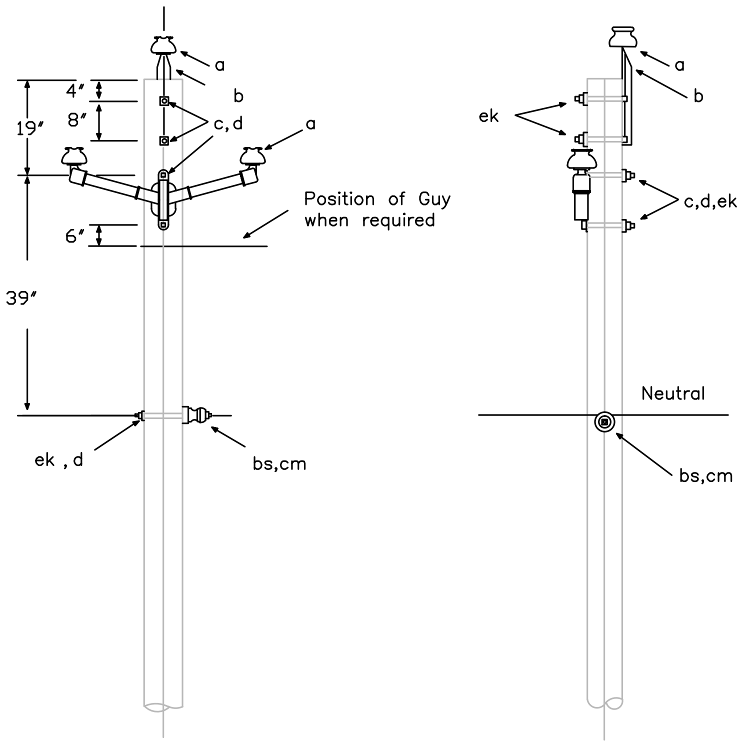
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator, pin type 15kV	cm	1	Insulator, secondary spool
b	2	Pin, pole top 20" steel	cu	2	Heavy Duty Brace x/arm 60" wood
c	8	Bolt, machine 5/8" x req'd length	da	1	Clevis, secondary rigid
c	2	Bolt, machine 1/2" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4", as req'd		1	Armor rods
d	2	Washer, rd 1 3/8"		10	Conductor, aluminum wire tie
f	2	Pin, crossarm saddle		1	Wraplock spool tie
g	1	Crossarm, 8'0" fiberglass		2	Wraplock top tie

DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
(LARGE CONDUCTORS)

DEC. 2008	CHELCO	C1–4F

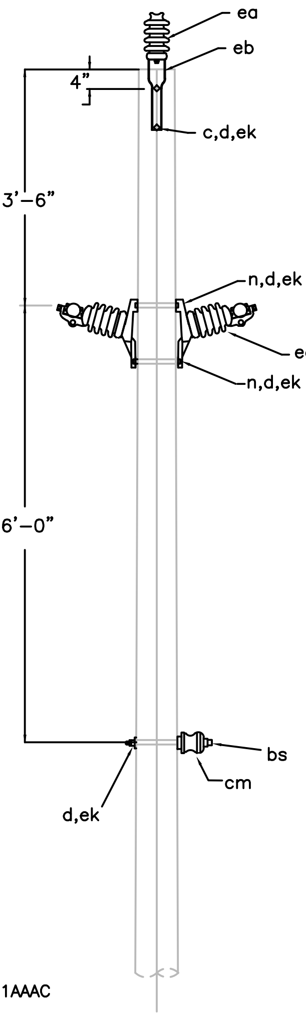


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	3	Insulator, pin type 15kv	cm	1	Insulator, secondary spool
b	1	Pin, pole top 20" steel	ek	4	Locknuts, as required
c	4	Bolt, machine 5/8" x req'd length		1	Wraplock spool tie
d	5	Washer, square 2 1/4", as req'd		3	Wraplock top tie
bs	1	Bolt, single upset		1	Bracket Insulator BIPIN "Bull Horn"

DESIGN LIMITS
Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 5°

12.5/7.2 kV PRIMARY,
3 PHASE SINGLE PRIMARY SUPPORT

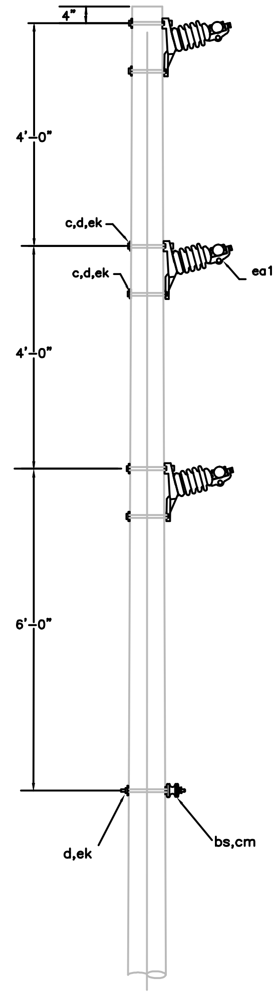
JUNE 2011	CHELCO	C1NP



NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt machine 5/8" x req'd length	eb	1	Bracket, pole top for screw-on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
n	2	Bolt, dbl arming x req'd length		2	Clamp for post insulator
bs	1	Bolt, single upset		2	Armor rods
cm	1	Insulator, secondary spool		*	Conductor, alminum tie wire
ea	1	Insulator, post screw on type		1	Wraplock spool tie
ea1	2	Insulator, horizontal post		1	Wraplock top tie

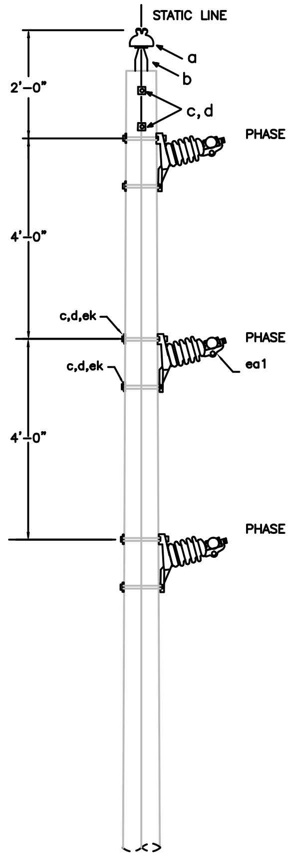
UP TO 1/0AAAC UP TO 5°	12.5/7.2 kV PRIMARY 3 PHASE DOUBLE PRIMARY SUPPORT		
	April 2019	CHELCO	C1-P



NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt machine 5/8" x req'd length	ek	*	Locknuts, as required
d	7	Washer, square, 2 1/4" as req'd		3	Clamp for post insulator
cm	1	Insulator, secondary spool		3	Armor rods
bs	1	Bolt, single upset		1	Wraplock spool tie
ea1	3	Insulator, horizontal post			

DESIGN LIMITS Max. transverse load: 1000 lbs. per conductor Max. line angle within load limits: 5°	12.5/7.2 kV PRIMARY 3 PHASE NARROW PROFILE CONSTRUCTION		
	FEB 2014	CHELCO	C1PA



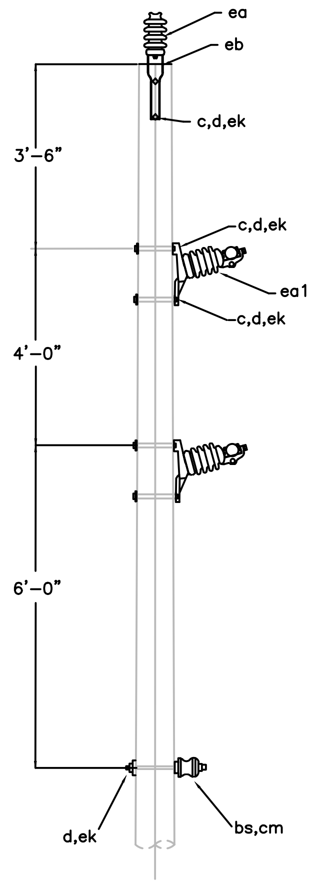
NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

NOT TO SCALE

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kv	ek	*	Locknuts, as required
b	1	Pin, pole top 20" steel		3	Clamp for post insulator
c	8	Bolt machine 3/4" x req'd length		3	Armor rods
d	8	Washer, square, 2 1/4" as req'd			
ea1	3	Insulator, horizontal post			

DESIGN LIMITS Max. transverse load: 1000 lbs. per conductor Max. line angle within load limits: 5°	12.5/7.2 kV PRIMARY 3 PHASE NARROW PROFILE CONSTRUCTION

FEB 2014	CHELCO	C1PA-EGLIN



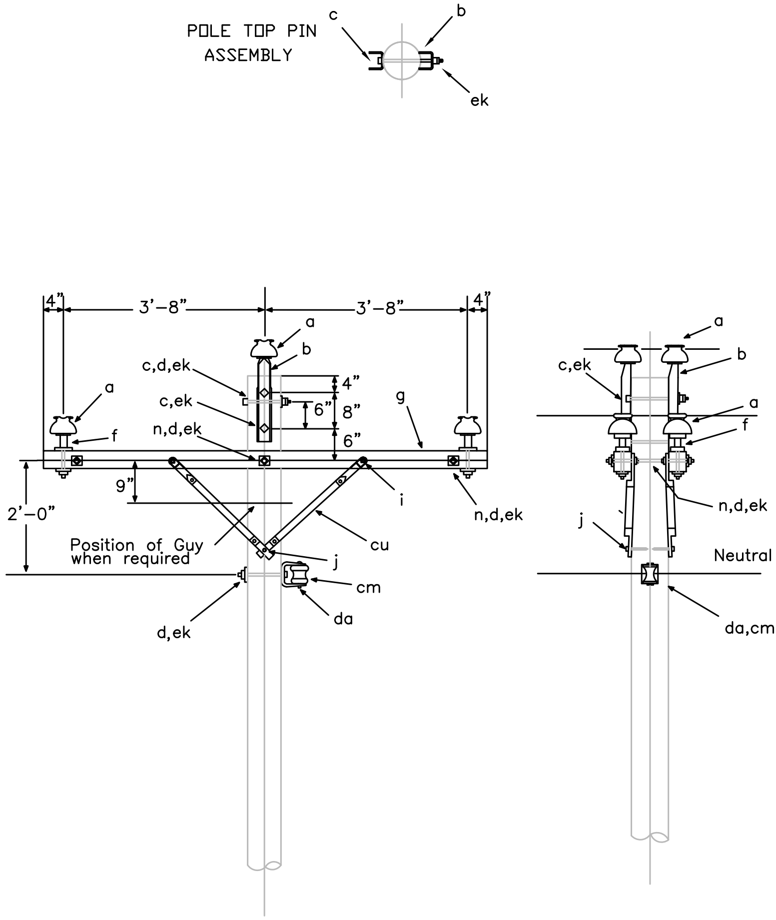
NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt machine 5/8" x req'd length	eb	1	Bracket, pole top for screw–on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
bs	1	Bolt, single upset		2	Clamp for post insulator
cm	1	Insulator, secondary spool		3	Armor rods
ea	1	Insulator, post screw on type		*	Conductor, alminum tie wire
ea1	2	Insulator, horizontal post		1	Wraplock spool tie

UP TO 1/0AAAC
UP TO 5°

12.5/7.2 kV PRIMARY
3 PHASE NARROW PROFILE CONSTRUCTION

April 2019 | CHELCO | C1PB



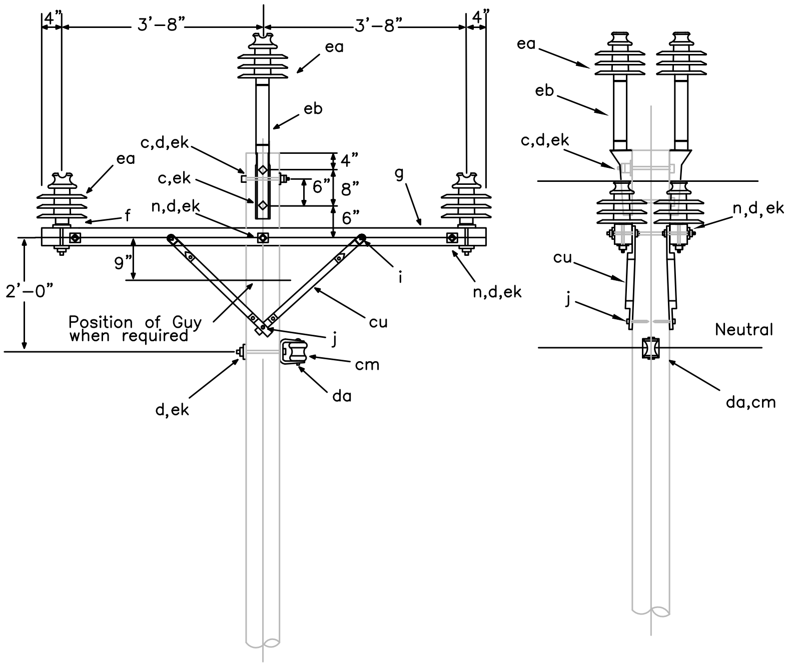
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator, pin type 15kV	n	3	Bolt, dbl arming 5/8" x req'd length
b	2	Pin, pole top 20" steel	cm	1	Insulator, secondary spool
c	4	Bolt, machine 5/8" x req'd length	cu	4	Brace x/arm 28" wood
d	13	Washer, square 2 1/4", as req'd	da	1	Clevis, secondary rigid
f	4	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"		3	Armor rods
i	4	Bolt, carriage 3/8" x 4–1/2"		30	Conductor, aluminum tie wire
j	2	Lag screw 1/2" x 4"		1	Wraplock spool tie

DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 20°

12.5\7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2008	CHELCO	C2



Note:
This construction required for all conductors having a breaking strength of more than 4,500 pounds

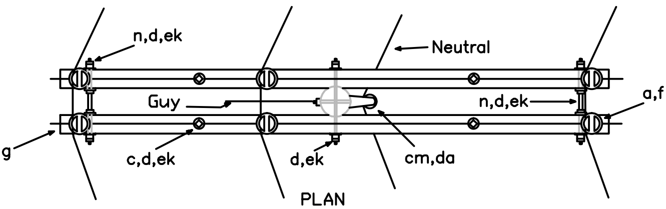
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	cu	4	Brace x/arm 28" wood
d	13	Washer, square 2 1/4", as req'd	da	1	Clevis, secondary rigid
f	4	Pin, steel crossarm	ea	6	Insulatar, screw on polymer 25kV
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	eb	2	Bracket, pole top for screw on
i	4	Bolt, carriage 3/8" x 4–1/2"	ek	*	Locknuts, as required
j	2	Lag screw 1/2" x 4"		3	Armor rods
n	3	Bolt, dbl arming 5/8" x req'd length		30	Conductor, aluminum tie wire
cm	1	Insulator, secondary spool		1	Wraplock top tie

DESIGN LIMITS

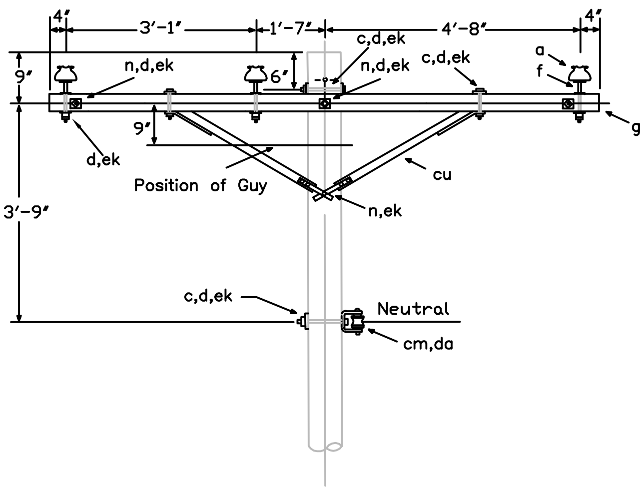
Max. transverse load: 500 lbs. per conductor
Max. line angle within load limits: 5° to 20°

25 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2008	CHELCO	VC2



PLAN



Notes: Center phase wire or neutral wire may be located on the opposite side of the pole where nesessary to avoid crossing of wires in midspan.

When the transverse load is more than 1000 pounds per conductor install a 2 1/4" x 2 1/4" x 3/16" washer on the top of the crossarm for each pin. If the load is more than 1500 pounds, use the construction shown on C2–2.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator pin type 15kV	cm	1	Insulator, secondary spool
c	3	Bolt, machine 5/8" x req'd length	cu	4	Heavy Duty Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	da	1	Clevis, secondary rigid
d	13	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
f	6	Pin, steel crossarm		3	Armor rods
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		30	Conductor, aluminum tie wire
i	4	Bolt, carriage 3/8" x 4–1/2"		1	Wraplock spool tie
n	3	Bolt, dbl arming 5/8" x req'd length			

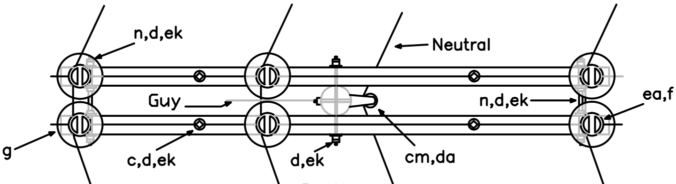
DESIGN LIMITS

Max. transverse load: 1500 lbs. per conductor

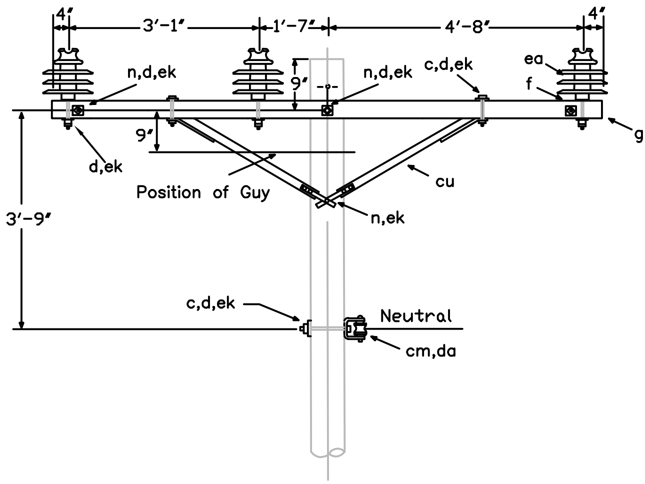
Max. line angle within load limits: 20°

12.5/7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2013	CHELCO	C2–1



PLAN



Notes: Center phase wire or neutral wire may be located on the opposite side of the pole where nesessary to avoid crossing of wires in midspan.

Neutral may also be mounted on the crossarm.

When the transverse load is more than 750 pounds per pin, construction similar to VC2-2. should be used.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	da	1	Clevis, secondary rigid
d	*	Washer, square 2 1/4", as req'd	ea	6	Insulator, screw on polymer 25kV
f	6	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		3	Armor rods
i	4	Bolt, carriage 3/8" x 4-1/2"		*	Conductor, aluminum tie wire
n	6	Bolt, dbl arming 5/8" x req'd length		*	Wraplock spool tie
cm	1	Insulator, secondary spool			

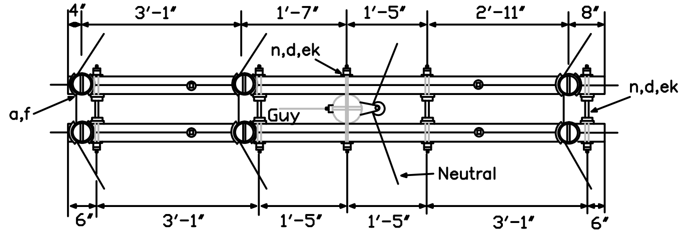
DESIGN LIMITS

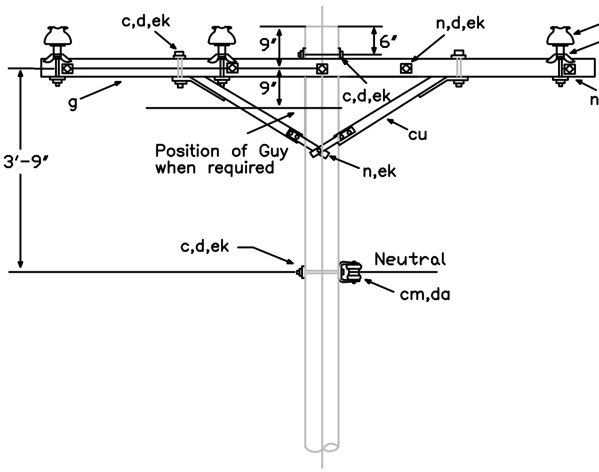
Max. transverse load: 750 lbs. per pin

Max. line angle within load limits: 5° to 20°

25 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

DEC. 2013	CHELCO	VC2-1





Notes:

1. Side groove of insulator must always be larger than the overall diameter of conductor including armor rods when required.
2. Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.
3. This construction required for all conductors having a breaking strenght of more than 4,500 pounds.
4. If transverse load exceeds 2000 pounds per conductor, use vertical construction.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator pin type 15kV	cm	1	Insulator, secondary spool
c	3	Bolt, machine 5/8" x req'd length	cu	4	Heavy Duty Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	da	1	Clevis, secondary rigid
d	20	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
f	6	Pin, crossarm saddle		3	Armor rods
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		30	Conductor, aluminum tie wire
n	5	Bolt, dbl arming 5/8" x req'd length		1	Wraplock spool tie

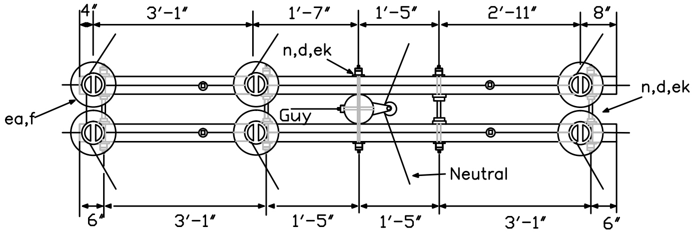
DESIGN LIMITS

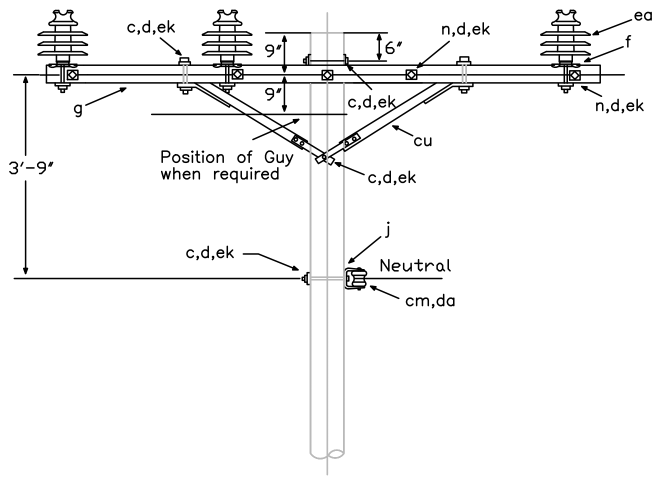
Max. transverse load: 2000 lbs. per conductor

Max. line angle within load limits: 20°

12.5/7.2 kV PRIMARY, 3 PHASE
CROSSARM CONSTR. DOUBLE PRIMARY
SUPPORT (LARGE CONDUCTORS)

DEC. 2013	CHELCO	C2-2



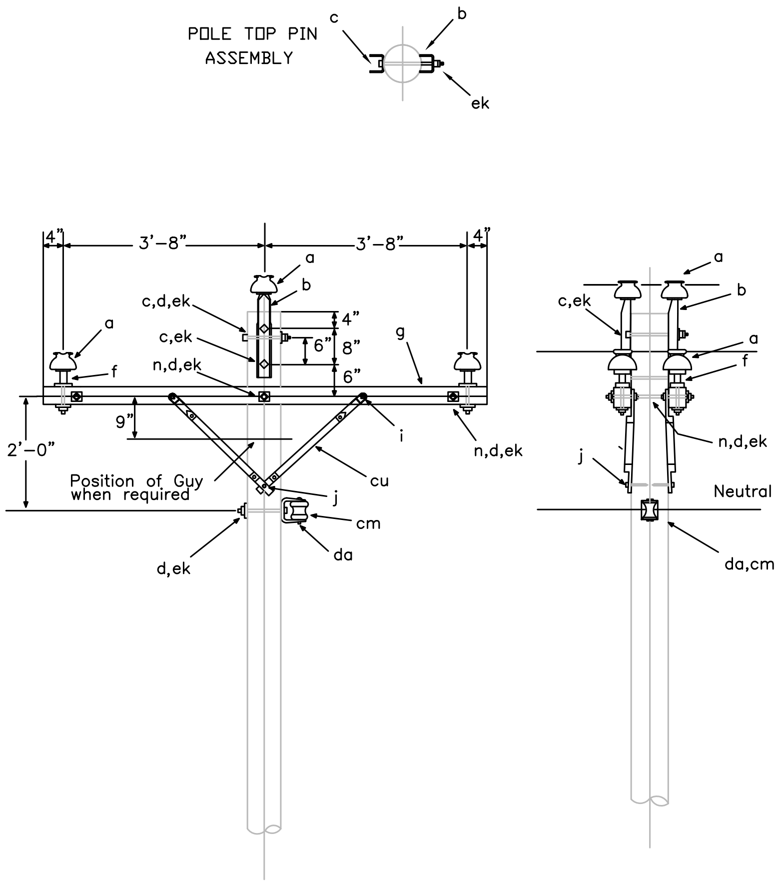


Notes:

1. Side groove of insulator must always be larger than the overall diameter of conductor including armor rods when required.
2. Center phase wire or neutral wire may be located on the opposite side of the pole where necessary to avoid crossing of wires in midspan.
3. This construction required for all conductors having a breaking strenght of more than 4,500 pounds.
4. If transverse load exceeds 2000 pounds per conductor, use vertical construction.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length	cu	2	Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	da	1	Clevis, secondary rigid
d	*	Washer, square 2 1/4", as req'd	ea	6	Insulator, screw on polymer, 25kV
f	6	Pin, crossarm saddle	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		3	Armor rods
j	2	Lag screw 1/2" x 4"		*	Conductor, aluminum tie wire
n	6	Bolt, dbl arming 5/8" x req'd length		*	Wraplock top tie
cm	1	Insulator, secondary spool			

DESIGN LIMITS Max. transverse load: 750 lbs. pin Max. line angle within load limits: 5° to 20°	12.5/7.2 kV PRIMARY, 3 PHASE CROSSARM CONSTR. DOUBLE PRIMARY SUPPORT (LARGE CONDUCTORS)		
	DEC. 2008	CHELCO	VC2-2



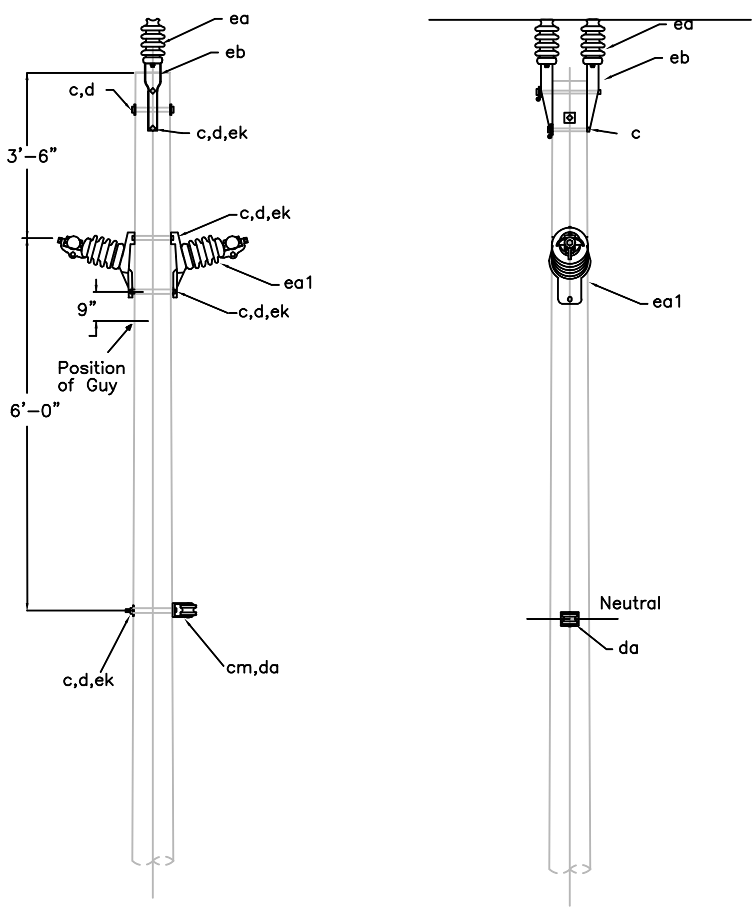
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	6	Insulator, pin type 15kV	n	3	Bolt, dbl arming 5/8" x req'd length
b	2	Pin, pole top 20" steel	cm	1	Insulator, secondary spool
c	4	Bolt, machine 5/8" x req'd length	cu	4	Brace x/arm 28" wood
d	13	Washer, square 2 1/4", as req'd	da	1	Clevis, secondary rigid
f	4	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Fiberglass Crossarm, 8'0"		4	Armor rods
i	4	Bolt, carriage 3/8" x 4-1/2"		30	Conductor, aluminum tie wire
j	2	Lag screw 1/2" x 4"		1	Wraplock top tie

DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 20°

12.5\7.2 kV
3 PHASE CROSSARM CONSTRUCTION
DOUBLE PRIMARY SUPPORT

JUNE 2011	CHELCO	C2F

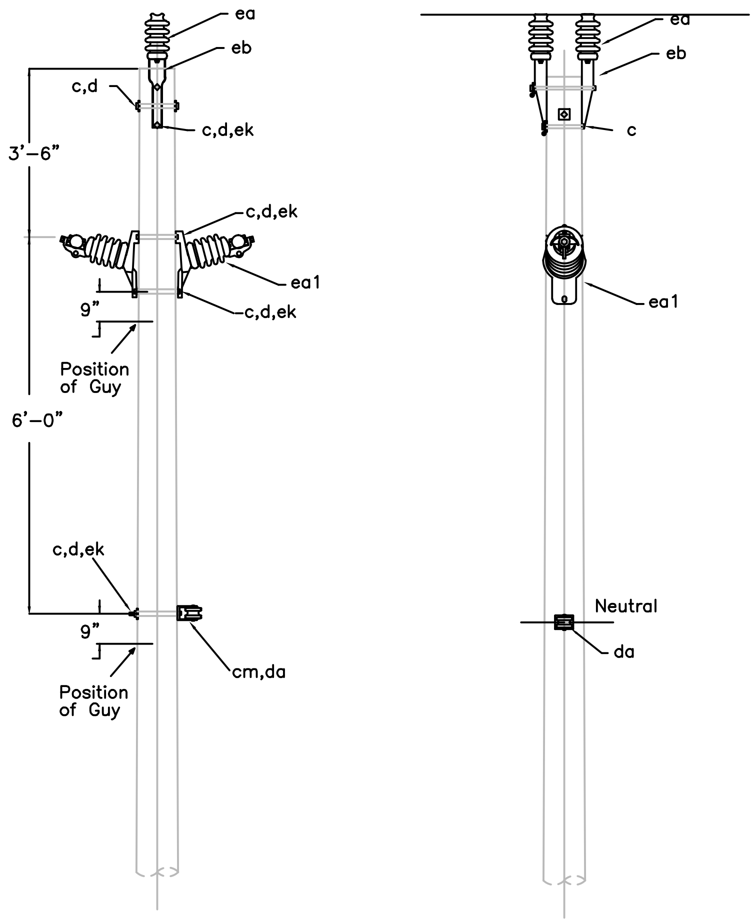


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt machine 5/8" x req'd length	eb	2	Bracket, pole top for screw–on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
cm	1	Insulator, secondary spool		2	Clamp for post insulator
da	1	Clevis, secondary rigid		3	Armor rods
ea	2	Insulator, post screw on type		*	Conductor, alminum tie wire
ea1	2	Insulator, horizontal post		1	Wraplock spool tie

UP TO 1/0AAAC
5° – 20°

12.5/7.2 kV PRIMARY
3 PHASE NARROW PROFILE CONSTRUCTION

SEP. 2013	CHELCO	C2–P



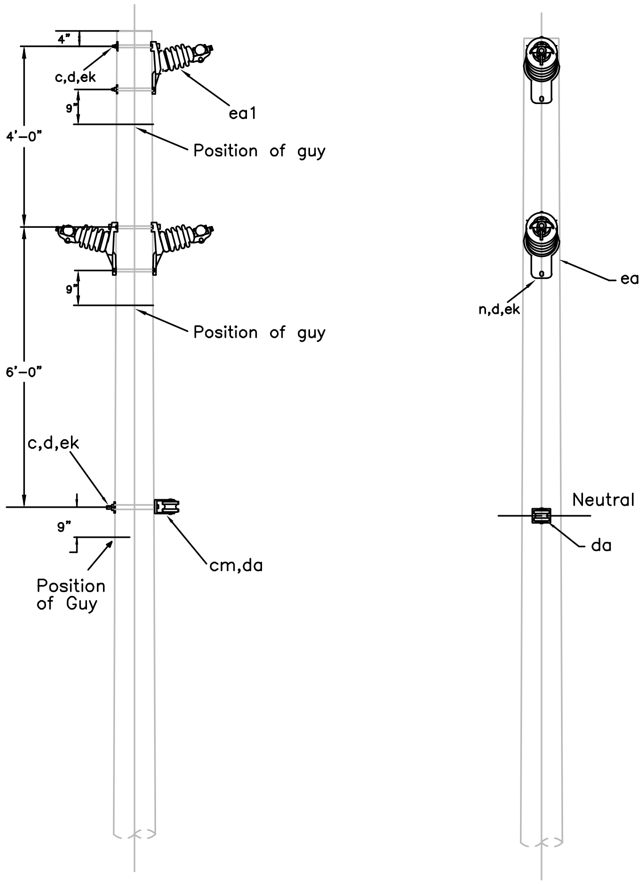
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt machine 3/4" x req'd length	eb	2	Bracket, pole top for screw–on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
cm	1	Insulator, secondary spool		2	Clamp for post insulator
da	1	Clevis, secondary rigid		3	Armor rods
ea	2	Insulator, post screw on type		*	Conductor, alminum tie wire
ea1	2	Insulator, horizontal post		1	Wraplock spool tie

HEAVY CONSTRUCTION

4/0 AAAC – 741 AAAC
5° – 12°

12.5/7.2 kV PRIMARY
3 PHASE NARROW PROFILE CONSTRUCTION

SEP. 2013 | CHELCO | C2–P



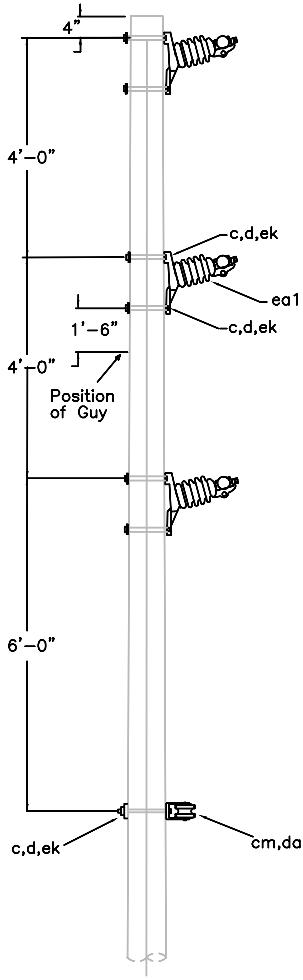
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt machine 3/4" x req'd length	ek	*	Locknuts, as required
d	8	Washer, square, 2 1/4" as req'd		3	Clamp for post insulator
cm	1	Insulator, secondary spool		3	Armor rods
da	1	Clevis, secondary rigid		*	Conductor, alminum tie wire
ea1	3	Insulator, horizontal post		1	Wraplock spool tie

HEAVY CONSTRUCTION

4/0 AAAC – 741 AAAC
5° – 12°

12.5/7.2 kV PRIMARY
3 PHASE NARROW PROFILE CONSTRUCTION

MAY 2014 | CHELCO | C2PRC



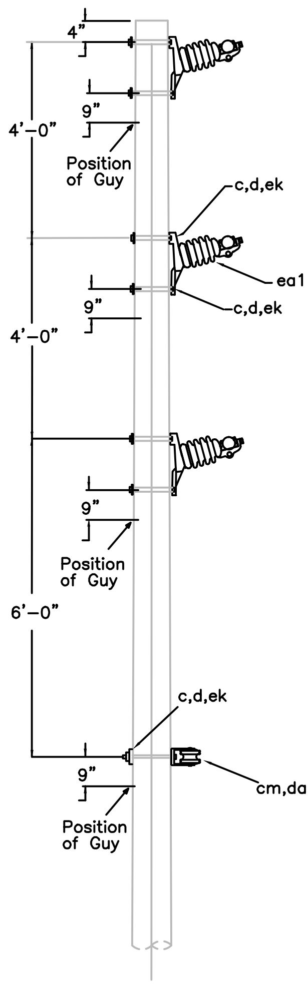
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	7	Bolt machine 5/8" x req'd length	ek	*	Locknuts, as required
d	7	Washer, square, 2 1/4" as req'd		3	Clamp for post insulator
cm	1	Insulator, secondary spool		3	Armor rods
da	1	Clevis, secondary rigid		1	Wraplock spool tie
ea1	3	Insulator, horizontal post			

UP TO 1/0AAAC

5° – 20°

12.5/7.2 kV PRIMARY
3 PHASE NARROW PROFILE CONSTRUCTION

FEB 2014	CHELCO	C2PA



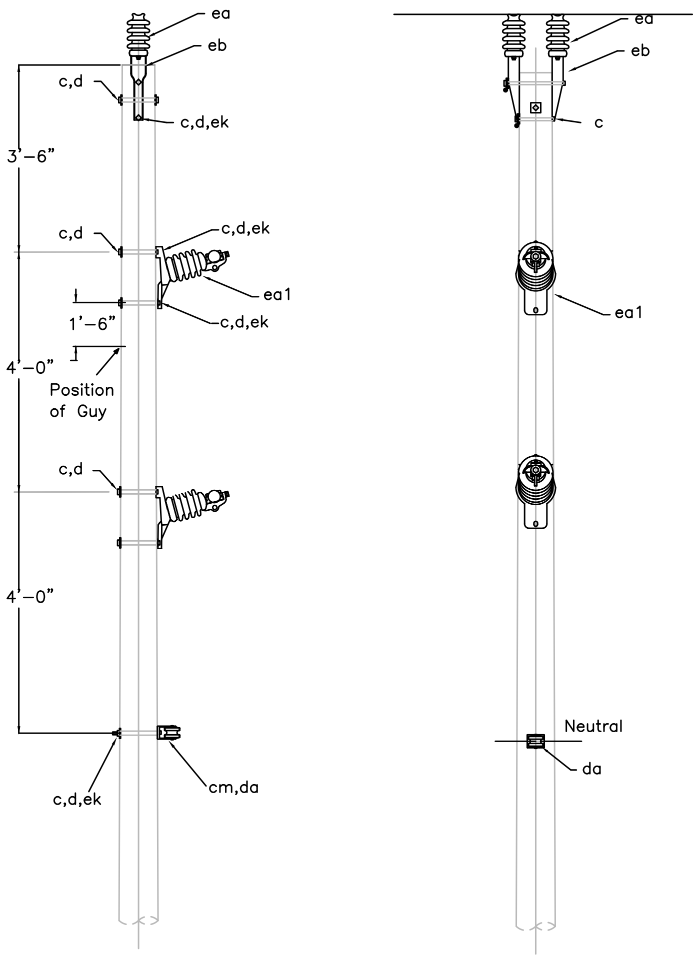
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	7	Bolt machine 3/4" x req'd length	ek	*	Locknuts, as required
d	7	Washer, square, 2 1/4" as req'd		3	Clamp for post insulator
cm	1	Insulator, secondary spool		3	Armor rods
da	1	Clevis, secondary rigid		1	Wraplock spool tie
ea1	3	Insulator, horizontal post			

HEAVY CONSTRUCTION

4/0 AAAC – 741 AAAC
5° – 12°

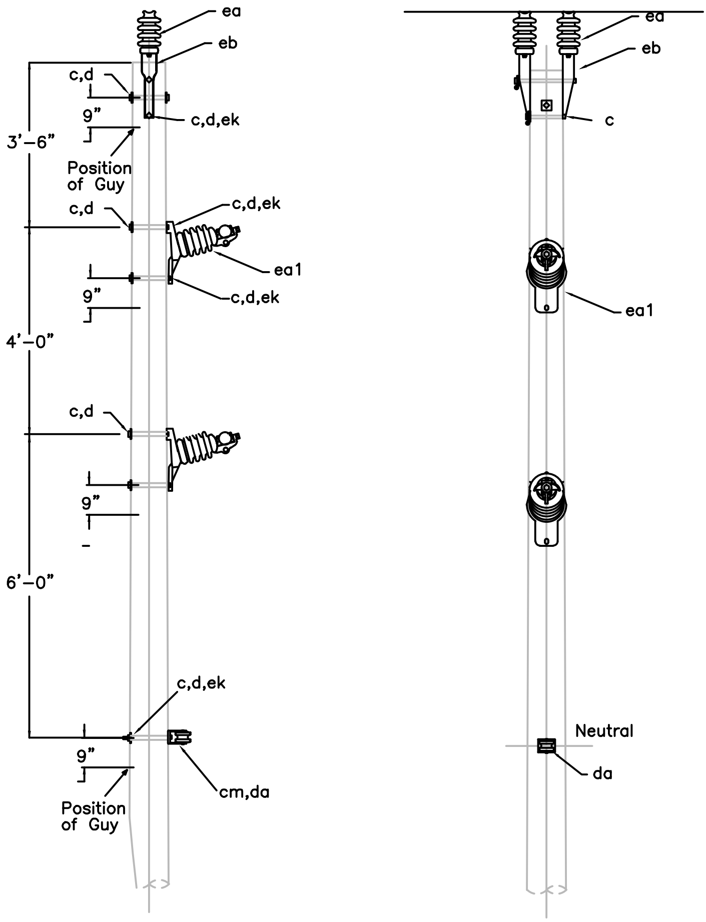
12.5/7.2 kV PRIMARY
3 PHASE NARROW PROFILE CONSTRUCTION

FEB 2014 | CHELCO | C2PA



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	8	Bolt machine 5/8" x req'd length	eb	2	Bracket, pole top for screw–on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
cm	1	Insulator, secondary spool		2	Clamp for post insulator
da	1	Clevis, secondary rigid		3	Armor rods
ea	2	Insulator, post screw on type		*	Conductor, alminum tie wire
ea1	2	Insulator, horizontal post		1	Wraplock spool tie

UP TO 1/0AAAC 5° – 20°	12.5/7.2 kV PRIMARY 3 PHASE NARROW PROFILE CONSTRUCTION		
	DEC. 2008	CHELCO	C2PB



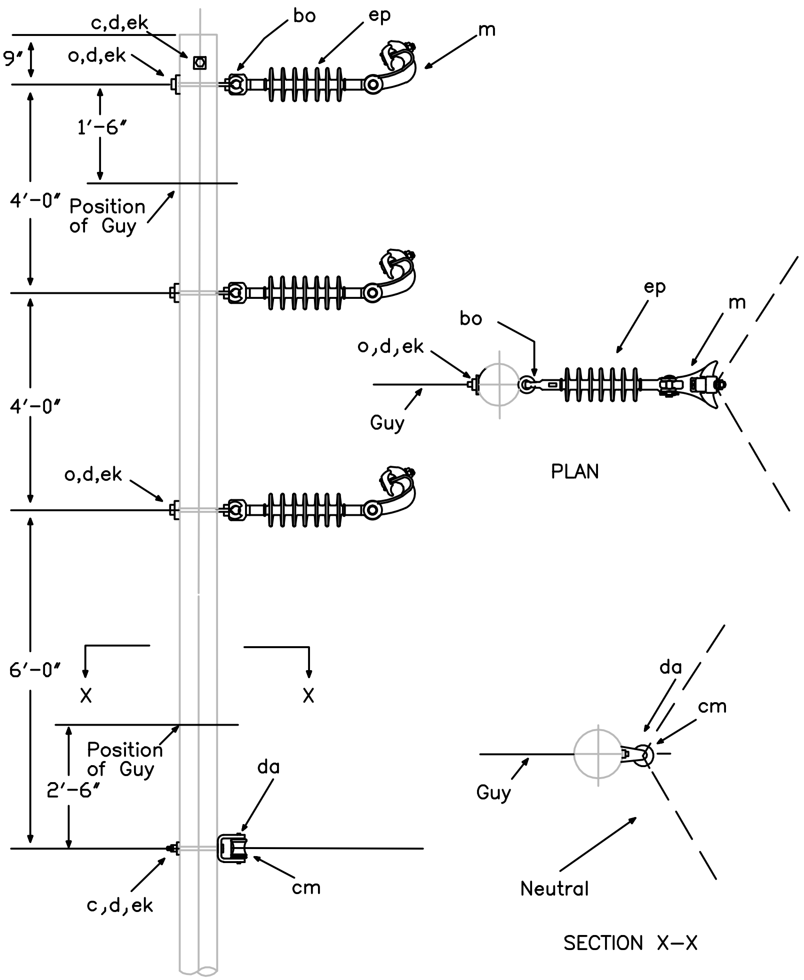
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	8	Bolt machine 3/4" x req'd length	eb	2	Bracket, pole top for screw–on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
cm	1	Insulator, secondary spool		2	Clamp for post insulator
da	1	Clevis, secondary rigid		3	Armor rods
ea	2	Insulator, post screw on type		*	Conductor, alminum tie wire
ea1	2	Insulator, horizontal post		1	Wraplock spool tie

HEAVY CONSTRUCTION

4/0 AAAC – 741 AAAC
5° – 12°

12.5/7.2 kV PRIMARY
3 PHASE NARROW PROFILE CONSTRUCTION

FEB 2014	CHELCO	C2PB



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length	da	1	Clevis secondary rigid
d	5	Washer, square 2 1/4" as req'd	ek	*	Locknut, as required
m	3	Clamp, Susp 2 bolt #4-3/0	ep	3	Insulator, epoxilator 25kV
o	3	Bolt, oval eye, 5/8" x required lg		3	Armor rods
bo	3	Shackle, anchor		1	Wraplock spool tie
cm	1	Insulator secondary spool			

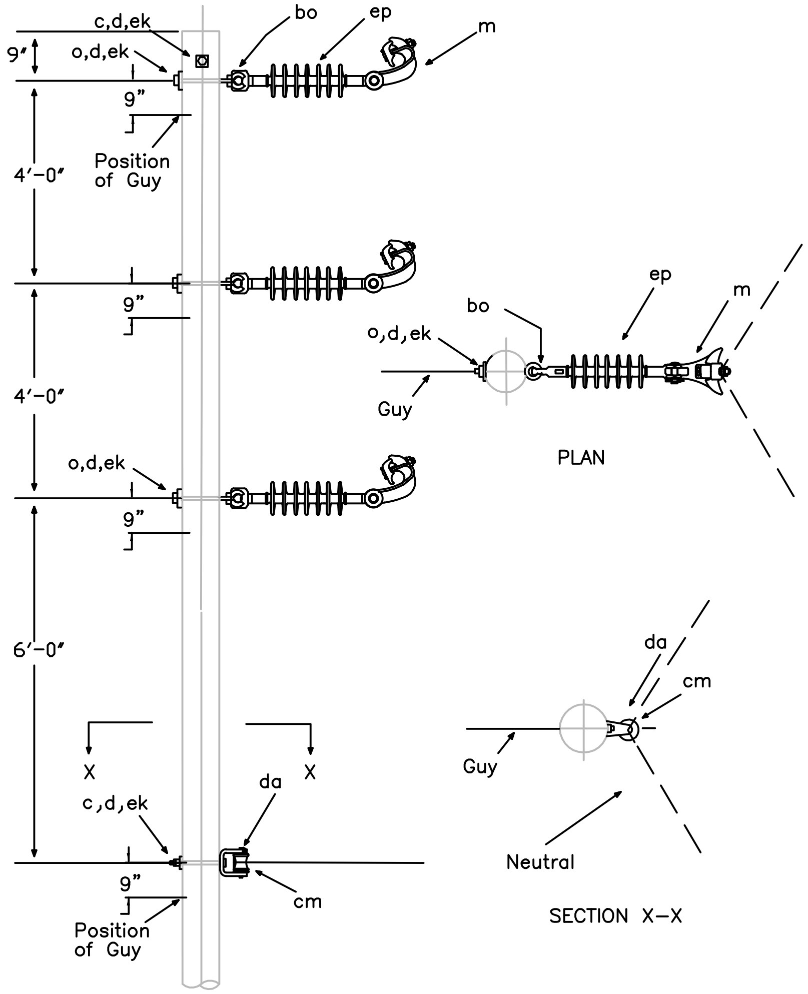
DESIGN LIMITS

Max. transverse load: 4000 lbs. per conductor

Angle: 20° to 60°

12.5/7.2 kV PRIMARY
3 PHASE, VERTICAL CONSTRUCTION

JUNE 2013	CHELCO	C3



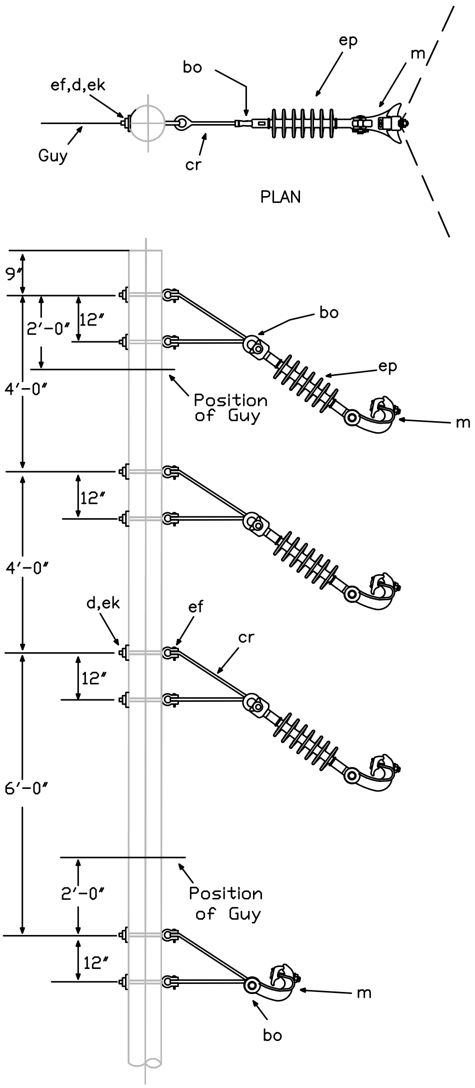
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 3/4" x req'd lg	da	1	Clevis secondary rigid
d	5	Washer, square 2 1/4" as req'd	ek	*	Locknut, as required
m	3	Clamp, Susp 2 bolt #4-3/0	ep	3	Insulator, epoxilator 25kV
o	3	Bolt, oval eye, 5/8" x req'd lg		4	Armor rods
bo	3	Shackle, anchor		1	Wraplock spool tie
cm	1	Insulator secondary spool		2	Conductor, aluminum tie wire

HEAVY CONSTRUCTION

4/0 AAAC – 741 AAAC
13° – 45°

12.5/7.2 kV PRIMARY
3 PHASE, VERTICAL CONSTRUCTION

JUNE 2013 | CHELCO | C3



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	8	Washer, square 2 1/4" as req'd	ef	8	Bolt, clevis 5/8" x req'd length
m	4	Clamp, Susp 2 bolt #4-3/0	ek	*	Locknut, as required
bo	4	Shackle, anchor	ep	3	Insulator, epoxilator 25kV
cr	4	Bracket, angle 3/4"		4	Armor rods

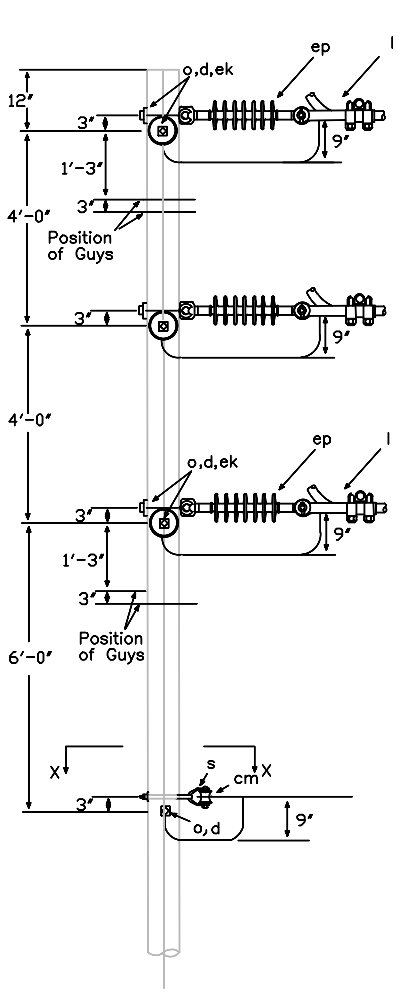
DESIGN LIMITS

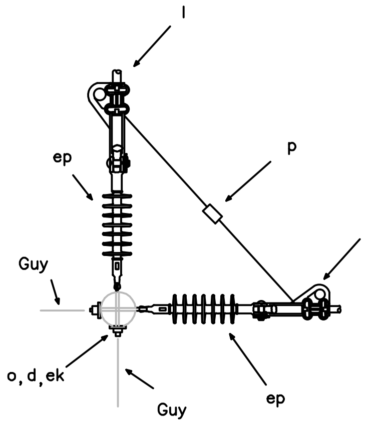
Max. transverse load: 4000 lbs. per conductor

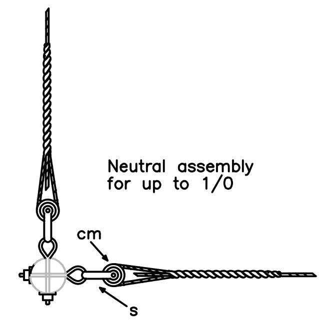
Angle: 10° to 20°

12.5/7.2 kV PRIMARY
3 PHASE, VERTICAL CONSTRUCTION
(LARGE CONDUTORS)

DEC. 2008	CHELCO	C3-1







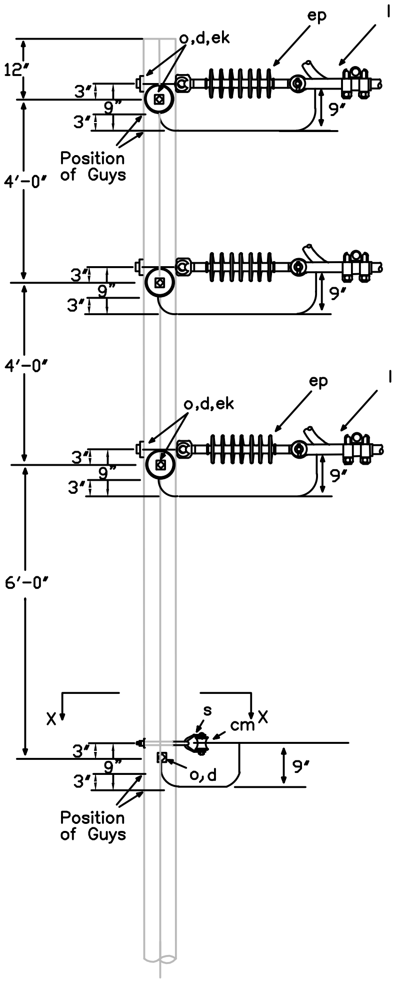
SECTION X–X

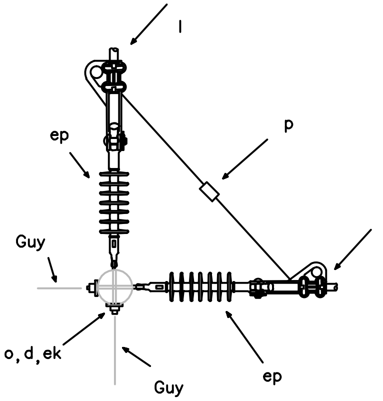
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	8	Washer, square 2 1/4" as req'd	cm	2	Insulator, secondary spool
l	6	Clamp, deadend shoe	ek	*	Locknuts, as required
o	8	Bolt, eye, 5/8" x required length	ep	6	Insulator, epoxilator 25kv
p	*	Conectors, as required		2	Deadend distribution grips
s	2	Clevis, secondary swinging			

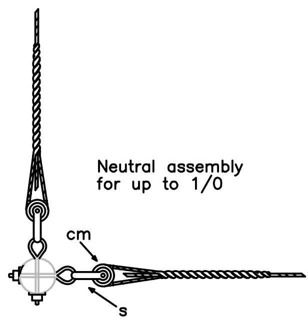
60° TO 90° ANGLE

12.5/7.2 kV PRIMARY, 3 PHASE
VERTICAL CONSTRUCTION

JUNE 2013	CHELCO	C4







SECTION X–X

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	8	Washer, square 2 1/4" as req'd	cm	2	Insulator, secondary spool
l	6	Clamp, deadend shoe	ek	*	Locknuts, as required
o	8	Bolt, eye, 3/4" x required length	ep	6	Insulator, epoxilator 25kv
p	*	Conectors, as required		2	Deadend distribution grips
s	2	Clevis, secondary swinging			

HEAVY CONSTRUCTION

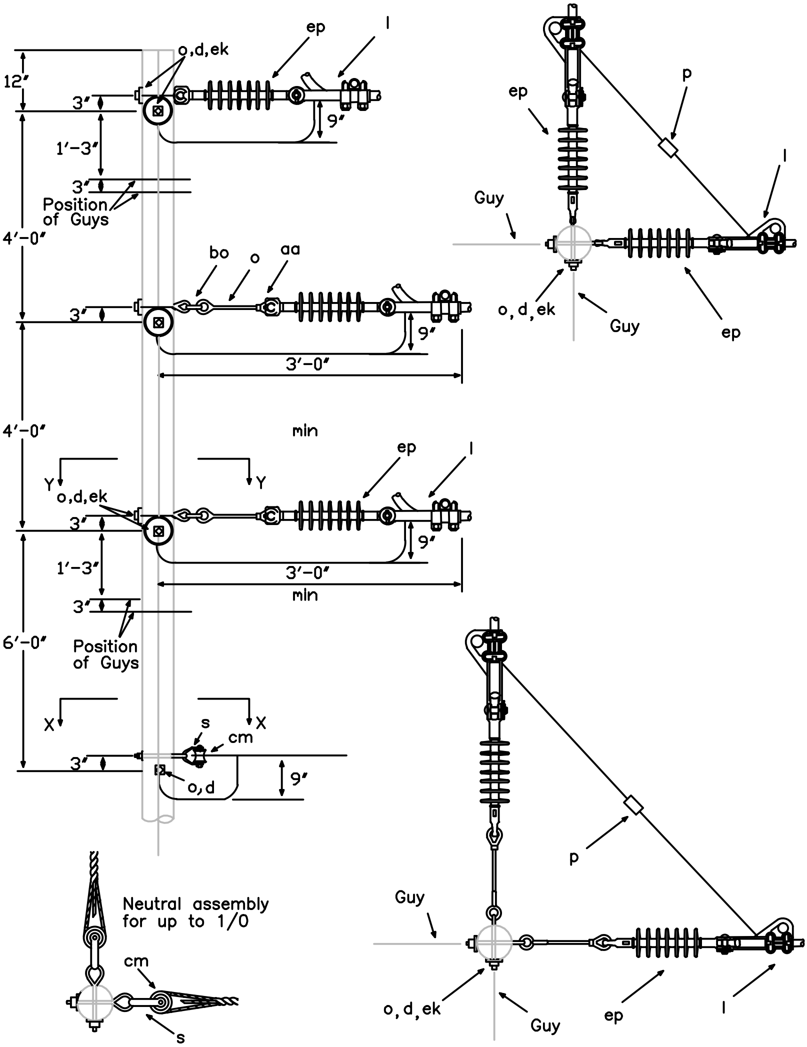
4/0 AAAC – 741 AAAC

45° TO 90° ANGLE

12.5/7.2 kV PRIMARY, 3 PHASE

VERTICAL CONSTRUCTION

JUNE 2013	CHELCO	C4



SECTION X–X

SECTION Y–Y

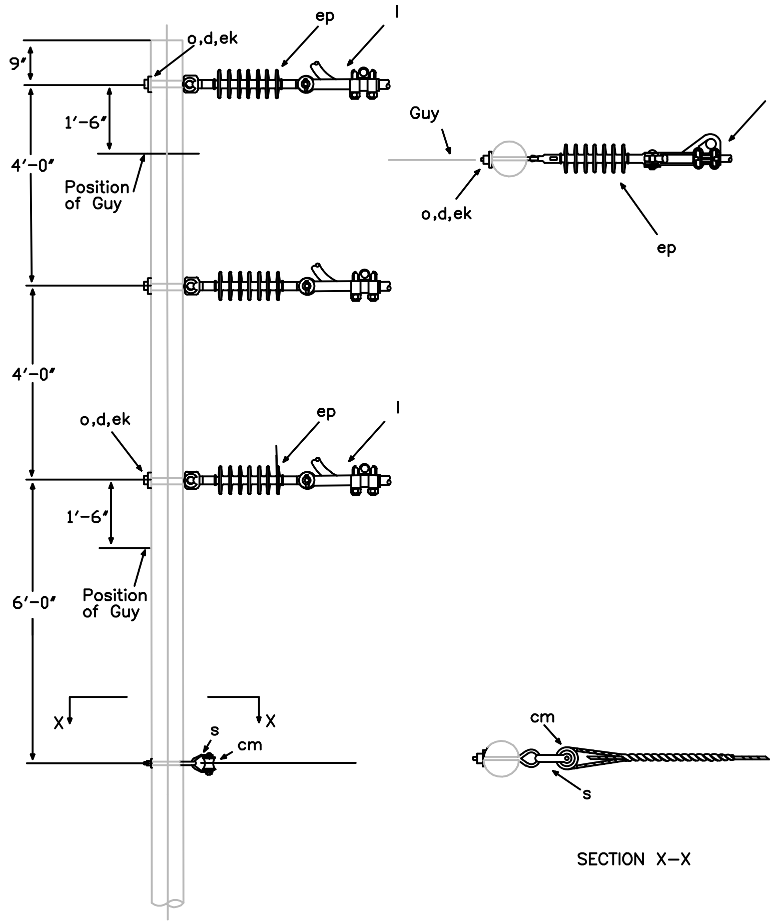
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	8	Washer, square 2 1/4"	bo	4	Shackle, anchor
l	6	Clamp, deadend shoe	cm	2	Insulator, secondary spool
o	12	Bolt, oval eye, 5/8" as required	ek	*	Locknuts, as required
p	*	Connectors, as required	ep	6	Insulator, epoxilator 25kV
s	2	Clevis, secondary swinging		2	Deadend distribution grip
aa	4	Nut, oval eye 5/8"			

DESIGN LIMITS

ANGLE: 60° – 90°

12.5/7.2 kV PRIMARY, 3 PHASE
VERTICAL CONSTRUCTION

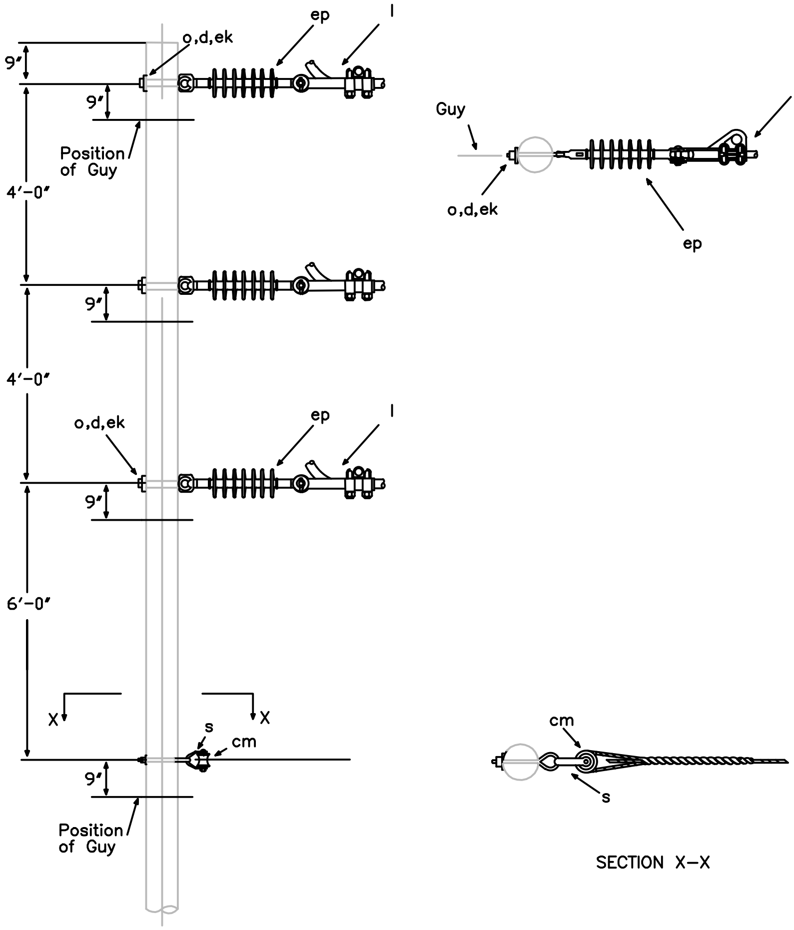
JUNE 2013	CHELCO	C4–1



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	4	Washer, square 2 1/4"	cm	1	Insulator, secondary spool
l	3	Clamp, deadend shoe	ek	*	Locknuts, as required
o	4	Bolt, eye, 5/8" x required length	ep	3	Insulator, epoxilator 25kv
p	*	Connectors, as required		1	Deadend distribution grip
s	1	Clevis, secondary swinging			

12.5/7.2 kV PRIMARY, 3 PHASE
VERTICAL CONSTRUCTION
DEADEND SINGLE

DEC. 2013	CHELCO	C5



SECTION X-X

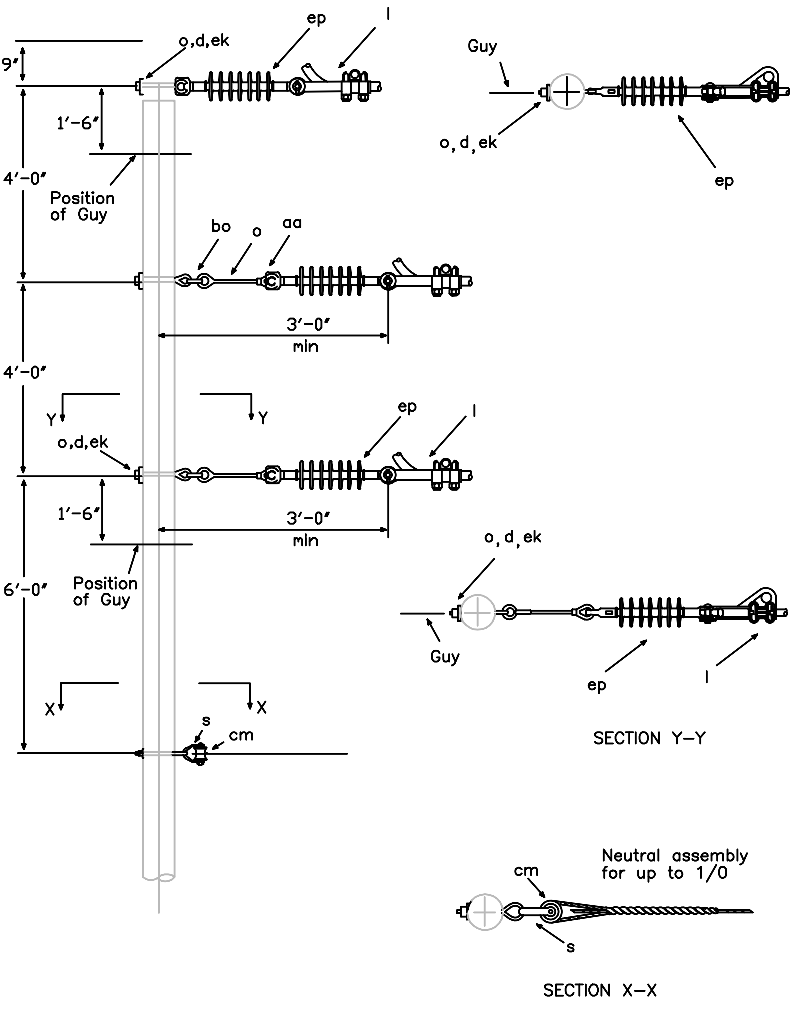
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	4	Washer, square 2 1/4"	cm	1	Insulator, secondary spool
l	3	Clamp, deadend shoe	ek	*	Locknuts, as required
o	4	Bolt, eye, 3/4" x required length	ep	3	Insulator, epoxilator 25kv
p	*	Connectors, as required		1	Deadend distribution grip
s	1	Clevis, secondary swinging			

HEAVY CONSTRUCTION

4/0 AAAC – 741 AAAC

12.5/7.2 kV PRIMARY, 3 PHASE
VERTICAL CONSTRUCTION
DEADEND SINGLE

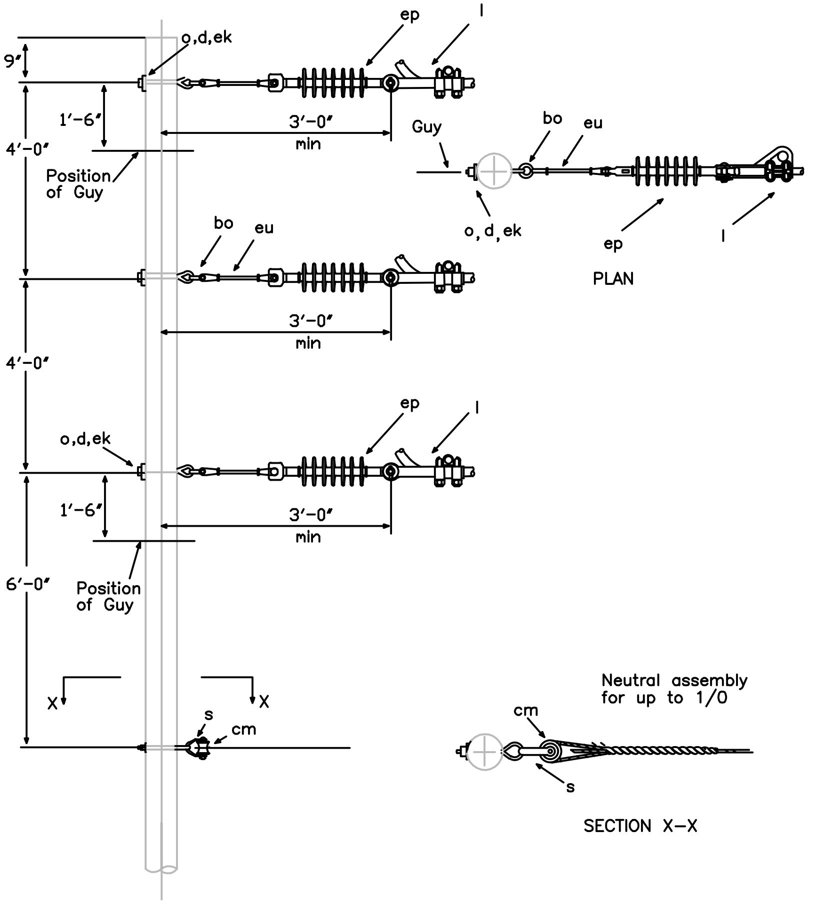
DEC. 2013	CHELCO	C5



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	4	Washer, square 2 1/4"	bo	2	Shackle, anchor
l	3	Clamp, deadend shoe	cm	1	Insulator, secondary spool
o	6	Bolt, oval eye, 5/8" as required	ek	*	Locknuts, as required
s	1	Clevis, secondary swinging	ep	3	Insulator, epoxilator 25kV
aa	2	Nut, oval eye 5/8"		1	Deadend distribution grip

12.5/7.2 kV PRIMARY
3 PHASE, VERTICAL CONSTRUCTION
DEADEND (SINGLE)

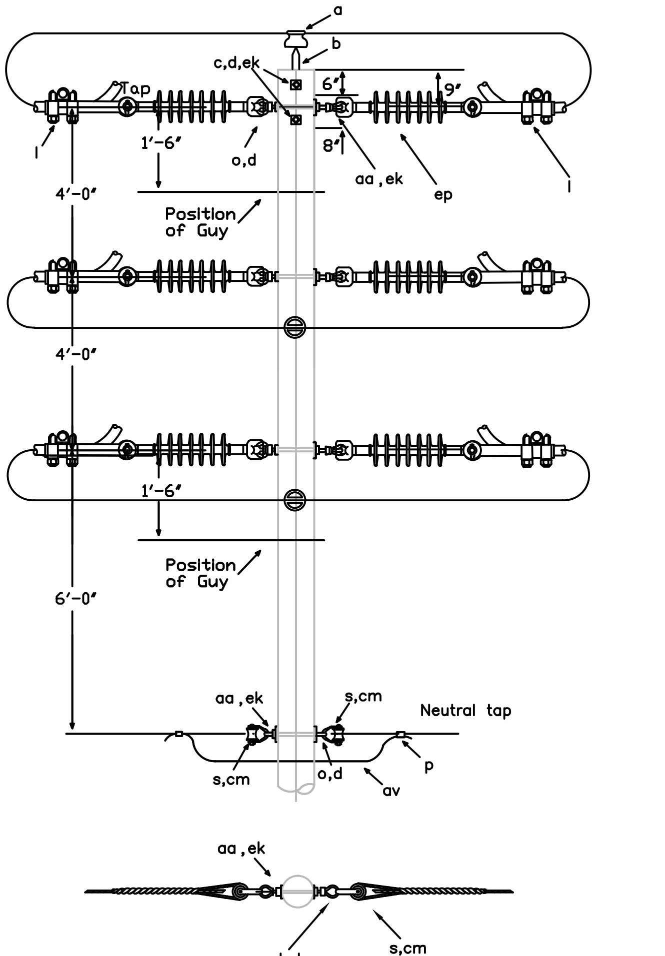
DEC. 2013	CHELCO	C5–1



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	4	Washer, square 2 1/4"	cm	1	Insulator, secondary spool
l	3	Clamp, deadend shoe	ek	*	Locknuts, as required
o	4	Bolt, oval eye, 5/8" as required	ep	3	Insulator, epoxilator 25kV
s	1	Clevis, secondary swinging	eu	3	Insulator, extension fiberglass
bo	3	Shackle, anchor		1	Deadend distribution grip

12.5/7.2 kV PRIMARY
3 PHASE, VERTICAL CONSTRUCTION
DEADEND (SINGLE)

DEC. 2013	CHELCO	C5-7



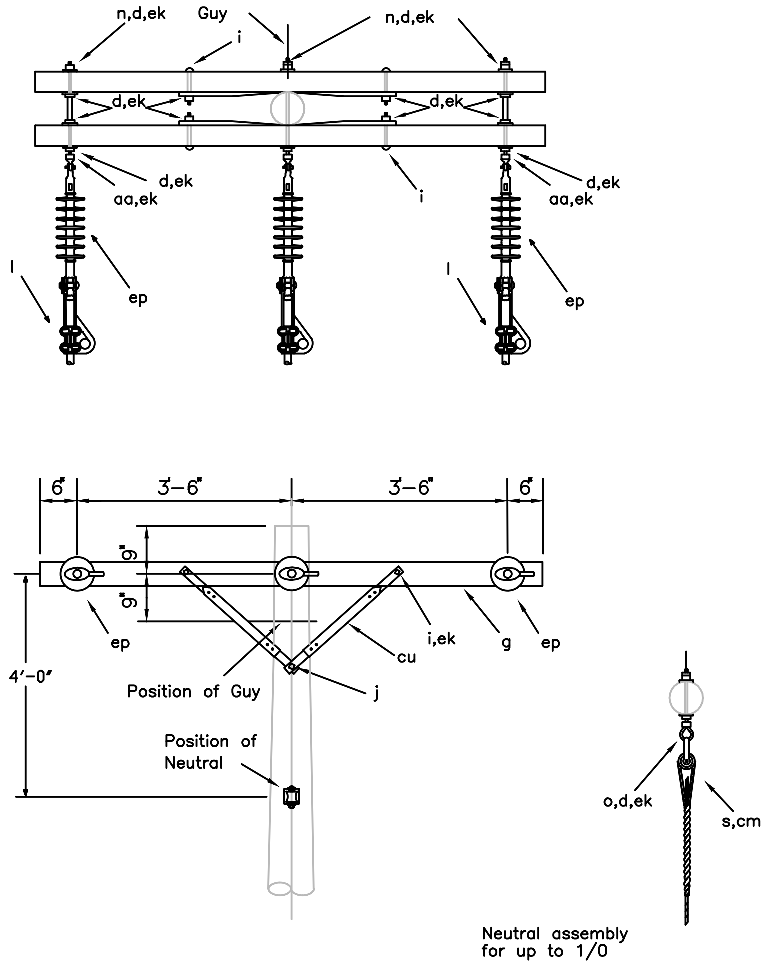
NOTES:
For conductors 4/0AAAC –741AAAC use 3/4" hardware.

Neutral assembly for up to 1/0

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	aa	4	Nut, oval eye, 5/8"
b	1	Pin, pole top 20" steel	av	*	Jumpers, as required
d	8	Washer, square 2 1/4", as req'd	cm	2	Insulator, secondary spool
l	6	Clamp, deadend shoe	ek	*	Locknuts, as required
o	4	Bolt, oval eye, 5/8" x req'd length	ep	6	Insulator, epoxilator 25kV
p	*	Connectors, as required		2	Deadend distribution grip
s	2	Clevis, secondary swinging		2	Jumper adapters

12.5/7.2 kV PRIMARY, 3 PHASE, VERTICAL DOUBLE DEADEND

DEC. 2013	CHELCO	C6

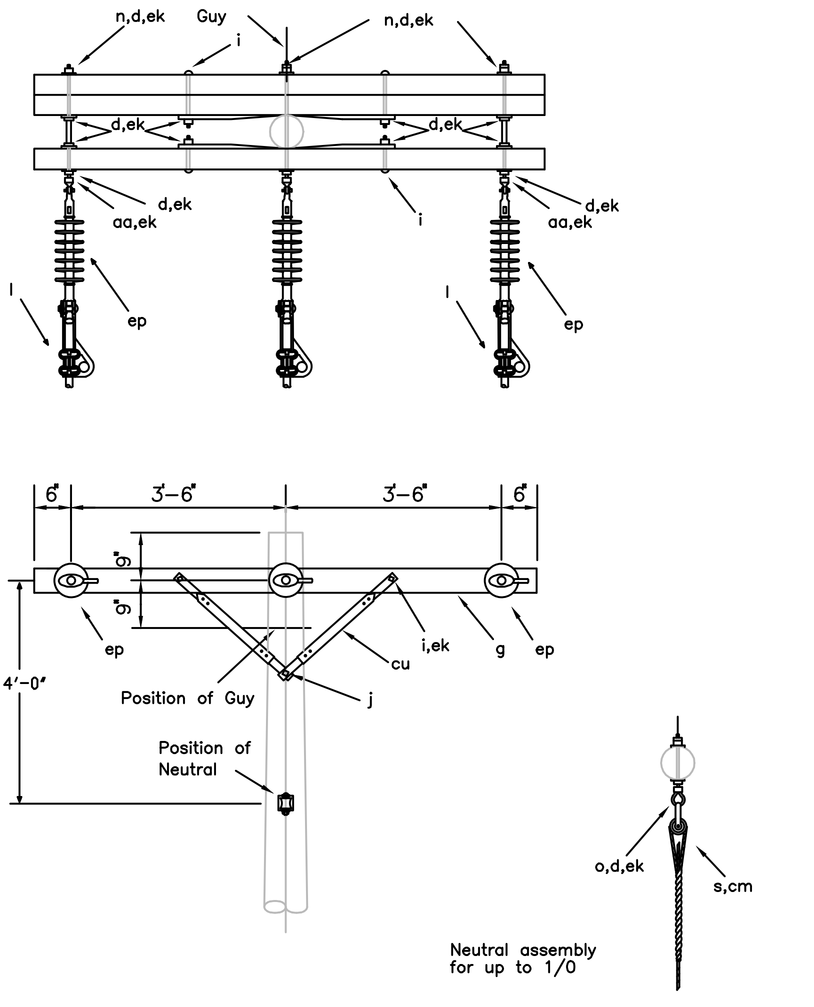


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	11	Washer, square 2 1/4", as req'd	s	1	Clevis, secondary swinging
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	aa	3	Nut, oval eye 5/8"
i	4	Bolt, carriage 3/8" x 4-1/2"	cm	1	Insulator, secondary spool
j	2	Lag, screw 1/2" x 4"	cu	4	Brace x/arm 28" wood
l	3	Clamp, deadend shoe	ek	*	Locknuts, as required
n	3	Bolt, dbl arming 5/8" x req'd length	ep	3	Insulator, epoxilator 25kv
o	1	Bolt, oval eye 5/8" x required length		1	Deadend distrubution grip

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DEADEND(SINGLE)

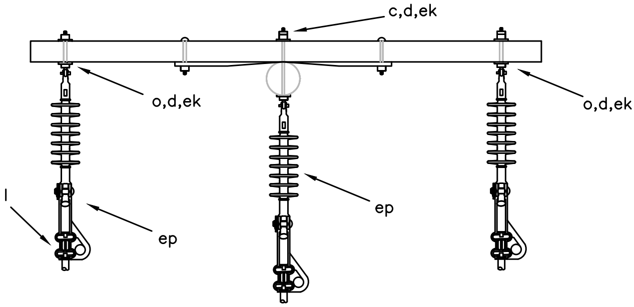
DEC. 2013	CHELCO	C7

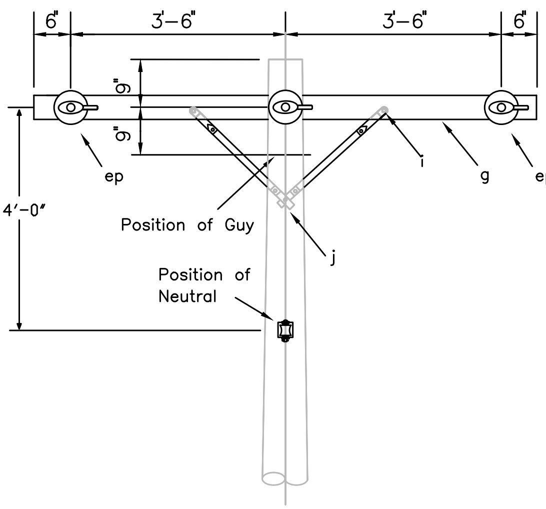


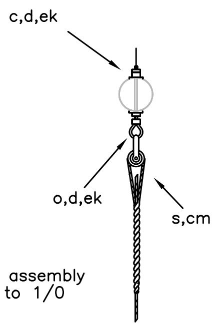
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	11	Washer, square 2 1/4", as req'd	s	1	Clevis, secondary swinging
g	3	Crossarm, 3 3/4" x 4 3/4" x 8'0"	aa	3	Nut, oval eye 5/8"
i	4	Bolt, carriage 3/8" x 4-1/2"	cm	1	Insulator, secondary spool
j	2	Lag, screw 1/2" x 4"	cu	4	Brace x/arm 28" wood
l	3	Clamp, deadend shoe	ek	*	Locknuts, as required
n	3	Bolt, dbl arming 5/8" x req'd lngth	ep	3	Insulator, epoxilator 25kv
o	1	Bolt, oval eye 5/8" x req'd length		1	Deadend distrubution grip

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY 3 PHASE, CROSSARM CONSTRUCTION DEADEND(SINGLE)		
DEC. 2013	CHELCO	C7-1





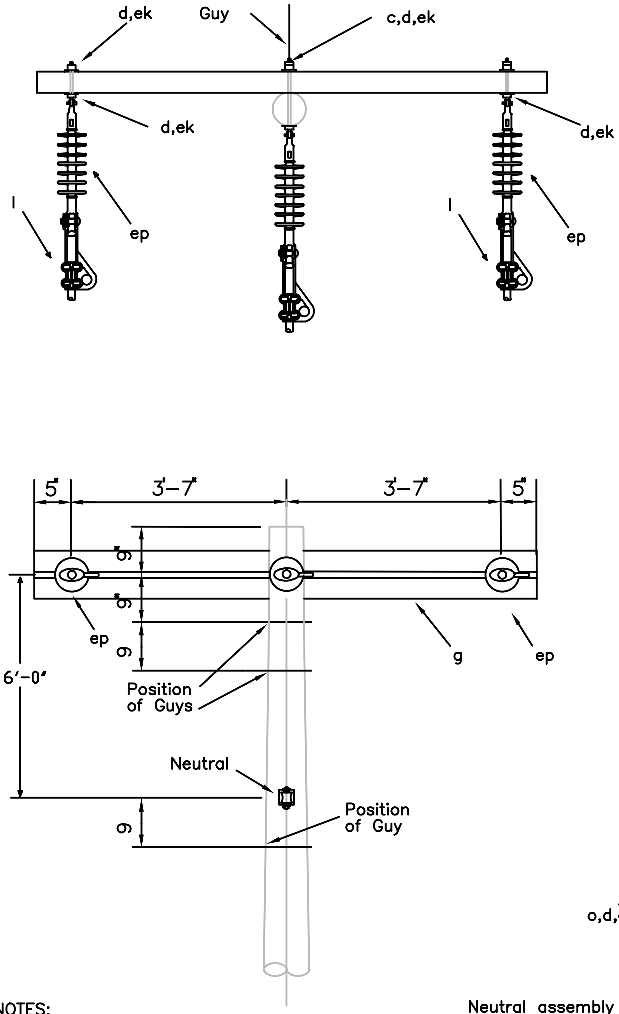


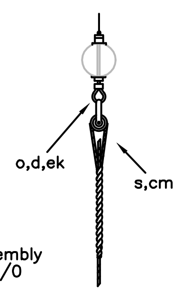
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	4	Washer, square 2 1/4", as req'd	o	4	Bolt, oval eye 5/8" x req'd length
g	1	Crossarm, 3'3/4"x4'3/4"x8'0" aluma	cm	1	Insulator, secondary spool
i	2	Bolt, carriage 3/8" x 4-1/2"	ek	*	Locknuts, as required
j	1	Lag crew 1/2" x 4"	ep	3	Insulator, epoxilator 25kv
l	3	Clamp, deadend shoe		1	Deadend distribution grip
s	1	Clevis, secondary swinging			

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DEADEND(SINGLE)LIGHT DUTY

DEC. 2008	CHELCO	C7LD





Neutral assembly
for up to 1/0

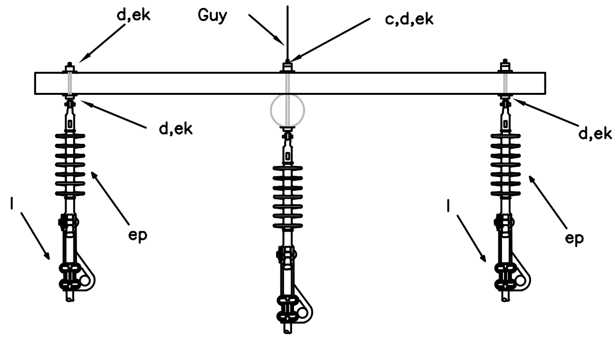
NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

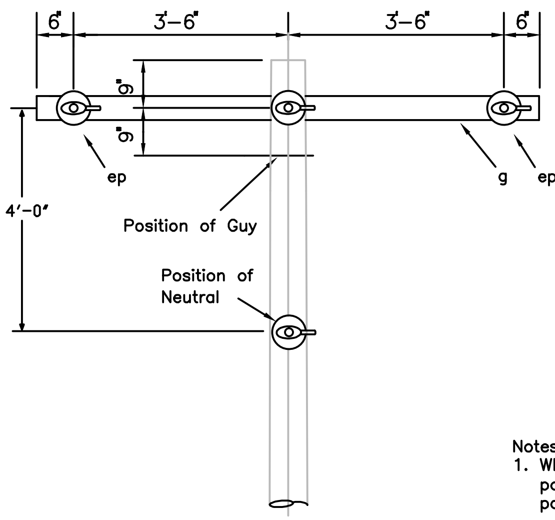
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	11	Washer, square 2 1/4", as req'd	cm	1	Insulator, secondary spool
g	1	Crossarm, 3'3/4"x4'3/4"x8'0" HD	ek	*	Locknuts, as required
l	3	Clamp, deadend shoe	ep	3	Insulator, epoxilator 25kv
o	1	Bolt, oval eye 5/8" x req'd length		1	Deadend distribution grip
s	1	Clevis, secondary swinging			

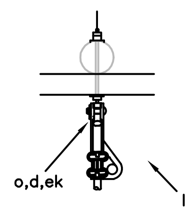
Notes:
See drawing E5-1 for
crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DEADEND(SINGLE)HEAVY DUTY

FEB 2014	CHELCO	C7HD







Notes:
1. When installing on concrete pole, bond crossarm to pole ground.
2. Neutral assembly for up to 1/0

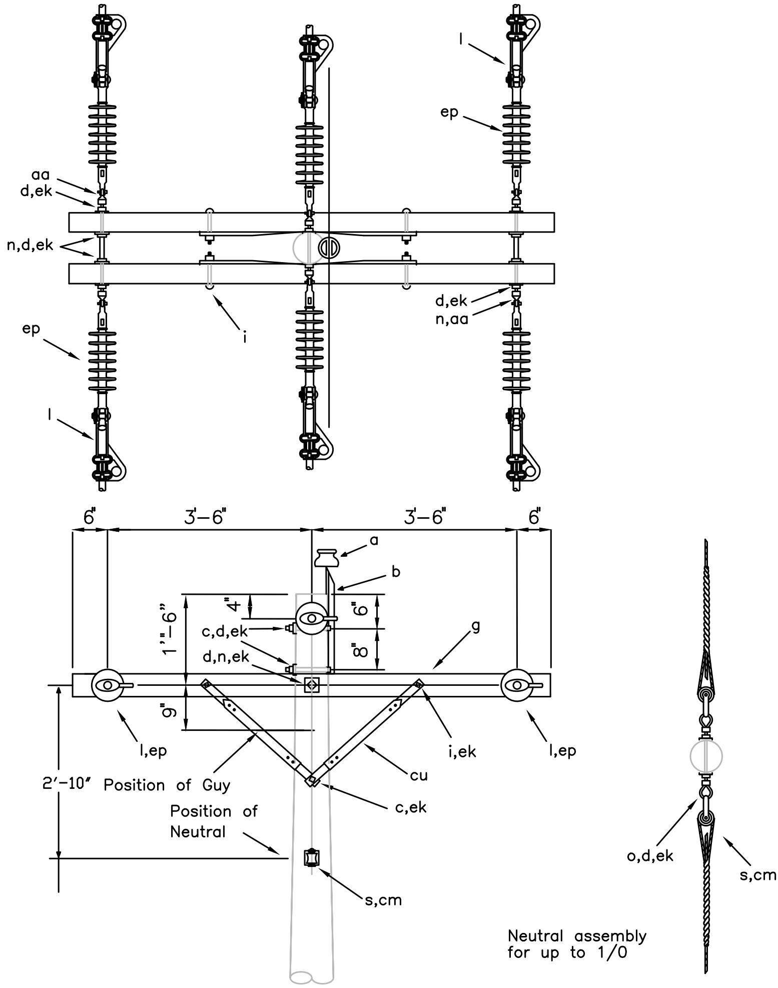
NOTES:
For conductors 4/0AAAC –741AAAC use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x required length	o	1	Bolt, oval eye 5/8" x req'd length
d	5	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
g	1	Crossarm, 3 3/4"x4 3/4"x8'0" steel	ep	3	Insulator, epoxilator 25kv
l	4	Clamp, deadend shoe		3	Bolt, shoulder eyebolt 3/4" x 24"

Notes:
See drawing E5–1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DEADEND(SINGLE)

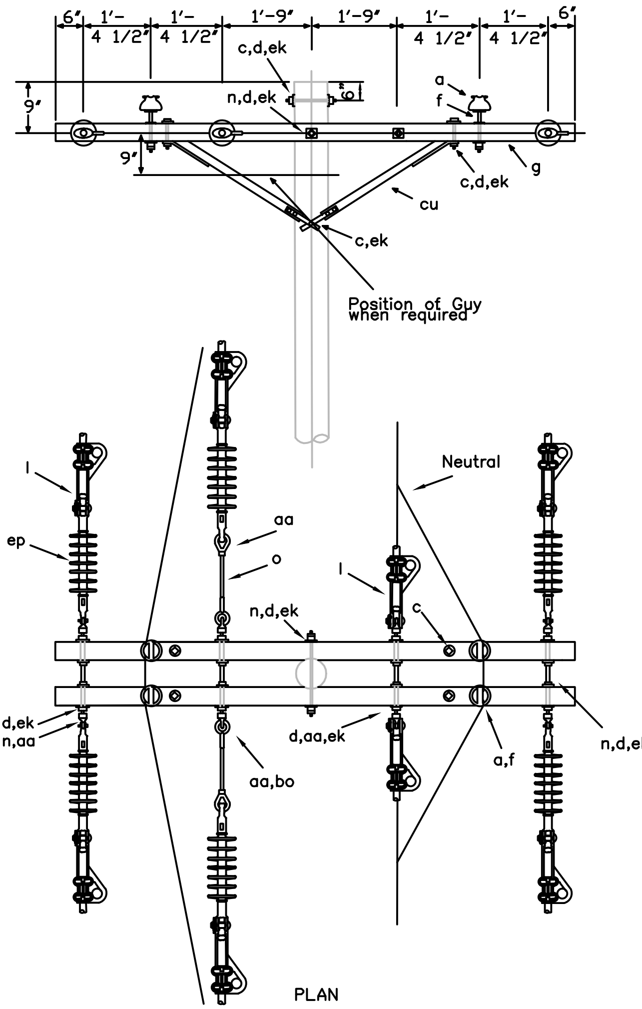
FEB 2014	CHELCO	C7–S



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	o	1	Bolt, oval eye 5/8" x req'd
b	1	Pin, pole top 20" steel	s	2	Clevis, secondary swinging
c	3	Bolt, machine 5/8" x req'd length	aa	7	Nut, oval eye 5/8"
c	4	Bolt, machine 1/2" x req'd length	cm	2	Insulator, secondary spool
d	15	Washer, square 2 1/4", as req'd	cu	4	Brace, x/arm 28", wood
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
i	4	Bolt, carriage 3/8" x 4-1/2"	ep	6	Insulator, epoxilator 25kv
l	6	Clamp, deadend shoe		2	Deadend distrubution grip
n	3	Bolt, dbl arming 5/8"x req'd lngth			

12.5/7.2 kV PRIMARY
3 PHASE DOUBLE
DEADEND ON CROSSARMS

DEC. 2008	CHELCO	C8

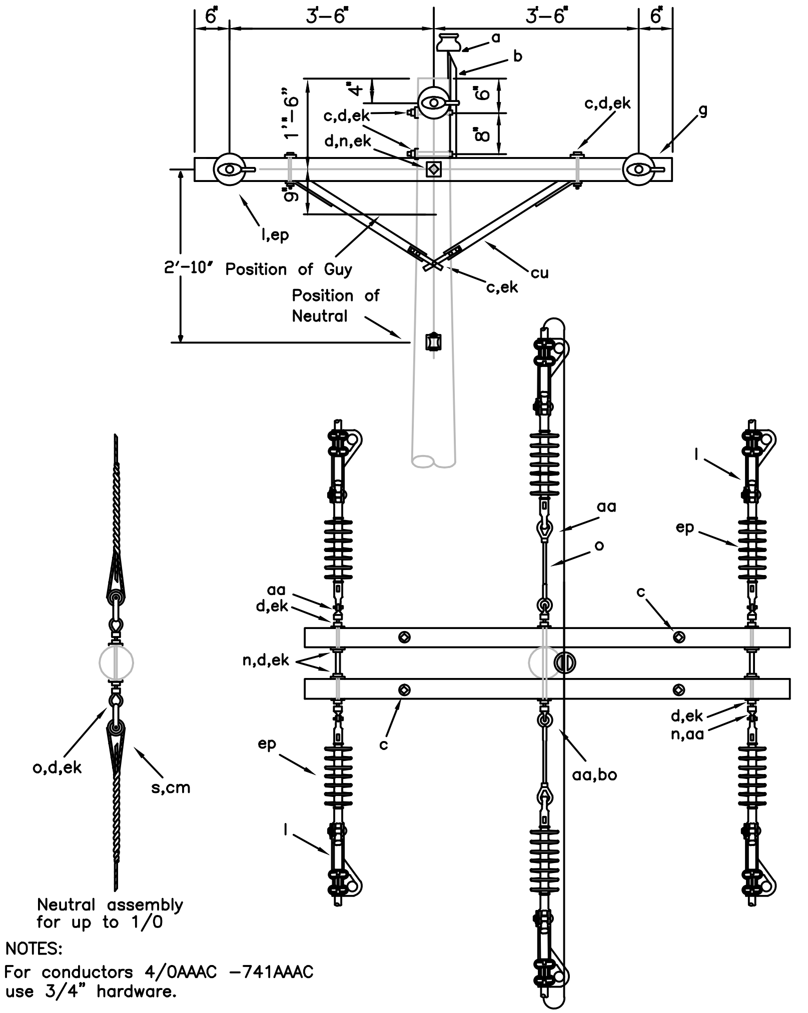


PLAN

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator, pin type 15kV	o	2	Bolt, oval eye 5/8" x req'd
c	4	Bolt, machine 1/2" x req'd length	aa	10	Nut, oval eye 5/8"
d	18	Washer, square 2 1/4", as req'd	bo	2	Shackle, anchor
f	4	Pin, steel crossarm	cu	4	Brace, x/arm 60", wood
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'	ek	*	Locknuts, as required
l	8	Clamp, deadend shoe	ep	6	Insulator, epoxilator 25kv
n	6	Bolt, dbl arming 5/8"x req'd length			

12.5/7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
DEADEND (DOUBLE)

DEC. 2013	CHELCO	C8-1



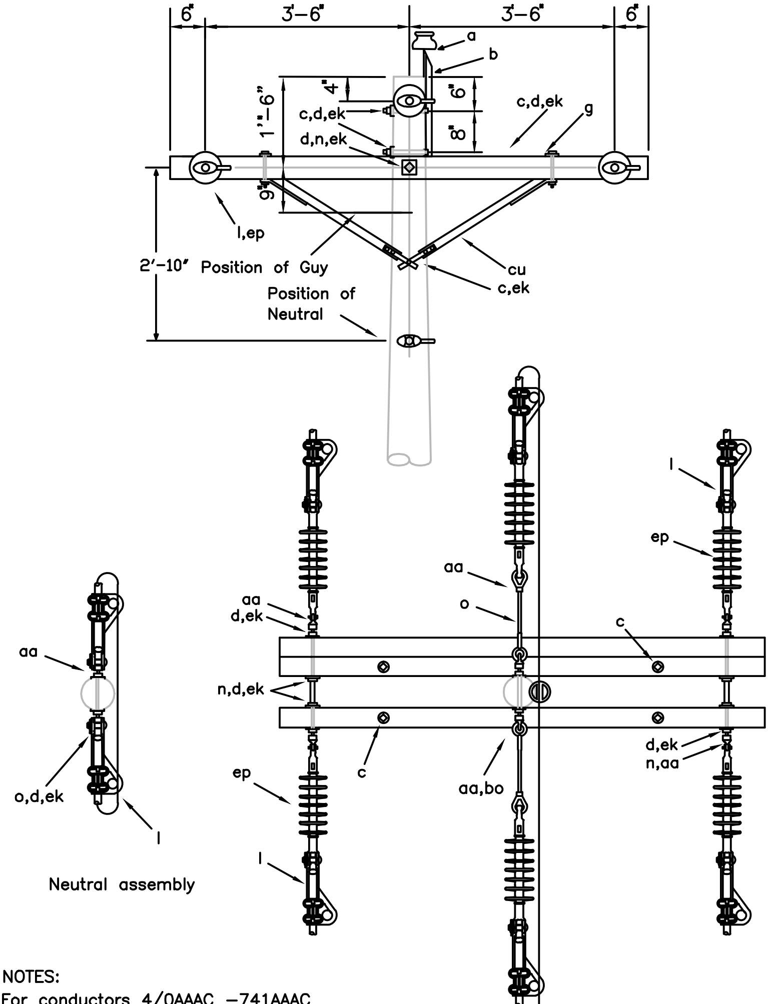
NOTES:

For conductors 4/0AAAC –741AAAC use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	s	2	Clevis, secondary swinging
b	1	Pin, pole top 20" steel	aa	9	Nut, oval eye 5/8"
c	4	Bolt, machine 1/2" x req'd length	bo	2	Shackle anchor
d	15	Washer, square 2 1/4", as req'd	cm	2	Insulator, secondary spool
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	cu	4	Brace, x/arm 60", wood
l	6	Clamp, deadend shoe	ek	*	Locknuts, as required
n	4	Bolt, dbl arming 5/8" x req'd lngth	ep	6	Insulator, epoxilator 25kv
o	4	Bolt, oval eye 5/8" x req'd		2	Deadend distrubution grip

12.5/7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
–DEADEND (DOUBLE) LARGE CONDUCTORS

FEB 2014	CHELCO	C8–2

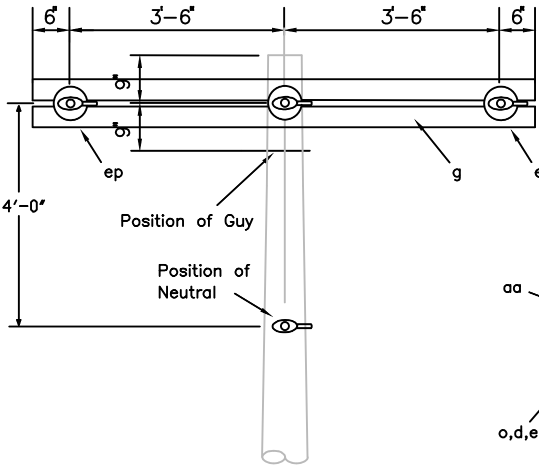


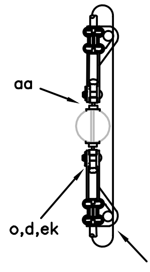
NOTES:
For conductors 4/0AAAC −741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	n	6	Bolt, dbl arming 5/8" x req'd lngth
b	1	Pin, pole top 20" steel	o	3	Bolt, oval eye 5/8" x req'd
c	4	Bolt, machine 1/2" x req'd length	aa	7	Nut, oval eye 5/8"
c	3	Bolt, machine 5/8" x req'd length	bo	6	Shackle anchor
d	15	Washer, square 2 1/4", as req'd	cu	4	Brace, x/arm 60", wood
g	3	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ek	*	Locknuts, as required
l	8	Clamp, deadend shoe	ep	6	Insulator, epoxilator 25kv

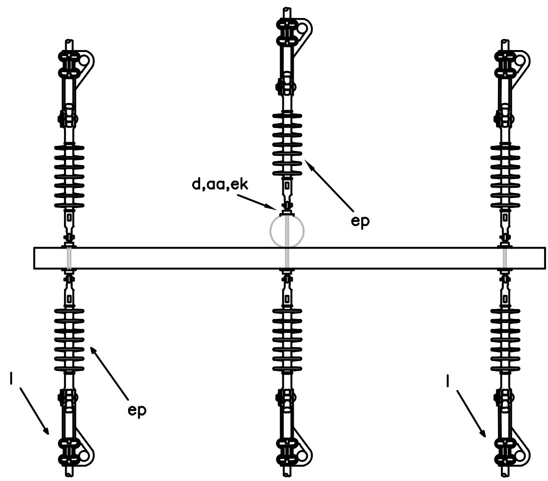
12.5/7.2 kV PRIMARY
3 PHASE CROSSARM CONSTRUCTION
−DEADEND (DOUBLE) LARGE CONDUCTORS
WITH UNBALANCED LOADS

FEB 2014	CHELCO	C8−3





FE



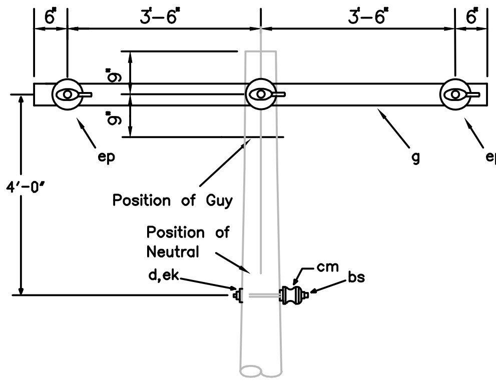
NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

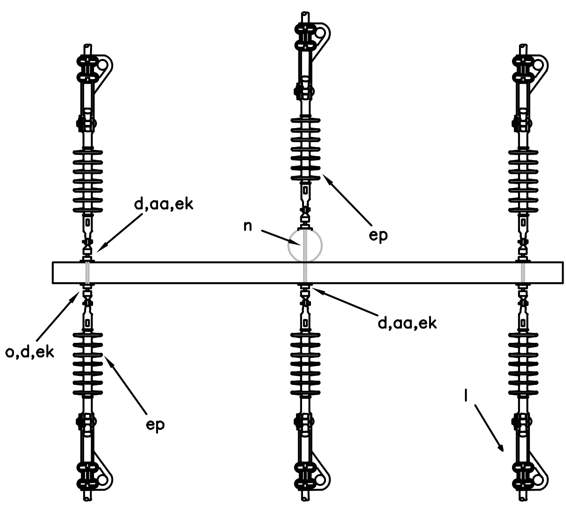
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length	o	1	Bolt, oval eye 5/8" x req'd length
d	3	Washer, square 2 1/4", as req'd	aa	2	Nut, oval eye 5/8"
g	1	Crossarm, 3'3/4"x4'3/4"x8'0" HD	ek	*	Locknuts, as required
l	8	Clamp, deadend shoe	ep	6	Insulator, epoxilator 25kv

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DEADEND(DOUBLE)HEAVY DUTY

FEB 2014	CHELCO	C8-HD





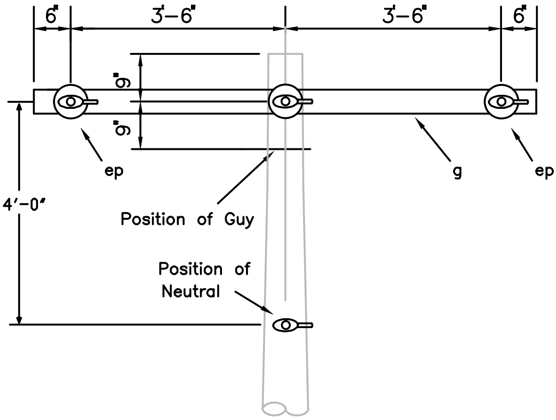
NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

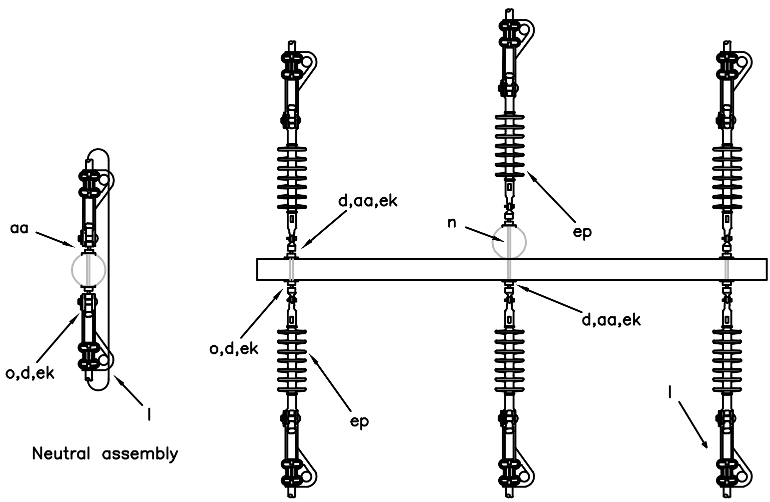
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 3/4" x req'd length	aa	3	Nut, oval eye 3/4" x required length
d	9	Washer, square 2 1/4", as req'd	bs	1	Bolt, single upset
g	1	Crossarm, 3 3/4"x 4 3/4"x10' steel	cm	1	Insulator, secondary spool
l	6	Clamp, deadend shoe	ek	*	Locknuts, as required
n	1	Bolt, dbl arming 5/8" x req'd length	ep	6	Insulator, epoxilator 25kv
o	3	Bolt, oval eye 3/4" x req'd length		2	Deadend distribution grip

Neutral on single upset

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DEADEND(DOUBLE)

FEB 2014 | CHELCO | C8-S



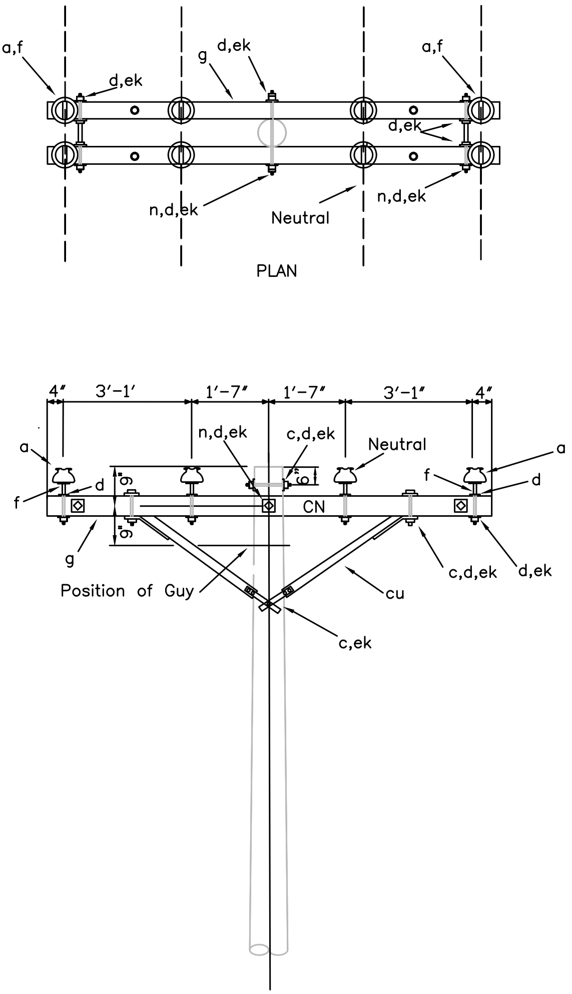


NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 3/4" x required length	o	3	Bolt, oval eye 3/4" x required length
d	9	Washer, square 2 1/4", as req'd	aa	2	Nut, oval eye 5/8" x required length
g	1	Crossarm, 3 3/4"x 4 3/4"x10' steel	aa	3	Nut, oval eye 3/4" x required length
l	8	Clamp, deadend shoe	ek	*	Locknuts, as required
n	1	Bolt, dbl arming 5/8" x req'd length	ep	6	Insulator, epoxilator 25kv

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DEADEND(DOUBLE)

FEB 2014	CHELCO	C8-S



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	8	Insulator, pin type 15kv	n	2	Bolt, dbl arming 5/8" x req'd length
c	2	Bolt, machine 5/8" x req'd length	cu	4	Brace x/arm 60" wood
c	4	Bolt, machine 1/2" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4", as req'd		4	Armor rods
f	8	Pin, steel crossarm		40	Conductor, aluminum tie wire
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		4	Letters, 2 'C', 2 'N' with 1" nails

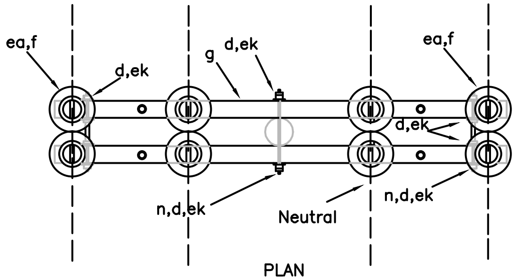
DESIGN LIMITS

Max. transverse load:1000 lbs. per conductor

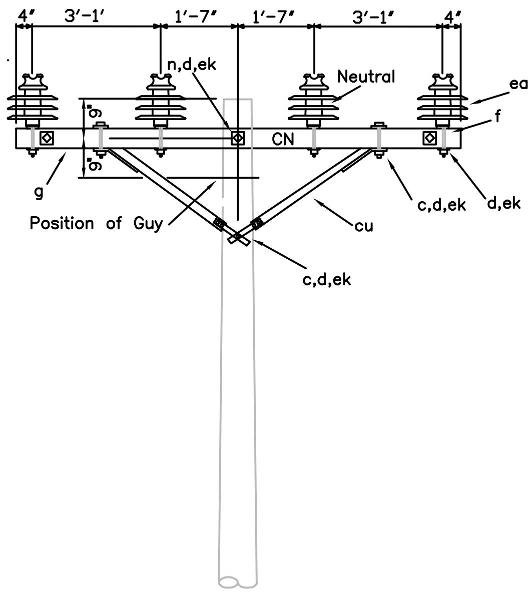
Max. line angle within load limits:20°

12.5/7.2 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION—DOUBLE LINE ARM

DEC. 2008	CHELCO	C9



PLAN



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	cu	4	Brace x/arm 60" wood
d	12	Washer, square 2 1/4", as req'd	ea	8	Insulator, screw on polymer, 25kV
f	8	Pin, steel crossarm	ek	*	Locknuts, as required
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		4	Armor rods
i	4	Bolt, carriage 3/8" x 4-1/2"		*	Conductor, aluminum tie wire
n	4	Bolt, dbl arming 5/8" x req'd length		4	Letters, 2 'C', 2 'N' with 1" nails

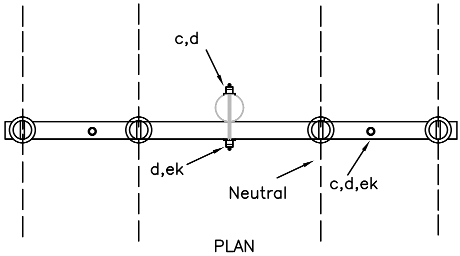
DESIGN LIMITS

Max. transverse load:1000 lbs. per conductor

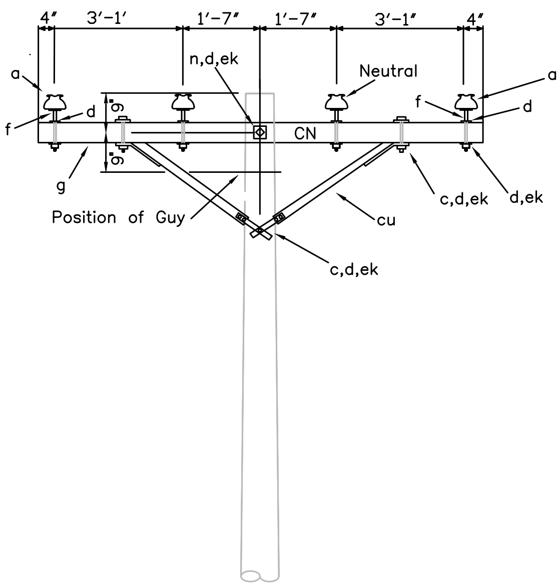
Max. line angle within load limits:20°

25 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION—DOUBLE LINE ARM

FEB 2014	CHELCO	VC9



PLAN



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator, pin type 15kv	cu	2	Brace x/arm 60" wood
c	2	Bolt, machine 1/2" x req'd length	ek	*	Locknuts, as required
c	2	Bolt, machine 5/8" x req'd length		4	Armor rods
d	8	Washer, square 2 1/4", as req'd		*	Conductor, aluminum tie wire
f	4	Pin, steel crossarm		4	Letters, 2 'C', 2 'N' with 1" nails
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'0"			

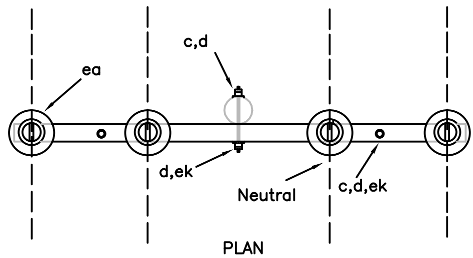
DESIGN LIMITS

Max. transverse load:1000 lbs. per conductor

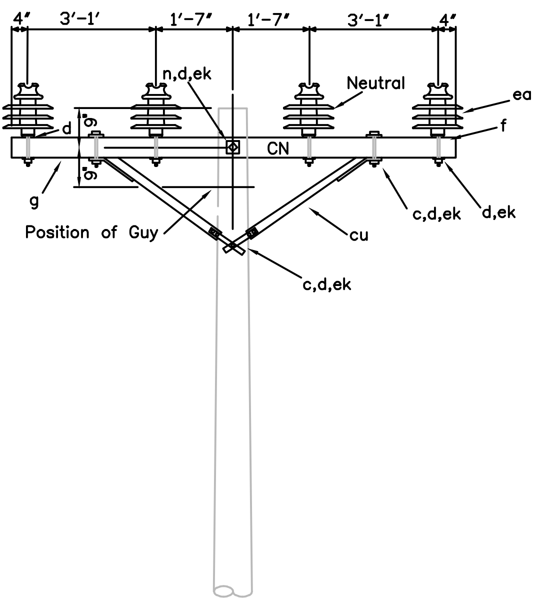
Max. line angle within load limits:20°

12.5/7.2 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION–SINGLE LINE ARM

DEC. 2008	CHELCO	C9–1



PLAN



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
			cu	2	Brace x/arm 60" wood
c	2	Bolt, machine 1/2" x req'd length	ea	4	Insulator, screw on polymer, 25kV
c	2	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	8	Washer, square 2 1/4", as req'd		4	Armor rods
f	4	Pin, steel crossarm		*	Conductor, aluminum tie wire
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'0"		4	Letters, 2 'C', 2 'N' with 1" nails

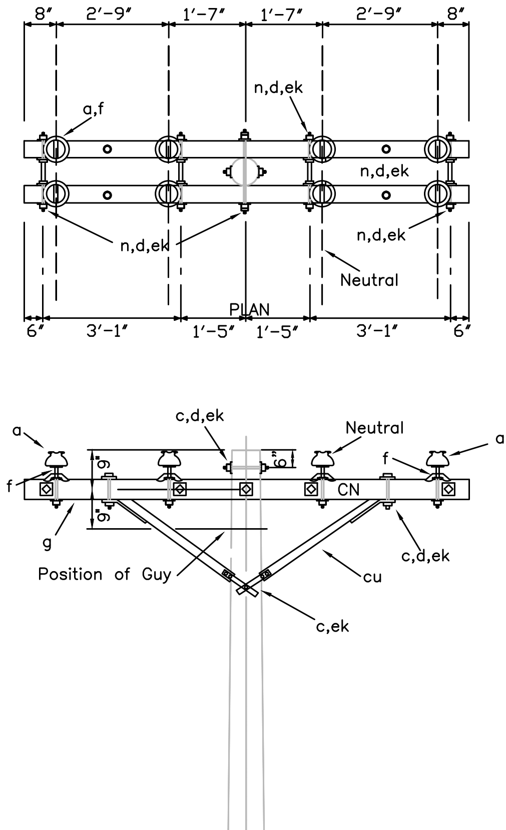
DESIGN LIMITS

Max. transverse load:1000 lbs. per conductor

Max. line angle within load limits:20°

25 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION–SINGLE LINE ARM

FEB 2014	CHELCO	VC9–1



NOTE:
This construction required for all conductors having a breaking strength of more than 4,500 pounds.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	8	Insulator, pin type 15kv	n	4	Bolt, dbl arming 5/8" x req'd length
c	4	Bolt, machine 1/2" x req'd length	cu	2	Brace x/arm 60" wood
c	2	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	20	Washer, square 2 1/4", as req'd		*	Conductor, aluminum tie wire
f	8	Pin, crossarm saddle		4	Letters, 2 'C', 2 'N' with 1" nails
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"			

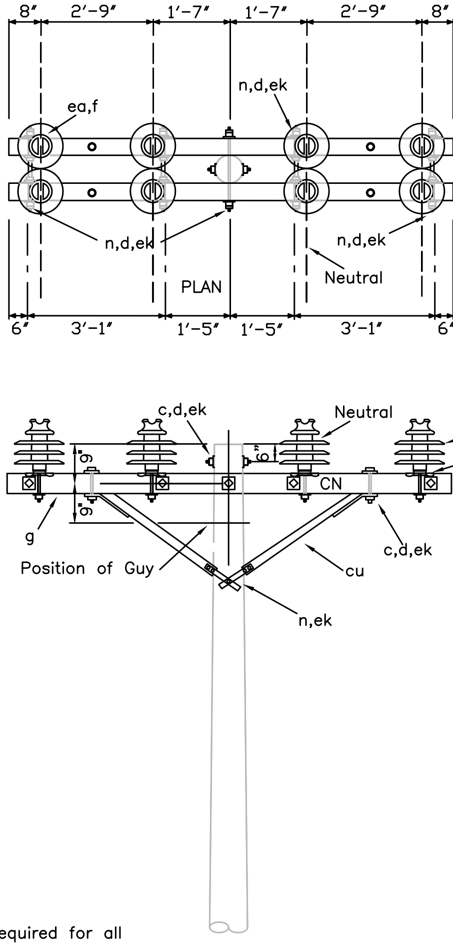
DESIGN LIMITS

Max. transverse load:2000 lbs. per conductor

Max. line angle within load limits: 5°

12.5/7.2 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION—DOUBLE LINE ARM

DEC. 2008	CHELCO	C9—2



NOTE:
This construction required for all conductors having a breaking strength of more than 4,500 pounds.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	cu	2	Brace x/arm 60" wood
c	1	Bolt, machine 5/8" x req'd length	ea	8	Insulator, screw on polymer, 25kV
d	12	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
f	8	Pin, crossarm saddle		*	Conductor, aluminum tie wire
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		4	Letters, 2 'C', 2 'N' with 1" nails
n	6	Bolt, dbl arming 5/8" x req'd length			

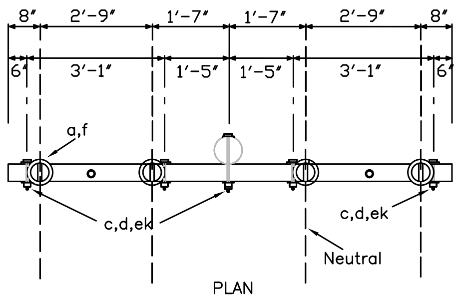
DESIGN LIMITS

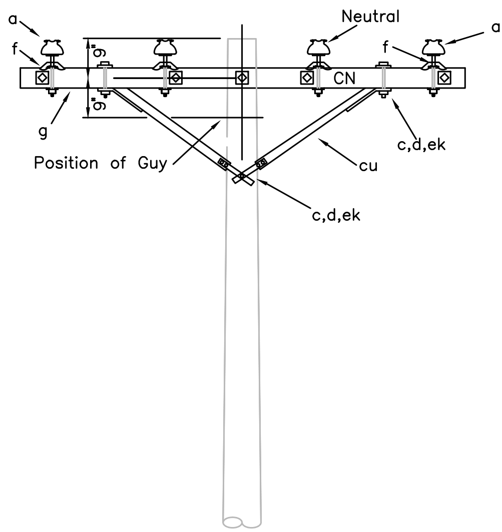
Max. transverse load:2000 lbs. per conductor

Max. line angle within load limits: 5°

25 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION—DOUBLE LINE ARM

DEC. 2008	CHELCO	VC9—2





NOTE:
This construction required for all conductors having a breaking strength of more than 4,500 pounds.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	4	Insulator, pin type 15kv	cu	1	Brace x/arm 60" wood
c	2	Bolt, machine 1/2" x req'd length	ek	*	Locknuts, as required
c	1	Bolt, machine 5/8" x req'd length		4	Armor rods
d	8	Washer, square 2 1/4", as req'd		4	Letters, 2 'C', 2 'N' with 1" nails
f	4	Pin, crossarm saddle			
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"			

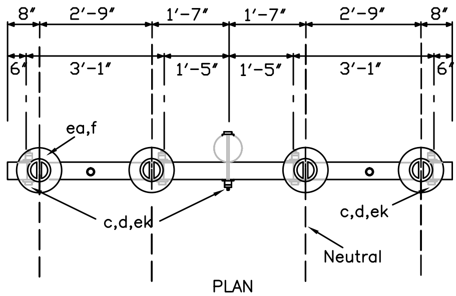
DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor

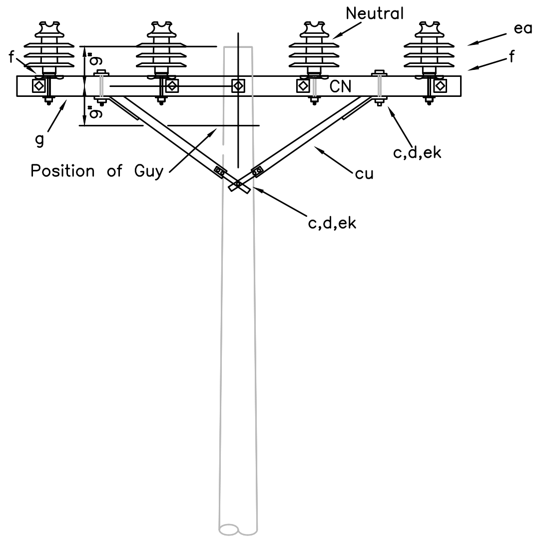
Max. line angle within load limits: 5°

12.5/7.2 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION—DOUBLE LINE ARM

DEC. 2008	CHELCO	C9–3



PLAN



NOTE:
This construction required for all conductors having a breaking strength of more than 4,500 pounds.

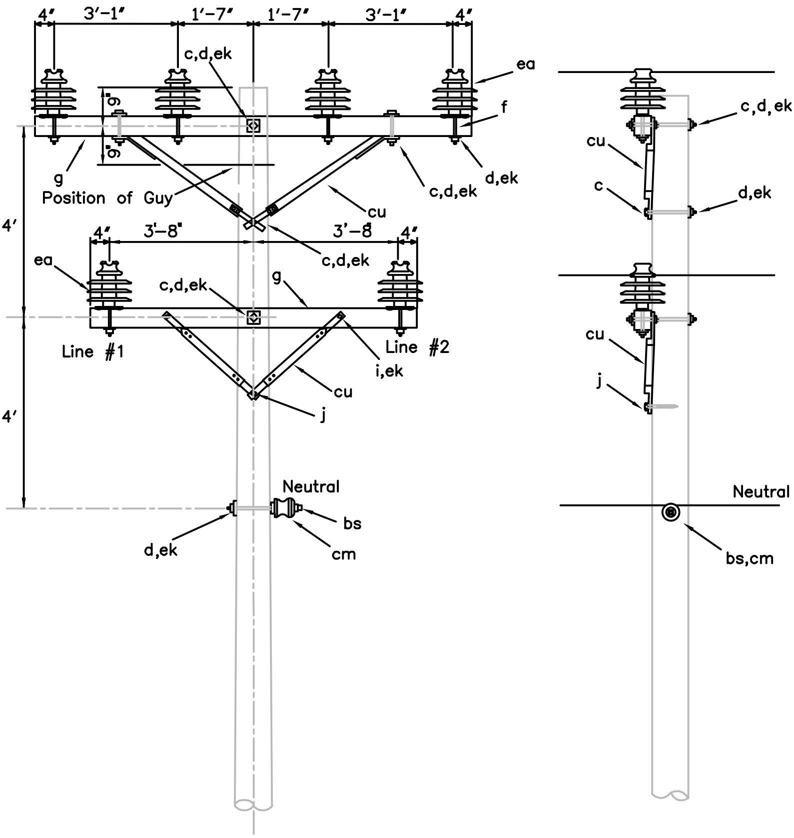
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 1/2" x req'd length	cu	1	Brace x/arm 60" wood
c	1	Bolt, machine 5/8" x req'd length	ea	4	Insulator, screw on polymer, 25kV
d	8	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
f	4	Pin, crossarm saddle		4	Armor rods
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		4	Letters, 2 'C', 2 'N' with 1" nails

DESIGN LIMITS

Max. line angle within load limits: 5°

25 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION–DOUBLE LINE ARM

DEC. 2008	CHELCO	VC9–3



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	3	Bolt, machine 5/8" x req'd length	cj	35	Conductor, No 4 S D copper
c	2	Bolt, machine 1/2" x req'd length	cm	1	Insulator, secondary spool
d	10	Washer, square 2 1/4", as req'd	cu	1	Brace x/arm 60" wood
g	1	Crossarm, 3 3/4" x 4 3/4" x 10'0"	cu	2	Brace x/arm 28" wood
g	1	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ea	6	Insulator, screw on polymer 25kV
f	6	Pin, crossarm saddle	ek	*	Locknuts, as required
i	4	Bolt, carriage 3/8" x 4-1/2"		1	Wraplock spool tie
j	1	Lag screw, 1/2" x 4-1/2"		6	Armor rods
bs	1	Bolt, single upset		*	Conductor, aluminum tie wire

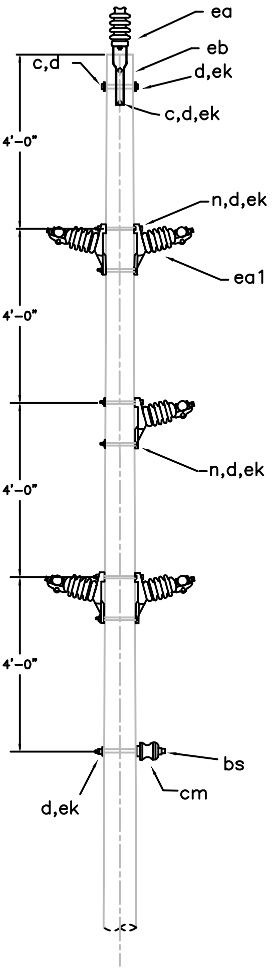
DESIGN LIMITS

Max. transverse load: 500 lbs. per conductor

Max. line angle within load limits: 5°

12.5/7.2 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION-DOUBLE CIRCUIT
SINGLE PRIMARY SUPPORT, 2 CROSSARM TYPE

JAN 2014	CHELCO	DC-C1-2



NOTES:
For conductors 4/0AAAC -741AAAC use 3/4" hardware.

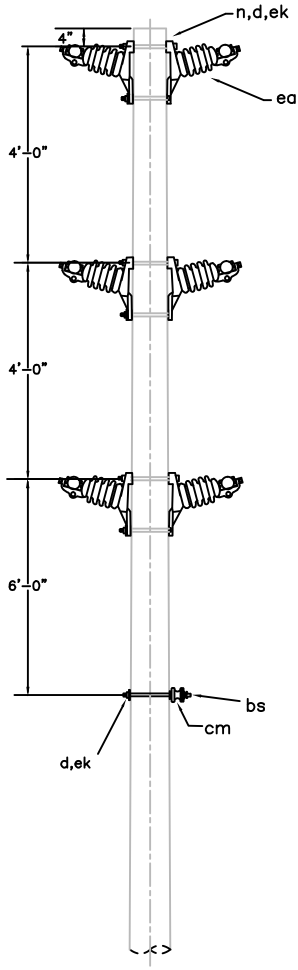
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine 5/8" x req'd length	eb	1	Bracket, pole top for screw-on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
n	4	Bolt, dbl arming x req'd length		5	Clamp for post insulator
bs	1	Bolt, single upset		5	Armor rods
cm	1	Insulator, secondary spool		*	Conductor, aluminum tie wire
ea	1	Insulator, post screw on type		1	Wraplock spool tie
ea1	5	Insulator, horizontal post		1	Wraplock top tie

DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5/7.2 kV PRIMARY
3 PHASE DOUBLE PRIMARY SUPPORT

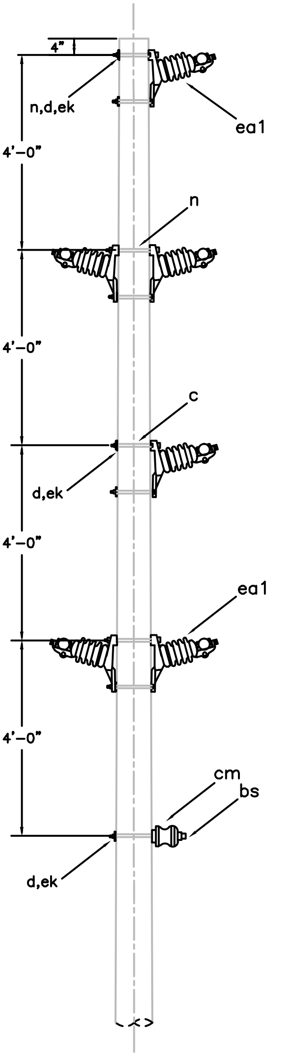
SEP. 2013	CHELCO	DC-C1P



NOTES:
For conductors 4/0AAAC –741AAAC use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
n	6	Bolt, dbl arming 5/8" x req'd length	ek	*	Locknuts, as required
d	7	Washer, square, 2 1/4" as req'd		6	Clamp for post insulator
bs	1	Bolt, single upset		6	Armor rods
cm	1	Insulator, secondary spool		1	Wraplock spool tie
ea1	6	Insulator, horizontal post			

DESIGN LIMITS	12.5/7.2 kV PRIMARY 3 PHASE NARROW PROFILE CONSTRUCTION		
Max. transverse load: 1000 lbs. per conductor Max. line angle within load limits: 5°	SEP. 2013	CHELCO	DC–C1PA



NOTES:
For conductors 4/0AAAC -741AAAC use 3/4" hardware.

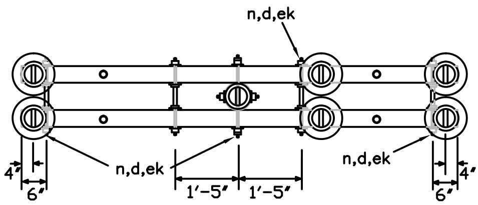
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	ea1	6	Insulator, horizontal post
d	9	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
n	4	Bolt, dbl arming 5/8" x req'd length		6	Clamp for post insulator
cm	1	Insulator, secondary spool		6	Armor rods
bs	1	Bolt, single upset		1	Wraplock spool tie

DESIGN LIMITS

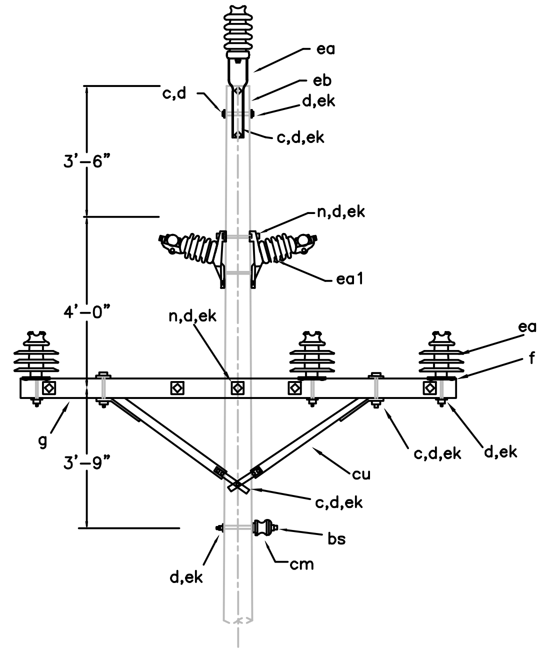
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5/7.2 kV PRIMARY 3 PHASE NARROW PROFILE CONSTRUCTION

SEP. 2013 | CHELCO | DC-C1PB



PLAN



NOTES:

For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

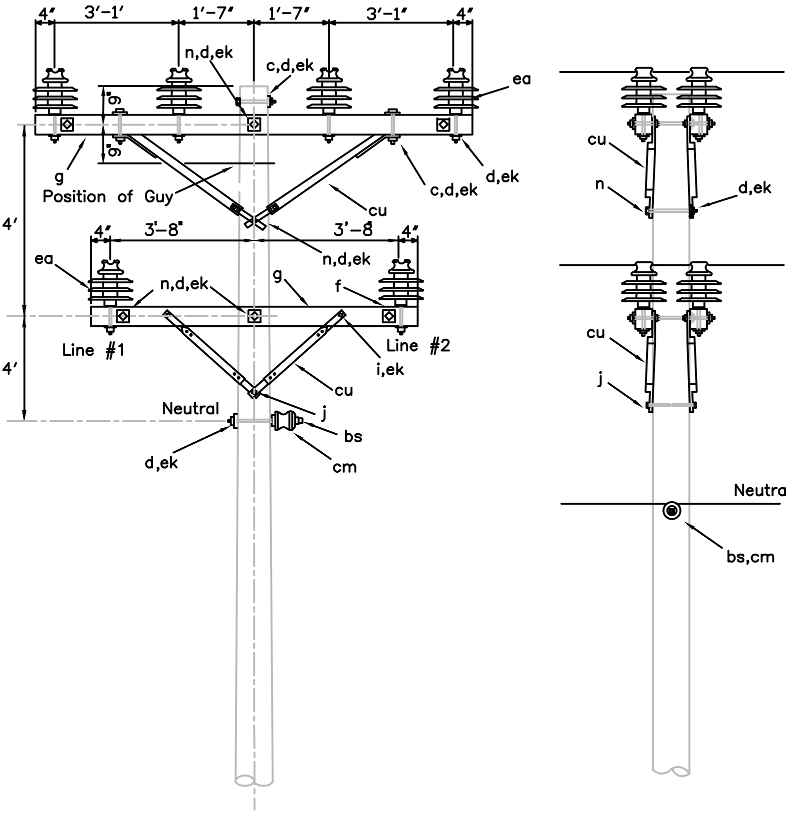
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	ea1	2	Insulator, horizontal post
c	4	Bolt, machine 1/2" x req'd length	eb	1	Bracket, pole top for screw–on
d	15	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
f	6	Pin, crossarm saddle	cu	4	Brace x/arm 60" wood
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"		2	Clamp for post insulator
n	7	Bolt, dbl arming x req'd length		5	Armor rods
bs	1	Bolt, single upset		1	Wraplock spool tie
cm	1	Insulator, secondary spool		1	Wraplock top tie
ea	7	Insulator, screw on polymer 25kV		*	Conductor, aluminum tie wire

DESIGN LIMITS

Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5/7.2 kV PRIMARY
3 PHASE DOUBLE PRIMARY SUPPORT

FEB 2014	CHELCO	DC–C1PC



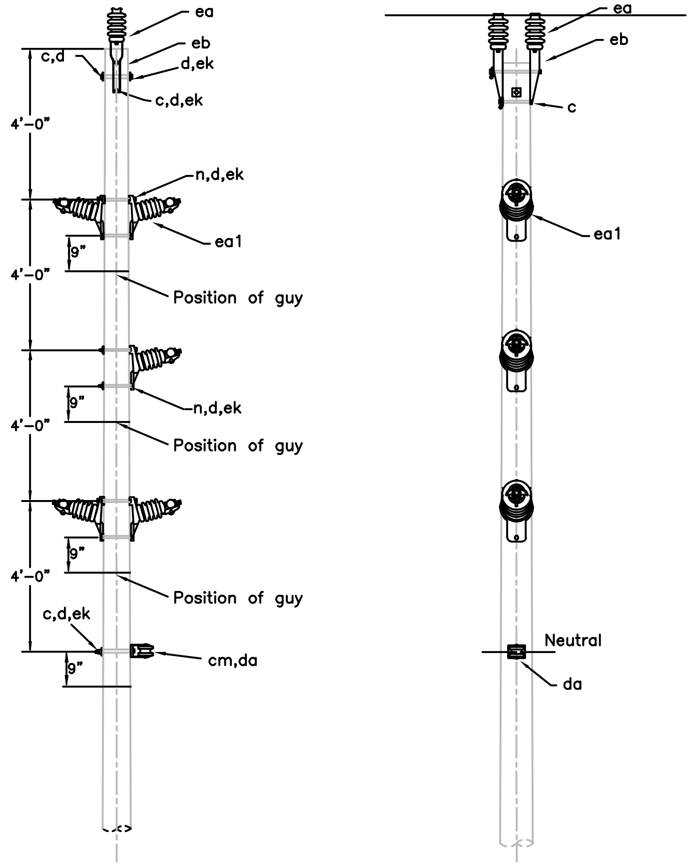
NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	cm	1	Insulator, secondary spool
d	24	Washer, square 2 1/4", as req'd	cu	2	Brace x/arm 60" wood
g	2	Crossarm, 3 3/4" x 4 3/4" x 10'0"	cu	4	Brace x/arm 28" wood
g	2	Crossarm, 3 3/4" x 4 3/4" x 8'0"	ea	12	Insulator, screw on polymer 25kV
f	12	Pin, steel crossarm	ek	*	Locknuts, as required
i	4	Bolt, carriage 3/8" x 4 1/2"		6	Armor rods
bs	1	Bolt, single upset		1	Wraplock spool tie
n	7	Bolt, dbl arming 5/8" x req'd length		*	Conductor, aluminum tie wire

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits:
Heavy- 5° to 12°
Light- 5° to 20°

12.5/7.2 kV PRIMARY, 3 PHASE
CROSSARM CONSTRUCTION-DOUBLE CIRCUIT
DOUBLE PRIMARY SUPPORT, 2 CROSSARM TYPE

FEB 2014	CHELCO	DC-C2



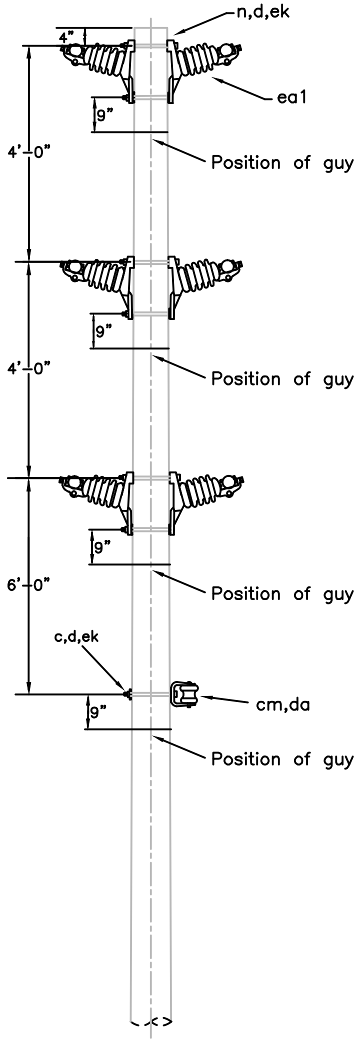
NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt, machine 5/8" x req'd length	eb	2	Bracket, pole top for screw–on
d	8	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
n	4	Bolt, dbl arming x req'd length		5	Clamp for post insulator
cm	1	Insulator, secondary spool		5	Clamp, bonding post type 5/8"
da	1	Clevis, secondary rigid		6	Armor rods
ea	2	Insulator, post screw on type		25	Conductor, aluminum tie wire
ea1	5	Insulator, horizontal post		1	Wraplock spool tie

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits:
Heavy– 5° to 12°
Light– 5° to 20°

12.5/7.2 kV PRIMARY
3 PHASE DOUBLE PRIMARY SUPPORT

FEB 2014 | CHELCO | DC–C2P



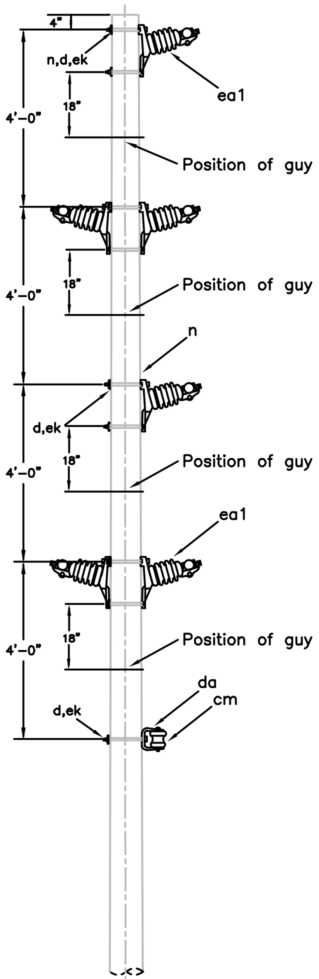
NOTES:
For conductors 4/0AAAC –741AAAC use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 5/8" x req'd length	ea1	6	Insulator, horizontal post
d	1	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
n	6	Bolt, dbl arming 5/8" x req'd length		6	Clamp for post insulator
cm	1	Insulator, secondary spool		6	Armor rods
da	1	Clevis, secondary rigid		1	Wraplock spool tie

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits:
Heavy– 5° to 12°
Light– 5° to 20°

12.5/7.2 kV PRIMARY 3 PHASE
NARROW PROFILE CONSTRUCTION

SEP. 2013 | CHELCO | DC–C2PA



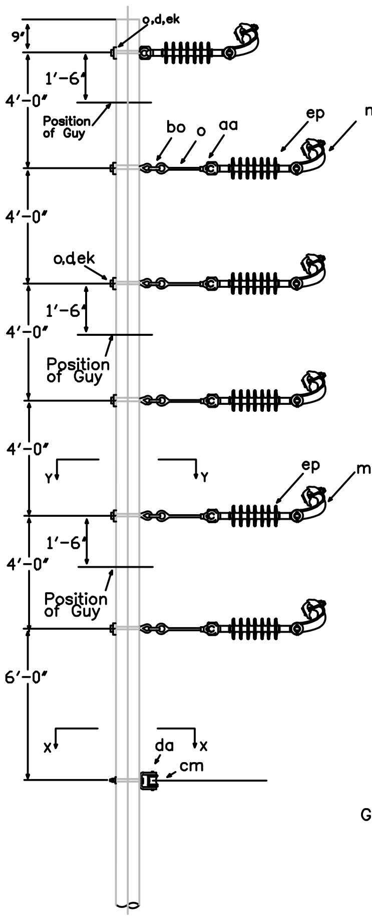
NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

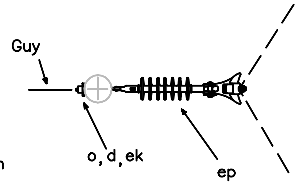
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine 5/8" x req'd length	ea1	6	Insulator, horizontal post
d	5	Washer, square, 2 1/4" as req'd	ek	*	Locknuts, as required
n	4	Bolt, dbl arming 5/8" x req'd length		6	Clamp for post insulator
cm	1	Insulator, secondary spool		6	Armor rods 394.5AAAC
da	1	Clevis, secondary rigid		1	Wraplock spool tie

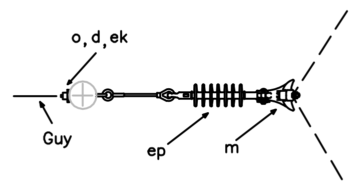
DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits:
Heavy– 5° to 12°
Light– 5° to 20°

12.5/7.2 kV PRIMARY 3 PHASE
NARROW PROFILE CONSTRUCTION

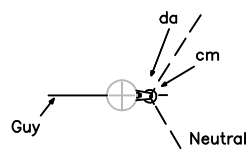
FEB 2014	CHELCO	DC–C2PB







SECTION Y–Y



SECTION X–X

NOTE: Under certain conditions this construction may be built on 2 poles. With 7' minimum distance between conductors on adjacent poles.

NOTES:

For conductors 4/0AAAC –741AAAC use 3/4" hardware.

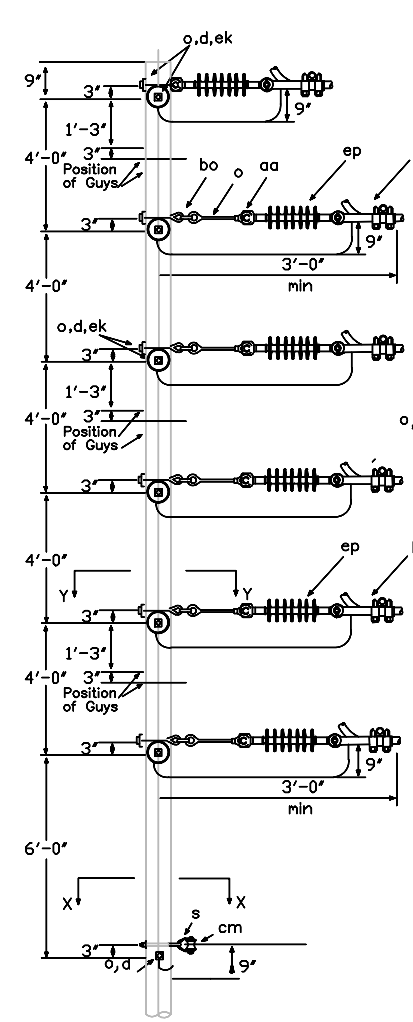
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	7	Washer, square 2 1/4"	bo	5	Shackle, anchor
m	6	Clamp, Susp 2 bolt #4–3/0	cm	1	Insulator, secondary spool
o	11	Bolt, oval eye, 5/8" as required	ek	*	Locknuts, as required
da	1	Clevis secondary rigid	ep	6	Insulator, epoxilator 25kV
aa	5	Nut, oval eye 5/8"		1	Wraplock top tie

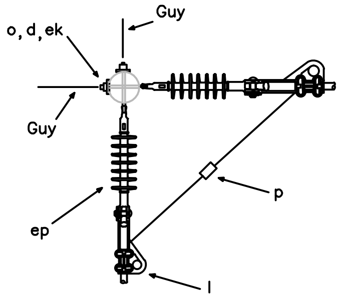
DESIGN LIMITS

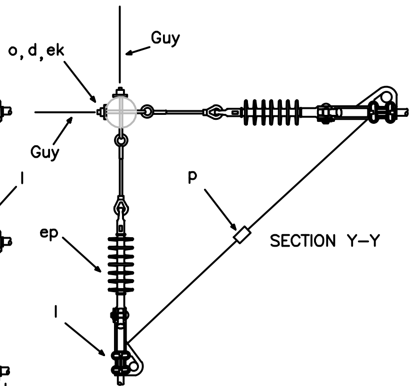
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits:
Heavy– 13° to 45°
Light– 20° to 60°

12.5/7.2 kV PRIMARY
3 PHASE, VERTICAL CONSTRUCTION

FEB 2014	CHELCO	DC–C3–1A

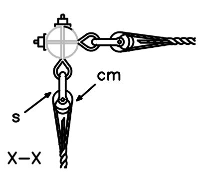






SECTION Y-Y

NOTE: Under certain conditions this construction may be built on 2 poles. With 7' minimum distance between conductors on adjacent poles.



SECTION X-X

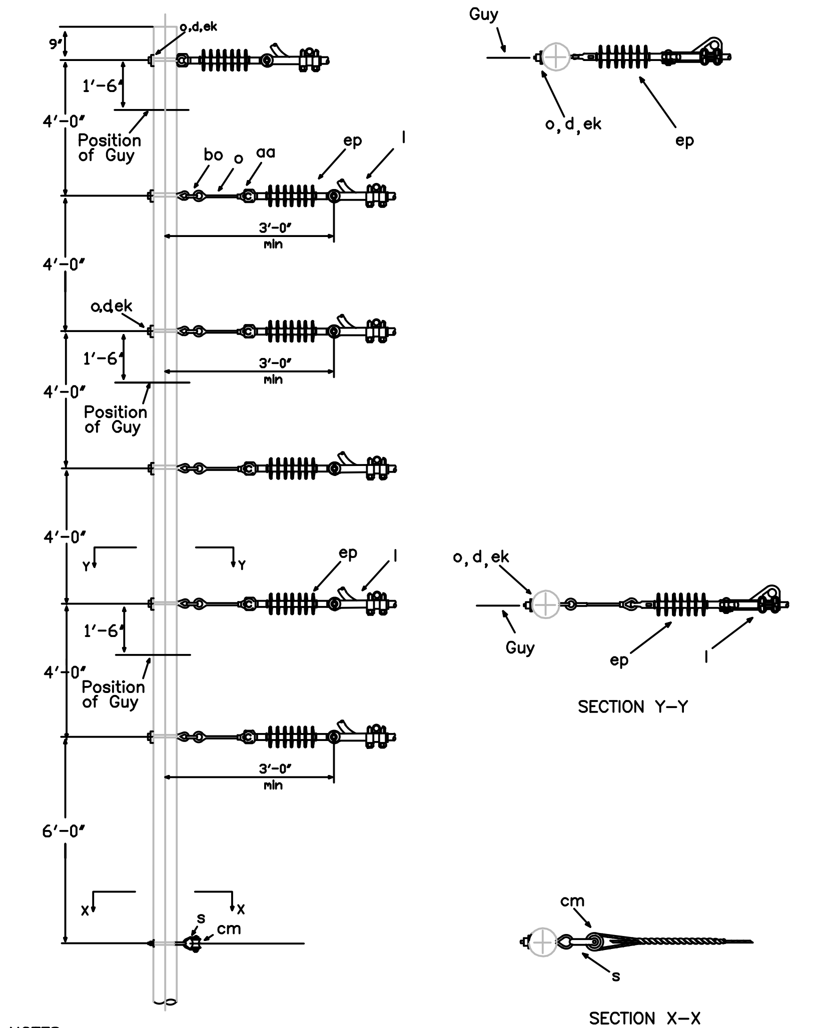
NOTES:
For conductors 4/0AAAC -741AAAC use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	14	Washer, square 2 1/4"	bo	10	Shackle, anchor
l	12	Clamp, deadend shoe	cm	2	Insulator, secondary spool
o	24	Bolt, oval eye, 5/8" as required	ek	*	Locknuts, as required
p	*	Connectors, as required	ep	12	Insulator, epoxilator 25kV
s	2	Clevis, secondary swinging		2	Deadend distribution grip
aa	10	Nut, oval eye 5/8"			

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits:
Heavy- 45° to 90°
Light- 60° to 90°

12.5/7.2 kV PRIMARY, 3 PHASE
VERTICAL CONSTRUCTION, DOUBLE CIRCUIT

FEB 2014	CHELCO	DC-C4-1A

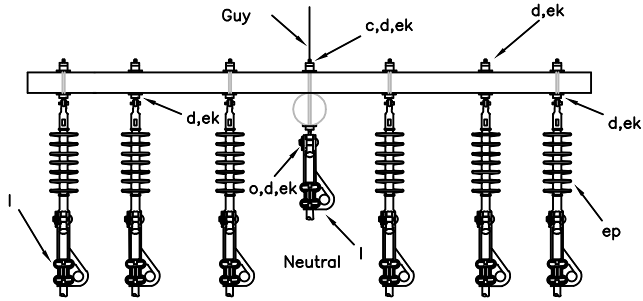


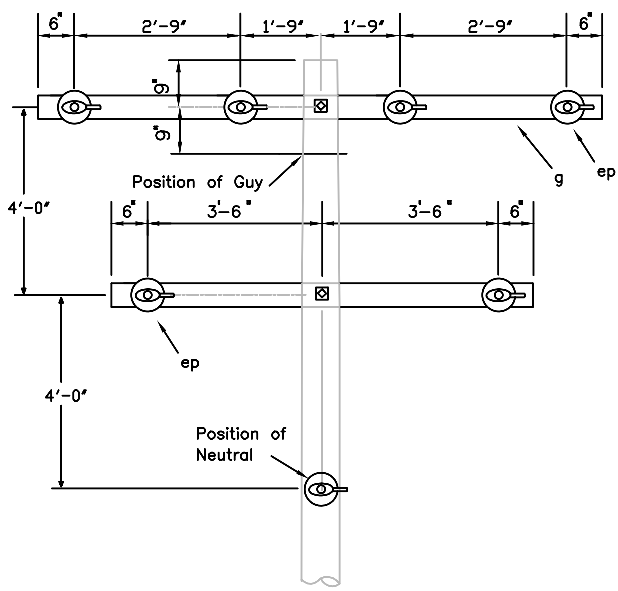
NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	7	Washer, square 2 1/4"	bo	5	Shackle, anchor
l	6	Clamp, deadend shoe	cm	1	Insulator, secondary spool
o	12	Bolt, oval eye, 5/8" as required	ek	*	Locknuts, as required
s	1	Clevis, secondary swinging	ep	6	Insulator, epoxilator 25kV
aa	5	Nut, oval eye 5/8"		1	Deadend distribution grip

DESIGN LIMITS	12.5/7.2 kV PRIMARY
Max. transverse load: 1000 lbs. per conductor	3 PHASE, VERTICAL CONSTRUCTION DOUBLE CIRCUIT, DEADEND

FEB 2014	CHELCO	DC–C5–1A





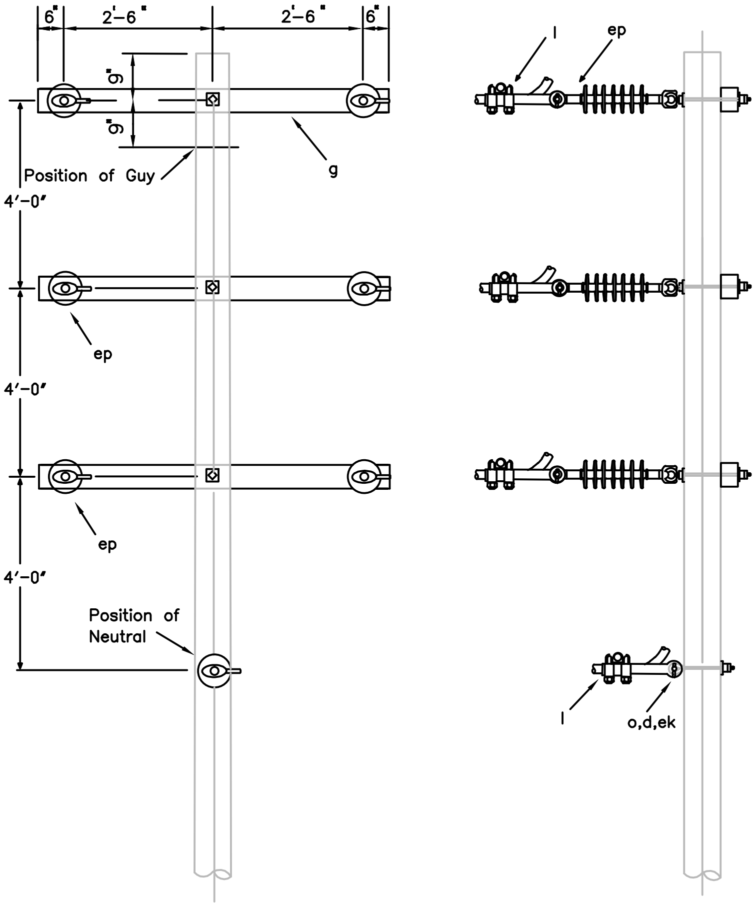
NOTES:
For conductors 4/0AAAC -741AAAC use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 3/4" x required length	ek	*	Locknuts, as required
d	6	Washer, square 2 1/4", as req'd	ep	6	Insulator, epoxilator 25kv
g	1	Crossarm, 3 3/4"x4 3/4"x10'0" steel		6	Bolt, shoulder eyebolt 3/4" x 8"
g	1	Crossarm, 3 3/4"x4 3/4"x8'0" steel		1	Bolt, shoulder eyebolt 3/4" x 24"
l	7	Clamp, deadend shoe			

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DOUBLE CIRCUIT, DEADEND

FEB 2014	CHELCO	DC-C7-S

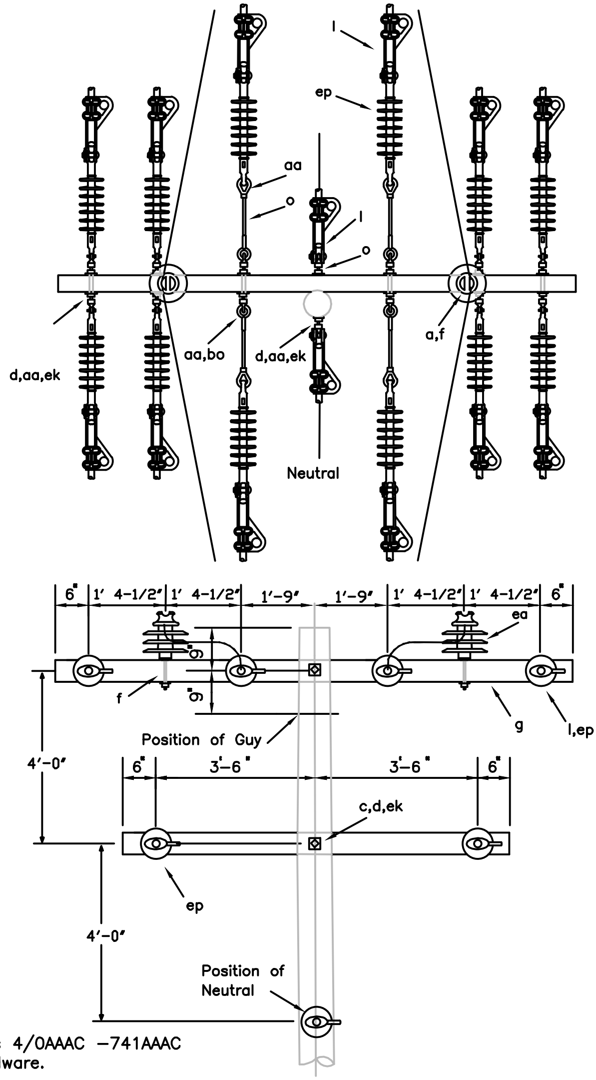


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	3	Bolt, machine 3/4" x required length	o	1	Bolt, oval eye 3/4" x req'd length
d	6	Washer, square 2 1/4", as req'd	ek	*	Locknuts, as required
g	3	Crossarm, 3 3/4"x4 3/4"x6'0" steel	ep	6	Insulator, epoxilator 25kV
l	7	Clamp, deadend shoe			

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DOUBLE CIRCUIT, DEADEND

FEB 2014	CHELCO	DC-C7V



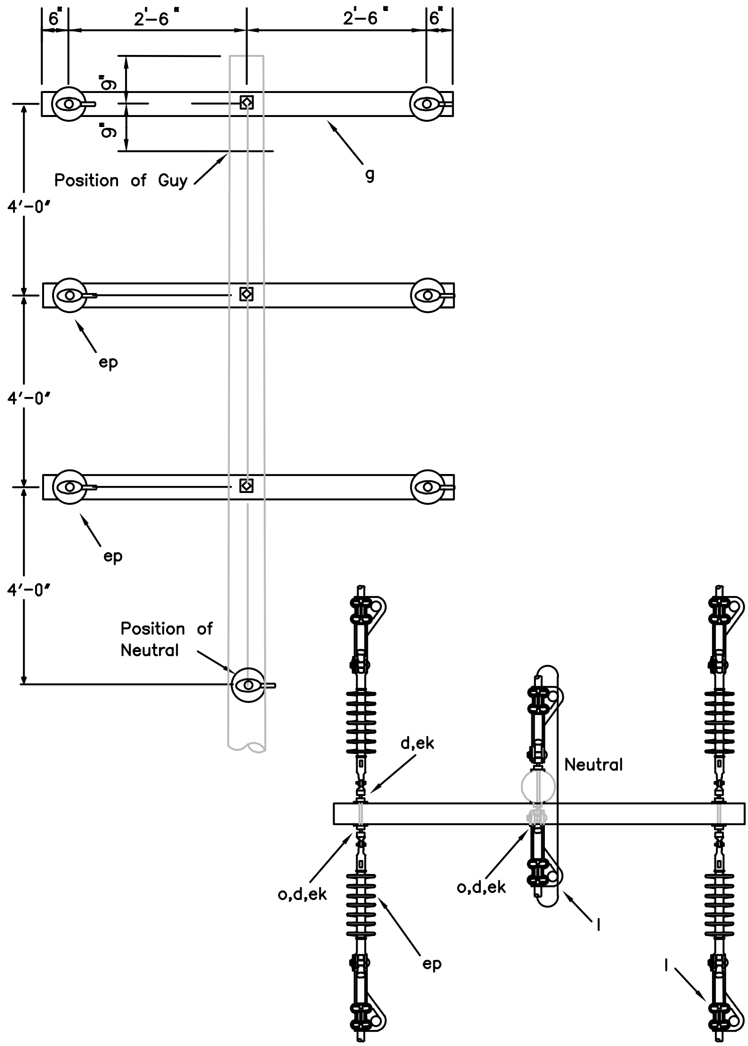
NOTES:
For conductors 4/0AAAC -741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	o	5	Bolt, oval eye 5/8" x req'd
d	10	Washer, square 2 1/4", as req'd	aa	17	Nut, oval eye 5/8"
f	2	Pin, steel crossarm	bo	4	Shackle, anchor
g	1	Crossarm, 3 3/4" x 4 3/4" x 10' steel	ea	2	Insulator, screw on polymer 25kV
g	1	Crossarm, 3 3/4" x 4 3/4" x 8' steel	ek	*	Locknuts, as required
l	14	Clamp, deadend shoe	ep	12	Insulator, epoxilator 25kv

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DOUBLE CIRCUIT, DEADEND(DOUBLE)

DEC. 2013	CHELCO	DC-C8L

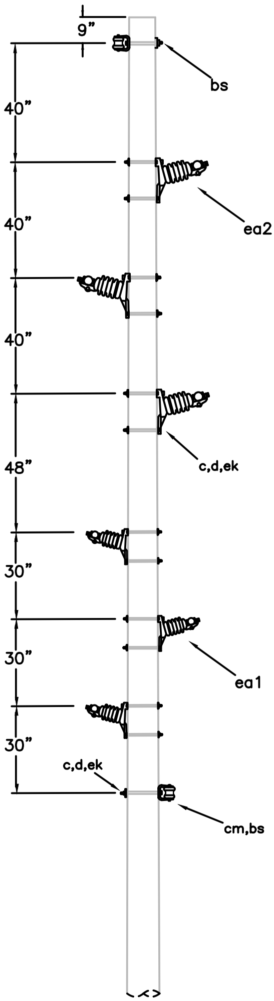


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
d	6	Washer, square 2 1/4", as req'd	o	1	Bolt, oval eye 3/4" x req'd length
g	3	Crossarm, 3 3/4"x4 3/4"x6'0" steel	aa	6	Nut, oval eye 3/4"
l	14	Clamp, deadend shoe	ek	*	Locknuts, as required
o	6	Bolt, oval eye 3/4" x req'd length	ep	12	Insulator, epoxilator 25kV

Notes:
See drawing E5-1 for crossarm loading limitations

12.5/7.2 kV PRIMARY
3 PHASE, CROSSARM CONSTRUCTION
DOUBLE CIRCUIT, DEADEND

FEB 2014	CHELCO	DC-C8V



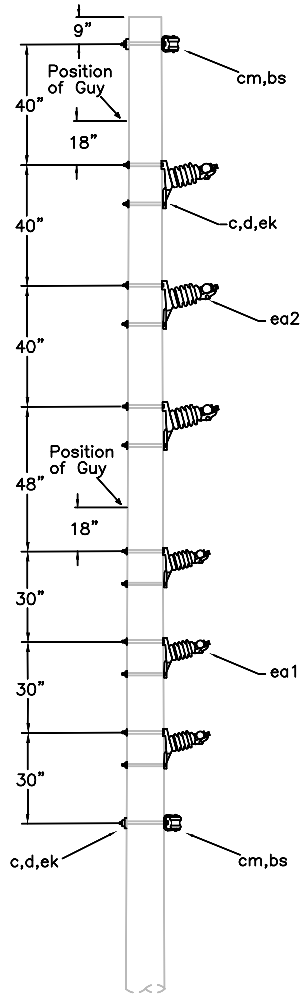
NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
bs	2	Bolt, single upset	ea1	3	Insulator, horizontal post 35kV
c	12	Bolt, machine 3/4" x req'd length	ea2	3	Insulator, horizontal post 46kV
cm	2	Insulator, secondary spool	ek	*	Locknuts, as required
d	14	Washer, curved		6	Armor Rods
				2	Wraplock Spool Tie

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits: 5°

12.5/7.2–25/14.4 kV PRIMARY DUAL VOLTAGE NARROW PROFILE CONSTRUCTION

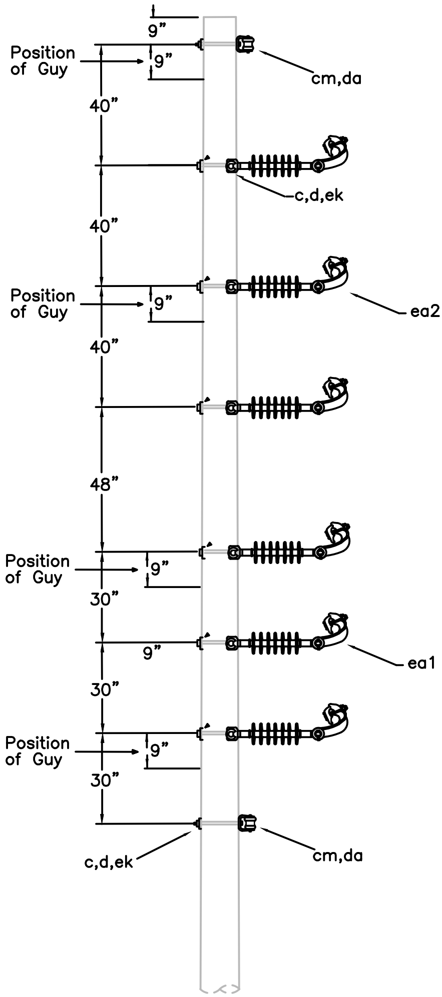
MAR 2019	CHELCO	DV–C1PA



NOTES:
For conductors 4/0AAAC –741AAAC
use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	14	Bolt, machine 3/4" x req'd length	ea1	3	Insulator, horizontal post 35kV
cm	2	Insulator, secondary spool	ea2	3	Insulator, horizontal post 46kV
d	14	Washer, curved	ek	*	Locknuts, as required
bs	2	Single upset bolt		6	Armor Rods
				2	Wraplock Spool Ties

DESIGN LIMITS	12.5/7.2–25/14.4 kV PRIMARY DUAL VOLTAGE NARROW PROFILE CONSTRUCTION		
Heavy– 5° to 20°	MAR 2019	CHELCO	DV–C2PA



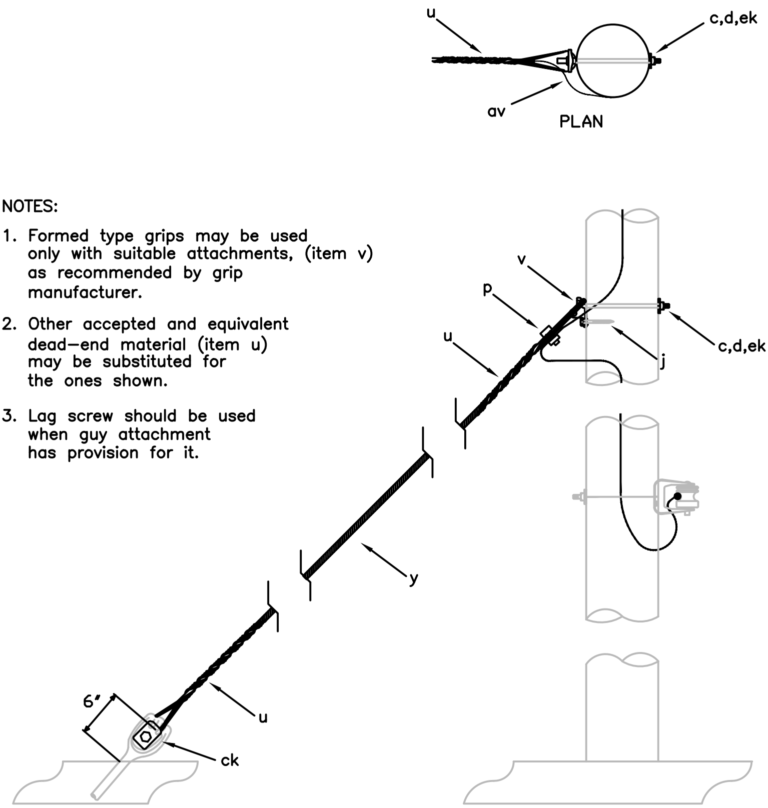
NOTES:
For conductors 4/0AAAC –741AAAC use 3/4" hardware.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	10	Bolt, machine 3/4" x req'd length	ea1	3	Insulator, 35kV
cm	2	Insulator, secondary spool	ea2	3	Insulator, 35kV
d	16	Washer, curved	ek	*	Locknuts, as required
da	2	Clevis, secondary rigid	o	6	Oval Eye Bolt, 5/8"
				6	Armour Rods

DESIGN LIMITS
Max. transverse load: 1000 lbs. per conductor
Max. line angle within load limits:
Heavy– 13° to 45°
Light– 20° to 60°

12.5/7.2–25/14.4 kV PRIMARY DUAL VOLTAGE NARROW PROFILE CONSTRUCTION

MAR 2019	CHELCO	DV–C3



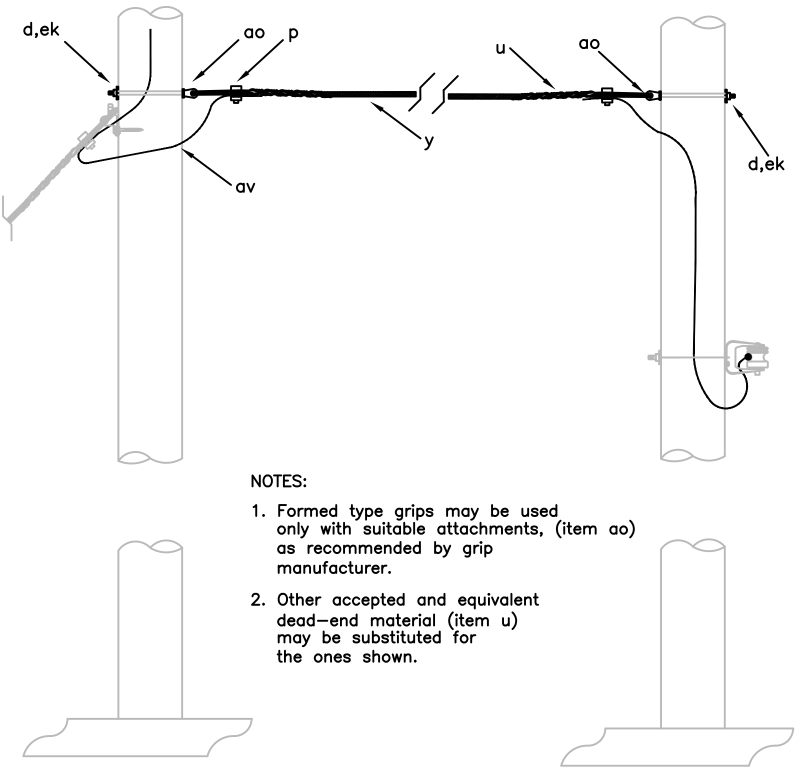
NOTES:

1. Formed type grips may be used only with suitable attachments, (item v) as recommended by grip manufacturer.
2. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.
3. Lag screw should be used when guy attachment has provision for it.

		ASSEMBLY UNIT		
		E1-2	E1-3	E1-4
ITEM	MATERIAL	REQUIRED	REQUIRED	REQUIRED
c	Bolt, machine 5/8" x req'd length	1	1	2
d	Washer, curved	1	1	1
j	Lag screw 1/2" x 4"	1	1	1
p	Connectors	as required	as required	as required
u	Deadend, preform guy 3/8"			2
u	Deadend, preform guy 8m	2		
u	Deadend, preform guy 10m		2	
v	Attachment, guy	1(5200 lbs)	1-H.D.(8500lbs)	1-H.D.(8500lbs)
y	Wire, guy alumoweld by req'd length	8M	10M	3/8"
av	Jumper	as required	as required	as required
ck	Clamp, anchor rod bond	1	1	1
ek	Locknuts	as required	as required	as required

12.5\7.2 kV PRIMARY
SINGLE DOWN GUY, THROUGH BOLT TYPE

MAY 2018	CHELCO	E1-2 E1-4 E1-3



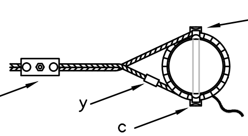
NOTES:

1. Formed type grips may be used only with suitable attachments, (item ao) as recommended by grip manufacturer.

2. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.

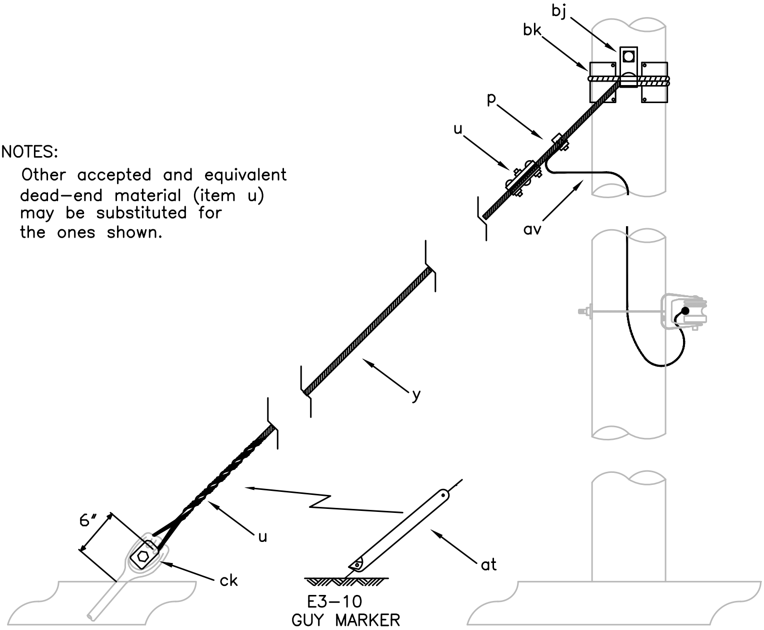
		ASSEMBLY UNIT		
		E2-2	E2-3	E2-4
ITEM	MATERIAL	REQUIRED	REQUIRED	REQUIRED
d	Washer, curved	2	2	2
p	Connectors	as required	as required	as required
u	Deadend, preform guy 3/8"			2
u	Deadend, preform guy 8m	2		
u	Deadend, preform guy 10m		2	
y	Wire, guy alumoweld by req'd length	8M	10M	3/8"
ab	Nut, thimble eye 5/8" x all	1	1	
ao	Bolt, thimble eye 5/8" x all	1	1	2
av	Jumper	as required	as required	as required
ek	Locknuts	as required	as required	as required

12.5\7.2 kV PRIMARY OVERHEAD GUY, THROUGH BOLT		
MAY 2018	CHELCO	E2-2 E2-4 E2-3



PLAN

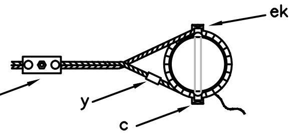
NOTES:
Other accepted and equivalent dead—end material (item u) may be substituted for the ones shown.



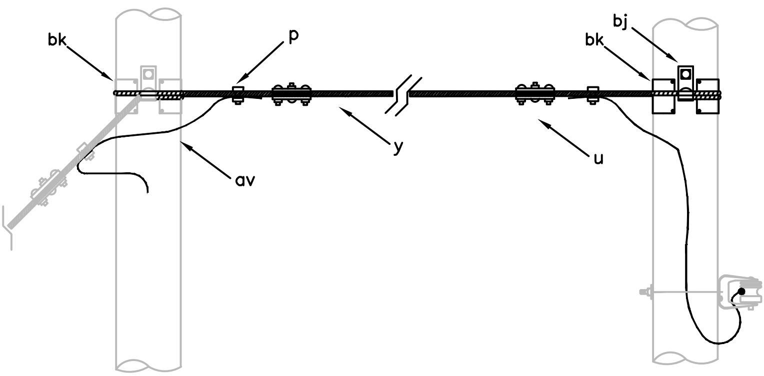
ITEM	MATERIAL	ASSEMBLY UNIT E3—2 REQUIRED	ASSEMBLY UNIT E3—3 REQUIRED	
c	Bolt, machine 5/8" x req'd length	1	1	
p	Connectors	as required	as required	
u	Deadend, preform guy 8m	8M	10M	
u	3 bolt guy clamp	1	1	
y	Wire, guy alumoweld by req'd length	8M	10M	
av	Jumper	as required	as required	
bj	Guy hook, J	2	2	
bk	Guy plate, 4"x8", 14 guage	1	1	
bp	Nail, 8 penny galvanized	8	8	
ck	Clamp, anchor rod bond	1	1	
ek	Locknuts	as required	as required	
at	Guy marker 8' min. length			

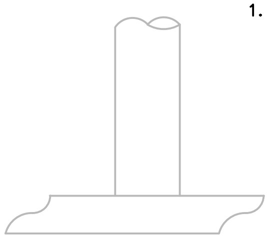
12.5\7.2 kV PRIMARY
WRAP DOWN GUY, GUY GUARD

DEC. 2008	CHELCO	E3—2 E3—3 E3—10



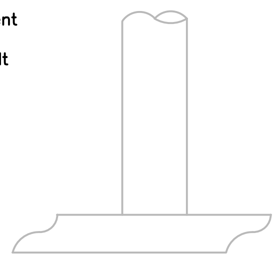
PLAN





NOTES:

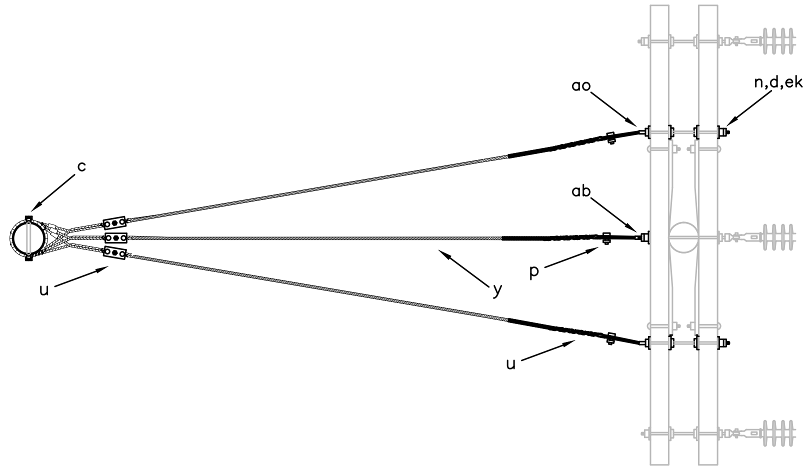
1. Other accepted and equivalent guy clamps (item u) may be substituted for the 3 bolt clamp shown.



		ASSEMBLY UNIT		
		E4-3		
ITEM	MATERIAL	REQUIRED		
c	Bolt, machine 5/8" x req'd length	1		
p	Connectors	as required		
u	3 bolt guy clamp	2		
y	Wire, guy alumoweld by req'd length	10M		
av	Jumper	as required		
bj	Guy hook, J	2		
bk	Guy plate, 4"x8", 14 guage	2		
bp	Nail, 8 penny galvanized	8		
ek	Locknuts	as required		

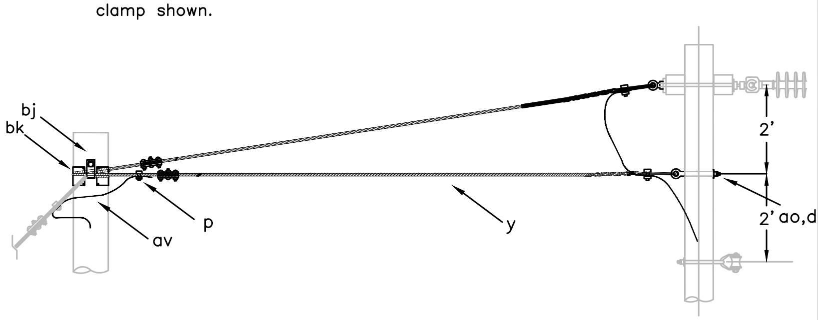
12.5\7.2 kV PRIMARY
OVERHEAD GUY, THROUGH BOLT

NOV. 2012	CHELCO	E4-3



NOTES:

1. Other accepted and equivalent guy clamps (item u) may be substituted for the 3 bolt clamp shown.



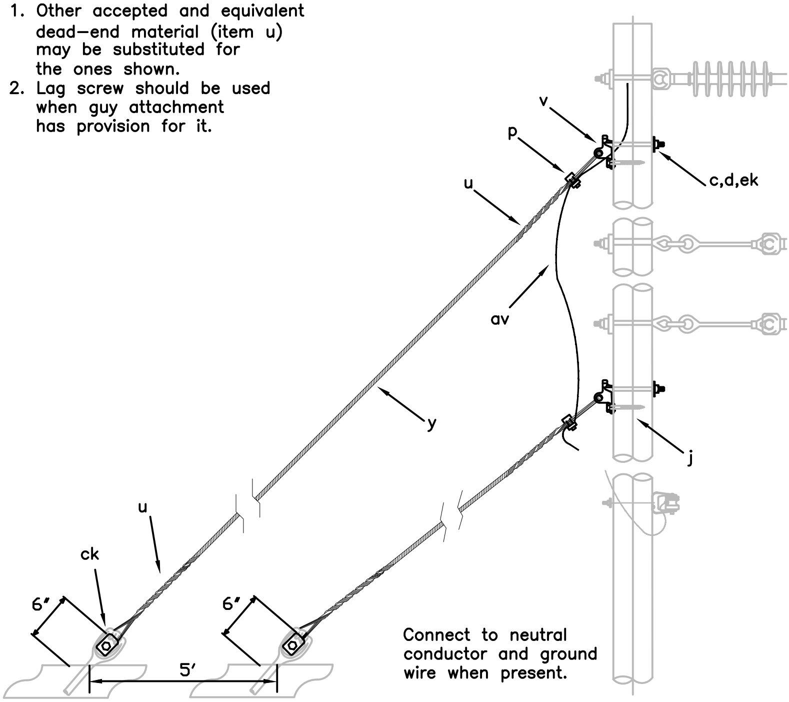
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine 5/8" x req'd length	ab	1	Bolt, thimble eye 5/8" x req'd lngth
d	9	Washer, square 2 1/4"	ao	2	Nut, thimble eye 5/8"
n	2	Bolt, dbl arming 5/8" x req'd length	av	*	Jumper
p	*	Connectors	bj	2	Guy hook, J
u	3	Deaadend, preform guy 10m	bk	2	Guy plate, 4"x8", 14 guage
u	3	3 bolt guy clamp	bp	8	Nails, 8 penny galvanized
y	*	Wire, 10m guy alumoweld as req'd	ek	*	Locknuts

12.5\7.2 kV PRIMARY
DEADEND GUY CROSSARM CONSTRUCTION

DEC. 2008	CHELCO	E5−1

NOTES:

1. Other accepted and equivalent dead—end material (item u) may be substituted for the ones shown.
2. Lag screw should be used when guy attachment has provision for it.



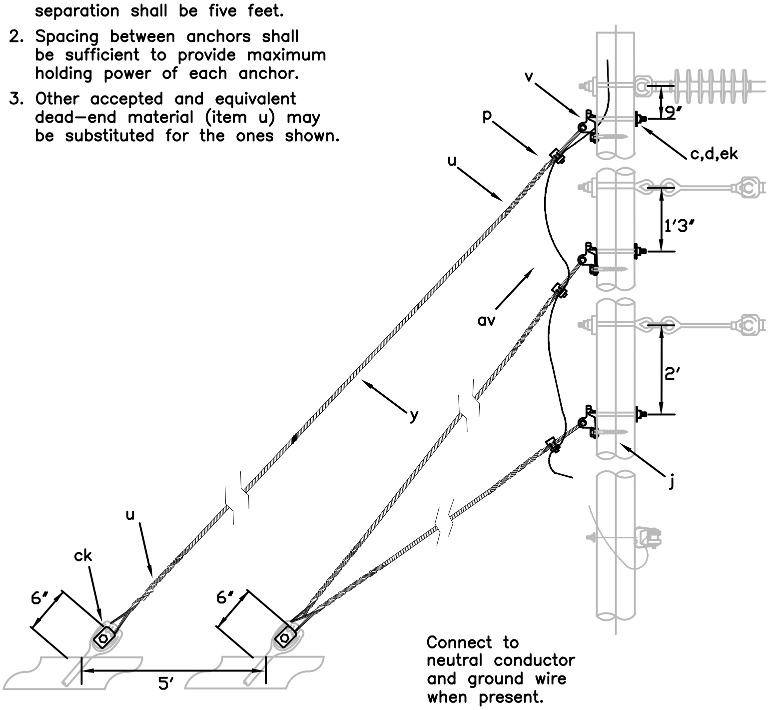
ITEM	MATERIAL	ASSEMBLY UNIT E6—2 REQUIRED	ASSEMBLY UNIT E6—3 REQUIRED	ASSEMBLY UNIT E6—4 REQUIRED
c	Bolt, machine 5/8" x req'd length	2	2	2
d	Washer, curved	2	2	2
j	Lag screw 1/2" x 4'	2	2	2
p	Connectors	as required	as required	as required
u	Deadend, preform guy 3/8"			4
u	Deadend, preform guy 8m	4		
u	Deadend, preform guy 10m		4	
v	Attachment, guy	2(5200 lbs)	2H.D.(8500 lbs)	2H.D.(8500 lbs)
y	Wire, guy alumoweld by req'd length	8M	10M	3/8"
av	Jumper	as required	as required	as required
ck	Clamp, anchor rod bond	2	2	2
ek	Locknuts	as required	as required	as required

12.5\7.2 kV PRIMARY
DOUBLE DOWN GUY

MAY 2018	CHELCO	E6—2 E6—4 E6—3

NOTES:

1. Where three separate anchors are installed the minimum separation shall be five feet.
2. Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
3. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.



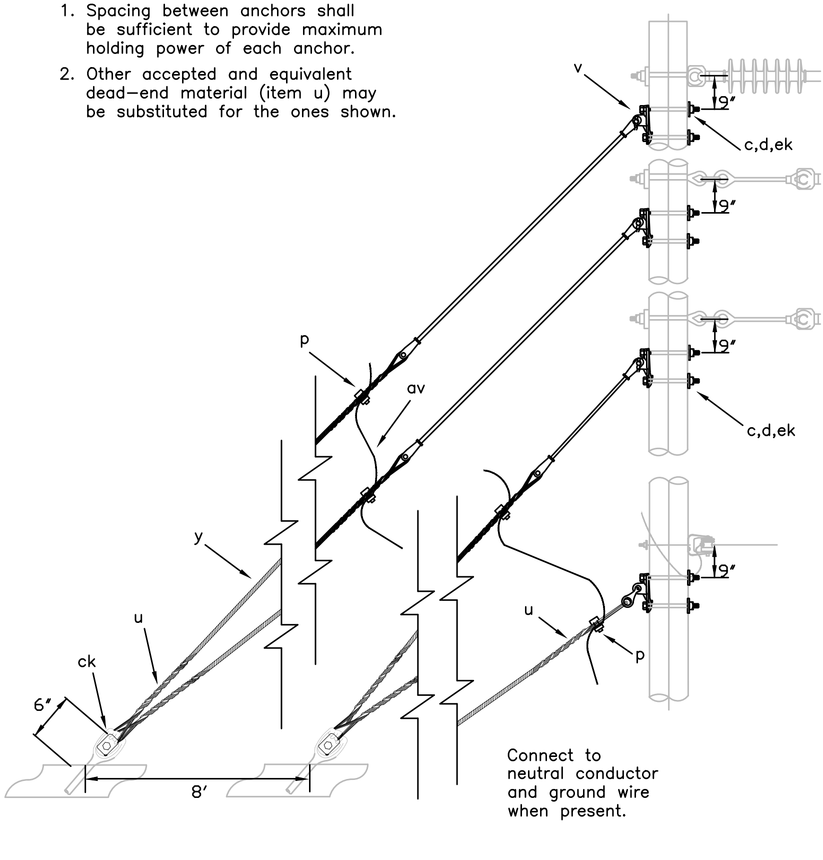
ITEM	MATERIAL	ASSEMBLY UNIT E7-2 REQUIRED	E7-3 REQUIRED	E7-4 REQUIRED
c	Bolt, machine 5/8" x req'd length	3	3	3
d	Washer, curved	3	3	3
j	Lag screw 1/2" x 4'	3	3	3
p	Connectors	as required	as required	as required
u	Deadend, preform guy 3/8"			6
u	Deadend, preform guy 8m	6		
u	Deadend, preform guy 10m		6	
v	Attachment, guy	3(5200 lbs)	3H.D.(8500 lbs)	3H.D.(8500 lbs)
y	Wire, guy alumoweld by req'd length	8M	10M	3/8"
av	Jumper	as required	as required	as required
ck	Clamp, anchor rod bond	2	2	2
ek	Locknuts	as required	as required	as required

12.5\7.2 kV PRIMARY
3 DOWN GUYS

MAY 2018	CHELCO	E7-2 E7-4 E7-3

NOTES:

1. Spacing between anchors shall be sufficient to provide maximum holding power of each anchor.
2. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.



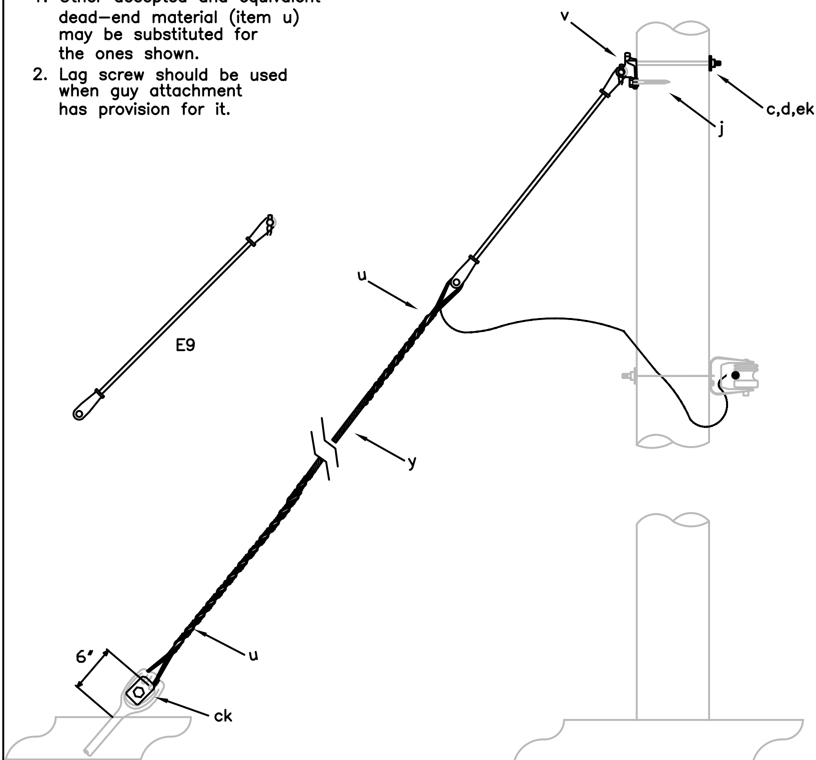
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	8	Bolt, machine 5/8" x req'd length	av	*	Jumper
d	8	Washer, curved	ck	2	Clamp, anchor rod bond
p	*	Connectors	ek	*	Locknuts
u	8	Deadend, preform guy 10m		2	Insulator, guy strain 6'
v	4	Attachment, guy H.D. pole plate		1	Insulator, guy strain 3'
y	*	Wire, 10m guy alumoweld as req'd		1	Attachment, guy H.D. thimble clevis

12.5\7.2 kV PRIMARY
4 DOWN GUYS

DEC. 2008	CHELCO	E8-3

NOTES:

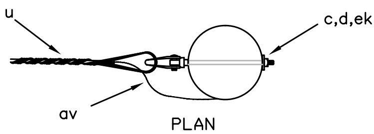
1. Other accepted and equivalent dead–end material (item u) may be substituted for the ones shown.
2. Lag screw should be used when guy attachment has provision for it.



ITEM	MATERIAL	ASSEMBLY UNIT E9–2 REQUIRED	E9–3 REQUIRED	E9–4 REQUIRED	E9
c	Bolt, machine 5/8" x req'd length	1	1	1	
d	Washer, curved	1	1	1	
j	Lag screw 1/2" x 4'	1	1	1	
p	Connectors	as required	as required	as required	
u	Deadend, preform guy 3/8"			2	
u	Deadend, preform guy 8m	2			
u	Deadend, preform guy 10m		2		
v	Attachment, guy HEAVY DUTY	1	1	1	
y	Wire, guy alumoweld by req'd length	8M	10M	3/8"	
av	Jumper	as required	as required	as required	
ck	Clamp, anchor rod bond	1	1	1	
ek	Locknuts	as required	as required	as required	
	Insulator, guy strain	1	1	1	1

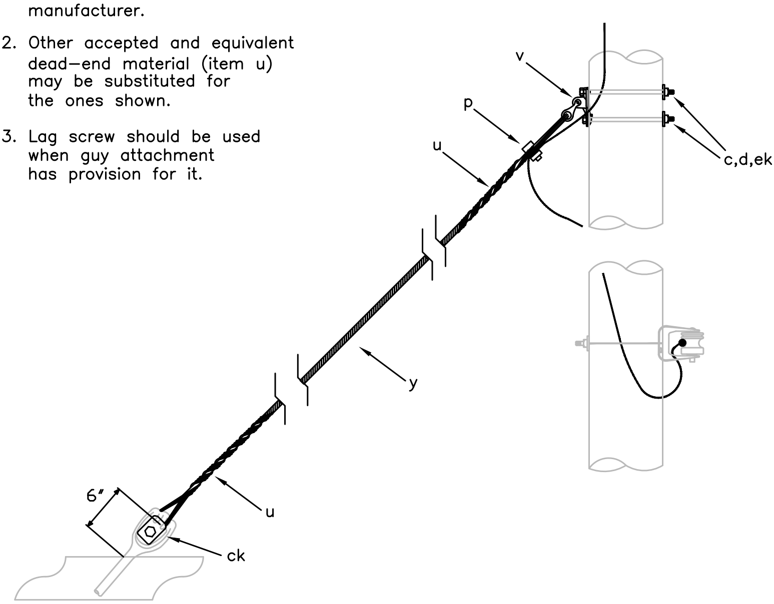
12.5\7.2 kV PRIMARY
DOWN GUY, NARROW PROFILE

MAY 2018	CHELCO	E9–2 E9–4 E9–3 E9



NOTES:

1. Formed type grips may be used only with suitable attachments, (item v) as recommended by grip manufacturer.
2. Other accepted and equivalent dead–end material (item u) may be substituted for the ones shown.
3. Lag screw should be used when guy attachment has provision for it.



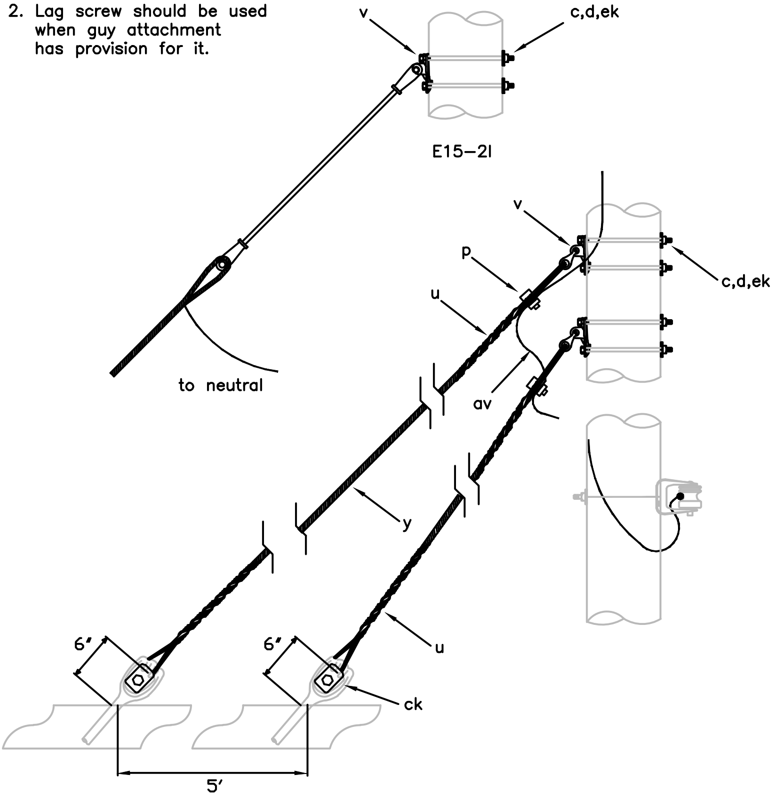
		ASSEMBLY UNIT		
		E15–1		
ITEM	MATERIAL	REQUIRED		
c	Bolt, machine 3/4" x req'd length	2		
d	Washer, curved	2		
p	Connectors	as required		
u	Deadend, preform guy 18m	2		
v	Attachment, guy H.D. pole plate	1		
y	Wire, guy alumoweld by req'd length	18M		
av	Jumper	as required		
ck	Clamp, anchor rod bond	1		
ek	Locknuts	as required		
	Attachment, guy H.D.thimble clevis	1		

12.5\7.2 kV PRIMARY
SINGLE DOWN GUY

DEC. 2008	CHELCO	E15–1

NOTES:

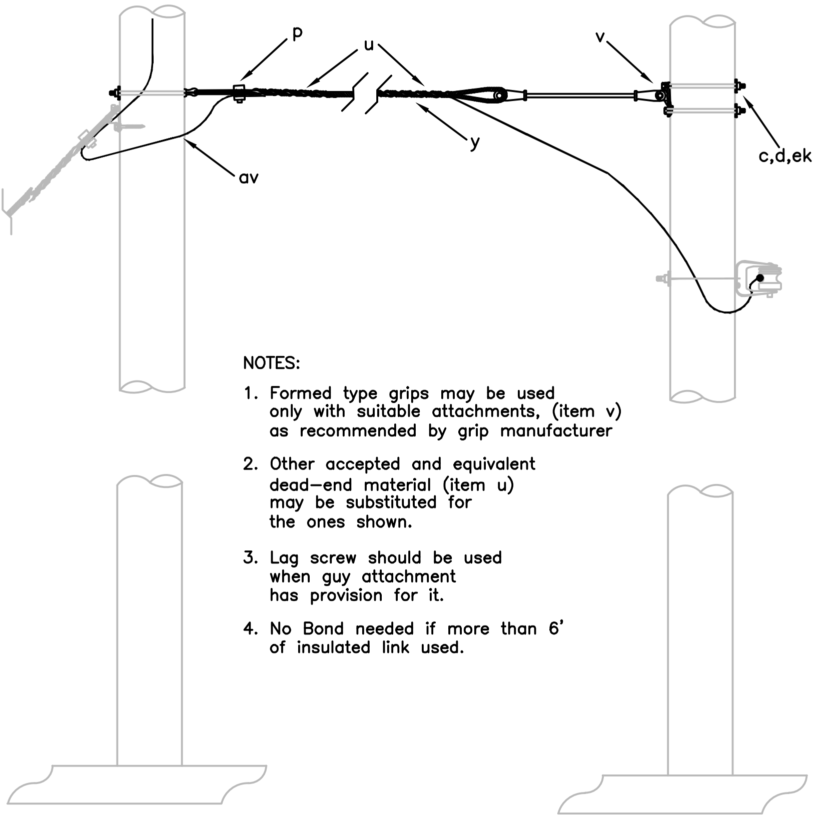
1. Other accepted and equivalent dead—end material (item u) may be substituted for the ones shown.
2. Lag screw should be used when guy attachment has provision for it.



		ASSEMBLY UNIT		
		E15—2	E15—2I	
ITEM	MATERIAL	REQUIRED	REQUIRED	
c	Bolt, machine 3/4" x req'd length	4	4	
d	Washer, curved	4	4	
p	Connectors	as required	as required	
u	Deadend, preform guy 18m	4	4	
v	Attachment, guy H.D. pole plate	2	2	
y	Wire, guy alumoweld by req'd length	18M	18M	
av	Jumper	as required	as required	
ck	Clamp, anchor rod bond	2	2	
ek	Locknuts	as required	as required	
	Attachment, guy H.D. thimble clevis	2		
	Insulator, guy strain		2	

12.5\7.2 kV PRIMARY
DOUBLE DOWN GUY

SEP. 2013	CHELCO	E15—2 E15—2I



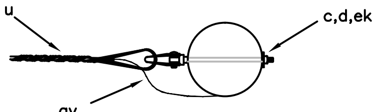
NOTES:

1. Formed type grips may be used only with suitable attachments, (item v) as recommended by grip manufacturer
2. Other accepted and equivalent dead–end material (item u) may be substituted for the ones shown.
3. Lag screw should be used when guy attachment has provision for it.
4. No Bond needed if more than 6' of insulated link used.

		ASSEMBLY UNIT		
		E15–3		
ITEM	MATERIAL	REQUIRED		
c	Bolt, machine 3/4" x req'd length	2		
d	Washer, curved	2		
p	Connectors	as required		
u	Deadend, preform guy 18m	2(5200 lbs)		
v	Attachment, guy HEAVY DUTY	1		
y	Wire, guy alumoweld by req'd length	18M		
av	Jumper	as required		
ek	Locknuts	as required		
	Attachment, guy HD thimble clevis	1		
	Insulator, guy strain 36"	1		

12.5\7.2 kV PRIMARY OVERHEAD GUY

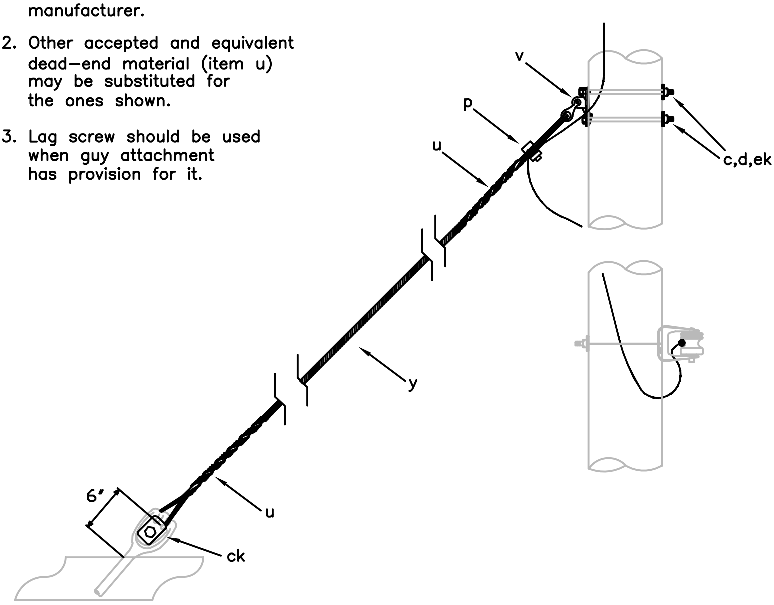
SEP. 2013	CHELCO	E15–3



PLAN

NOTES:

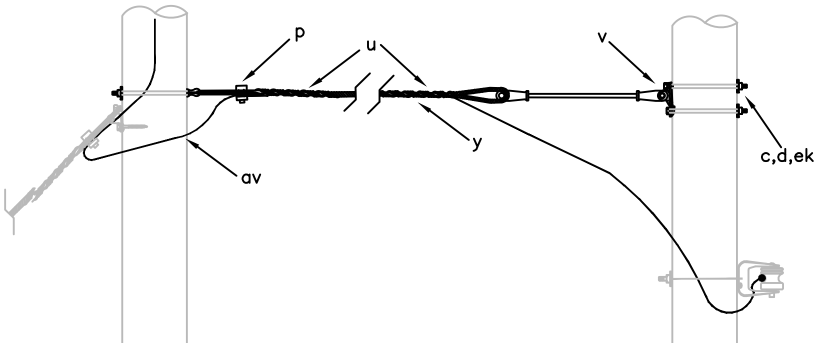
1. Formed type grips may be used only with suitable attachments, (item v) as recommended by grip manufacturer.
2. Other accepted and equivalent dead-end material (item u) may be substituted for the ones shown.
3. Lag screw should be used when guy attachment has provision for it.



		ASSEMBLY UNIT	
		E16-1	
ITEM	MATERIAL	REQUIRED	
c	Bolt, machine 3/4" x req'd length	2	
d	Washer, curved	2	
p	Connectors	as required	
u	Deadend, preform guy 1/2"	2	
v	Attachment, guy H.D. pole plate-42k lbs	2	
y	Wire, guy formed wire by req'd length	1/2"(26,900 lbs)	
av	Jumper	as required	
ck	Clamp, anchor rod bond	1	
ek	Locknuts	as required	
	Attachment, guy H.D.thimble clevis	1	

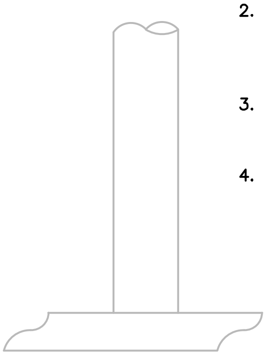
12.5\7.2 kV PRIMARY
SINGLE DOWN GUY 1/2"

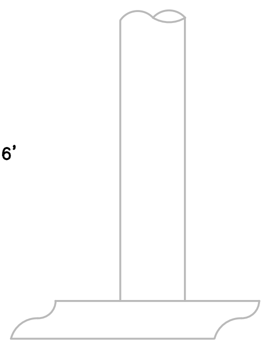
MAR 2014	CHELCO	E16-1



NOTES:

1. Formed type grips may be used only with suitable attachments, (item v) as recommended by grip manufacturer
2. Other accepted and equivalent dead–end material (item u) may be substituted for the ones shown.
3. Lag screw should be used when guy attachment has provision for it.
4. No Bond needed if more than 6' of insulated link used.

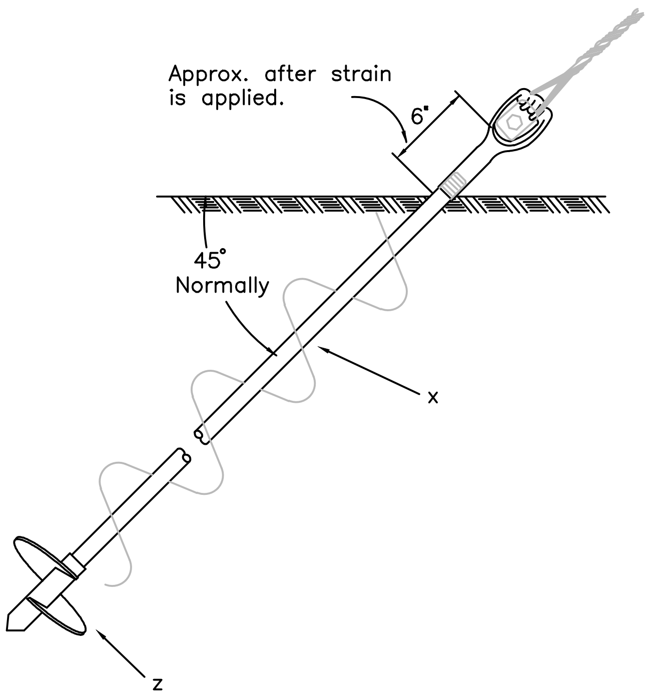




		ASSEMBLY UNIT	
		E16–3	
ITEM	MATERIAL	REQUIRED	
c	Bolt, machine 3/4" x req'd length	2	
d	Washer, curved	2	
p	Connectors	as required	
u	Deadend, preform guy 1/2"	2	
v	Attachment, guy HEAVY DUTY–42k lbs	1	
y	Wire, guy formed wire by req'd length	1/2'(26,900 lbs)	
av	Jumper	as required	
ek	Locknuts	as required	
	Attachment, guy HD thimble clevis	1	
	Insulator, guy strain 36"–30k lbs	1	

12.5\7.2 kV PRIMARY
OVERHEAD GUY 1/2"

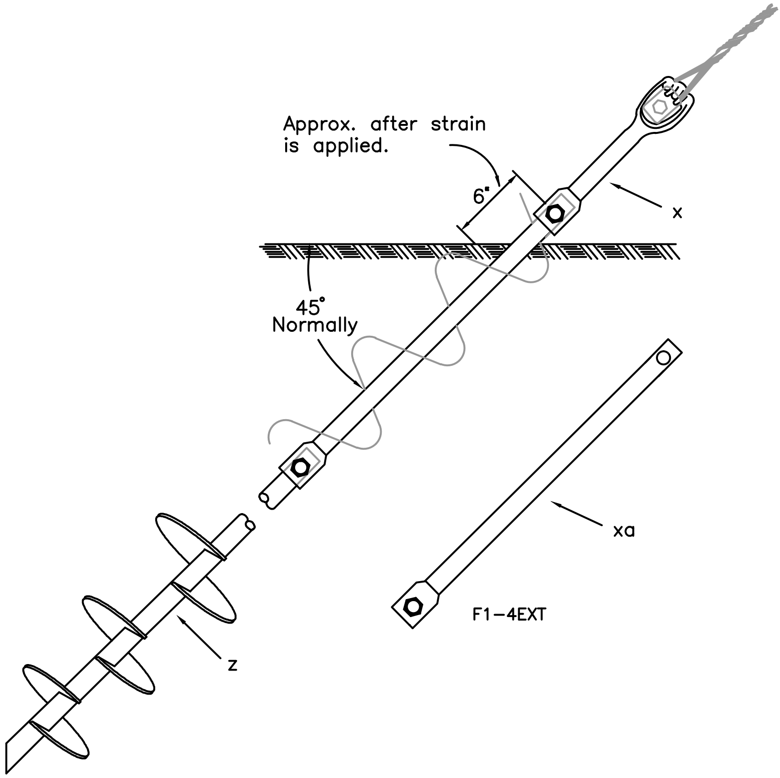
MAR 2014	CHELCO	E16–3



ITEM	MATERIAL	ASSEMBLY UNIT F1-1S 6000	ASSEMBLY UNIT F1-2S 8000	ASSEMBLY UNIT F1-4S 12,000
x	Rod, anchor, 5/8" x 7'	1	1	
x	Rod, anchor, 3/4" x 7'			1
z	Anchor	8"	12"	14"

12.5\7.2 kV PRIMARY
LINE ANCHOR ASSEMBLIES, POWER INSTALL

NOV. 2012	CHELCO	F1-1S F1-2S F1-4S



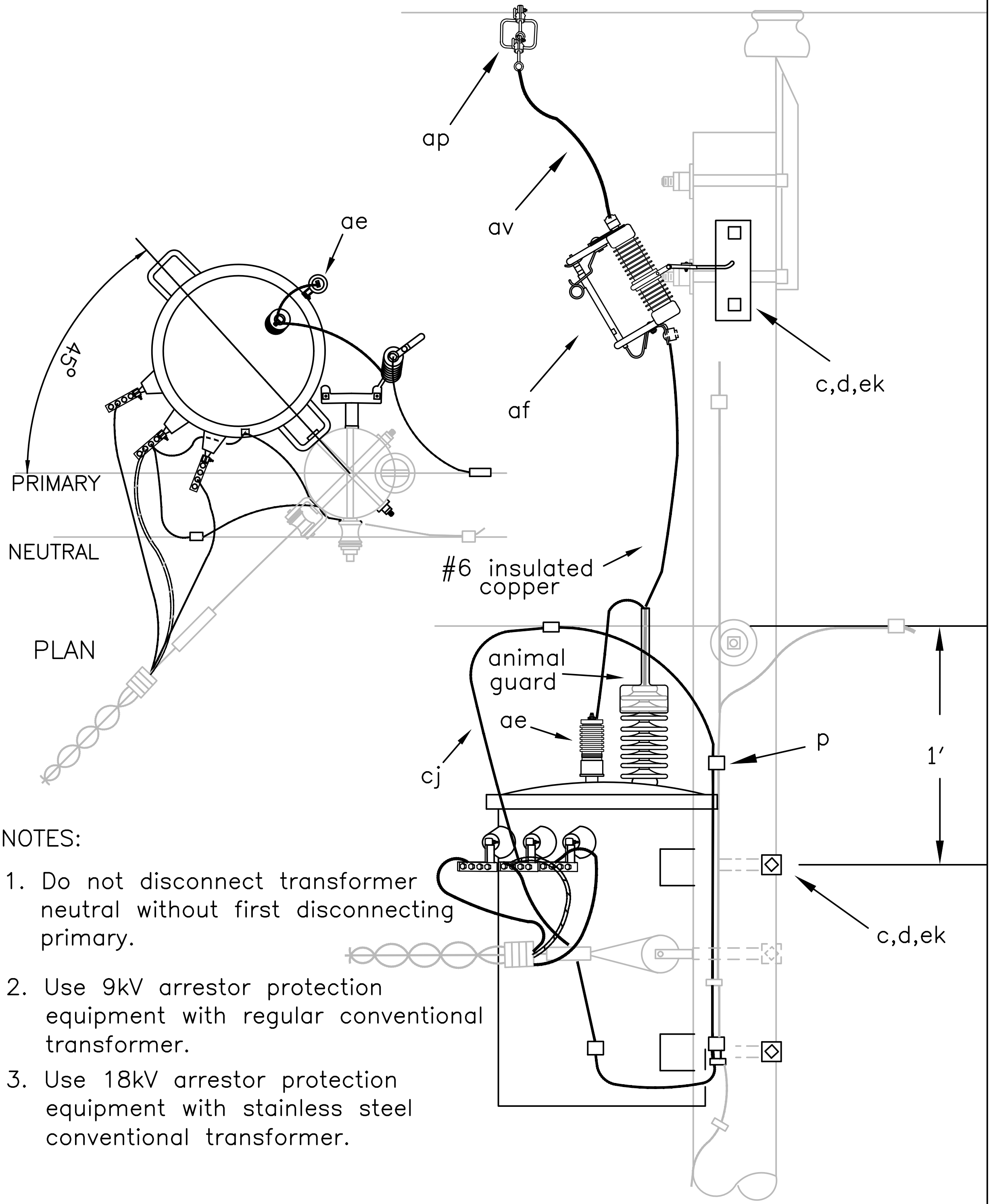
Soil Class	Common Soil-Type Description	Geological Soil Classification	Holding Capacity lb.
5	Medium dense coarse sands and sandy gravel; stiff to very stiff silts and clay	Saprolites, residual soils	45,000
6	Loose to medium dense fine to coarse sands; stiff clays and silts	Dense hydraulic fill; compacted fill; residual soils	37,000
**7	Loose fine sands; Alluvium 'loess' medium to stiff and varied clays; fill	Flood plain soils; lake clays adobe; gumbo, fill	**29,000
**8	Peat, organic silts; inundated silts, fly ash; very loose sands; very soft to soft clays	Miscellaneous fill, swamp marsh	**

**It is advisable to install anchors deep enough, by the use of extensions, to penetrate a Class 5 or 6, underlying the Class 7 or 8 Soils.

ITEM	MATERIAL	ASSEMBLY UNIT F1-4	F1-4EXT	
c	Bolt, machine 3/4" x req'd length		2	
d	Washer, curved		2	
ek	Locknuts		as required	
x	Rod, anchor, extension	1	1	
xa	Rod, anchor, thimble type eye	1		
z	Anchor, multi helix 8" 10" 12"	1		

12.5\7.2 kV PRIMARY
TRIPLE HELIX ANCHOR

FEB 2014	CHELCO	F1-4 F1-4EXT



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.

2. Use 9kV arrestor protection equipment with regular conventional transformer.

3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

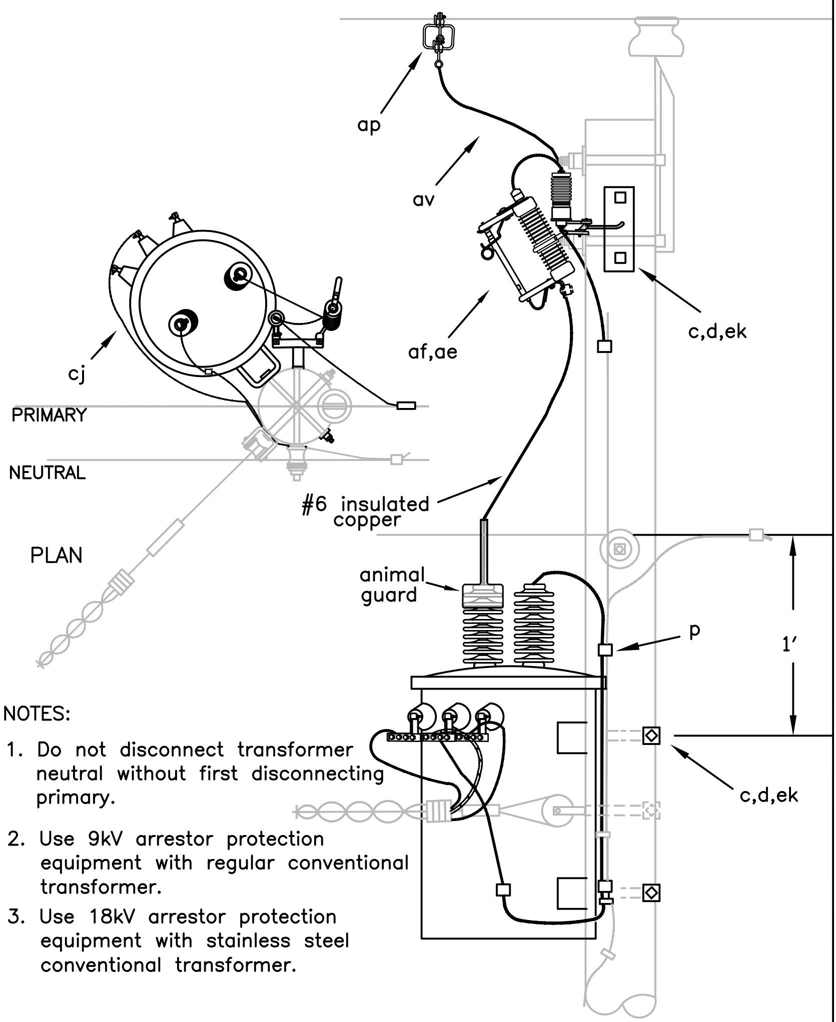
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 2 1/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

RC = regular conventional

SC = stainless steel conventional

12.5/7.2 kV 120/240 VOLT
SINGLE PHASE TRANSFORMER
TANGENT

OCT 2018	CHELCO	G9RC G9SC



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 21/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

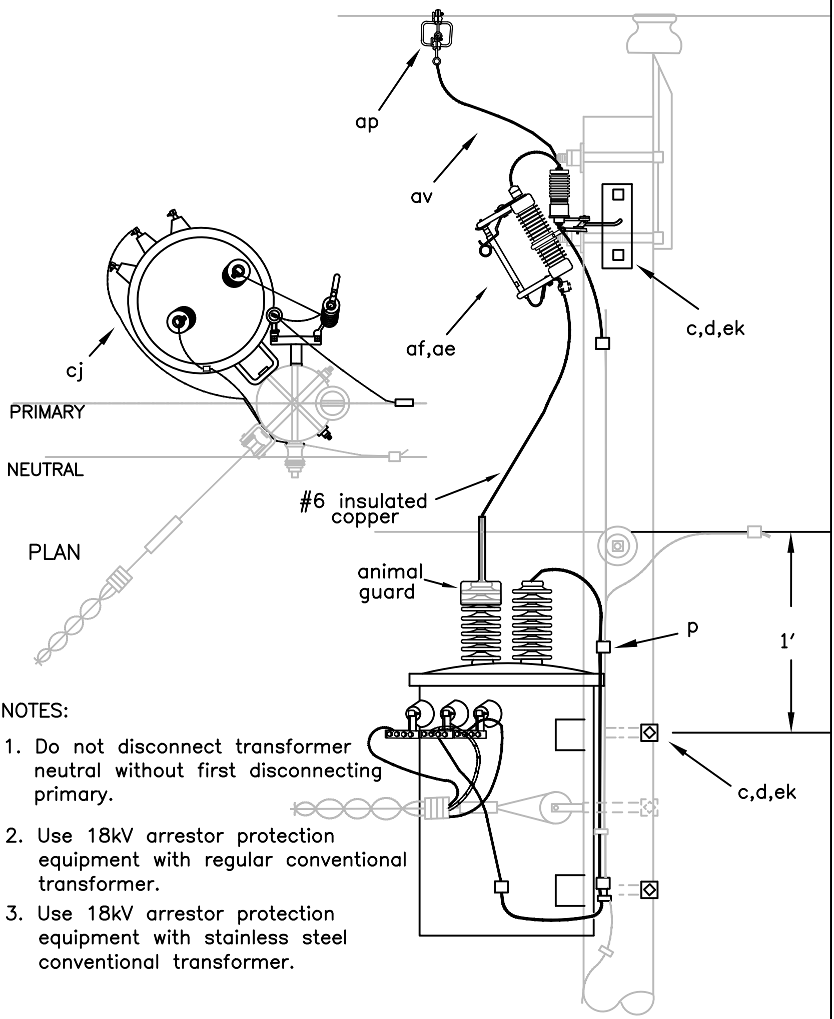
DB = double bushing

RC = regular conventional

SC = stainless steel conventional

12.5/7.2 kV 120/240 VOLT
DB SINGLE PHASE TRANSFORMER
TANGENT

JUNE 2018 | CHELCO | G9RCDB G9SCDB



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 18kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 21/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

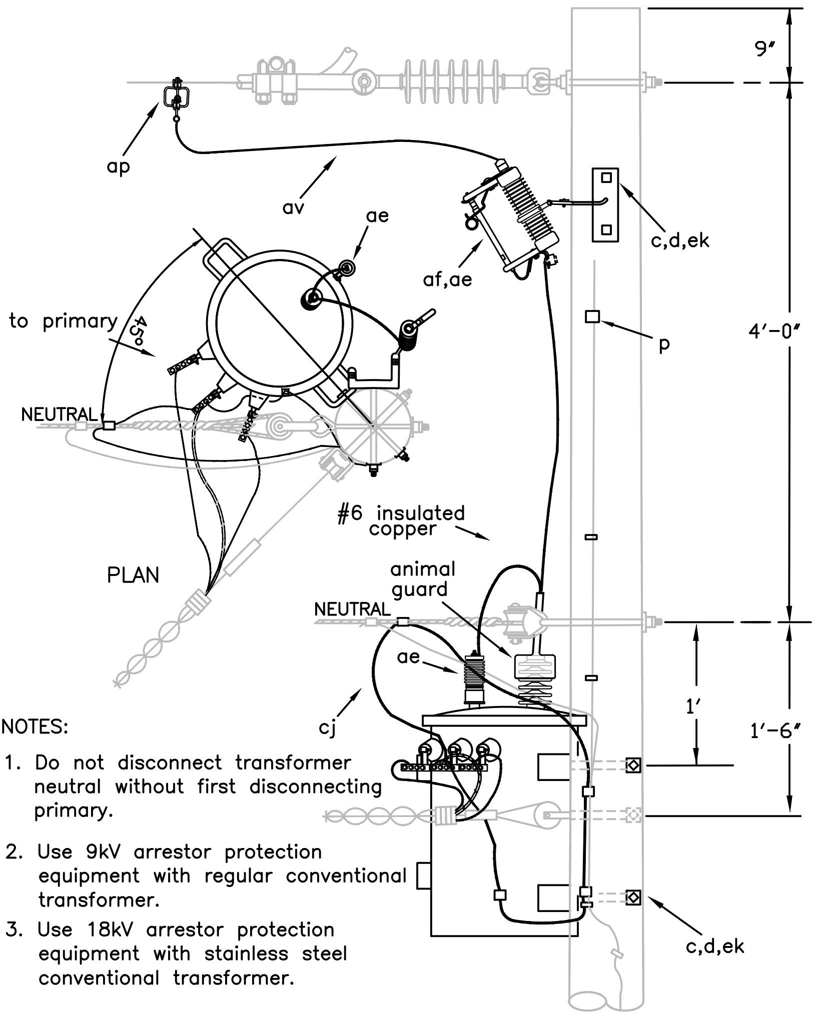
DB = double bushing

RC = regular conventional

SC = stainless steel conventional

24.9 – 14.4 kV 120/240 VOLT
DB SINGLE PHASE TRANSFORMER
TANGENT

JUNE 2018	CHELCO	VG9RCDB VG9SCDB



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

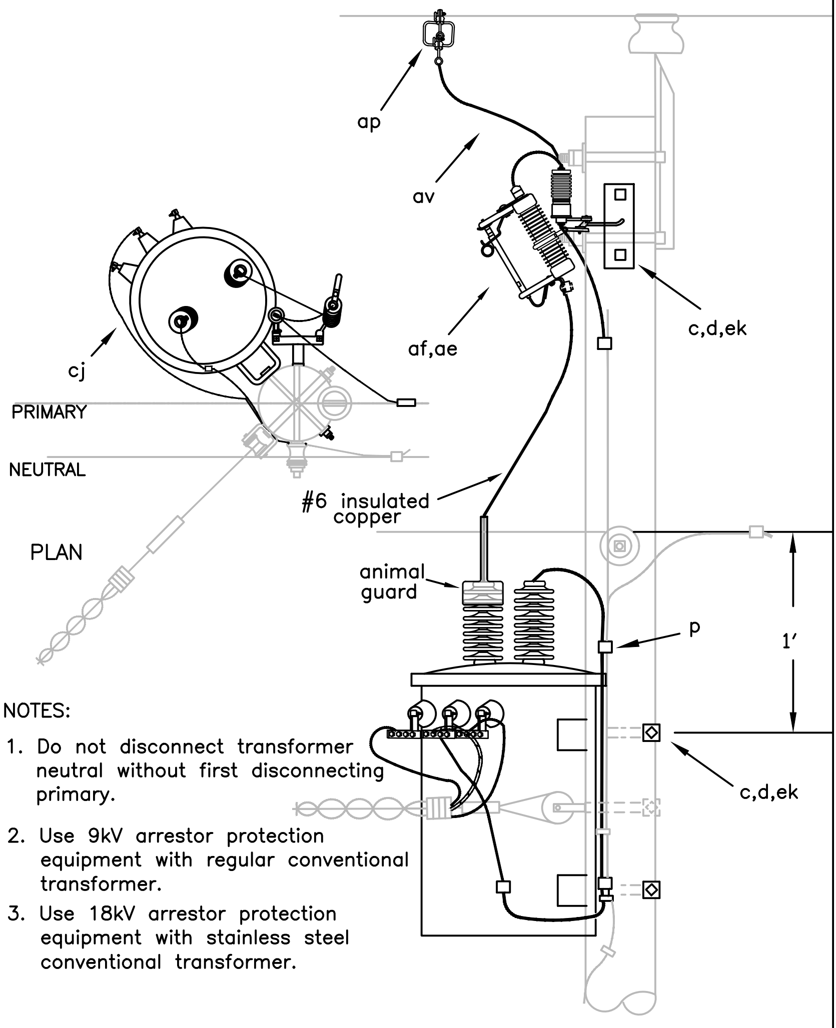
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 2 1/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

RC = regular conventional

SC = stainless steel conventional

12.5/7.2 kV 120/240 VOLT
SINGLE PHASE TRANSFORMER
DEADEND

OCT 2018	CHELCO	G10RC G10SC



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 21/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

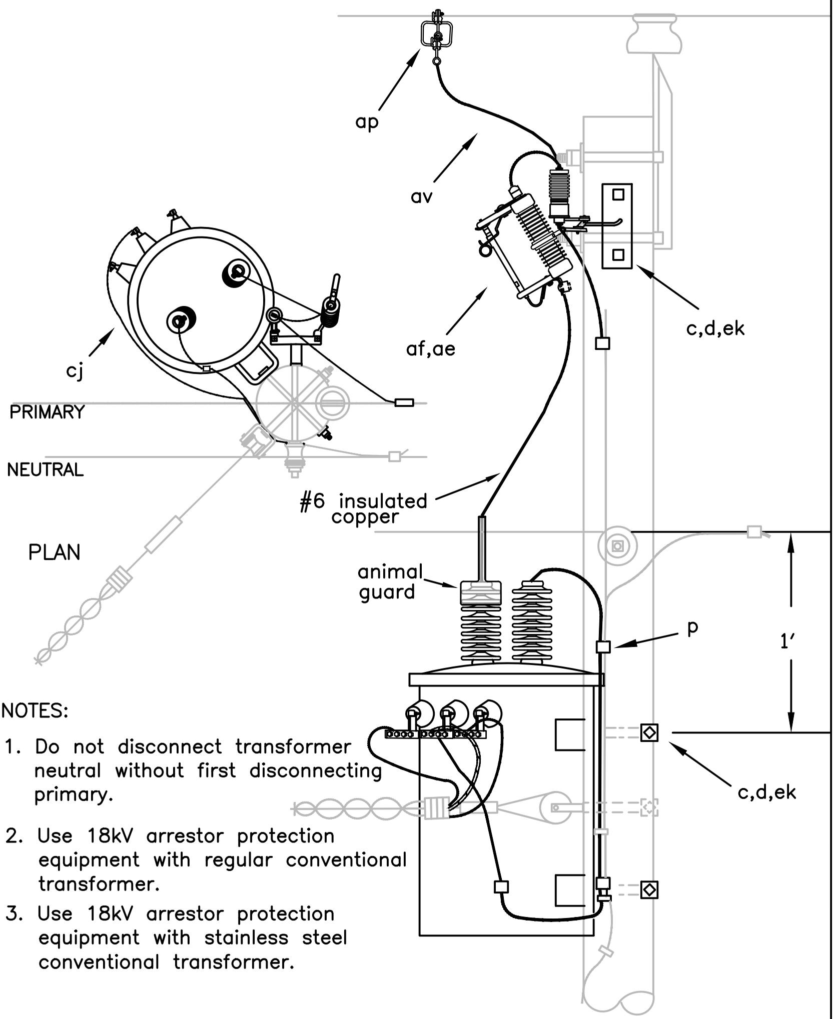
DB = double bushing

RC = regular conventional

SC = stainless steel conventional

12.5/7.2 kV 120/240 VOLT
DB SINGLE PHASE TRANSFORMER
TANGENT

JUNE 2018	CHELCO	G10RCDB G10SCDB



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 18kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 21/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

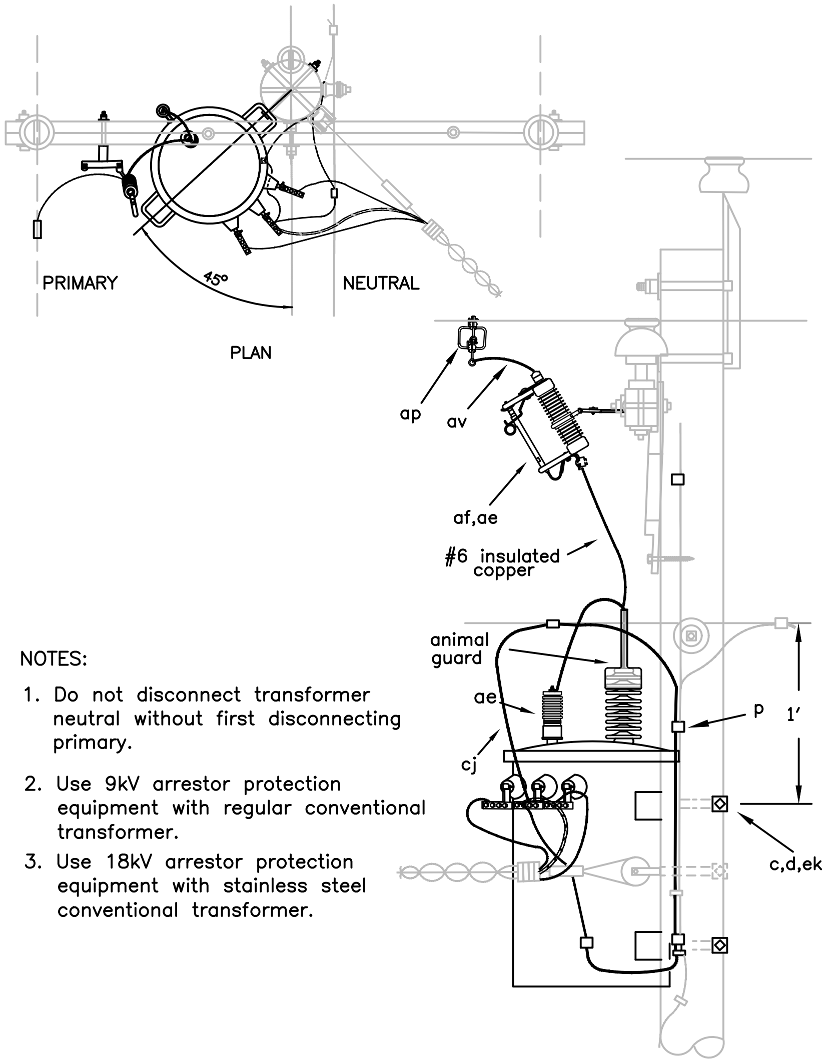
DB = double bushing

RC = regular conventional

SC = stainless steel conventional

24.9 – 14.4 kV 120/240 VOLT
DB SINGLE PHASE TRANSFORMER
TANGENT

JUNE 2018	CHELCO	VG10RCDB VG10SCDB



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

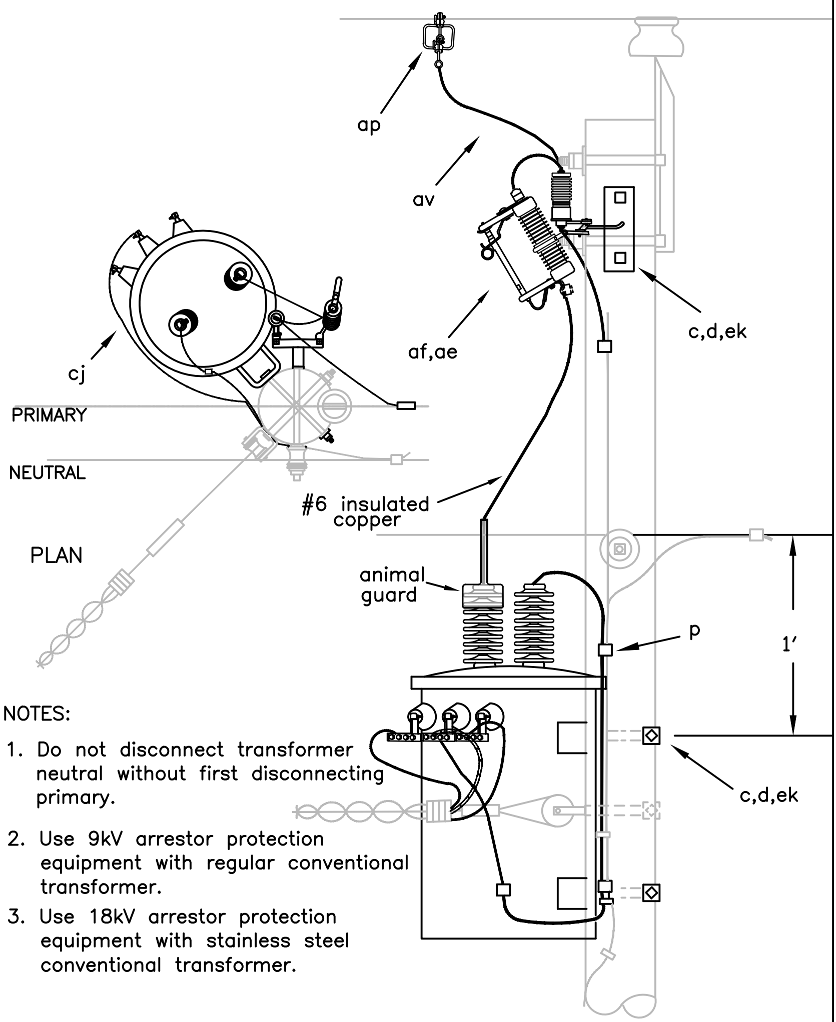
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 2 1/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		1	Guard, animal
ap	1	Clamp, hot line copper all			

RC = regular conventional

SC = stainless steel conventional

12.5/7.2 kV 120/240 VOLT
SINGLE PHASE TRANSFORMER
ON THREE PHASE CIRCUIT

OCT 2018	CHELCO	G39RC G39SC



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 21/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

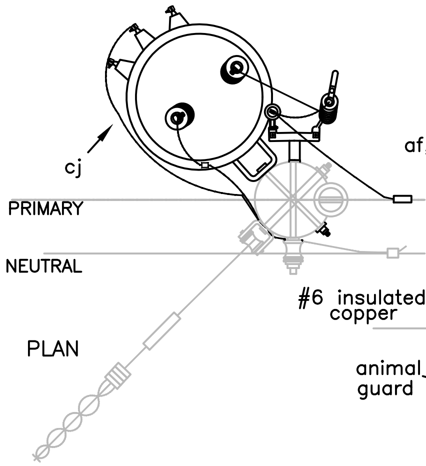
DB = double bushing

RC = regular conventional

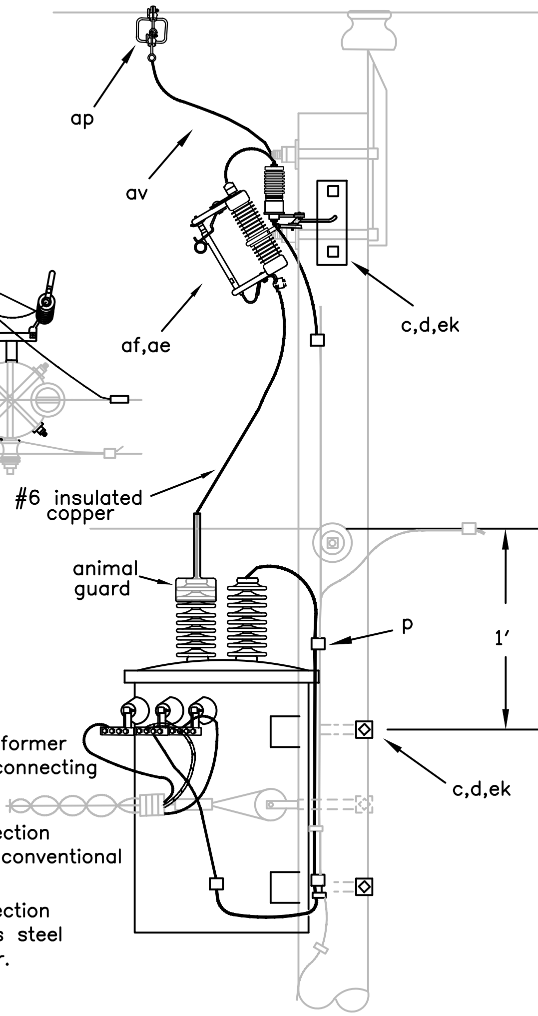
SC = stainless steel conventional

12.5/7.2 kV 120/240 VOLT
DB SINGLE PHASE TRANSFORMER
TANGENT

JUNE 2018	CHELCO	G39RCDB G39SCDB



PLAN



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 18kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	4	Washer, square 21/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	*	Locknuts, as required
ae	1	Arrestor, equipment protection	fn	1	Bracket, cutout 1 phase 'T'
af	1	Cutout, 100amp equip protection		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 6 insul copper
ap	1	Clamp, hot line copper all		1	Guard, animal

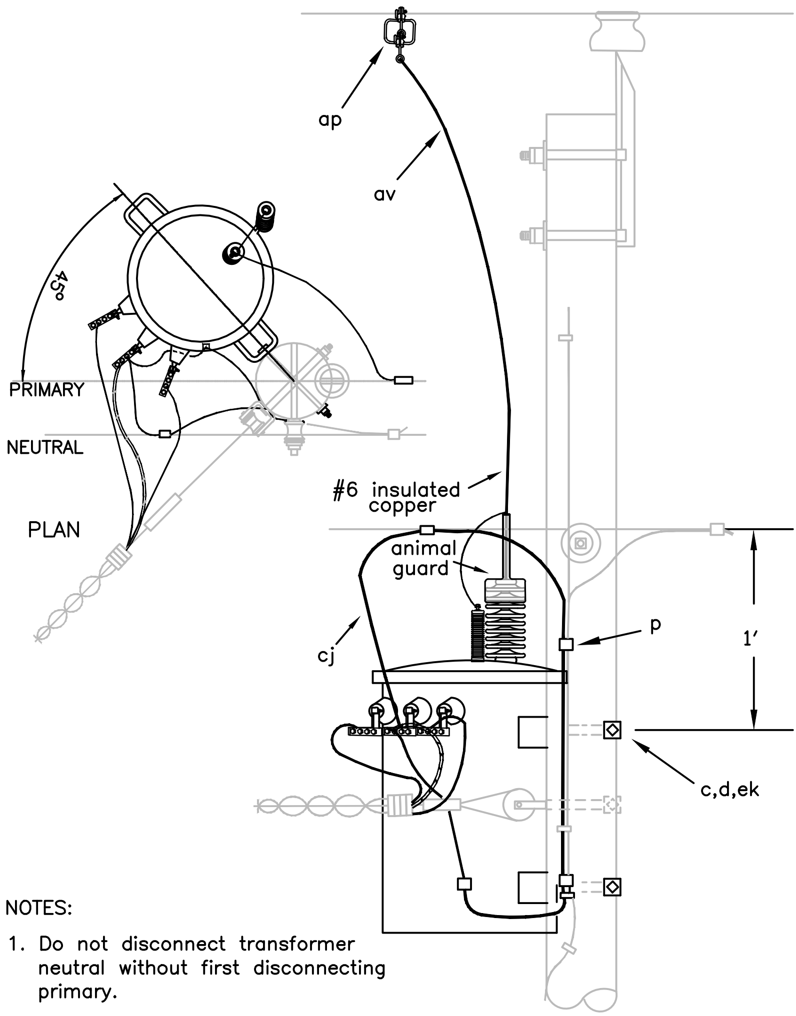
DB = double bushing

RC = regular conventional

SC = stainless steel conventional

24.9 – 14.4 kV 120/240 VOLT
DB SINGLE PHASE TRANSFORMER
TANGENT

JUNE 2018 | CHELCO | VG39RCDB VG39SCDB



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.

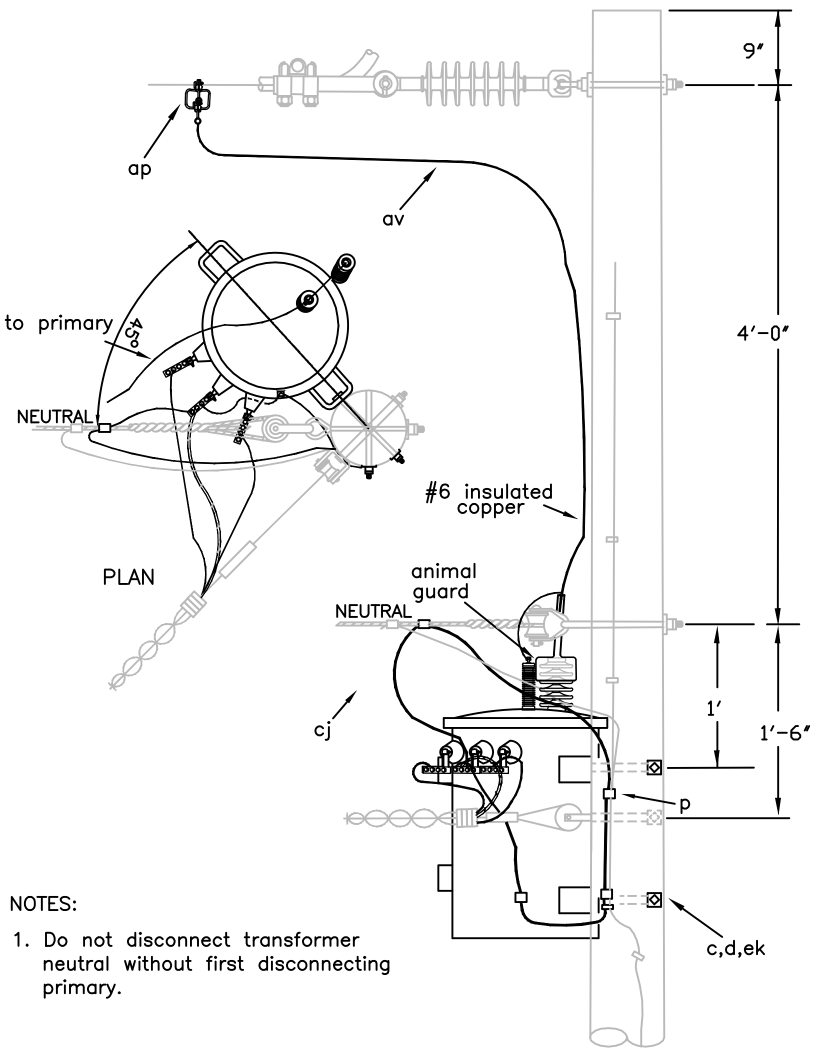
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	2	Washer, square 2 1/4" as req'd	ek	2	Locknuts, as required
p	*	Connectors, as required		1	Stirrup, burndy wejtap
an	1	Transformer		10	Conductor, No 4 S D copper
ap	1	Clamp, hot line copper all		1	Guard, animal

RP = regular CSP

SP = stainless steel CSP

12.5/7.2 kV 120/240 VOLT
SINGLE PHASE TRANSFORMER
TANGENT

JAN 2014	CHELCO	G105RP G105SP



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.

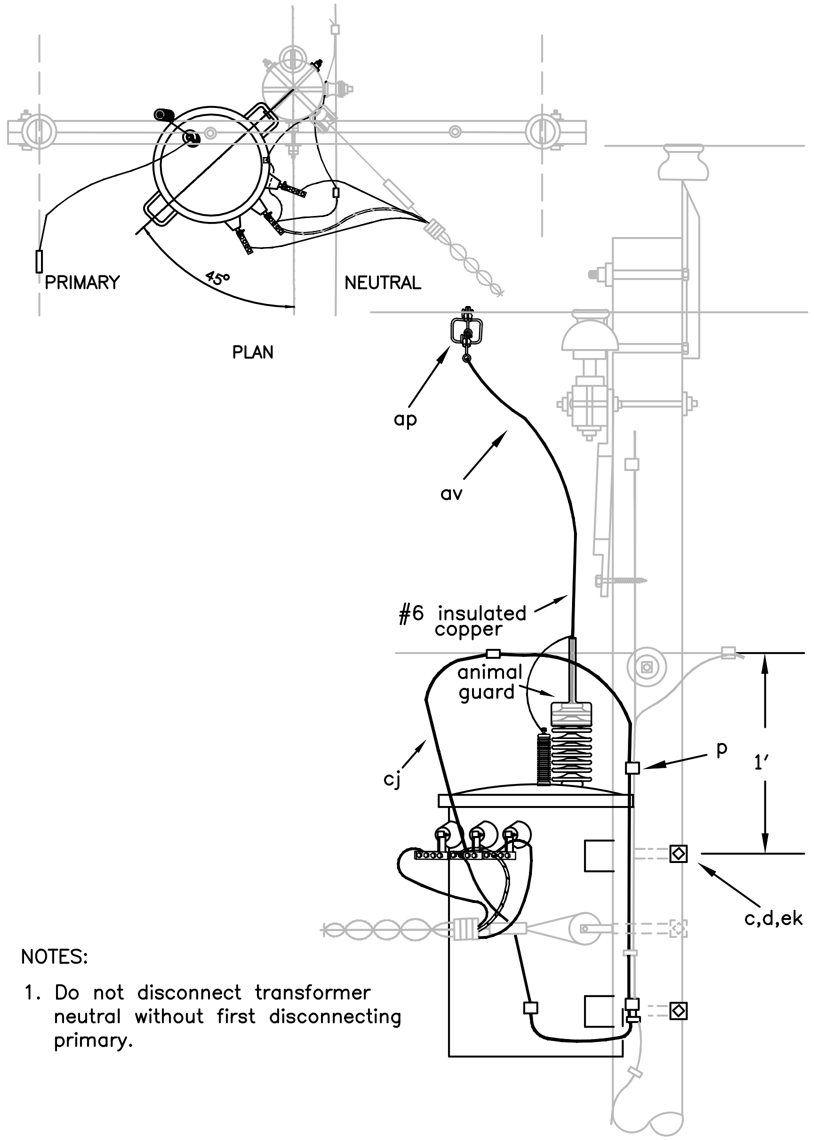
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8"x req'd lg	av	*	Jumpers, as required
d	2	Washer, square 2 1/4" as req'd	cj	10	Conductor, No 4 S D copper
p	*	Connectors, as required	ek	2	Locknuts, as required
an	1	Transformer		1	Stirrup, burndy wejtap
ap	1	Clamp, hot line copper all		1	Guard, animal

RP = regular CSP

SP = stainless steel CSP

12.5/7.2 kV 120/240 VOLT
SINGLE PHASE TRANSFORMER
DEADEND

JAN 2014 | CHELCO | G106RP G106SP



NOTES:

1. Do not disconnect transformer neutral without first disconnecting primary.

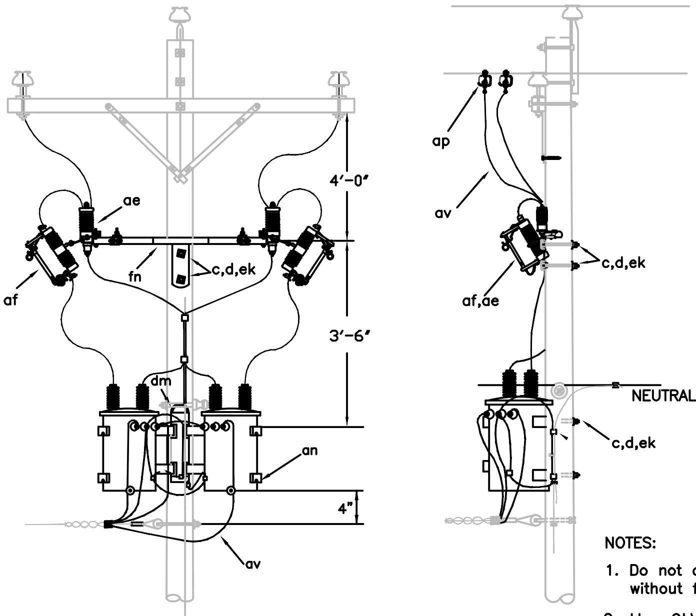
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length	cj	10	Conductor, No 4 S D copper
d	2	Washer, square 2 1/4", as req'd	ek	2	Locknuts, as required
an	1	Transformer		1	Stirrup, burndy wejtap
ap	1	Clamp, hot line copper all		*	Connectors, as required
av	*	Jumpers, as required		1	Guard, animal

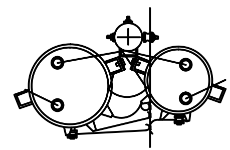
RP = regular CSP

SP = stainless steel CSP

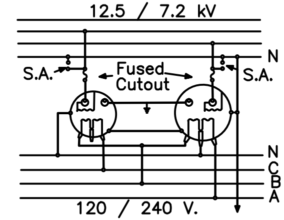
12.5/7.2 kV 120/240 VOLT
SINGLE PHASE TRANSFORMER
ON THREE PHASE CIRCUIT

JAN 2014 | CHELCO | G136RP G136SP





ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4", as req'd
ae	2	Arrrestor, equipment protection
af	2	Cutout, 100amp
an	2	Transformer by required size
ap	2	Clamp, hot line copper all
av	*	Jumpers, as required
dm	1	Bracket –two position for trans
ek	4	Locknuts, as required
fn	1	Bracket, cutout 3 phase
	2	Stirrup, burndy wejtap
	*	Connectors, as required
	22	Conductor, No 4 S D copper
	4	Guard, animal



WIRING DIAGRAM

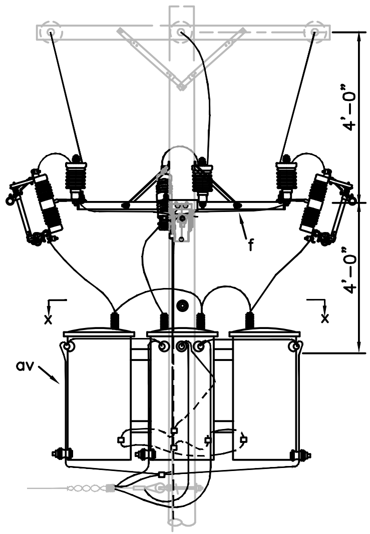
NOTES:

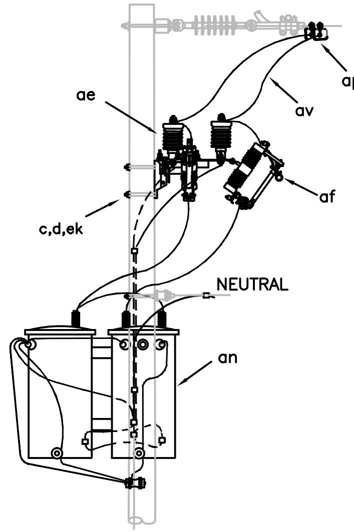
1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

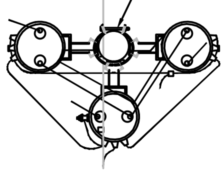
RD = regular double bushing CONV.

SD = stainless steel double bushing CONV.

12.5/7.2 kV 120/240 VOLT POWER LOADS TWO TRANSFORMERS, CLUSTER MOUNTED OPEN WYE – OPEN DELTA		
FEB 2014	CHELCO	G210RD G210SD

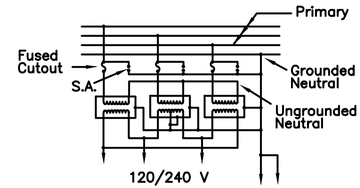






SECTION X–X

ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4", as req'd
ae	3	Arrrestor, equipment protector
af	3	Cutout, 100amp
an	3	Transformer by required size
ap	3	Clamp, hot line copper all
av	*	Jumpers, as required
dm	1	Bracket –three position for trans
ek	4	Locknuts, as required
fn	1	Bracket, cutout 3 phase
	3	Stirrup, burndy wejtap
	7	Connector, secondary for OH
	30	Conductor, No 4 S D copper
	6	Guard, animal



WIRING DIAGRAM

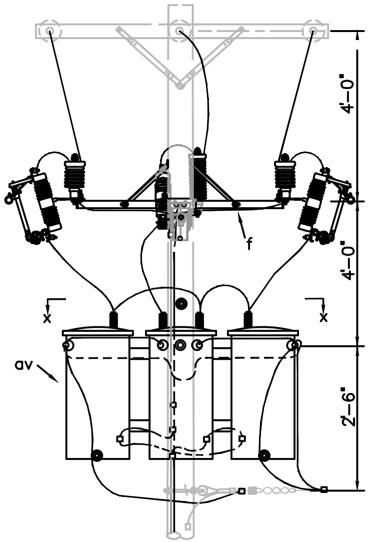
NOTES:

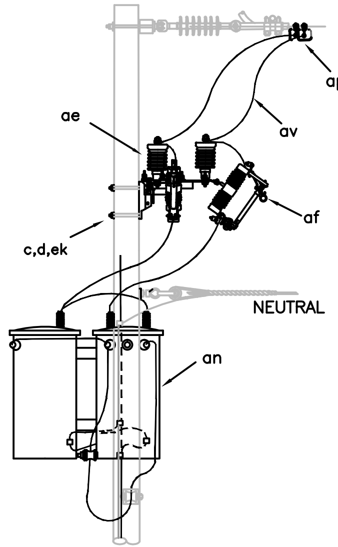
1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

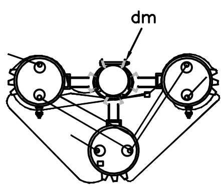
RD = regular double bushing CONV.

SD = stainless steel double bushing CONV.

12.5/7.2 kV 120/240 VOLT POWER LOADS THREE TRANSFORMERS, CLUSTER MOUNTED UNGROUNDED WYE–CENTER TAP GROUNDED DELTA		
FEB 2014	CHELCO	G310RD G310SD

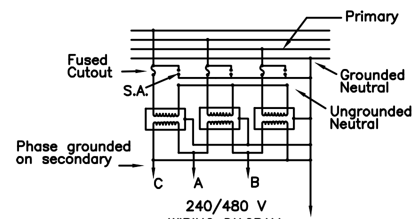






SECTION X–X

ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4", as req'd
ae	3	Arrrestor, equipment protector
af	3	Cutout, 100amp
an	3	Transformer by required size
ap	3	Clamp, hot line copper all
av	*	Jumpers, as required
dm	1	Bracket –three position for trans
ek	4	Locknuts, as required
fn	1	Bracket, cutout 3 phase
	3	Stirrup, burndy wejtap
	7	Connector, secondary for OH
	30	Conductor, No 4 S D copper
	6	Guard, animal



240/480 V
WIRING DIAGRAM

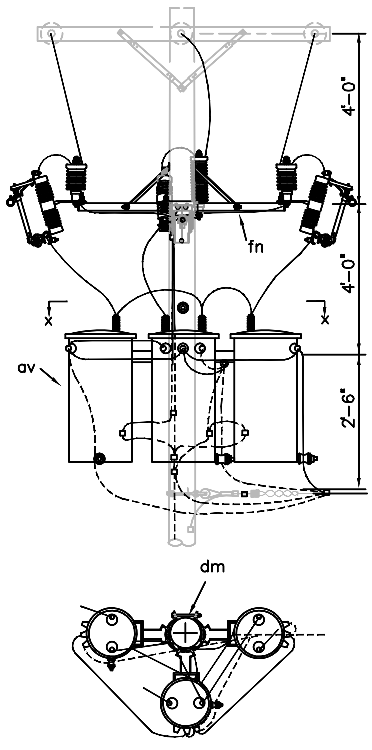
NOTES:

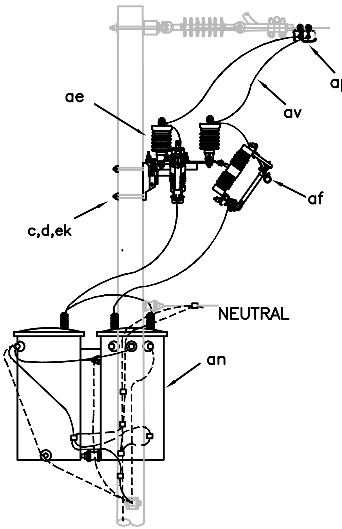
1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

RD = regular double bushing CONV.

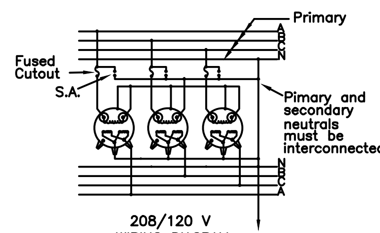
SD = stainless steel double bushing CONV.

12.5/7.2 kV 240/480 VOLT POWER LOADS THREE TRANSFORMERS, CLUSTER MOUNTED UNGROUNDED WYE–CORNER GROUNDED DELTA		
FEB 2014	CHELCO	G311RD G311SD





ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4", as req'd
ae	3	Arrrestor, equipment protector
af	3	Cutout, 100amp
an	3	Transformer by required size
ap	3	Clamp, hot line copper all
av	*	Jumpers, as required
dm	1	Bracket –three position for trans
ek	4	Locknuts, as required
fn	1	Bracket, cutout 3 phase
	3	Stirrup, burndy wejtap
	7	Connector, secondary for OH
	30	Conductor, No 4 S D copper
	6	Guard, animal



208/120 V
WIRING DIAGRAM

NOTES:

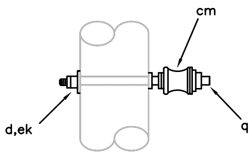
1. Do not disconnect transformer neutral without first disconnecting primary.
2. Use 9kV arrestor protection equipment with regular conventional transformer.
3. Use 18kV arrestor protection equipment with stainless steel conventional transformer.

RD = regular double bushing CONV.

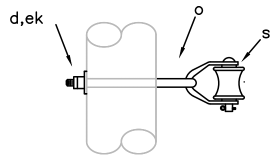
SD = stainless steel double bushing CONV.

12.5/7.2 kV
120/208 or 277/488 VOLT POWER LOADS
THREE TRANSFORMERS, CLUSTER MOUNTED
4 WIRE GROUNDED WYE – GROUNDED WYE

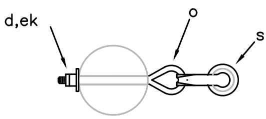
FEB 2014	CHELCO	G312RD G312SD



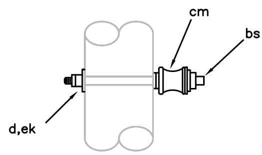
J5 DOUBLE UPSET



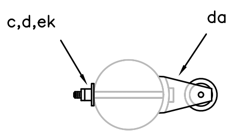
J6 SWINGING CLEVIS



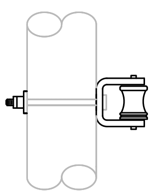
J7 SWINGING CLEVIS,
ANGLE 30 to 60



J8 SINGLE UPSET

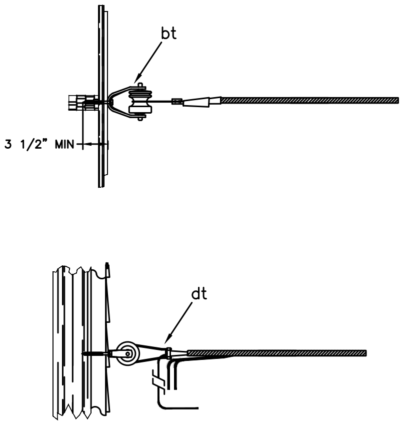


J10 BRACKET

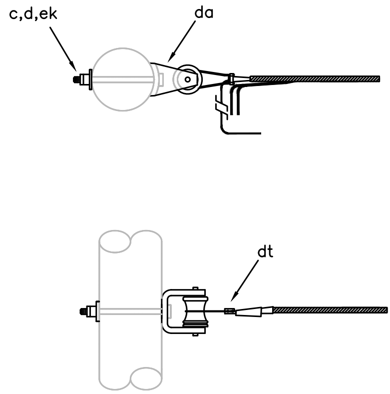


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c		Bolt, machine 5/8" x req'd length	bs		Bolt, single upset
d		Washer, square 2 1/4", as req'd	cm		Insulator, secondary spool
o		Bolt, oval eye 5/8" x required length	da		Clevis, secondary rigid
q		Bolt, double upset	ek		Locknuts, as required
s		Clevis, secondary swinging			

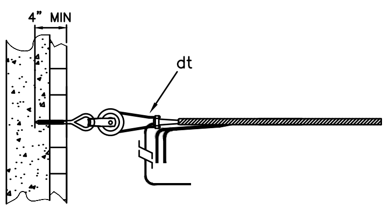
SECONDARY ASSEMBLIES		
DEC. 2008	CHELCO	J5 J6 J7 J8 J10



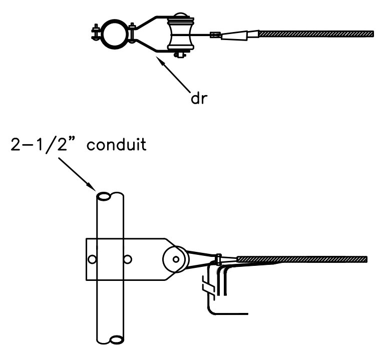
K10C



K14C



K10C –BRICK OR MASONRY

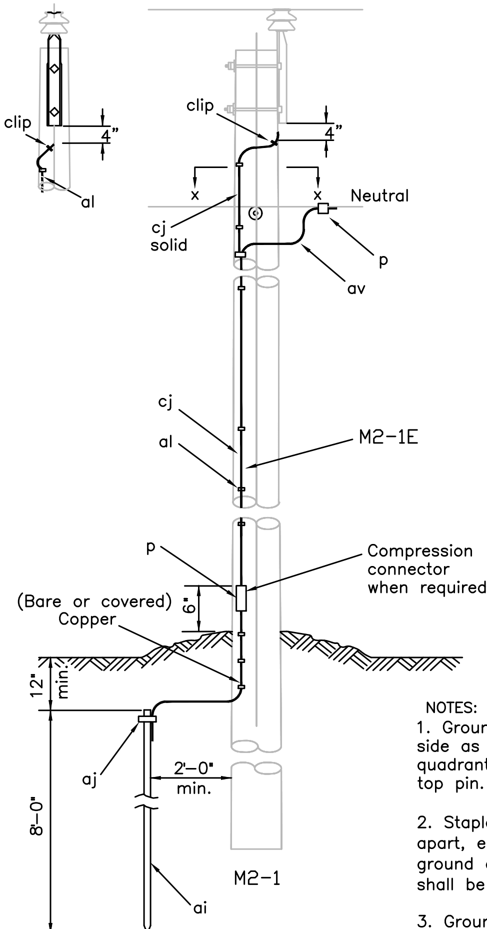


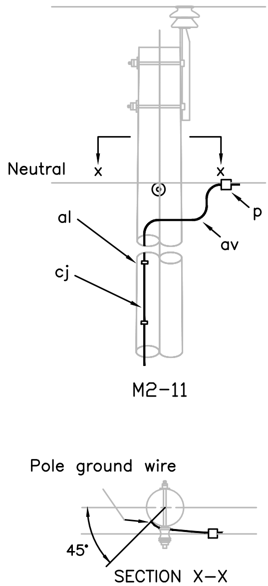
K16C

ITEM		MATERIAL	ITEM		MATERIAL
c		Bolt, machine 5/8" x req'd length	da		Clevis, secondary rigid
d		Washer, square 2 1/4", as req'd	dr		Clevis, conduit riser, insulated
bt		Wireholder, clevis type. insulated	dt		Service deadend, wedge type
cm		Insulator, secondary spool	ek		Locknuts, as required

SERVICE ASSEMBLIES, CABLE

DEC. 2008	CHELCO	K10C K14C K16C





NOTES:

1. Ground wire to be located on same side as Neutral conductor and in quadrant opposite climbing space or pole top pin.

2. Staples on ground wire shall be 2' apart, excepr for a distance of 8' above ground and 8' from pole top, where they shall be 6" apart.

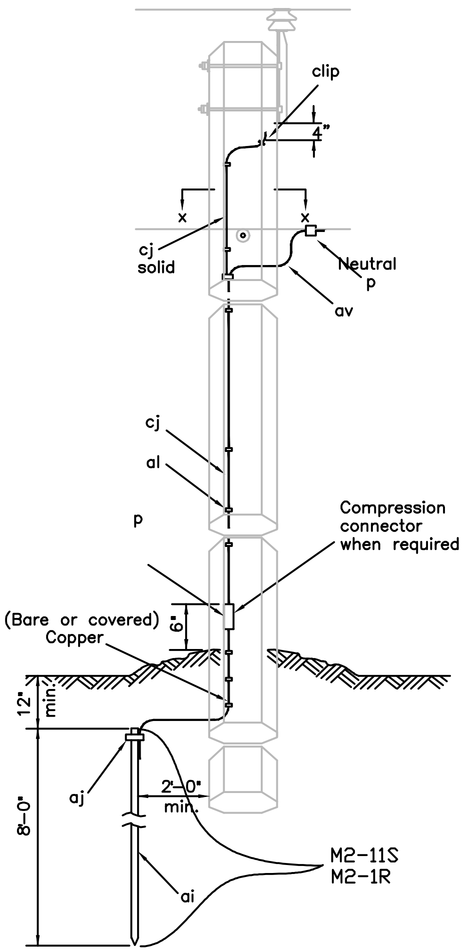
3. Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.

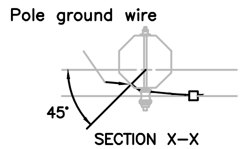
		ASSEMBLY UNIT		
		M2-1	M2-11	M2-1E
ITEM	MATERIAL	REQUIRED	REQUIRED	REQUIRED
p	Connectors	as required	as required	as required
ai	Rod, ground 5/8" x 8', galvanized	1	1	
aj	Clamp, ground rod	1	1	1
al	Staples, ground wire	as required	as required	as required
al	Ground wire clip	1		
cj	Conductor No. 4 S D copper	45	45	45
av	Jumper, stranded, min. No. 4 S D copper	as required	as required	

12.5\7.2 kV

GROUNDING ASSEMBLY–GROUND ROD TYPE

DEC. 2008	CHELCO	M2-1 M2-11 M2-1E





NOTES:

1. Ground wire to be located on same side as Neutral conductor and in quadrant opposite climbing space or pole top pin.

2. Ground wire to clear all hardware by 2" min. and shall be stapled to maintain this position.

3. M2-11S used for deep driven grounds.

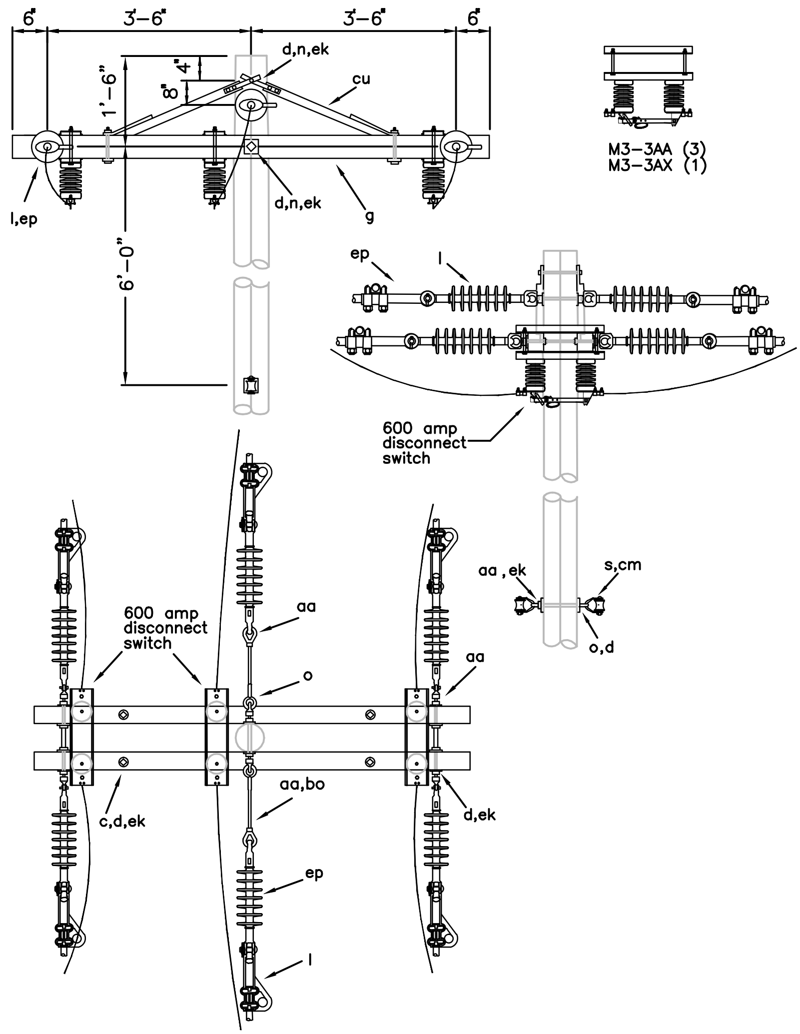
4. Bond all hardware.

		ASSEMBLY UNIT		
ITEM	MATERIAL	M2-1-CONC. REQUIRED	M2-11S REQUIRED	M2-1R REQUIRED
p	Connectors	as required		
ai	Rod, ground 5/8" x 8', galvanized	1		1
ai	Rod, ground sectional, copperweld		as required	
aj	Clamp, ground rod	1	1	1
al	Staples, ground wire	as required		
al	Ground wire clip	1		
cj	Conductor No. 4 S D copper	80	45	
av	Jumper, stranded, min. No. 4 S D copper	as required		

12.5\7.2 kV

GROUNDING ASSEMBLY-GROUND ROD TYPE

SEP. 2013	CHELCO	M2-1-CONC. M2-11S M2-1R

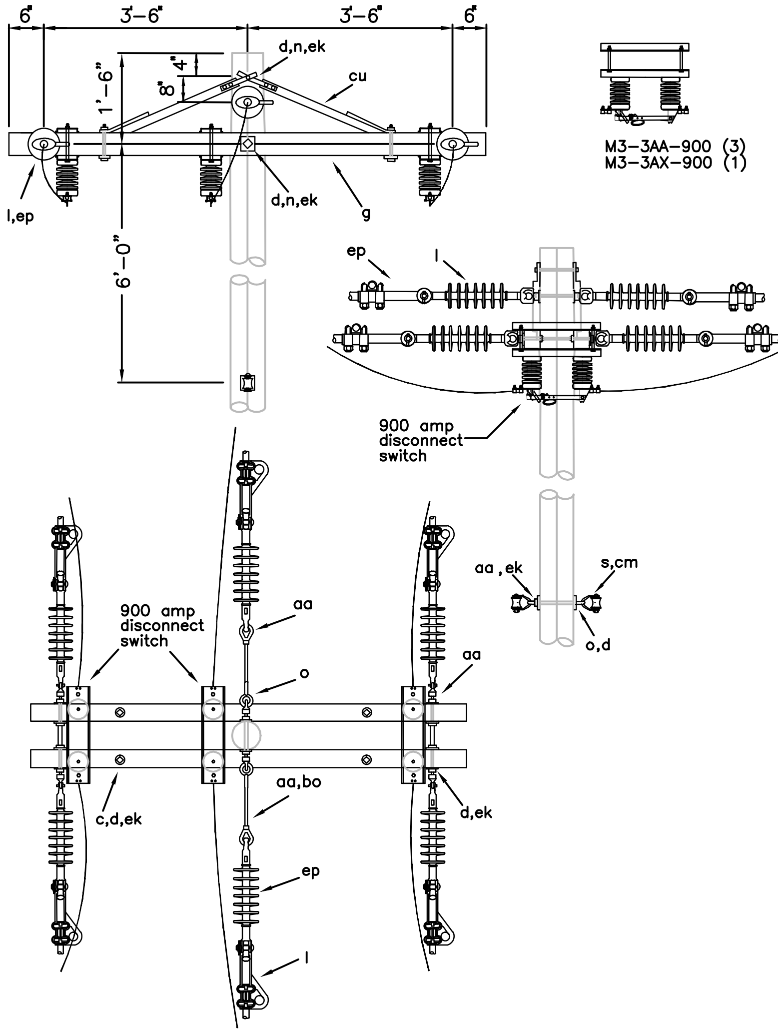


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	aa	6	Nut, oval eye 5/8"
d	17	Washer, square 2 1/4", as req'd	bo	2	Shackle anchor
g	2	Crossarm, 3 3/4" x 4 3/4"x 8'0"	cm	2	Insulator, secondary spool
l	6	Clamp, deadend shoe by req'd size	cu	4	Brace, x/arm 60" wood
n	2	Bolt, dble arming 5/8" x req'd len	ek	*	Locknuts, as required
o	4	Bolt, oval eye 5/8" x req'd length	ep	6	Insulator, epoxilator 25kv
p	*	Connectors, as required		3	Switch, disconnect 600 amp
s	2	Clevis, secondary swinging		2	Deadend distribution grips

NOTES:
Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV
600 AMP DISCONNECT SWITCH

JAN 2014	CHELCO	M3-3A M3-3AA M3-3AX

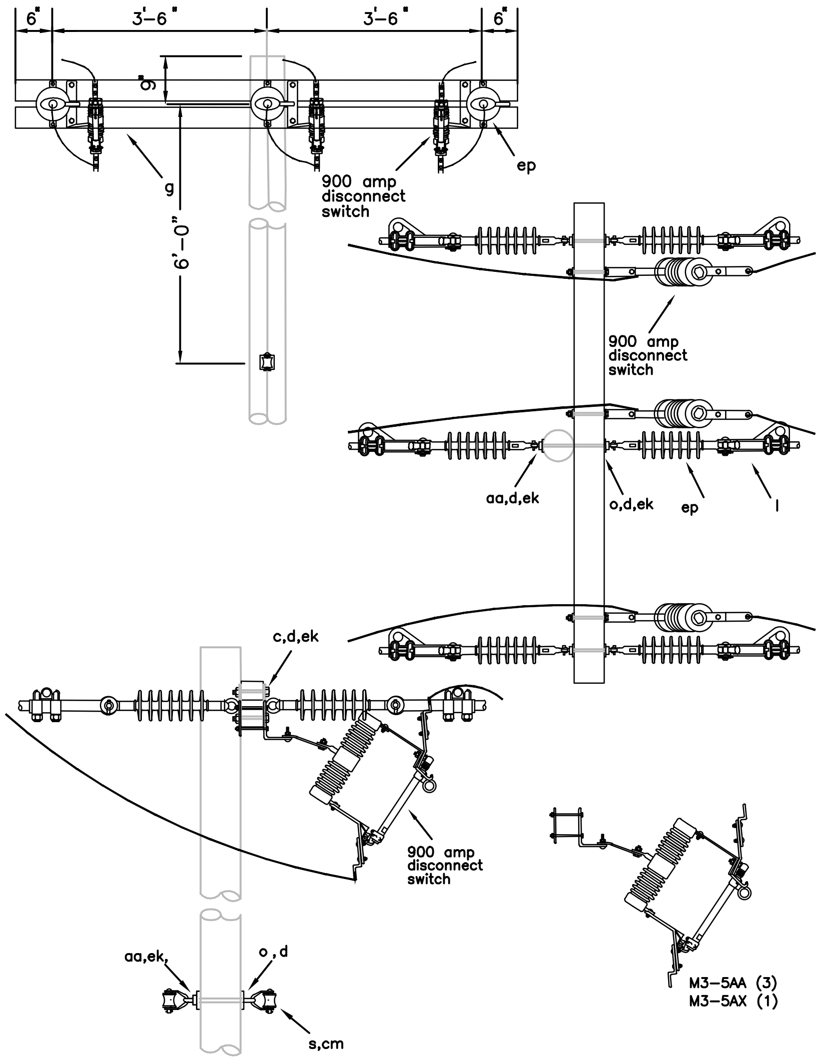


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	aa	6	Nut, oval eye 5/8"
d	17	Washer, square 2 1/4", as req'd	bo	2	Shackle anchor
g	2	Crossarm, 3 3/4" x 4 3/4"x 8'0"	cm	2	Insulator, secondary spool
l	6	Clamp, deadend shoe by req'd size	cu	4	Brace, x/arm 60" wood
n	2	Bolt, dble arming 5/8" x req'd len	ek	*	Locknuts, as required
o	4	Bolt, oval eye 5/8" x req'd length	ep	6	Insulator, epoxilator 25kv
p	*	Connectors, as required		3	Switch, disconnect 900 amp
s	2	Clevis, secondary swinging		2	Deadend distribution grips

NOTES:
Jumper wire ampacity to equal
conductor ampacity

12.5/7.2 kV
900 AMP DISCONNECT SWITCH

JAN 2014	CHELCO	M3-3A-900 M3-3AA-900 M3-3AX-900

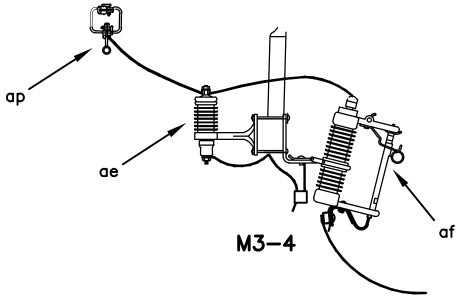


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 1/2" x req'd length	aa	4	Nut, oval eye 5/8"
d	17	Washer, square 2 1/4", as required	cm	2	Insulator, secondary spool
g	2	Crossarm,3 3/4" x 4 3/4"x 8'0"HD	ek	*	Locknuts, as required
l	6	Clamp, deadend shoe	ep	6	Insulator, epoxilator 25kv
o	4	Bolt, oval eye 5/8" x req"d length		3	Switch, disconnect 900 amp
p	*	Connectors, as required		2	Deadend distribution grips
s	2	Clevis, secondary swinging			

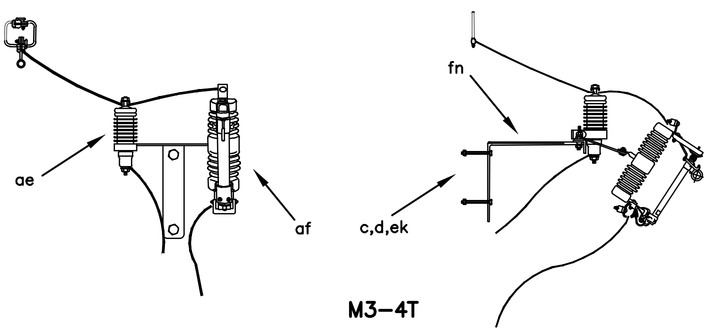
NOTES:
Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV
900 AMP DISCONNECT SWITCH

JAN. 2014	CHELCO	M3-5A M3-5AA M3-5AX



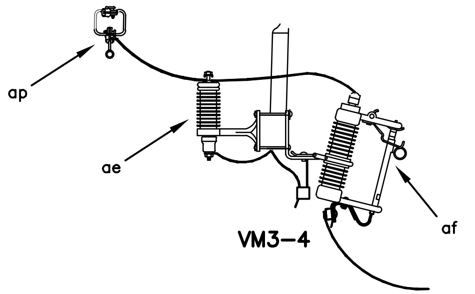
M3-4

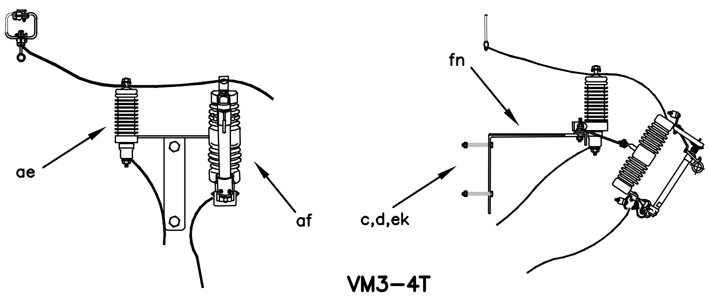


M3-4T

ITEM	MATERIAL	ASSEMBLY UNIT M3-4 REQUIRED	ASSEMBLY UNIT M3-4T REQUIRED
c	Bolt, machine 5/8" x req'd length		2
d	Washer, square 2 1/4"		2
ae	Arrestor, equipment protection	1	1
af	Cutout, 100amp equipment protection	1	1
ap	Clamp, hot line copper all	1	1
cj	Conductor, no. 4 S D copper	10	10
ek	Locknuts, as required		
fn	Bracket, cutout 1 phase 'T'		1
	Stirrup, burndy wejtap	1	1

CUTOUT/ARRESTOR COMBINATION FOR TRANSFORMER & LINE PROTECTION		
MAY 2014	CHELCO	M3-4 M3-4T

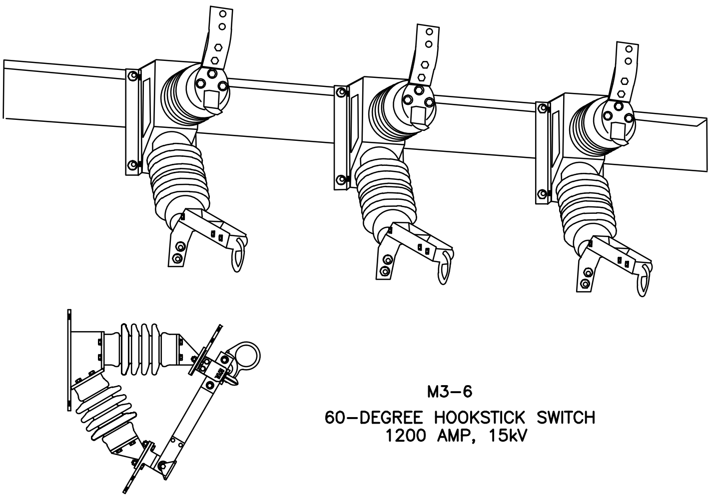




		ASSEMBLY UNIT	
		VM3-4	VM3-4T
ITEM	MATERIAL	REQUIRED	REQUIRED
c	Bolt, machine 5/8" x req'd length		2
d	Washer, square 2 1/4"		2
ae	Arrestor, equipment protection 18kV	1	1
af	Cutout, 100amp equipment protection	1	1
ap	Clamp, hot line copper all	1	1
cj	Conductor, no. 4 S D copper	10	10
ek	Locknuts, as required		
fn	Bracket, cutout 1 phase 'T'		1
	Stirrup, burndy wejtap	1	1

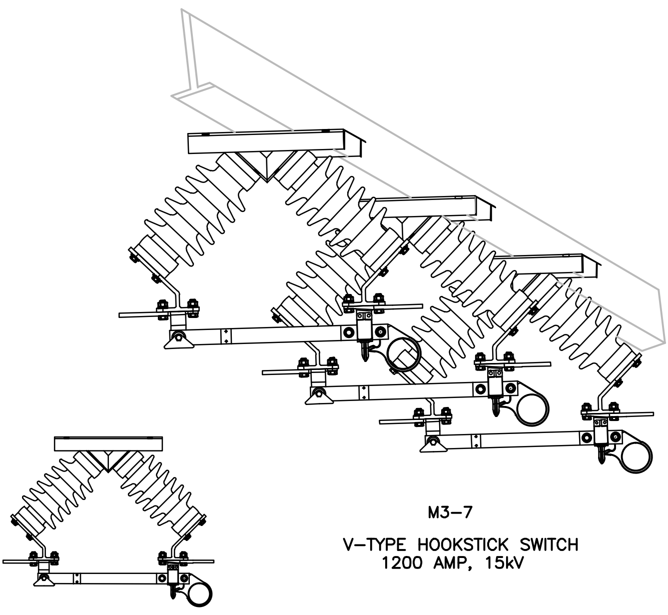
CUTOUT/ARRESTOR COMBINATION
FOR TRANSFORMER & LINE PROTECTION

MAY 2014	CHELCO	VM3-4 VM3-4T



M3-6

60-DEGREE HOOKSTICK SWITCH
1200 AMP, 15kV



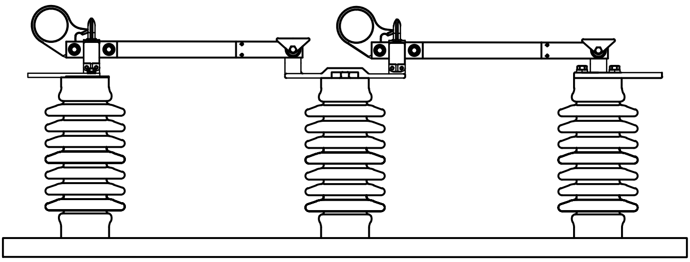
M3-7

V-TYPE HOOKSTICK SWITCH
1200 AMP, 15kV

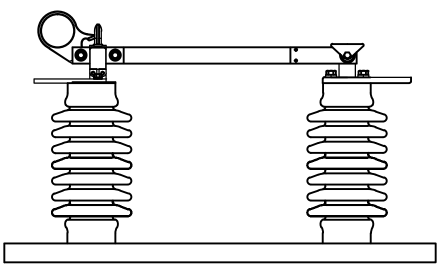
	ASSEMBLY UNIT	
	M3-6	M3-7
ITEM		
422504	3	
423002		3

SUBSTATION SWITCHES, 1200 AMP, 15kV

OCT. 2013	CHELCO	M3-6 M3-7



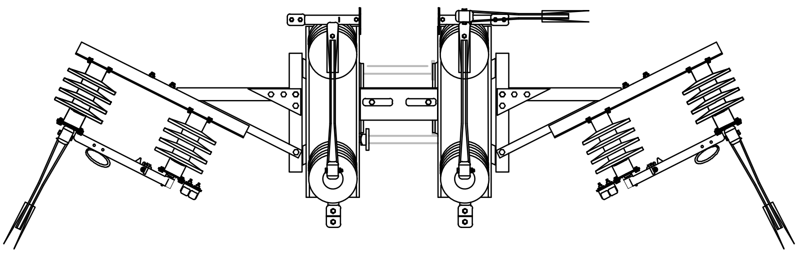
M3–8
TANDEM SWITCH



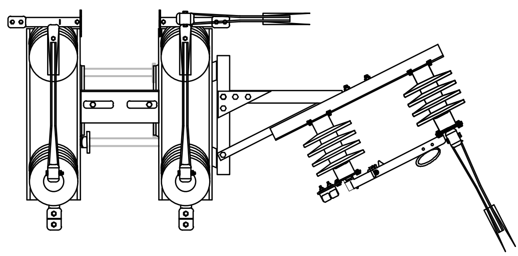
M3–8A
SOURCE SWITCH

SUBSTATION SWITCHES, 1200 AMP, 15kV		
MAY 2014	CHELCO	M3–8 M3–8A

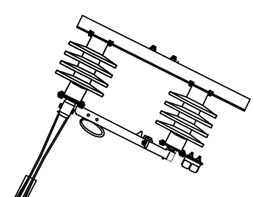
FRONT VIEW



SIDE VIEW

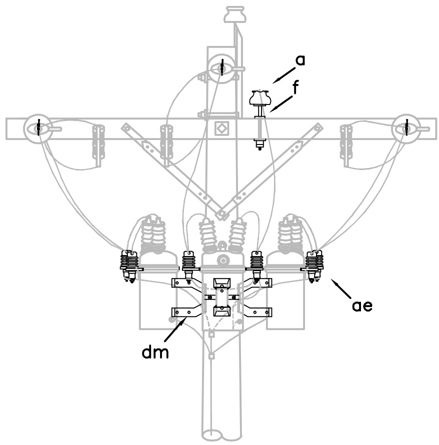


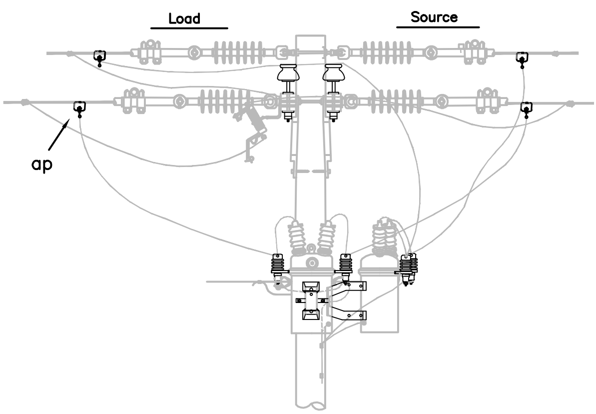
M3–9A



M3–9AA (3)
M3–9AX (1)

SOURCE–LOAD–BYPASS SWITCH 900 AMP		
NOV 2015	CHELCO	M3–9A M3–9AA M3–9AX

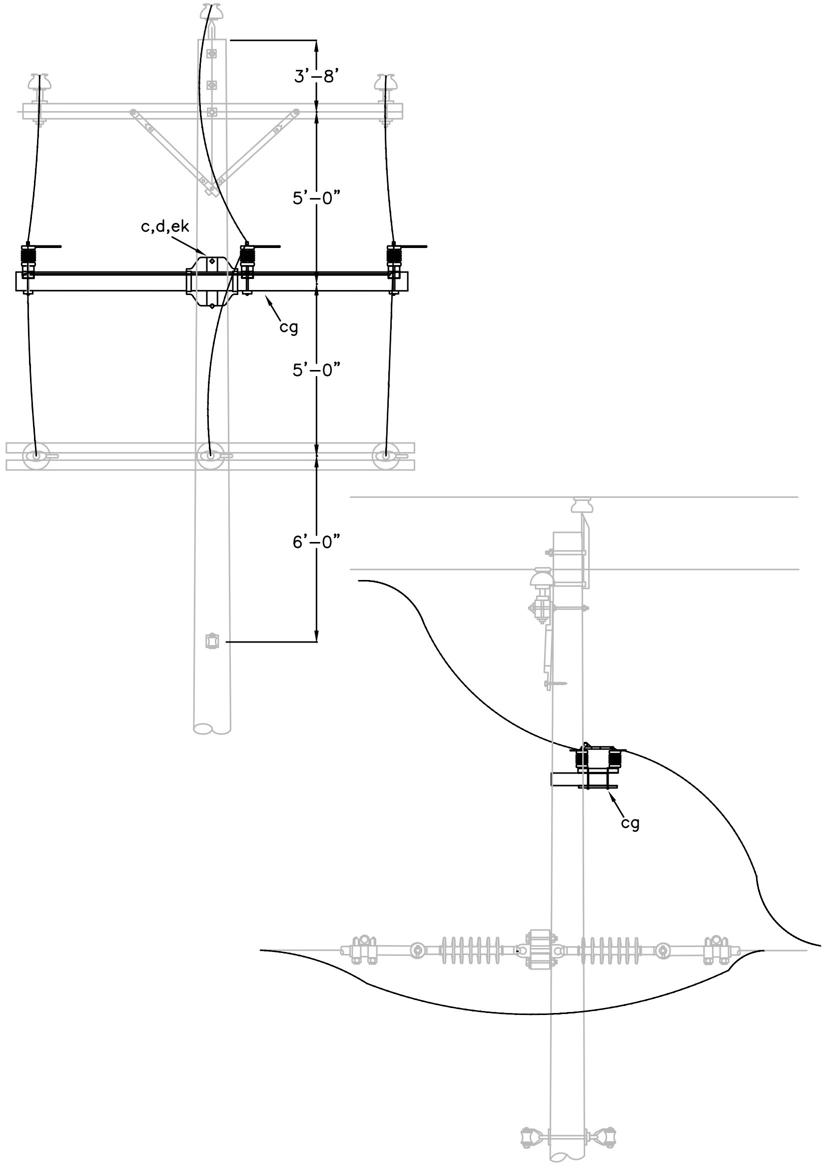




ITEM	MATERIAL	ASSEMBLY UNIT M3–12A	ASSEMBLY UNIT VM3–12A
a	Insulator, pin type 15kV	2	2
d	Washer, square 2 1/4"	2	2
f	Pin, steel crossarm	2	2
ae	Arrestor, lightning 9kV protection	6	
ae	Arrestor, lightning 18kV protection		6
ap	Clamp, hot line copper all	6	6
ek	Locknuts	2	2
dm	Bracket, three position for L –OCR	1	1
	Stirrup, burndy wetjap	6	6

12.5/7.2 kV and 25kV
THREE OCR CLUSTER MOUNT

MAY 2014	CHELCO	M3–12A VM3–12A

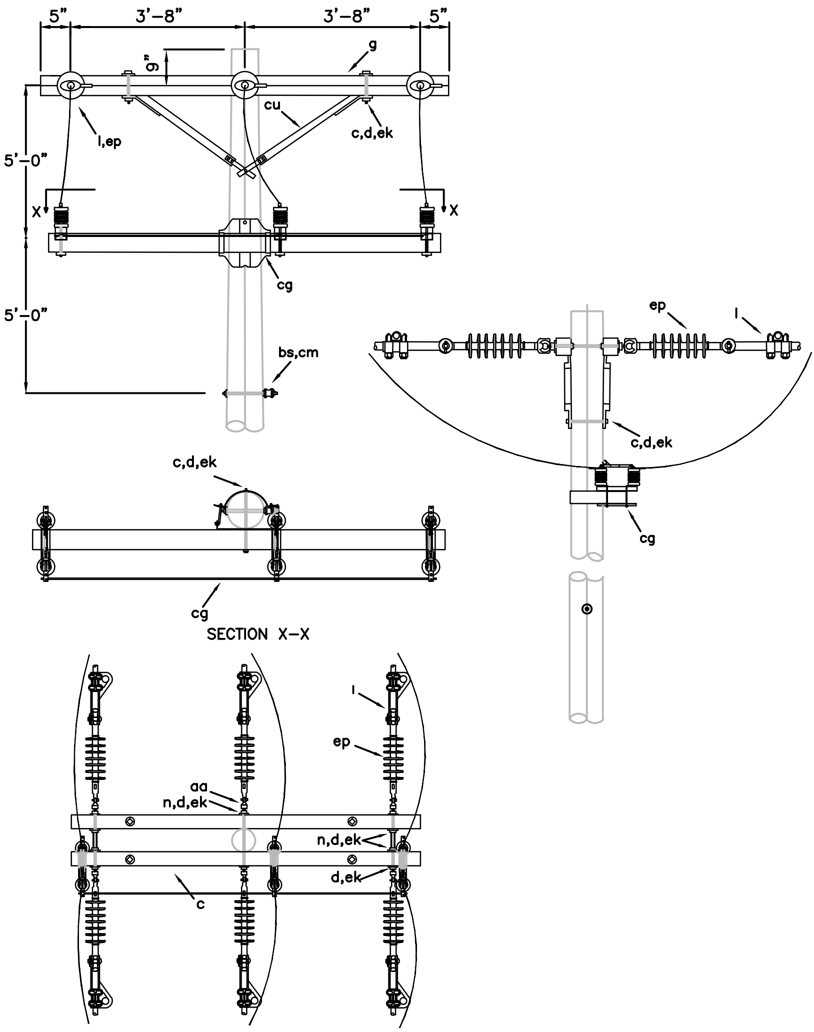


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 3/4" x req'd length	cg	1	Switch, 3 phasez, 900 amp
d	2	Washer, curved	ek	*	Locknuts, as required
p	*	Connectors, as required			

NOTES:
Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV
3 PHASE TOP OVER BOTTOM
HORIZONTAL AIRBREAK SWITCH

DEC. 2008	CHELCO	M3–14

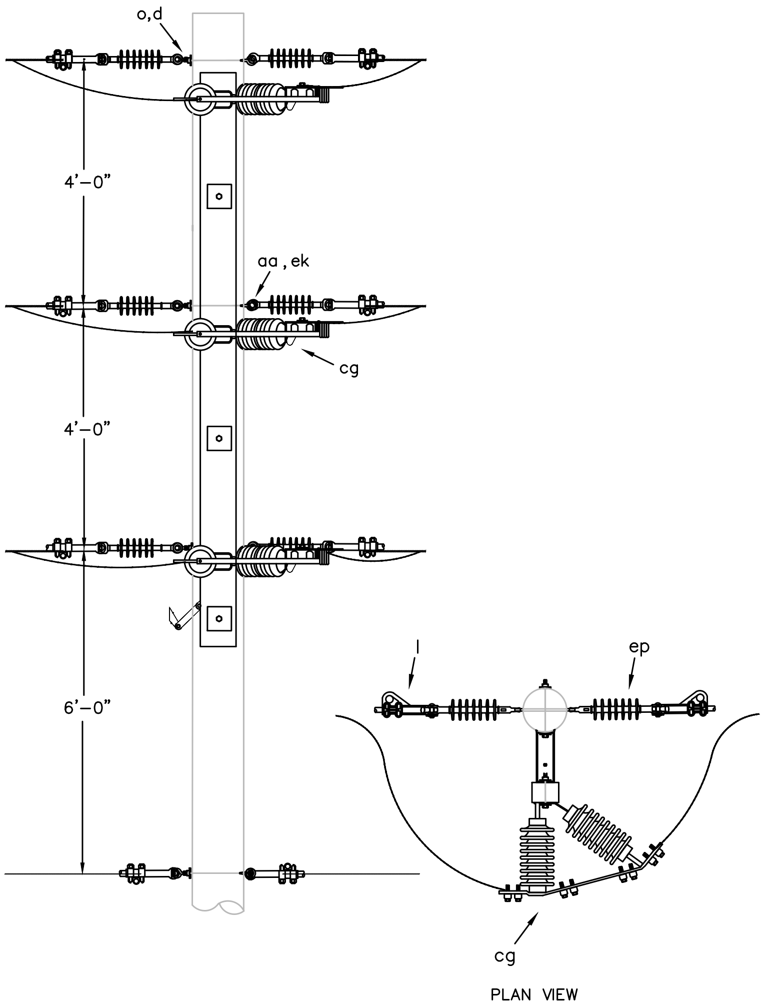


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 3/4" x required length	p	*	Connectors, as required
c	5	Bolt, machine 5/8" x required length	aa	6	Nut, oval eye 5/8"
c	4	Bolt, machine 1/2" x required length	bs	1	Bolt, single upset
d	17	Washer, square 2 1/4", as required	cg	1	Switch, air-break 3 ph. horiz 25kV
d	2	Washer, curved	cm	1	Insulator, secondary spool
g	2	Crossarm, 3 3/4" x 4 3/4"x 8'0"	cu	4	Brace, x/arm 60" wood
l	6	Clamp, deadend shoe	ek	*	Locknuts, as required
n	3	Bolt, dble arming 5/8" x required len	ep	6	Insulator, epoxilator 25kv

NOTES:
Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV
3 PHASE HORIZONTAL AIRBREAK SWITCH

DEC. 2008	CHELCO	M3-15

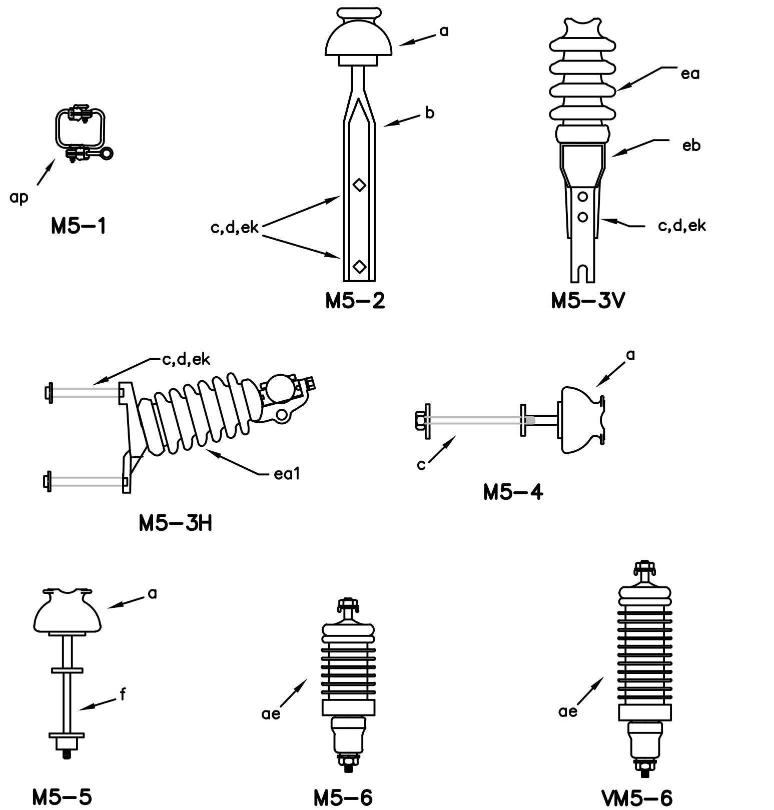


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	3	Bolt, machine 3/4" x req'd length	p	*	Connectors, as required
c	5	Bolt, machine 5/8" x req"d length	aa	4	Nut, oval eye 5/8"
d	17	Washer, square 2 1/4", as required	cg	1	Switch air–break vert ph over ph 25kV
l	8	Clamp, deadend shoe	ek	*	Locknuts, as required
o	4	Bolt, oval eye 5/8" x req"d length	ep	6	Insulator, epoxilator 25kv

NOTES:
Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV
3 PHASE VERTICAL AIRBREAK SWITCH

DEC. 2008 | CHELCO | M3–16V



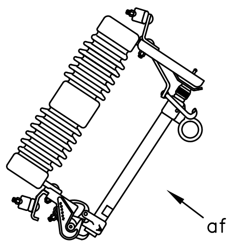
ITEM	MATERIAL	M5-1	M5-2	M5-3V	M5-3H	M5-4	M5-5	M5-6	VM5-6
		ASSEMBLY UNIT							
a	Insulator, pin type 15kV		1			1	1		
b	Pin, pole top 20" steel		1			1			
c	Bolt, machine 5/8" x req'd lngth		2			1			
c	Bolt, machine 3/4" x req'd lngth			2	2				
d	Washer, square 2 1/4", as req'd		2	2	2	1	1		
f	Pin, steel crossarm						1		
ae	Arrestor, equip protection 9kV							1	
ae	Arrestor, equip protection 18kV								1
ap	Clamp, hot line copper all	1							
av	Conductor no 4 S D copper	5						3	3
ea	Insulator, post screw on type 25kV			1					
ea1	Insulator, horizontal post 25kV				1				
eb	Bracket, pole top for screw-on			1					
ek	Locknuts, as required		2	2	2	1	1		
	Stirrup, burndy wejtap	1							

MISCELLANEOUS PRIMARY ASSEMBLIES

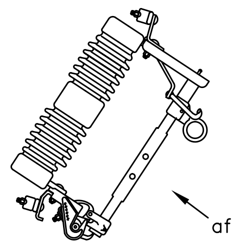
NOV 2015

CHELCO

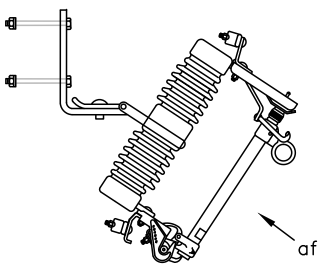
M5-1 M5-2 M5-3V M5-3H M5-4 M5-5 M5-6 VM5-6



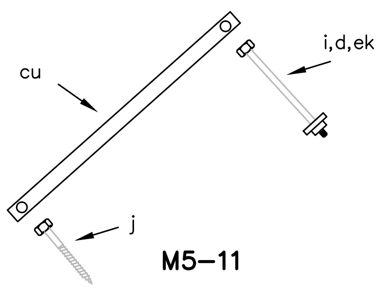
M5–9



M5–9–300



M5–9L

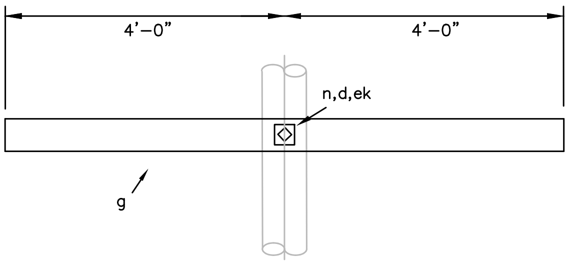


M5–11

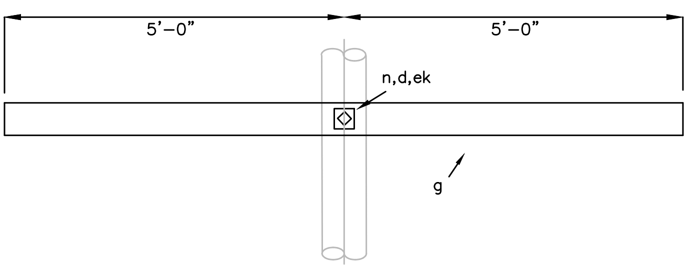
ITEM	MATERIAL	ASSEMBLY UNIT			
		M5–9	M5–9–300	M5–9L	M5–11
c	Bolt, machine 5/8" x req'd length		2	2	
d	Washer, square 2 1/4", as req'd		2	2	1
i	Bolt, carriage 3/8" x 4–1/2"				1
j	Lag screw, 1/2" x 4–1/2"				1
af	Cutout, 100 amp line protection	1		1	
af	Cutout, 300 amp solid blade		1		
ek	Locknuts, as required		2	2	1
cu	Brace x/arm 28" wood				2
	Bracket, cutout 1 phase 'T'		1	1	

MISCELLANEOUS PRIMARY ASSEMBLIES

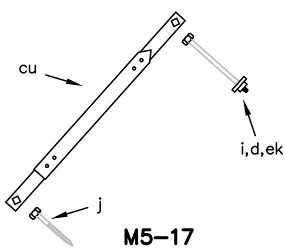
DEC 2008	CHELCO	M5–9 M5–9L M5–9–300 M5–11



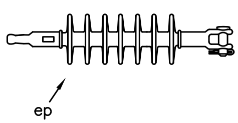
M5-14



M5-16



M5-17

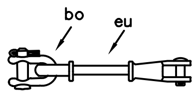


M5-20

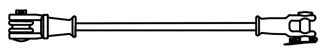
ITEM	MATERIAL	ASSEMBLY UNIT			
		M5-14	M5-16	M5-17	M5-20
d	Washer, square by required size	1	1	1	
g	Crossarm, 3 3/4" x 4 3/4" x 8'0"	1			
g	Crossarm, 3 3/4" x 4 3/4" x 10'0"		1		
i	Bolt, carriage 3/8" x 4-1/2"			1	
j	Lag screw, 1/2" x 4-1/2"			1	
n	Bolt, double arming 5/8"x req'd length	1	1		
cu	Brace x/arm 28" wood			2	
ek	Locknuts, as required	1	1	1	
ep	Insulator, epoxilator 25kV				1

MISCELLANEOUS PRIMARY ASSEMBLIES

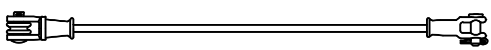
DEC 2008	CHELCO	M5-14 M5-16	M5-17 M5-20



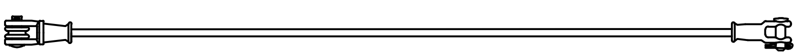
M5-23-12



M5-23-36
M5-23-36-30k



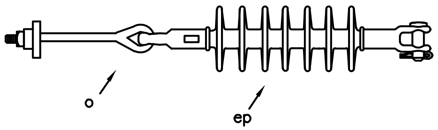
M5-23-72
M5-23-72-30k



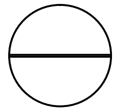
M5-23-144

ITEM	MATERIAL	ASSEMBLY UNIT					
		M5-23 -12	M5-23 -36	M5-23 -36-30k	M5-23 -72	M5-23 -72-30k	M5-23 -144
bo	Shackle anchor	1	1	1	1	1	1
eu	Insulator, extension fiberglass	1					
	Insulator, guy strain, 36"		1				
	Insulator, guy strain, 36" 30k lbs			1			
	Insulator, guy strain, 72"				1		
	Insulator, guy strain, 72" 30k lbs					1	
	Insulator, guy strain, 144"						1

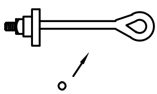
MISCELLANEOUS PRIMARY ASSEMBLIES			
MAY 2014	CHELCO	M5-23-12 M5-23-36 M5-23-36-30k	M5-23-72 M5-23-72-30k M5-23-144



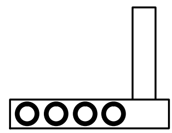
M5–24



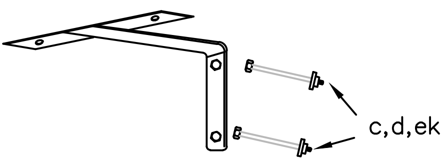
M5–30



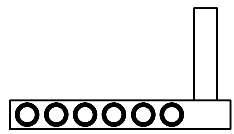
M5–25



M5–34

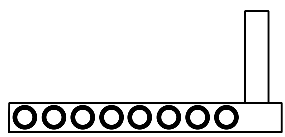


M5–27



M5–36

M5–28

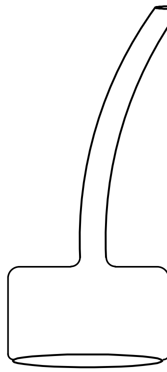


M5–38

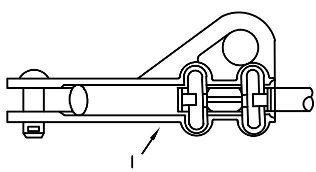
		ASSEMBLY UNIT							
ITEM	MATERIAL	M5–24	M5–25	M5–27	M5–28	M5–30	M5–34	M5–36	M5–38
c	Bolt, machine 5/8" x req'd length			2					
d	Washer, square 2 1/4", as req'd	1	1	2					
o	Bolt, oval eye 5/8" x req'd length	1	1						
ek	Locknuts	1	1	2					
ep	Insulator, epoxilator 25kV	1							
fn	Bracket, cutout 1 phase 'T'			1					
	Damper, conductor for 394.5				1				
	Marker, spherical–line					1			
	Connector, secondary for OH tran						1	1	1

MISCELLANEOUS PRIMARY ASSEMBLIES

MAY 2014	CHELCO	M5–24 M5–25 M5–27 M5–28 M5–30 M5–34 M5–36 M5–38



M5-SG

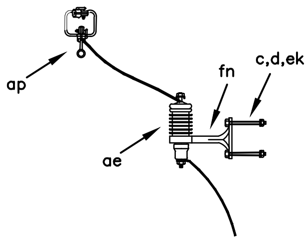


M42-11
M42-394
M42-741

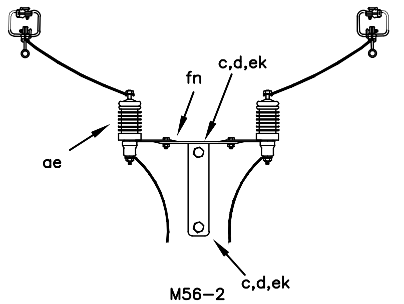
		ASSEMBLY UNIT			
ITEM	MATERIAL	M5-SG	M42-11	M42-394	M42-741
1	Clamp, deadend shoe #2-4/0		1		
1	Clamp, deadend shoe 394.5			1	
1	Clamp, deadend shoe 740.8				1
	Guard, animal for conv. trans	1			

MISCELLANEOUS PRIMARY ASSEMBLIES

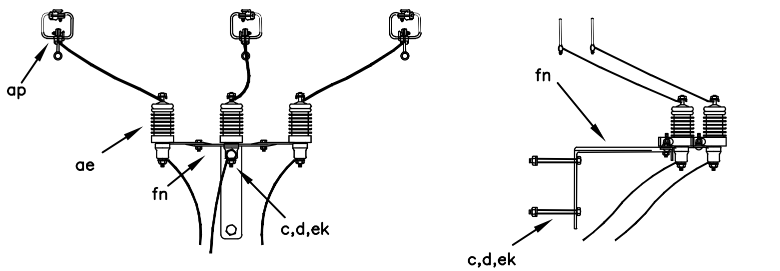
JAN 2014 | CHELCO | M5-SG M42-11 M42-394 M42-741



M56-1



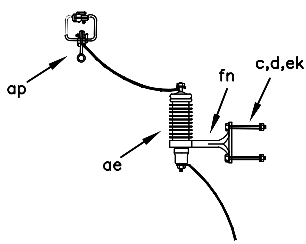
M56-2



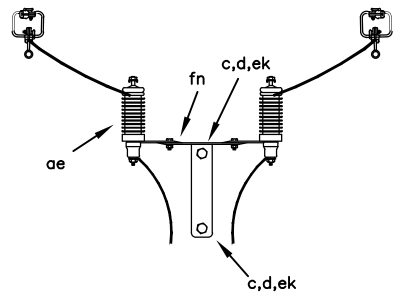
M56-3

		ASSEMBLY UNIT		
ITEM	MATERIAL	M56-1	M56-2	M56-3
c	Bolt, machine 5/8" x req'd length	2	2	2
d	Washer, square 2 1/4"	2	2	2
ae	Arrestor, lightning 9kV protection	1	2	3
ap	Clamp, hot line copper all	1	2	3
cj	Conductor, no. 4 S D copper	8	16	24
ek	Locknuts	2	2	2
fn	Bracket, cutout 1 phase 'T'	1	1	1
	Stirrup, burndy wejtap	1	2	3

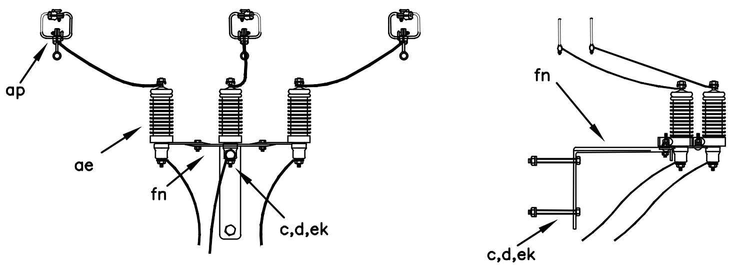
9kV ARRESTOR		
MAY 2014	CHELCO	M56-1 M56-2 M56-3



VM56-1



VM56-2

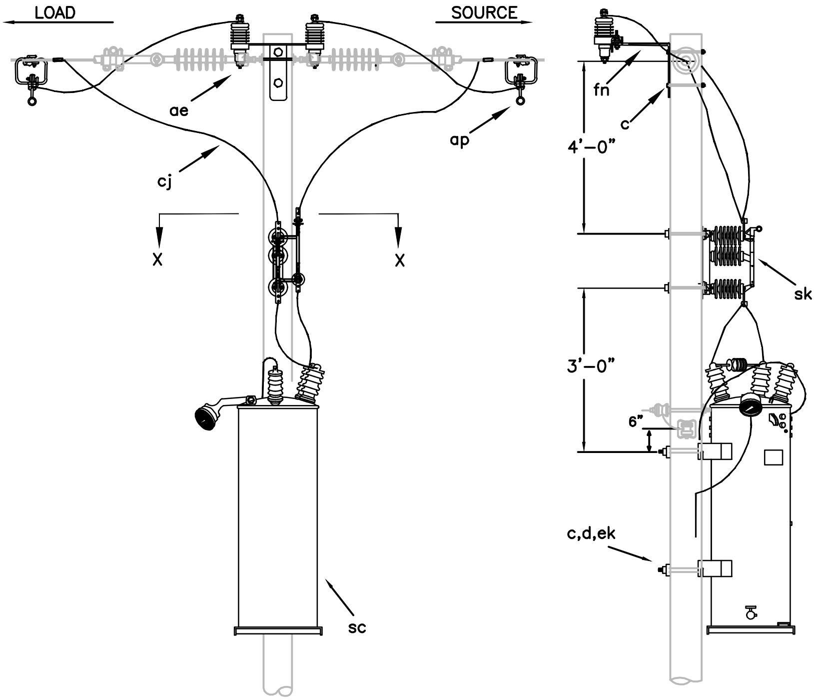


VM56-3

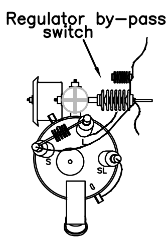
NOTES:
1. FOR PURPOSES OF THIS MANUAL AN 18kV ARRESTER IS ACTUALLY A HIGH CREEP 9kV ARRESTER.

ITEM	MATERIAL	ASSEMBLY UNIT VM56-1	VM56-2	VM56-3
c	Bolt, machine 5/8" x req'd length	2	2	2
d	Washer, square 2 1/4"	2	2	2
ae	Arrestor, lightning 18kV protection	1	2	3
ap	Clamp, hot line copper all	1	2	3
cj	Conductor, no. 4 S D copper	8	16	24
ek	Locknuts	2	2	2
fn	Bracket, cutout 1 phase 'T'	1	1	1
	Stirrup, burndy wejtap	1	2	3

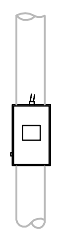
18kV ARRESTOR		
MAY 2014	CHELCO	VM56-1 VM56-2 VM56-3



SECTION X–X



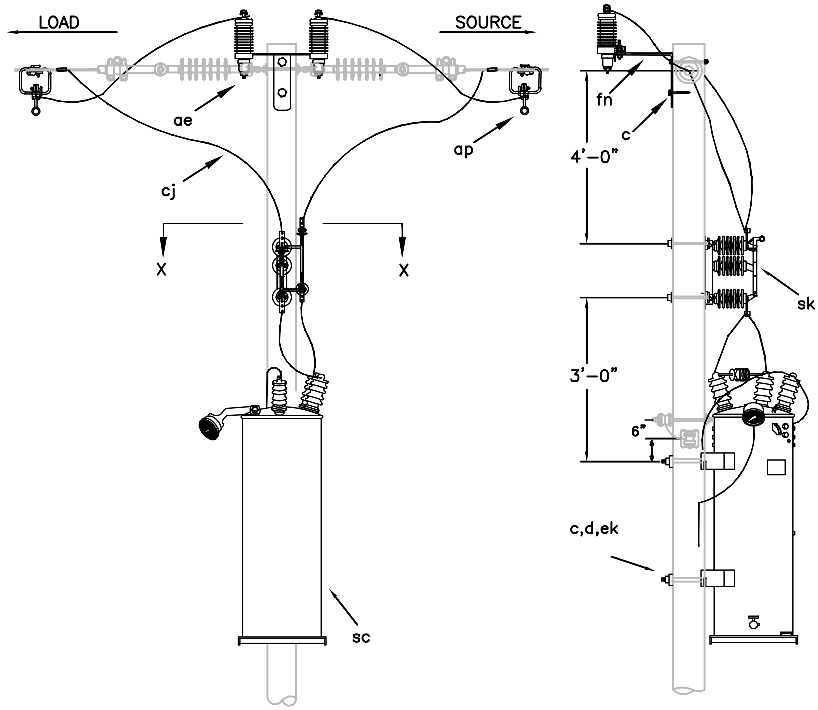
NOTES:
Install regulator controls approximately 5 feet from ground on field side of pole. Control cable shall be properly shielded or installed in suitable conduit.



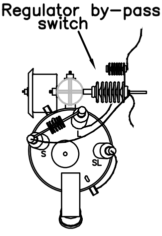
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 3/4" x req'd length	cj	30	Conductor, No 4 S D copper
c	5	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	6	Washer, square 2 1/4", as req'd	fn	1	Bracket, cutout 1 phase 'T'
p	*	Connectors, as required	sc	1	Regulator, by required size
ae	2	Arrestor, lightning 9kV protection	sk	1	Switch, B1 regulator by–pass
ap	2	Clamp, hot line copper all		1	Regulator control panel
av	*	Jumpers, as required		2	Stirrup, burndy wejtap

12.5\7.2 kV PRIMARY
ONE VOLTAGE REGULATOR
POLE MOUNTED

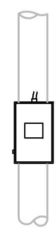
AUG 2011	CHELCO	M7–11



SECTION X–X



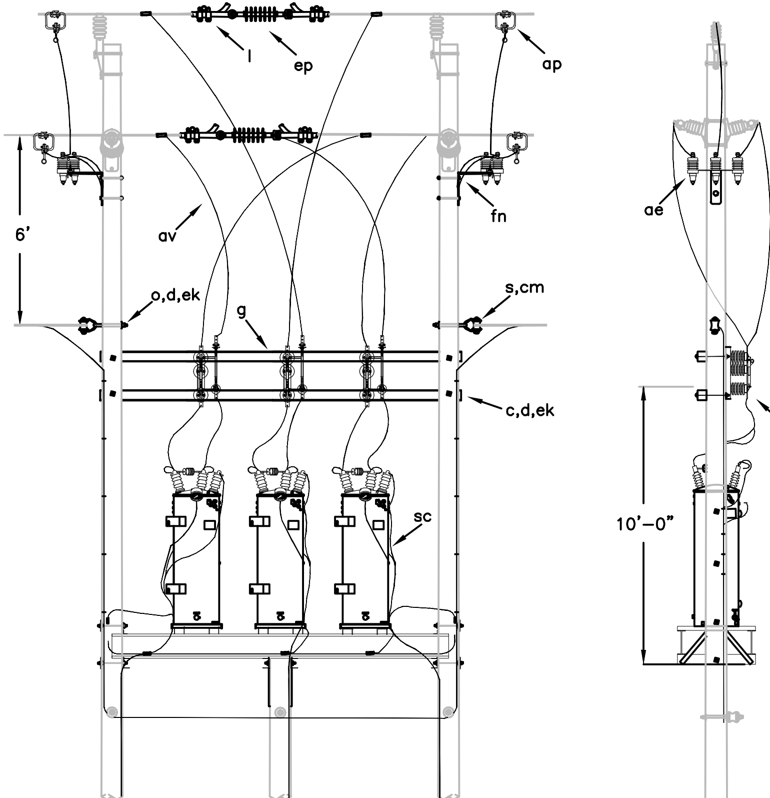
NOTES:
Install regulator controls approximately 5 feet from ground on field side of pole. Control cable shall be properly shielded or installed in suitable conduit.

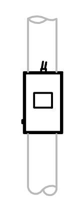


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine 3/4" x req'd length	cj	30	Conductor, No 4 S D copper
c	5	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	6	Washer, square 2 1/4", as req'd	fn	1	Bracket, cutout 1 phase 'T'
p	*	Connectors, as required	sc	1	Regulator, by required size
ae	2	Arrestor, lightning 18kV protection	sk	1	Switch, B1 regulator by–pass
ap	2	Clamp, hot line copper all		1	Regulator control panel
av	*	Jumpers, as required		2	Stirrup, burndy wejtap

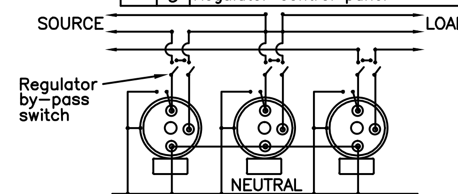
12.5\7.2 kV PRIMARY
ONE VOLTAGE REGULATOR
POLE MOUNTED

MAY 2014	CHELCO	VM7–11





ITEM	QTY	MATERIAL
c	5	Bolt, machine 3/4" x req'd length
c	10	Bolt, machine 5/8" x req'd length
d	15	Washer, square 2 1/4", as req'd
g	2	Beams, 4" x 6" x 16' treated
l	6	Clamp, deadend shoe
o	2	Bolt, oval eye, 5/8" as required
p	*	Connectors, as required
s	2	Clevis, secondary swinging
ae	6	Arrestor, lightning 9kV protection
ap	6	Clamp, hot line copper all
av	*	Jumpers, as required
cj	200	Conductor, No 4 S D copper
cm	2	Insulator, secondary spool
ek	*	Locknuts, as required
ep	3	Insulator, epoxilator 25kV
fn	2	Bracket, cutout 1 phase 'T'
sc	3	Regulator, by required size
sk	3	Switch, B1 regulator by-pass
	2	Deadend distribution grip
	1	Platform, regulator
	3	Regulator control panel

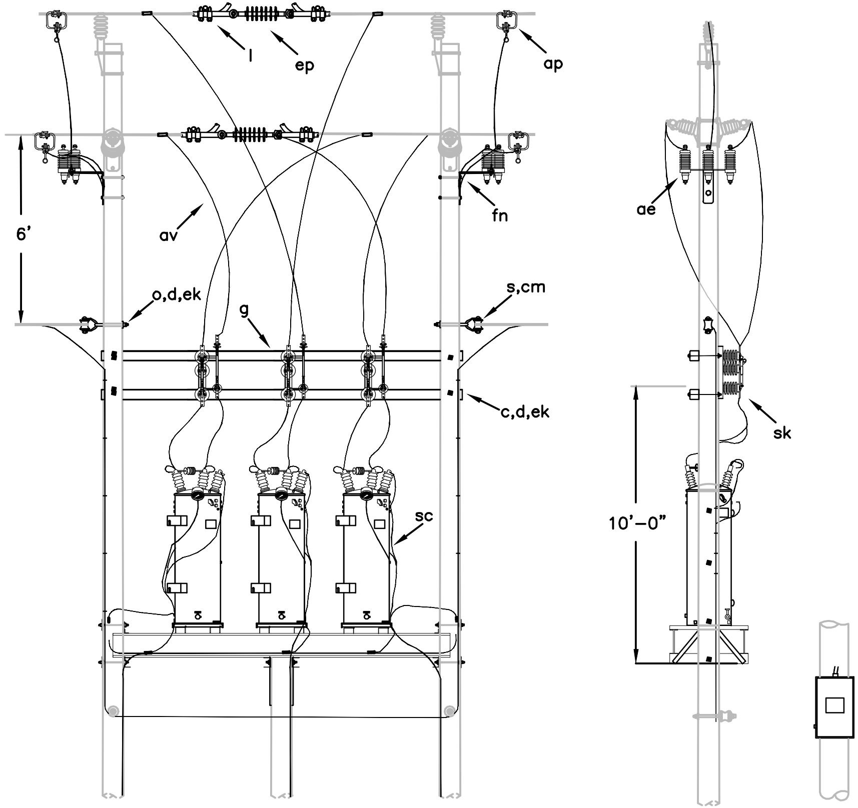


WIRING DIAGRAM

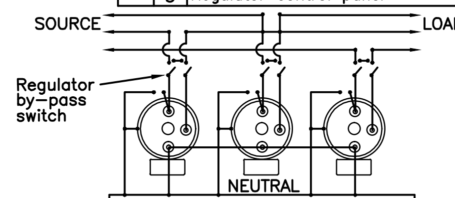
NOTES: Install regulator controls approximately 5 feet from ground on field side of pole. Control cable shall be properly shielded or installed in suitable conduit.

12.5/7.2 kV
THREE VOLTAGE REGULATORS
PLATFORM MOUNTED

DEC. 2013	CHELCO	M7–13



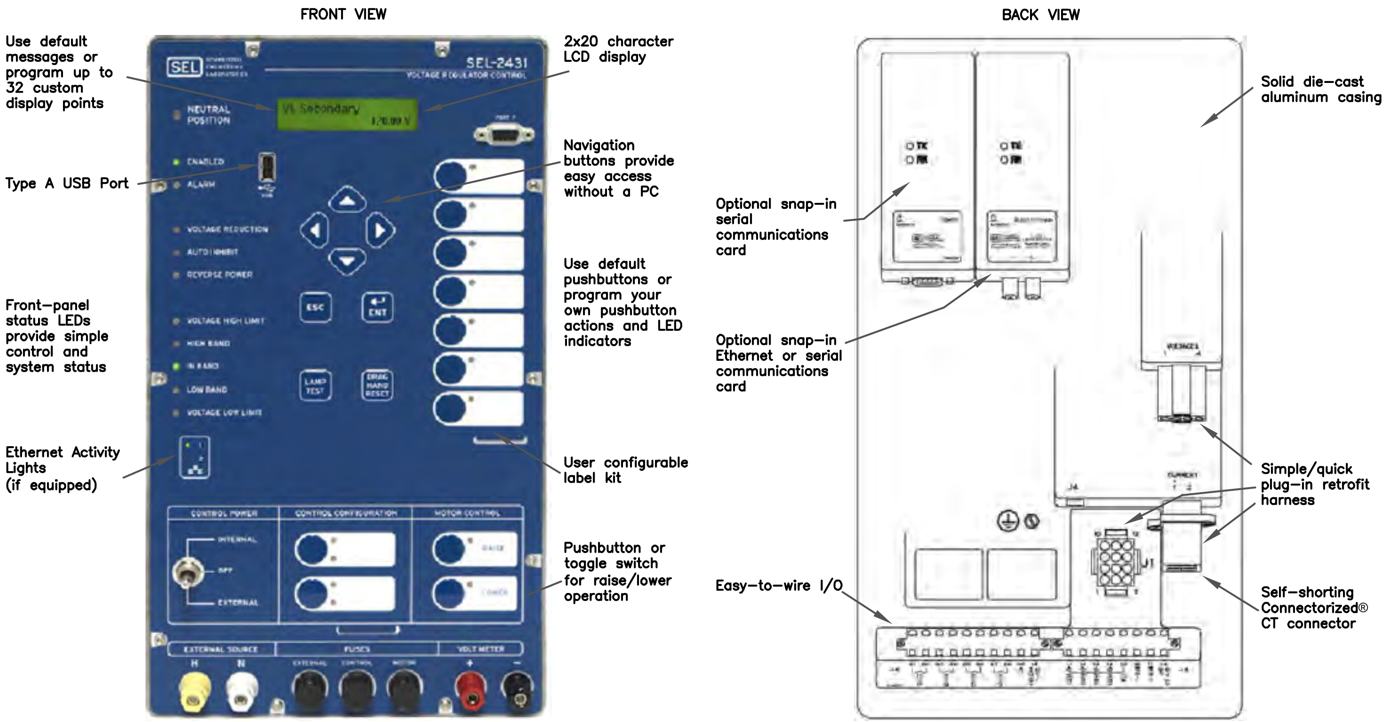
ITEM	QTY	MATERIAL
c	5	Bolt, machine 3/4" x req'd length
c	10	Bolt, machine 5/8" x req'd length
d	15	Washer, square 2 1/4", as req'd
g	2	Beams, 4" x 6" x 16' treated
l	6	Clamp, deadend shoe
o	2	Bolt, oval eye, 5/8" as required
p	*	Connectors, as required
s	2	Clevis, secondary swinging
ae	6	Arrestor, lightning 18kV protection
ap	6	Clamp, hot line copper all
av	*	Jumpers, as required
cj	200	Conductor, No 4 S D copper
cm	2	Insulator, secondary spool
ek	*	Locknuts, as required
ep	3	Insulator, epoxilator 25kV
fn	2	Bracket, cutout 1 phase 'T'
sc	3	Regulator, by required size
sk	3	Switch, B1 regulator by-pass
	2	Deadend distribution grip
	1	Platform, regulator
	3	Regulator control panel



WIRING DIAGRAM

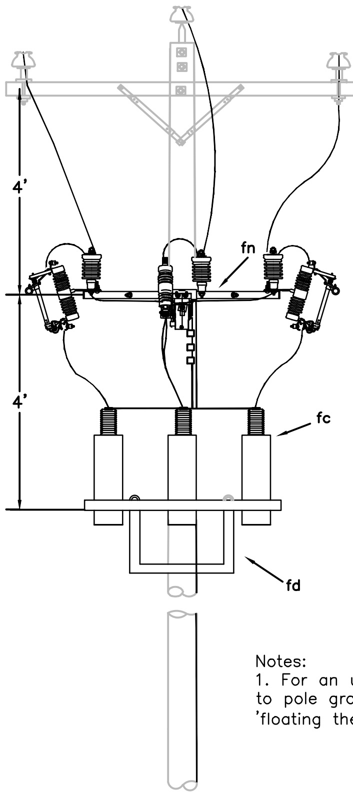
NOTES: Install regulator controls approximately 5 feet from ground on field side of pole. Control cable shall be properly shielded or installed in suitable conduit.

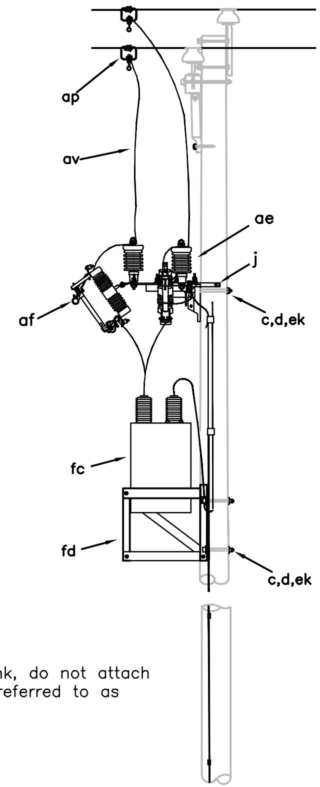
12.5/7.2 kV THREE VOLTAGE REGULATORS PLATFORM MOUNTED		
MAY 2014	CHELCO	VM7–13

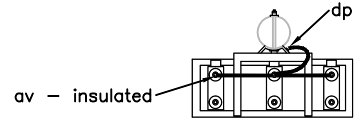


SEL VOLTAGE REGULATOR CONTROL PANEL

OCT 2013	CHELCO	SEL–2431–CP





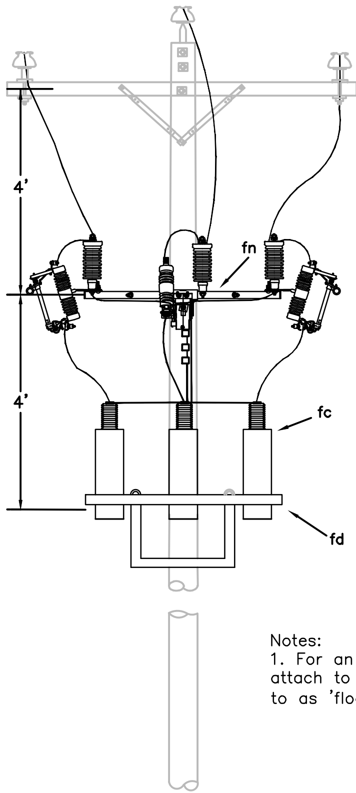


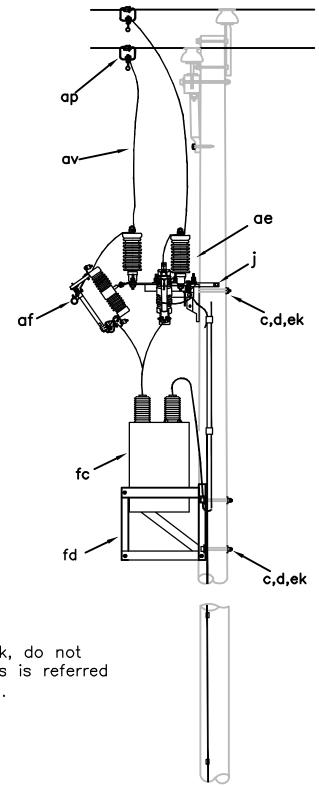
WIRING DIAGRAM

ITEM	QTY	MATERIAL
c	3	Bolt, machine 5/8" x req'd length
d	3	Washer, square 2 1/4", as req'd
j	3	Lag screw 1/2" x 4"
ae	3	Arrrestor, 9kV equipment protector
af	3	Cutout, 100 amp
ap	3	Clamp, hot line copper all
av	*	Jumpers, as required
cj	75	Conductor, No 4 S D copper
dp	1	Clamp, ground wire
ek	*	Locknuts, as required
fd	1	Rack, capacitor 3 phase
fc	1	300 KVAR Capacitor bank
fn	1	Bracket –cutout 3 phase
	3	Stirrup, burndy wejtap

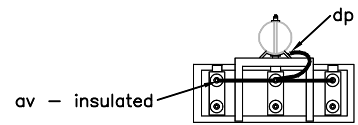
Notes:
1. For an ungrounded bank, do not attach to pole ground. This is referred to as 'floating the neutral'.

12.5/7.2 kV THREE PHASE CAPACITOR BANK 300 KVAR		
JAN 2014	CHELCO	M9–13





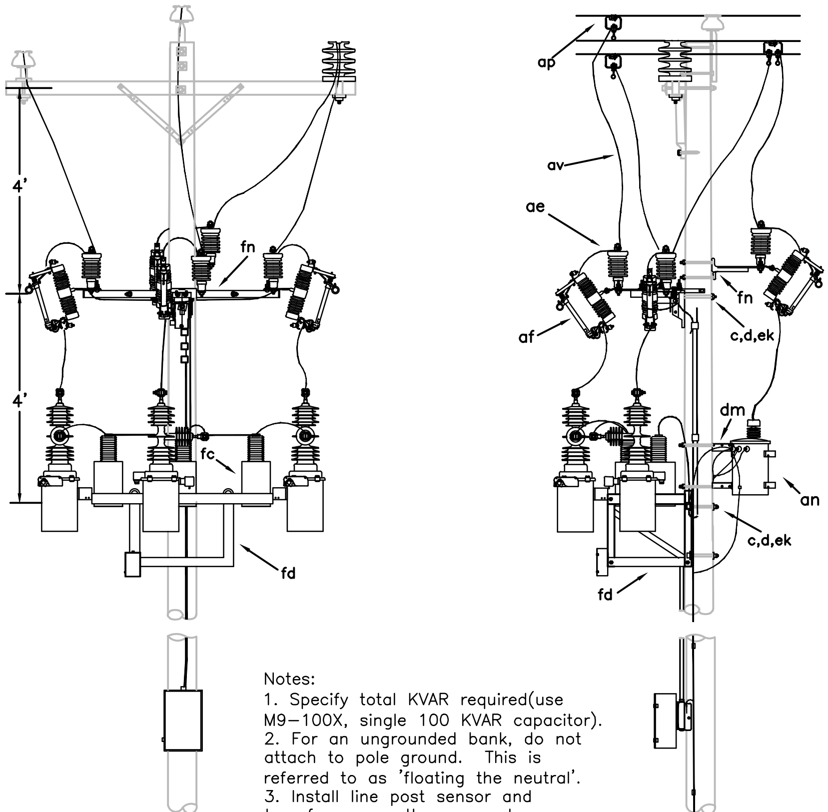
ITEM	QTY	MATERIAL
c	3	Bolt, machine 5/8" x req'd length
d	3	Washer, square 2 1/4", as req'd
j	3	Lag screw 1/2" x 4"
ae	3	Arrrestor, 18kV equipment protector
af	3	Cutout, 100 amp
ap	3	Clamp, hot line copper all
av	*	Jumpers, as required
dp	1	Clamp, ground wire
cj	75	Conductor, No 4 S D copper
ek	*	Locknuts, as required
fd	1	Rack, capacitor 3 phase
fc	1	300 KVAR Capacitor bank
fn	1	Bracket –cutout 3 phase
	3	Stirrup, burndy wejtap



WIRING DIAGRAM

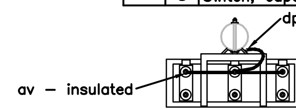
Notes:
1. For an ungrounded bank, do not attach to pole ground. This is referred to as 'floating the neutral'.

12.5/7.2 kV THREE PHASE CAPACITOR BANK 300 KVAR		
MAY 2014	CHELCO	VM9–13



Notes:
1. Specify total KVAR required(use M9–100X, single 100 KVAR capacitor).
2. For an ungrounded bank, do not attach to pole ground. This is referred to as 'floating the neutral'.
3. Install line post sensor and transformer on the same phase.

ITEM	QTY	MATERIAL
c	8	Bolt, machine 5/8" x req'd length
d	8	Washer, square 2 1/4", as req'd
j	6	Lag screw 1/2" x 4"
ae	4	Arrrestor, 9kV equipment protector
af	4	Cutout, 100 amp
an	1	Transformer 1.5 kva
ap	4	Clamp, hot line copper all
av	*	Jumpers, as required
cj	75	Conductor, No 4 S D copper
dm	1	Bracket –single position for trans
dp	1	Clamp, ground wire
ek	*	Locknuts, as required
fd	1	Rack, capacitor 3 phase
fc	1	Capacitor bank
fn	1	Bracket –cutout 3 phase
fn	1	Bracket –cutout 1 phase 'T'
	*	12/2 AWG Multi–color as required
	1	Capacitor control panel
	1	Capacitor junction box
	3	Conduit, 1"
	1	Conduit, 1" coupling
	2	Conduit, 1" locking ring
	2	Conduit, 1" male term adapter
	1	Line Post Current Sensor
	1	Meter Socket, 6 terminal
	4	Stirrup, burndy wejtap
	3	Switch, capacitor 15kV

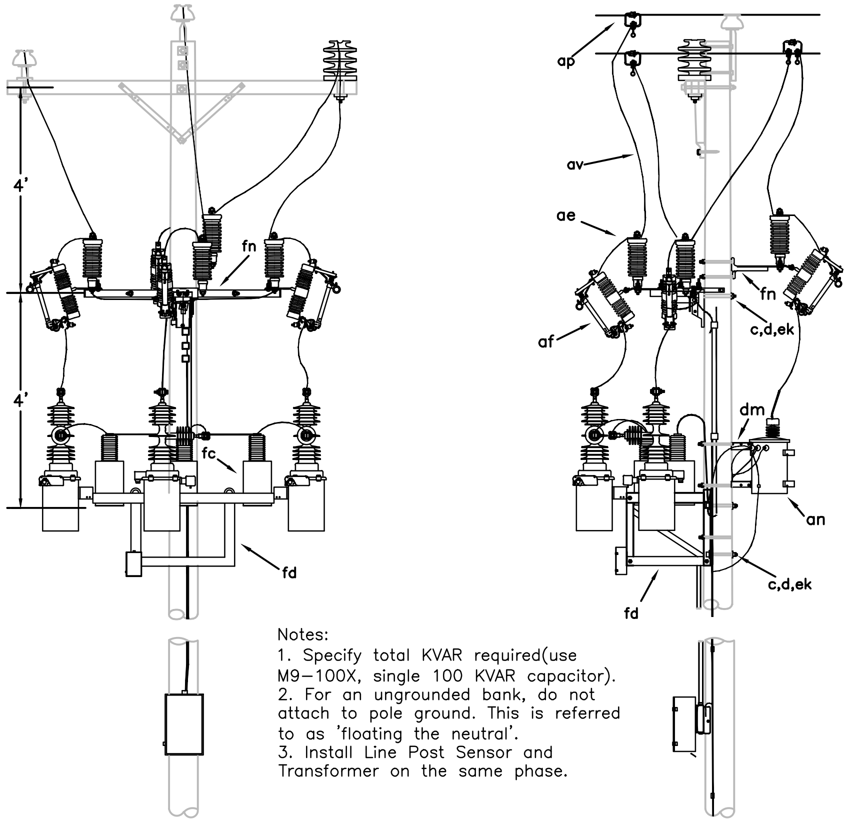


WIRING DIAGRAM

12.5/7.2 kV

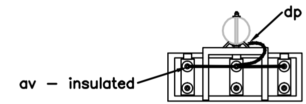
THREE PHASE CAPACITOR BANK
AUTOMATICALLY SWITCHED

OCT. 2013	CHELCO	M9–13AS



Notes:
1. Specify total KVAR required(use M9−100X, single 100 KVAR capacitor).
2. For an ungrounded bank, do not attach to pole ground. This is referred to as 'floating the neutral'.
3. Install Line Post Sensor and Transformer on the same phase.

ITEM	QTY	MATERIAL
c	8	Bolt, machine 5/8" x req'd length
d	9	Washer, square 2 1/4", as req'd
j	6	Lag screw 1/2" x 4"
ae	4	Arrrestor, 18kV equipment protector
af	4	Cutout, 100 amp
an	1	Transformer 1.5 kva
ap	4	Clamp, hot line copper all
av	*	Jumpers, as required
cj	75	Conductor, No 4 S D copper
dm	1	Bracket −single position for trans
dp	1	Clamp, ground wire
ek	*	Locknuts, as required
fd	1	Rack, capacitor 3 phase
fc	1	Capacitor bank
fn	1	Bracket −cutout 3 phase
fn	1	Bracket −cutout 1 phase 'T'
	*	12/2 AWG Multi−color as required
	1	Capacitor control panel
	1	Capacitor junction box
	3	Conduit, 1"
	1	Conduit, 1" coupling
	2	Conduit, 1" locking ring
	2	Conduit, 1" male term adapter
	1	Line Post Current Sensor
	1	Meter Socket, 6 terminal
	4	Stirrup, burndy wejtap
	3	Switch, capacitor 15kV

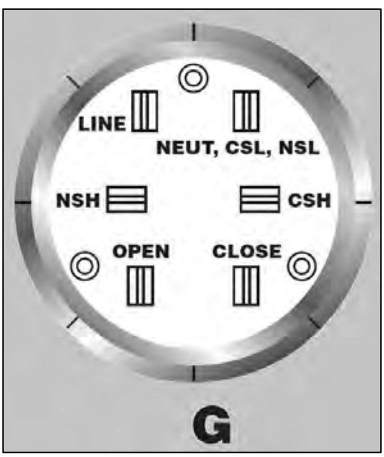


WIRING DIAGRAM

12.5/7.2 kV

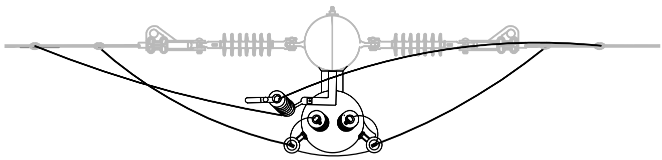
THREE PHASE CAPACITOR BANK
AUTOMATICALLY SWITCHED

MAY 2014	CHELCO	VM9−13AS

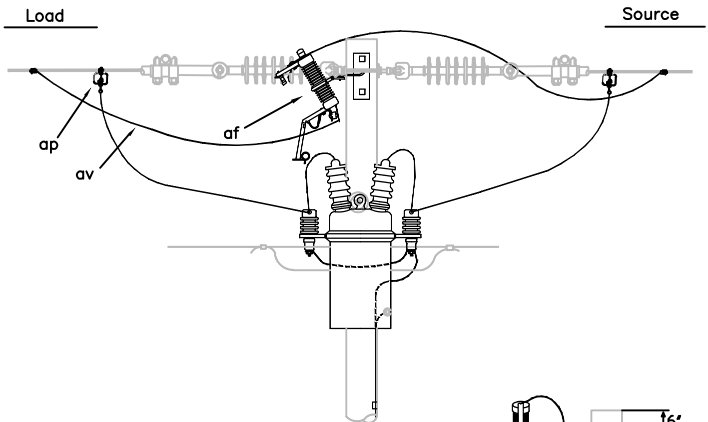


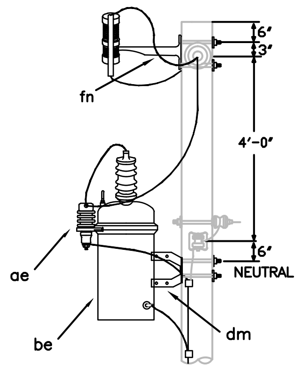
SWITCHED BANK
CAPACITOR CONTROL

JUNE 2011	CHELCO	M9-13-CP



PLAN





NOTES:

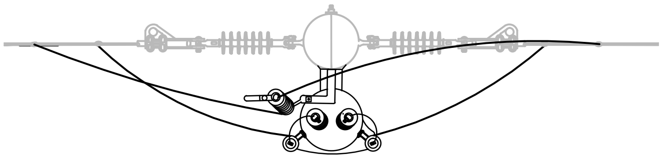
1. The terminal bushing connected directly to the coil should be conneceted to the source. Where necessary to provide for this connection the recloser and cutout may be mounted on the other side of the pole and the neutral deadended.
2. Mount cutout so that exhaust blast of arc is directed away from linemen.
3. Jumper wire ampacity to equal conductor ampacity

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	cj	20	Conductor, No 4 S D copper
d	4	Washer, square 2 1/4"	dm	1	Bracket, as required for ocr
ae	2	Arrestor, lightning 9kV protection	ek	*	Locknuts, as required
af	1	Cutout, line protection	fn	1	Bracket, cutout 1 phase 'T'
ap	2	Clamp, hot line copper all		2	Stirrup, burndy wejtap
av	*	Jumpers, as required		*	Connectors, as required
be	1	Recloser, oil circuit			

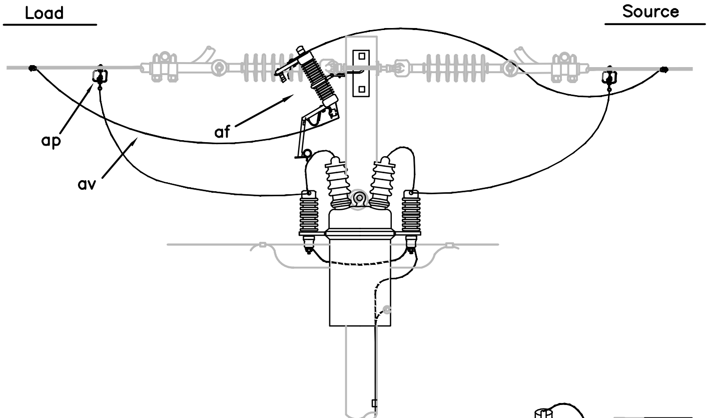
15 THROUGH 70 AMP

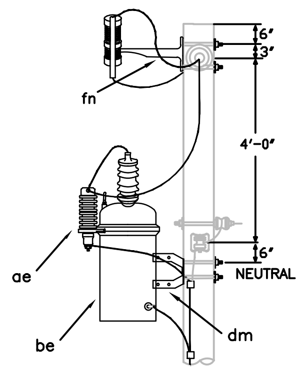
12.5/7.2 kV
OIL CIRCUIT RECLOSER
WITH BYPASS CUTOUT

MAY 2014	CHELCO	M23



PLAN

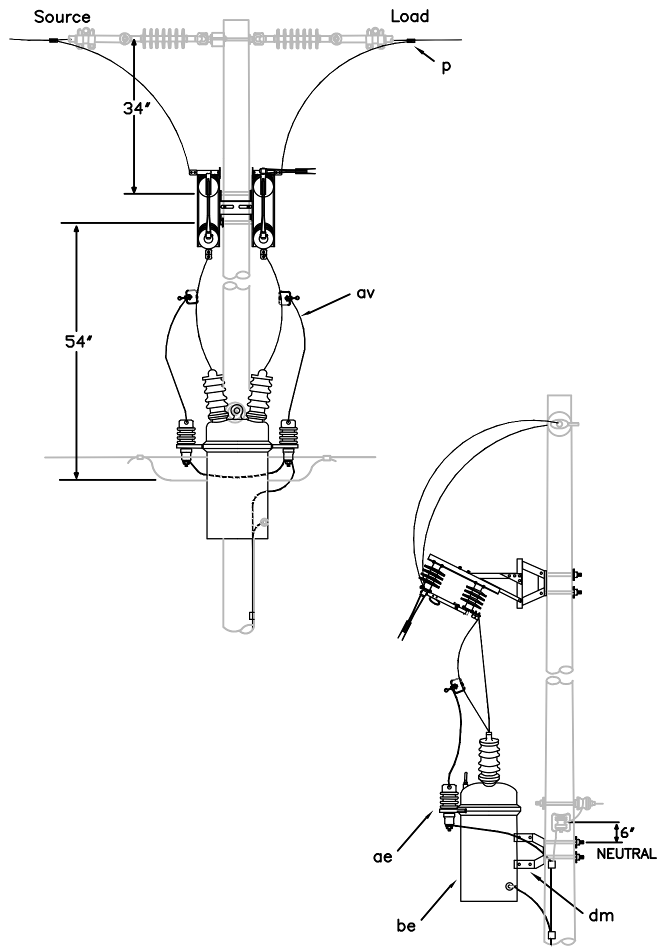




NOTES:
1. The terminal bushing connected directly to the coil should be coneceted to the source. Where necessary to provide for this connection the recloser and cutout may be mounted on the other side of the pole and the neutral deadended.
2. Mount cutout so that exhaust blast of arc is directed away from linemen.
3. Jumper wire ampacity to equal conductor ampacity

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	cj	20	Conductor, No 4 S D copper
d	4	Washer, square 2 1/4"	dm	1	Bracket, as required for ocr
ae	2	Arrestor, lightning 18kV protection	ek	*	Locknuts, as required
af	1	Cutout, line protection	fn	1	Bracket, cutout 1 phase 'T'
ap	2	Clamp, hot line copper all		2	Stirrup, burndy wejtap
av	*	Jumpers, as required		*	Connectors, as required
be	1	Recloser, oil circuit			

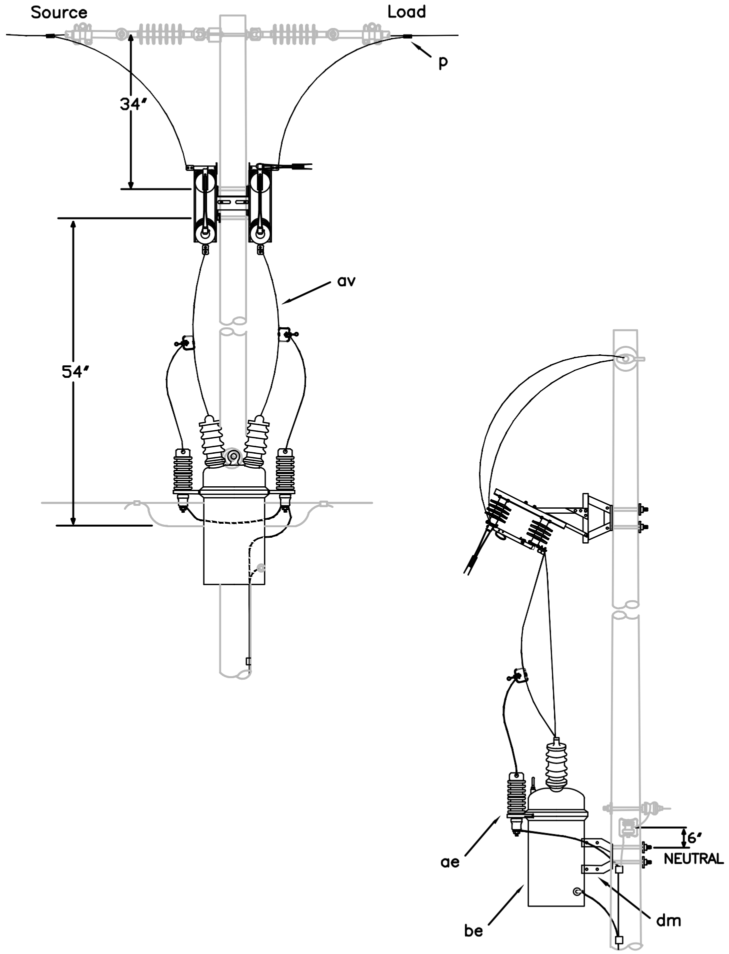
15 THROUGH 70 AMP	12.5/7.2 kV OIL CIRCUIT RECLOSER WITH BYPASS CUTOUT		
	MAY 2014	CHELCO	VM23



NOTES:
1. Jumper wire ampacity to equal conductor ampacity

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	be	1	Recloser, oil circuit
d	4	Washer, square 2 1/4"	cj	20	Conductor, No 4 S D copper
p	*	Connectors, as required	dm	2	Bracket, as required for ocr
ae	2	Arrestor, lightning 9kV protection	ek	*	Locknuts, as required
ap	2	Clamp, hot line copper all		1	SLB, 900 amp
av	*	Jumpers, as required		2	Stirrup, burndy wejtap

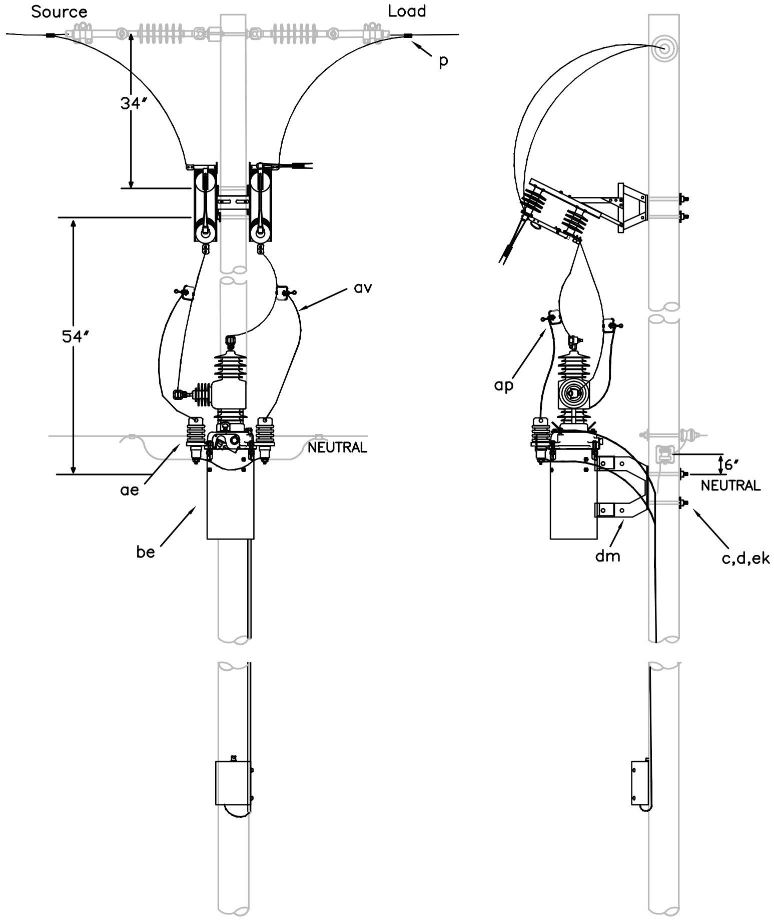
100 AMP	12.5/7.2 kV OIL CIRCUIT RECLOSER WITH BYPASS SWITCH		
	MAY 2014	CHELCO	M23-100



NOTES:
1. Jumper wire ampacity to equal conductor ampacity

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	be	1	Recloser, oil circuit
d	4	Washer, square 2 1/4"	cj	20	Conductor, No 4 S D copper
p	*	Connectors, as required	dm	2	Bracket, as required for ocr
ae	2	Arrestor, lightning 18kV protection	ek	*	Locknuts, as required
ap	2	Clamp, hot line copper all		1	SLB, 900 amp
av	*	Jumpers, as required		2	Stirrup, burndy wejtap

100 AMP	12.5/7.2 kV OIL CIRCUIT RECLOSER WITH BYPASS SWITCH		
	MAY 2014	CHELCO	VM23-100

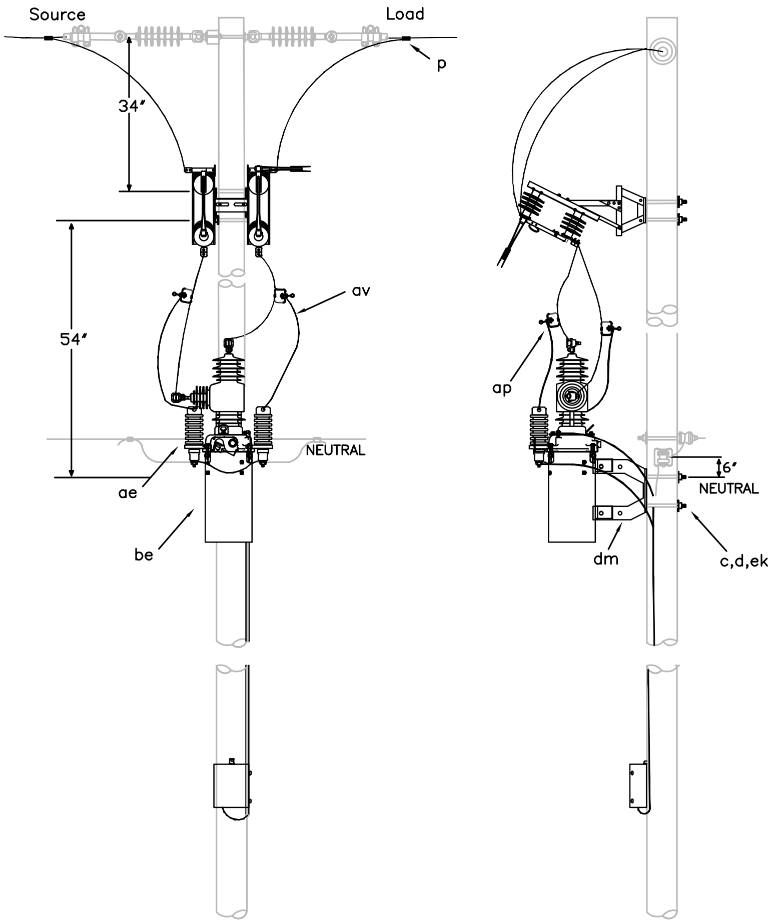


Note:
Jumper wire ampacity to
equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	dm	2	Brackets, as required for ocr
d	4	Washer, square 2 1/4"	ek	*	Locknuts, as required
ae	2	Arrestor, lightning 9kV protection		1	Control cable for 1 phase Nova
ap	2	Clamp, hot line copper all		1	Recloser control panel Nova
av	*	Jumpers, as required		1	SLB, 900 amp
be	1	Recloser, single phase Nova		2	Stirrup, burndy wetjap
cj	20	Conductor, No 4 S D copper			

12.5/7.2 kV
1 NOVA TYPE
ELECTRONIC RECLOSER

MAY 2014	CHELCO	M23-NOVA

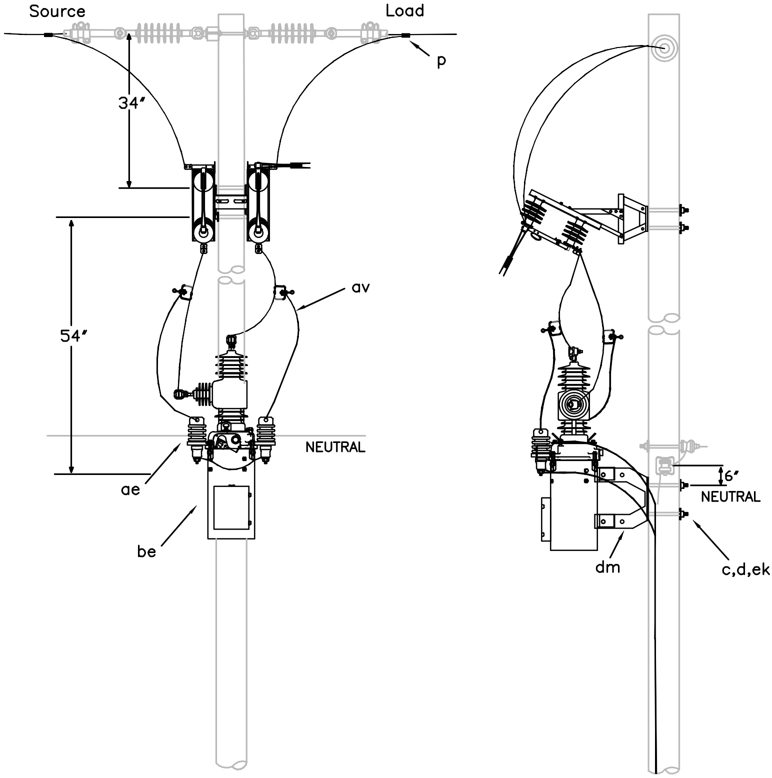


Note:
Jumper wire ampacity to
equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	dm	2	Brackets, as required for ocr
d	4	Washer, square 2 1/4"	ek	*	Locknuts, as required
ae	2	Arrestor, lightning 18kV protection		1	Control cable for 1 phase Nova
ap	2	Clamp, hot line copper all		1	Recloser control panel Nova
av	*	Jumpers, as required		1	SLB, 900 amp
be	1	Recloser, single phase Nova		2	Stirrup, burndy wetjap
cj	20	Conductor, No 4 S D copper			

12.5/7.2kV
1 NOVA TYPE
ELECTRONIC RECLOSER

MAY 2014 | CHELCO | VM23–NOVA

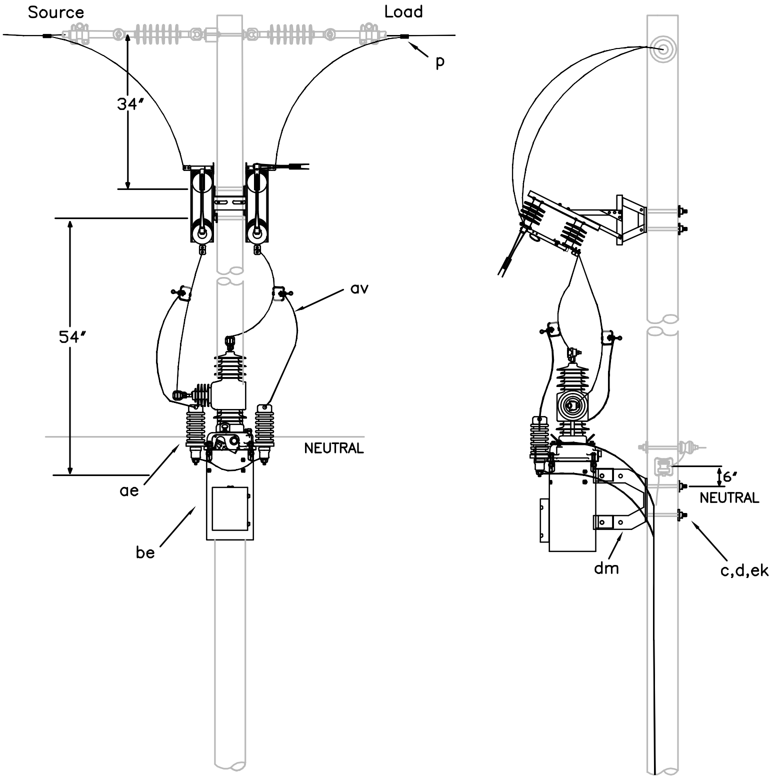


Note:
Jumper wire ampacity to
equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	dm	2	Brackets, as required for ocr
d	4	Washer, square 2 1/4"	ek	*	Locknuts, as required
ae	2	Arrestor, lightning 9kV protection		1	Control cable for 1 phase Nova
ap	2	Clamp, hot line copper all		1	Recloser, control box
av	*	Jumpers, as required		1	SLB, 900 amp
be	1	Recloser, single phase		2	Stirrup, burndy wetjap
cj	20	Conductor, No 4 S D copper			

12.5/7.2 kV
1 VXE TYPE
ELECTRONIC RECLOSER

MAY 2014	CHELCO	M23-VXE

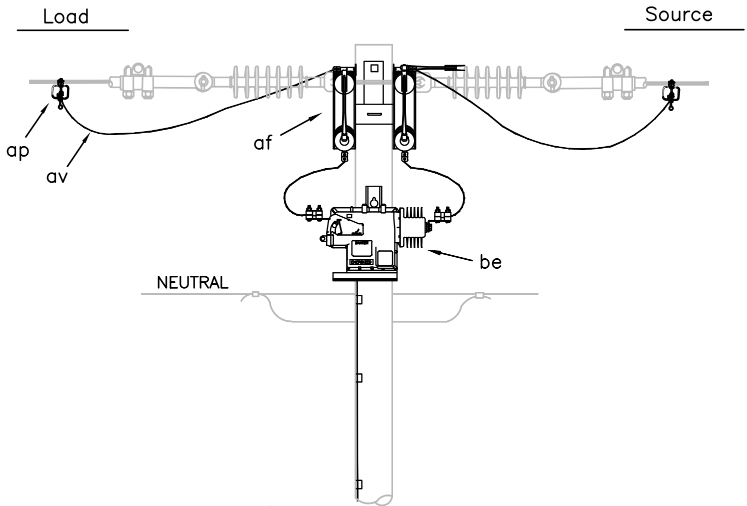


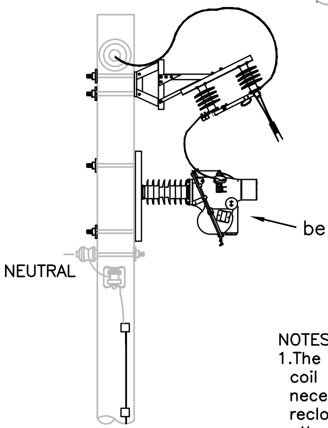
Note:
Jumper wire ampacity to
equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	dm	2	Brackets, as required for ocr
d	4	Washer, square 2 1/4"	ek	*	Locknuts, as required
ae	2	Arrestor, lightning 18kV protection		1	Control cable for 1 phase Nova
ap	2	Clamp, hot line copper all		1	Recloser, control panel Nova
av	*	Jumpers, as required		1	SLB, 900 amp
be	1	Recloser, single phase Nova		2	Stirrup, burndy wetjap
cj	20	Conductor, No 4 S D copper			

12.5/7.2kV
1 VXE TYPE
ELECTRONIC RECLOSER

MAY 2014	CHELCO	VM23-VXE



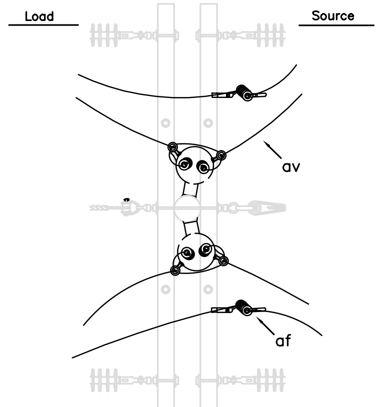


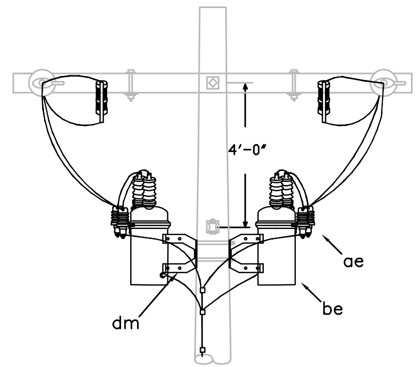
NOTES:
1. The terminal bushing connected directly to the coil should be connected to the source. Where necessary to provide for this connection the recloser and cutout may be mounted on the other side of the pole and the neutral deadended.
2. Mount cutout so that exhaust blast of arc is directed away from linemen.
3. Jumper wire ampacity to equal conductor ampacity.

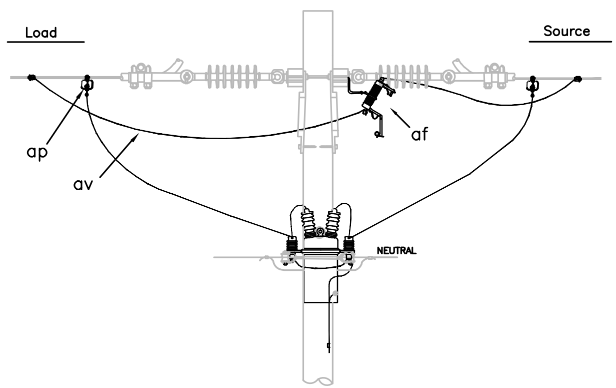
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length	dm	1	Bracket, as required for ocr
d	4	Washer, square 2 1/4"	ek	*	Locknuts, as required
ap	2	Clamp, hot line copper all		1	SLB, 900 amp
av	*	Jumpers, as required		2	Stirrup, burndy wejtap
be	1	Recloser, single phase Versatech		*	Connectors, as required
cj	20	Conductor, No 4 S D copper			

12.5/7.2 kV
SINGLE PHASE RECLOSER
WITH BYPASS CUTOUT

MAY 2014 | CHELCO | M23—VERSATECH







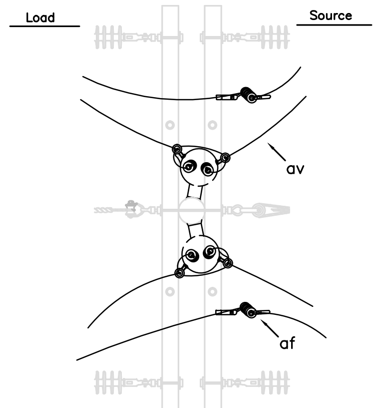
15 THROUGH 70 AMP

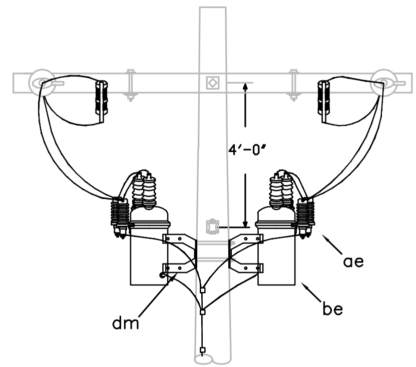
ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length
d	2	Washer, square 2 1/4"
ae	4	Arrestor, lightning 9kV protection
af	2	Cutout, line protection
ap	4	Clamp, hot line copper all
av	*	Jumpers, as required
be	2	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	1	Bracket, two position for ocr
ek	*	Locknuts, as required
	4	Stirrup, burndy wejtap
	*	Connectors, as required

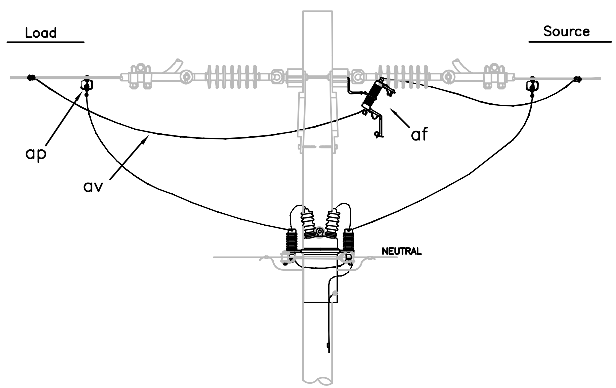
NOTES:

1. The terminal bushing connected directly to the coil should be conneceted to the source. Where necessary to provide for this connection the recloser and cutout may be mounted on the other side of the pole and the neutral deadended.
2. Mount cutout so that exhaust blast of arc is directed away from linemen.
3. Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV 2 OIL CIRCUIT RECLOSERS WITH BYPASS CUTOUTS		
MAY 2014	CHELCO	M24





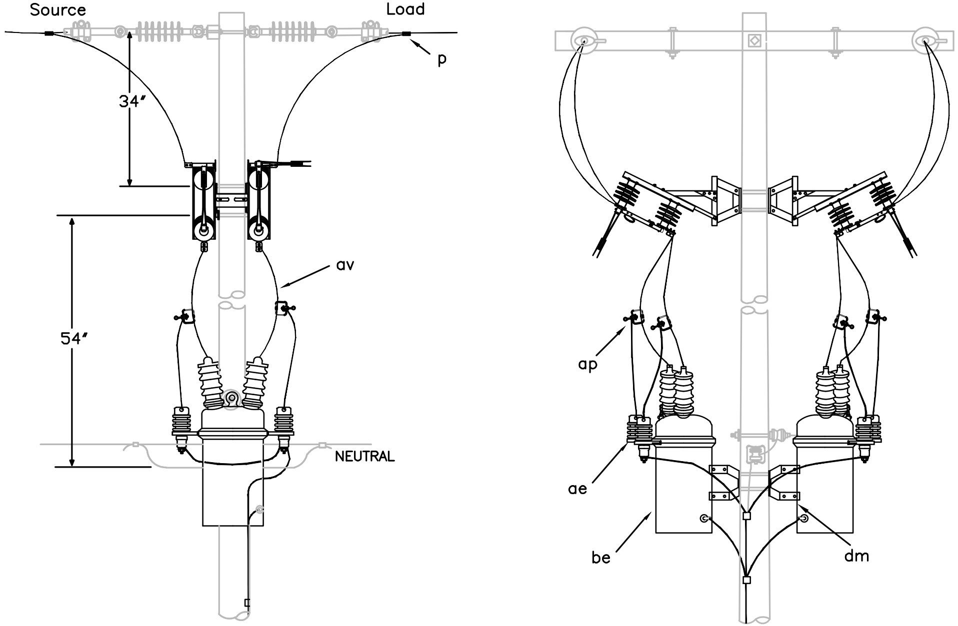


15 THROUGH 70 AMP

ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length
d	2	Washer, square 2 1/4"
ae	4	Arrestor, lightning 18kV protection
af	2	Cutout, line protection
ap	4	Clamp, hot line copper all
av	*	Jumpers, as required
be	2	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	1	Bracket, two position for ocr
ek	*	Locknuts, as required
	4	Stirrup, burndy wejtap
	*	Connectors, as required

NOTES:
1. The terminal bushing connected directly to the coil should be conneceted to the source. Where necessary to provide for this connection the recloser and cutout may be mounted on the other side of the pole and the neutral deadended.
2. Mount cutout so that exhaust blast of arc is directed away from linemen.
3. Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV 2 OIL CIRCUIT RECLOSERS WITH BYPASS CUTOUTS		
MAY 2014	CHELCO	VM24



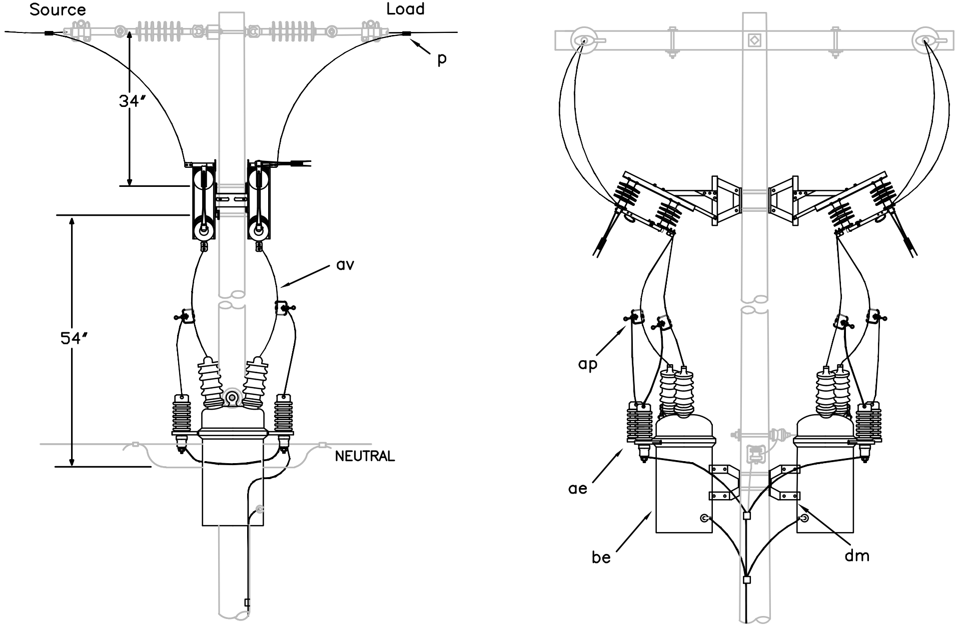
100 AMP

ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4"
ae	4	Arrestor, lightning 9kV protection
ap	4	Clamp, hot line copper all
av	*	Jumpers, as required
be	2	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	2	Bracket, two position for ocr
ek	*	Locknuts, as required
	2	SLB, 900 amp
	4	Stirrup, burndy wejtap
	*	Connectors, as required

NOTES:
1. Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV
2 OIL CIRCUIT RECLOSERS
WITH BYPASS SWITCH

MAY 2014	CHELCO	M24-100



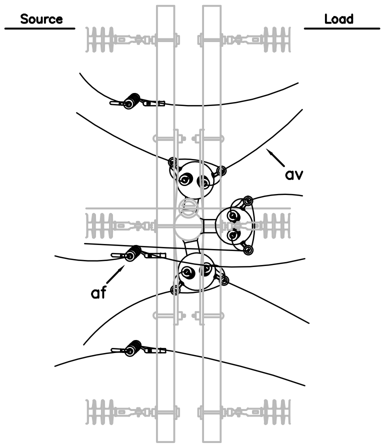
ITEM	QTY	MATERIAL
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4"
ae	4	Arrestor, lightning 18kV protection
ap	4	Clamp, hot line copper all
av	*	Jumpers, as required
be	2	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	2	Bracket, two position for ocr
ek	*	Locknuts, as required
	2	SLB, 900 amp
	4	Stirrup, burndy wejtap
	*	Connectors, as required

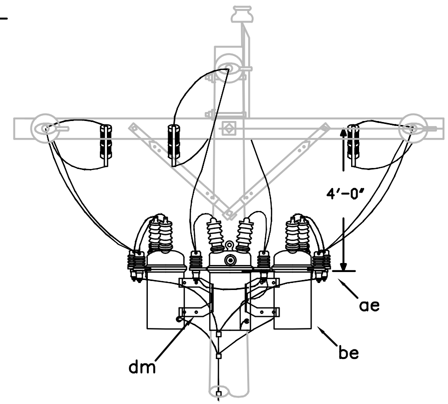
NOTES:
1. Jumper wire ampacity to equal conductor ampacity

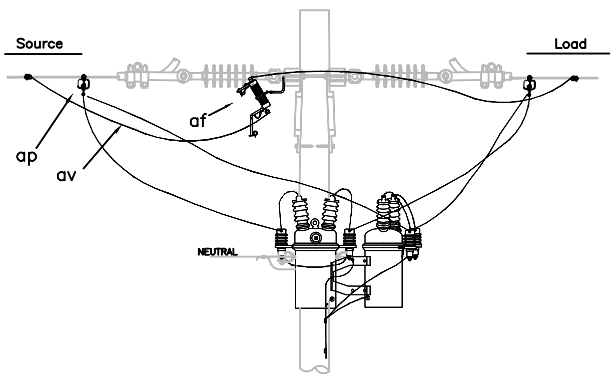
100 AMP

12.5/7.2 kV
2 OIL CIRCUIT RECLOSERS
WITH BYPASS SWITCH

MAY 2014	CHELCO	VM24-100





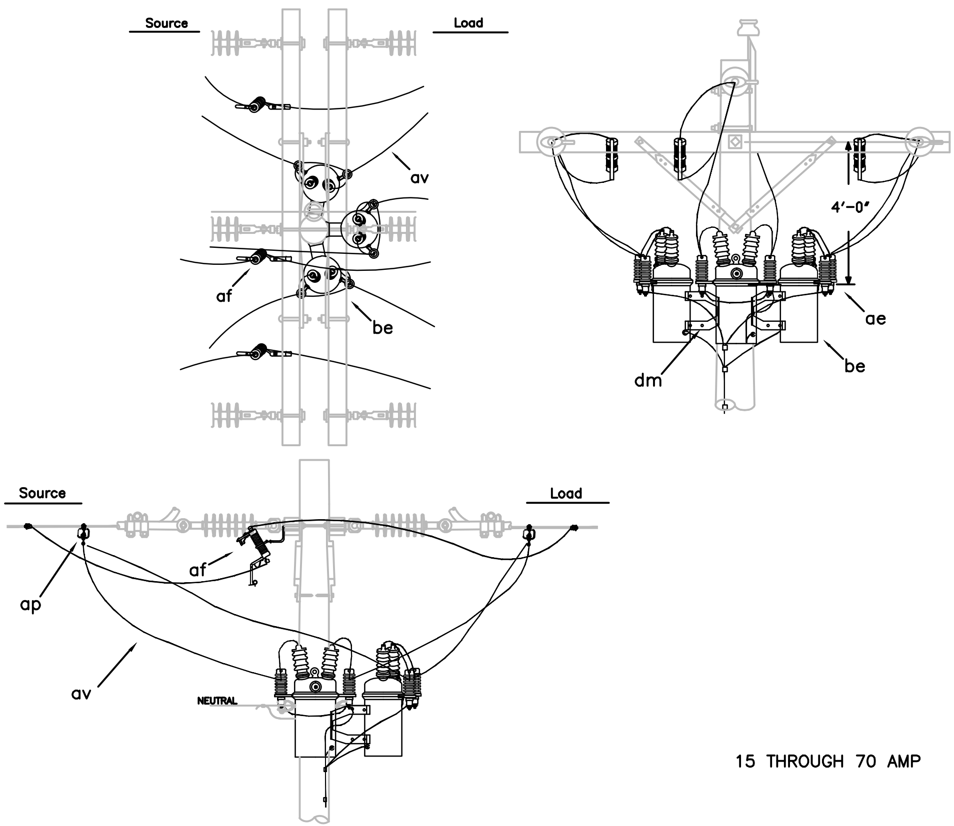


15 THROUGH 70 AMP

ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length
d	2	Washer, square 2 1/4"
ae	6	Arrestor, lightning 9kV protection
af	3	Cutout, line protection
ap	6	Clamp, hot line copper all
av	*	Jumpers, as required
be	3	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	1	Bracket, three phase cluster
ek	*	Locknuts, as required
	6	Stirrup, burndy wejtap
	*	Connectors, as required

NOTES:
1. The terminal bushing connected directly to the coil should be conneceted to the source. Where necessary to provide for this connection the recloser and cutout may be mounted on the other side of the pole and the neutral deadended.
2. Mount cutout so that exhaust blast of arc is directed away from linemen.
3. Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV 3 OIL CIRCUIT RECLOSERS WITH BYPASS CUTOUTS		
SEP 2015	CHELCO	M25

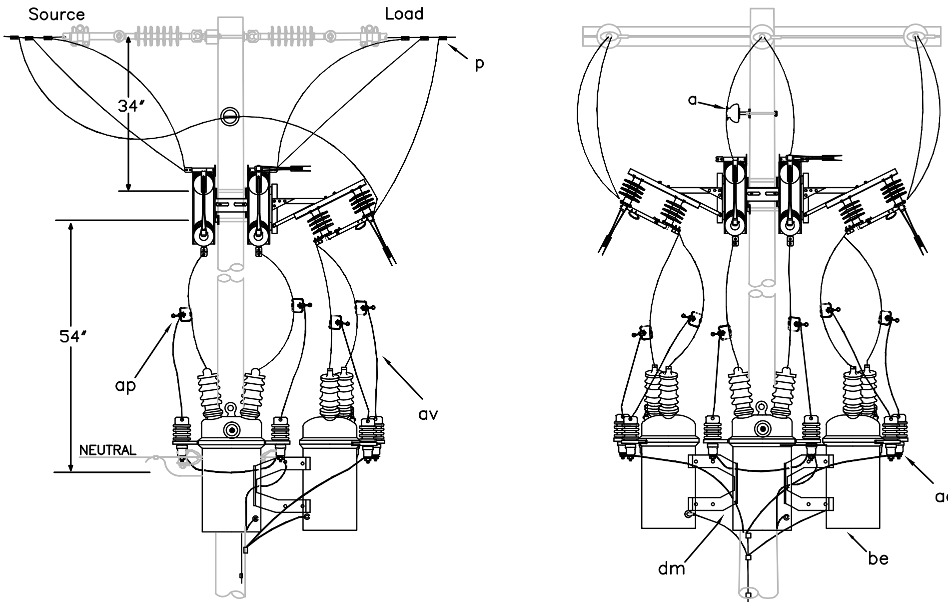


15 THROUGH 70 AMP

ITEM	QTY	MATERIAL
c	2	Bolt, machine 5/8" x req'd length
d	2	Washer, square 2 1/4"
ae	6	Arrestor, lightning 18kV protection
af	3	Cutout, line protection
ap	6	Clamp, hot line copper all
av	*	Jumpers, as required
be	3	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	1	Bracket, three phase cluster
ek	*	Locknuts, as required
	6	Stirrup, burndy wejtap
	*	Connectors, as required

NOTES:
1. The terminal bushing connected directly to the coil should be conneceted to the source. Where necessary to provide for this connection the recloser and cutout may be mounted on the other side of the pole and the neutral deadended.
2. Mount cutout so that exhaust blast of arc is directed away from linemen.
3. Jumper wire ampacity to equal conductor ampacity

12.5/7.2 kV 3 OIL CIRCUIT RECLOSERS WITH BYPASS CUTOUTS		
SEP 2015	CHELCO	VM25



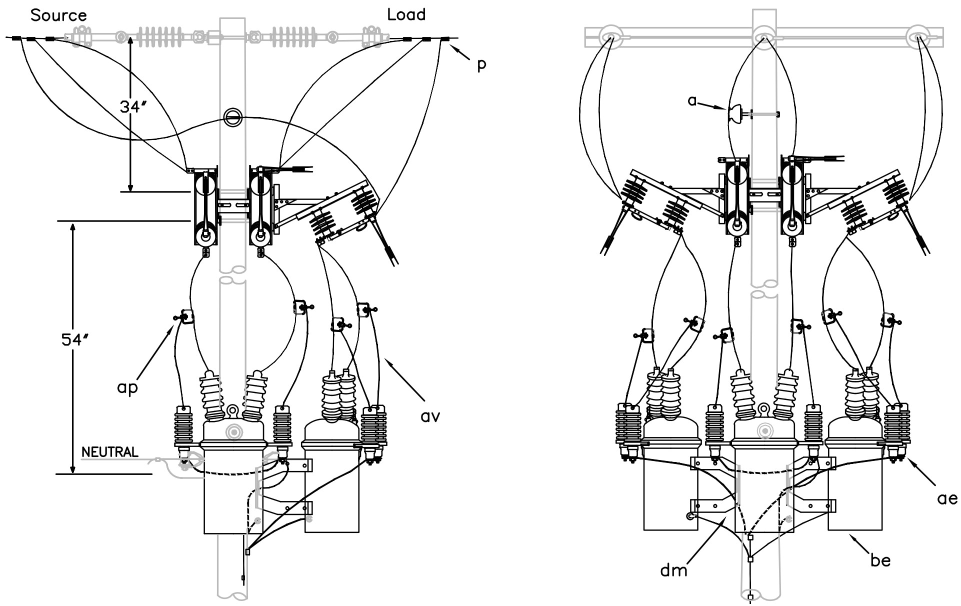
ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4"
p	*	Connectors, as required
ae	6	Arrestor, lightning 9kV protection
ap	6	Clamp, hot line copper all
av	*	Jumpers, as required
be	3	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	2	Brackets, three phase cluster
ek	*	Locknuts, as required
	3	SLB, 900 amp
	6	Stirrup, burndy wejtap

NOTES:
1. Jumper wire ampacity to equal conductor ampacity

100 AMP

12.5/7.2 kV
3 OIL CIRCUIT RECLOSERS
WITH BYPASS SWITCH

MAY 2014	CHELCO	M25-100

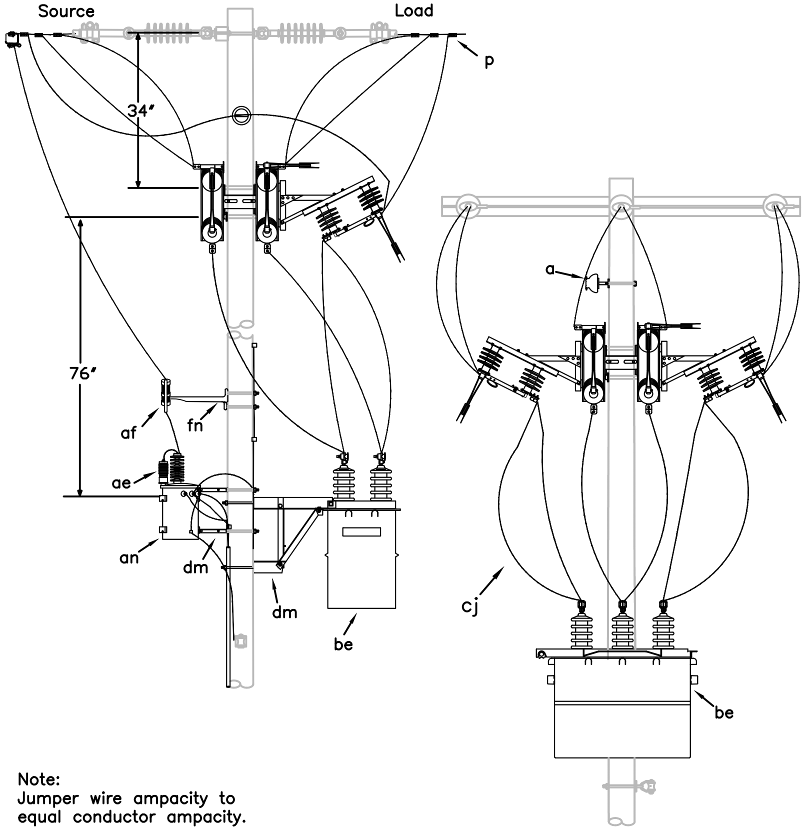


ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV
c	4	Bolt, machine 5/8" x req'd length
d	4	Washer, square 2 1/4"
p	*	Connectors, as required
ae	6	Arrestor, lightning 18kV protection
ap	6	Clamp, hot line copper all
av	*	Jumpers, as required
be	3	Recloser, oil circuit
cj	40	Conductor, No 4 S D copper
dm	2	Brackets, three phase cluster
ek	*	Locknuts, as required
	3	SLB, 900 amp
	6	Stirrup, burndy wejtap

NOTES:
1. Jumper wire ampacity to equal conductor ampacity

100 AMP

12.5/7.2 kV 3 OIL CIRCUIT RECLOSERS WITH BYPASS SWITCH		
MAY 2014	CHELCO	VM25-100

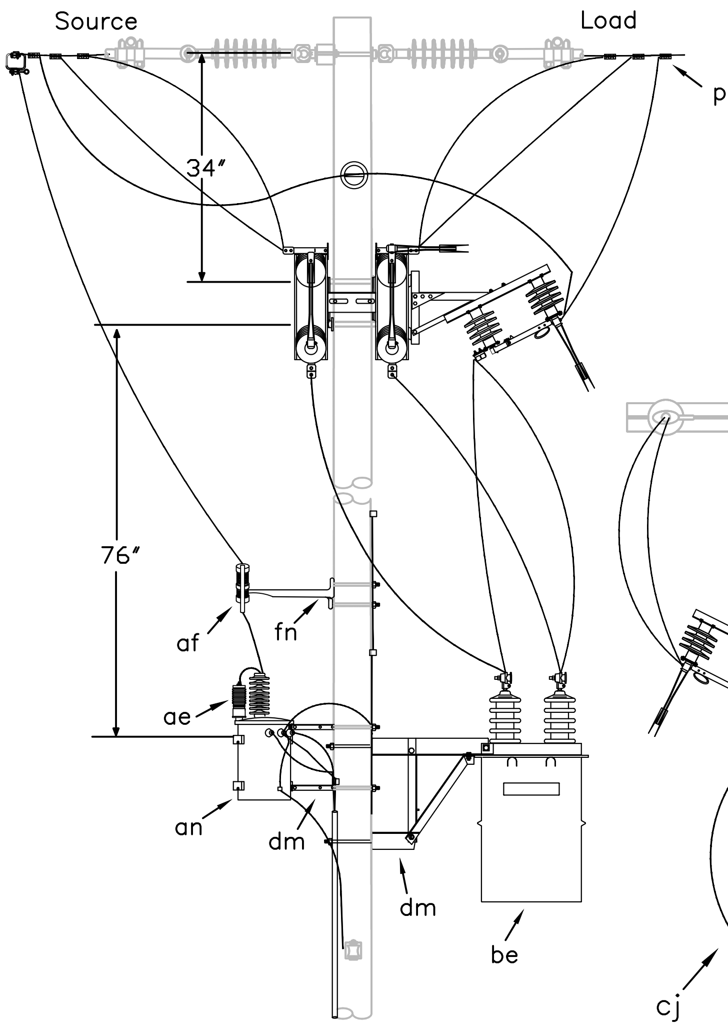


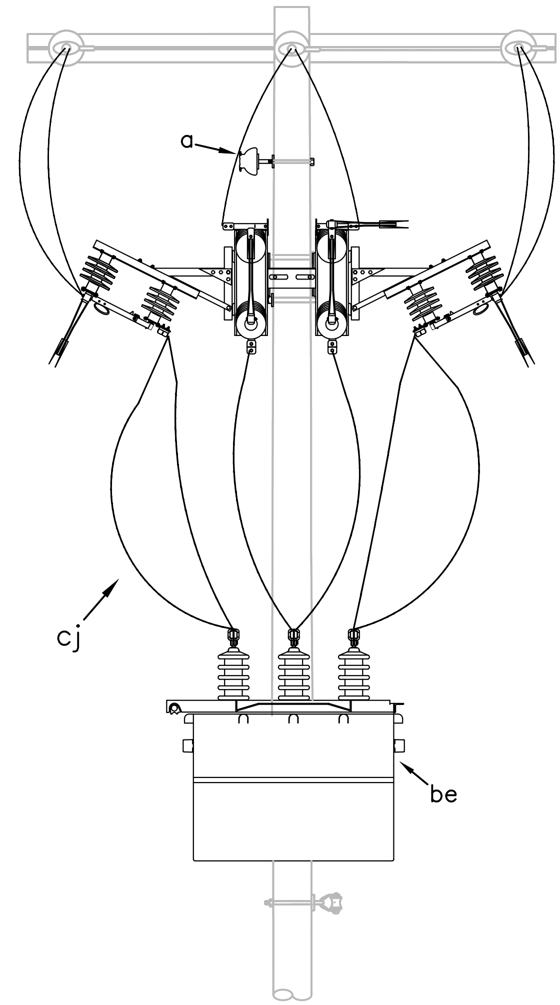
Note:
Jumper wire ampacity to equal conductor ampacity.

ITEM	MATERIAL	ASSEMBLY UNIT M30-RE	ASSEMBLY UNIT M31-WE
a	Insulator, pin type 15kV	1	1
c	Bolt, machine 1/2" x req'd length		4
c	Bolt, machine 5/8" x req'd length	8	5
d	Washer, square 2 1/4" as required	8	9
p	Connectors, as required		
ae	Arrestor, lightning 9kV protection	1	1
af	Cutout, line protection	1	1
an	Transformer 1.5 kva	1	1
av	Jumpers, as required		
be	Recloser, 3 phase type	1	1
cj	Conductor, No 4 S D copper	10	10
dm	Bracket, single position for trans	1	1
dm	Bracket, 3ph VWE OCR hangar	1	1
dm	Bracket, three phase cluster	1	1
ek	Locknuts as required		
fn	Bracket, cutout 1 phase 'T'	1	1
	Adpater, insulator pin	1	1
	SLB, 900 amp	3	3

12.5/7.2 kV
3 PHASE ELECTRONIC RECLOSER

OCT 2018	CHELCO	M30-RE M31-WE





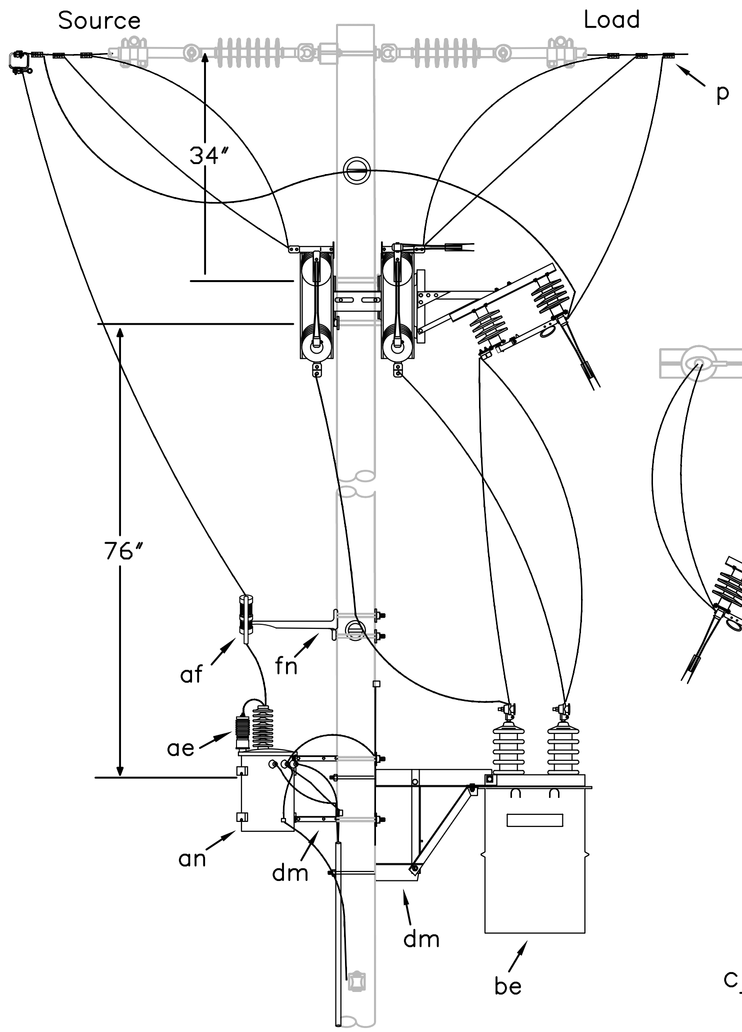
Note:
Jumper wire ampacity to
equal conductor ampacity.

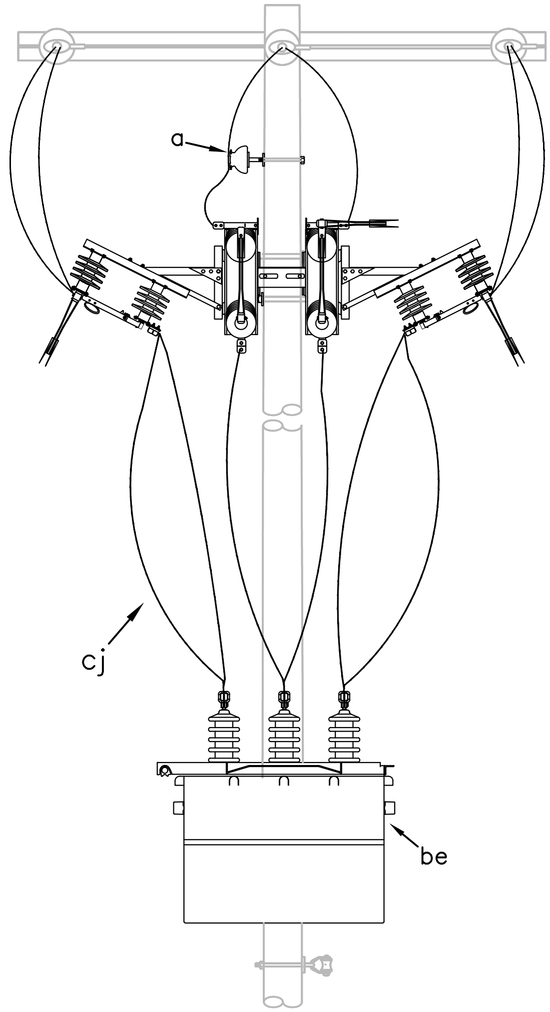
ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV
c	4	Bolt, machine 3/4" x req'd length
c	7	Bolt, machine 5/8" x req'd length
d	10	Washer, square 2 1/4"
ae	1	Arrestor, lightning 9kV protection
af	1	Cutout, 100 amp line protection
an	1	Transformer 1.5 kva
ap	1	Clamp, hot line copper all
av	*	Jumpers, as required
be	1	Recloser, 3 phase type: VWE
cj	30	Conductor, No 4 S D copper
dm	1	Bracket, single position for trans

ITEM	QTY	MATERIAL
dm	1	Bracket, adapter for VWE frame
dm	1	Bracket, three phase cluster
ek	*	Locknuts, as required
fn	1	Bracket, cutout 1 phase 'T'
	3	SLB, 900 amp
	1	Control panel
	1	Control cable
	1	Stirrup, burndy wejtap
	*	Connectors, as required
	1	Adpater, insulator pin
	3	Conduit, 1" pvc-sch 40

12.5/7.2 kV
3 PHASE VWE
ELECTRONIC RECLOSER

OCT 2018	CHELCO	M32P-VWE



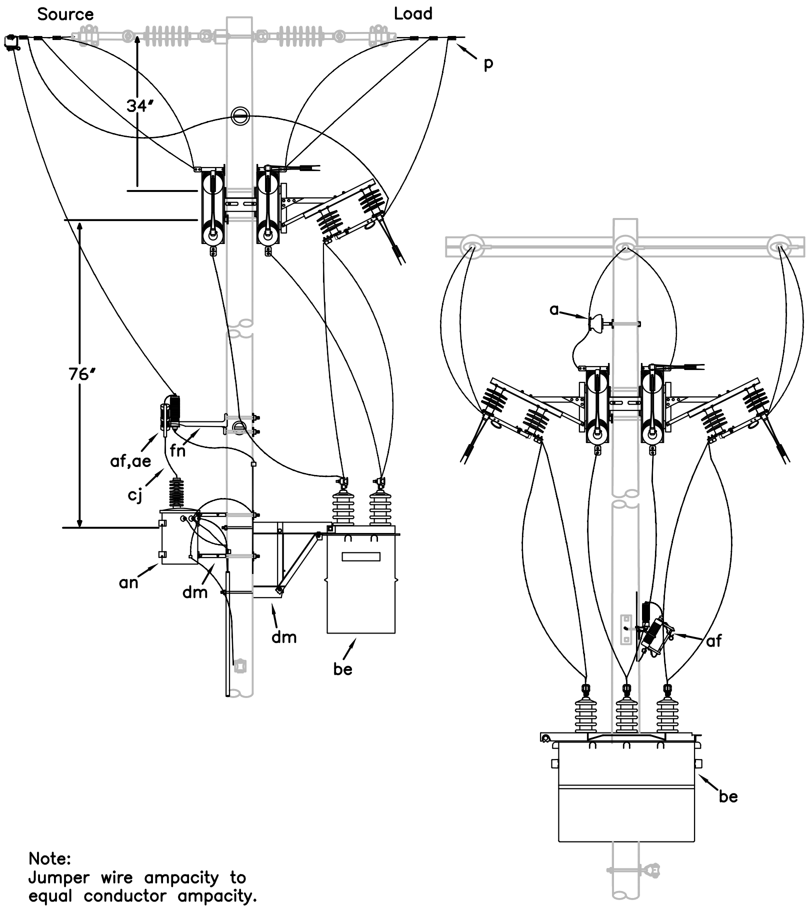


Note:
Jumper wire ampacity to
equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	dm	1	Bracket, adapter for VWE frame
c	4	Bolt, machine 3/4" x req'd length	dm	1	Bracket, three phase cluster
c	7	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
ae	1	Arrestor, lightning 18kV protection		3	SLB, 900 amp
af	1	Cutout, 100 amp line protection		1	Control panel
an	1	Transformer 1.5 kva		1	Control cable
ap	1	Clamp, hot line copper all		1	Stirrup, burndy wejtap
av	*	Jumpers, as required		*	Connectors, as required
be	1	Recloser, 3 phase type: VWE		1	Adpater, insulator pin
cj	30	Conductor, No 4 S D copper		3	Conduit, 1" pvc-sch 40
dm	1	Bracket, single position for trans			

12.5/7.2 kV
3 PHASE VWE
ELECTRONIC RECLOSER

OCT 2018	CHELCO	VM32P-VWE



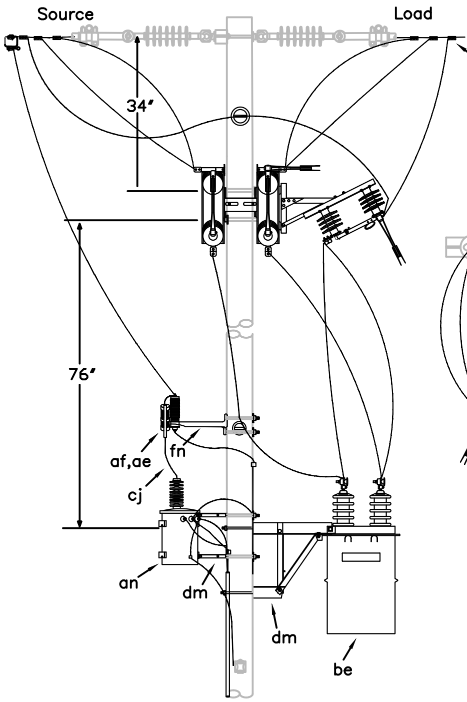
Note:
Jumper wire ampacity to
equal conductor ampacity.

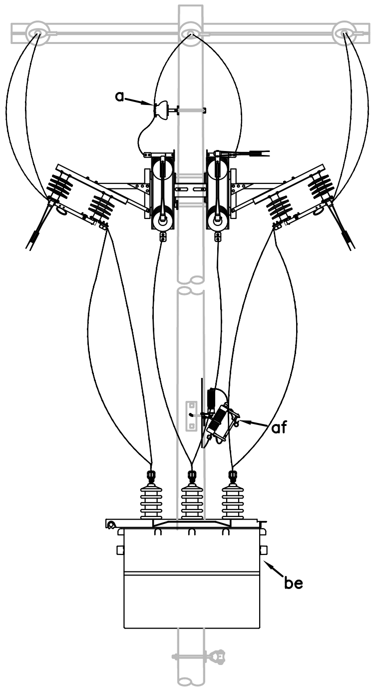
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	dm	1	Bracket, adapter for VWVE frame
c	4	Bolt, machine 3/4" x req'd length	dm	1	Bracket, three phase cluster
c	7	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
ae	1	Arrestor, lightning 18kV protection		3	SLB, 900 amp
af	1	Cutout, 100 amp line protection		1	Control panel
an	1	Transformer 1.5 kva		1	Control cable
ap	1	Clamp, hot line copper all		1	Stirrup, burndy wejtap
av	*	Jumpers, as required		*	Connectors, as required
be	1	Recloser, 3 phase type: VWVE		1	Adpater, insulator pin
cj	30	Conductor, No 4 S D copper		3	Conduit, 1" pvc-sch 40
dm	1	Bracket, single position for trans			

'X' Assembly = VWVE only

24.9/14.4kV
3 PHASE VWVE
800A ELECTRONIC RECLOSER

AUG 2018	CHELCO	VM32P-VWVE VM32P-VWVE-X





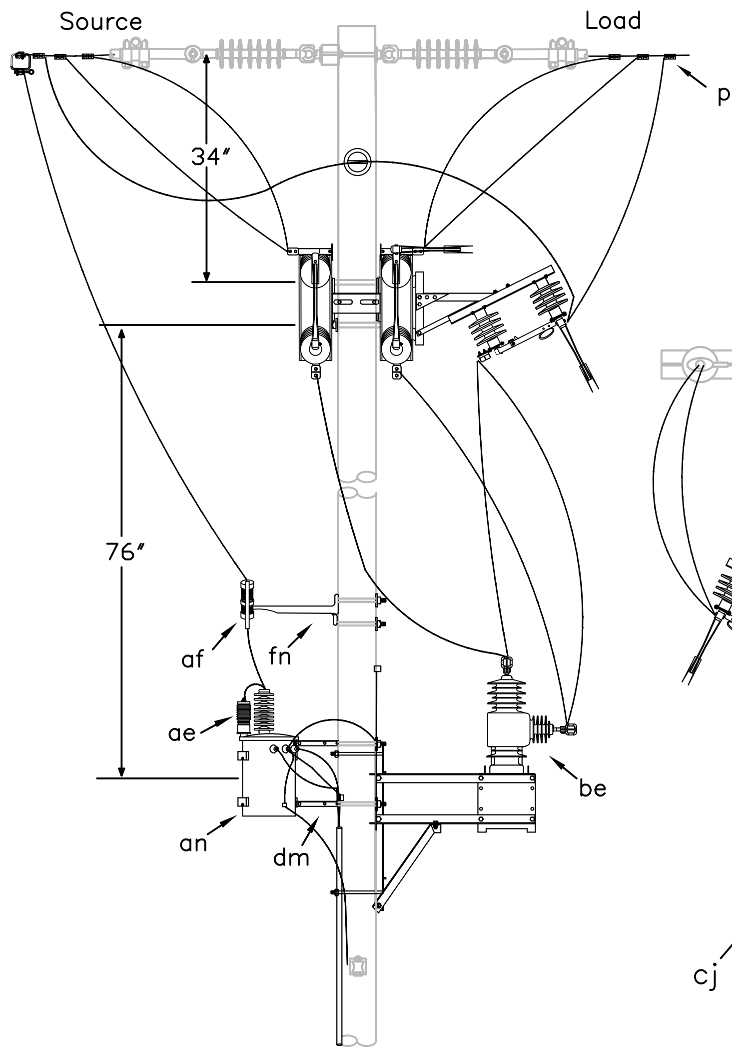
Note:
Jumper wire ampacity to
equal conductor ampacity.

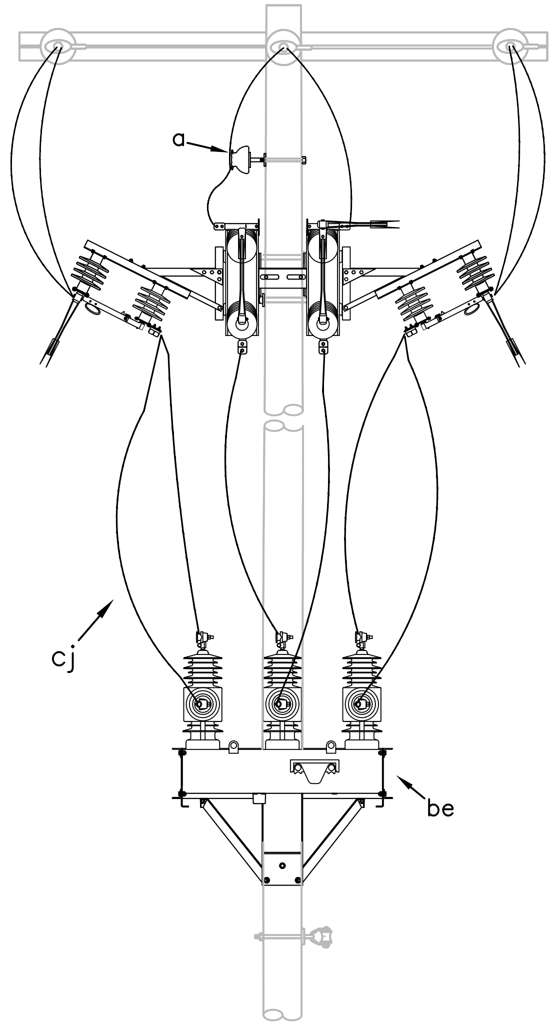
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	dm	1	Bracket, adapter for WVE frame
c	4	Bolt, machine 3/4" x req'd length	dm	1	Bracket, three phase cluster
c	7	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
ae	1	Arrestor, lightning 18kV protection		3	SLB, 900 amp
af	1	Cutout, 100 amp line protection		1	Control panel
an	1	Transformer 1.5 kva		1	Control cable
ap	1	Clamp, hot line copper all		1	Stirrup, burndy wejtap
av	*	Jumpers, as required		*	Connectors, as required
be	1	Recloser, 3 phase type: WVE		1	Adpater, insulator pin
cj	30	Conductor, No 4 S D copper		3	Conduit, 1" pvc-sch 40
dm	1	Bracket, single position for trans			

'X' Assembly = WVE only

24.9/14.4kV
3 PHASE WVE
560A ELECTRONIC RECLOSER

AUG 2018	CHELCO	VM32P-WVE VM32P-WVE-X



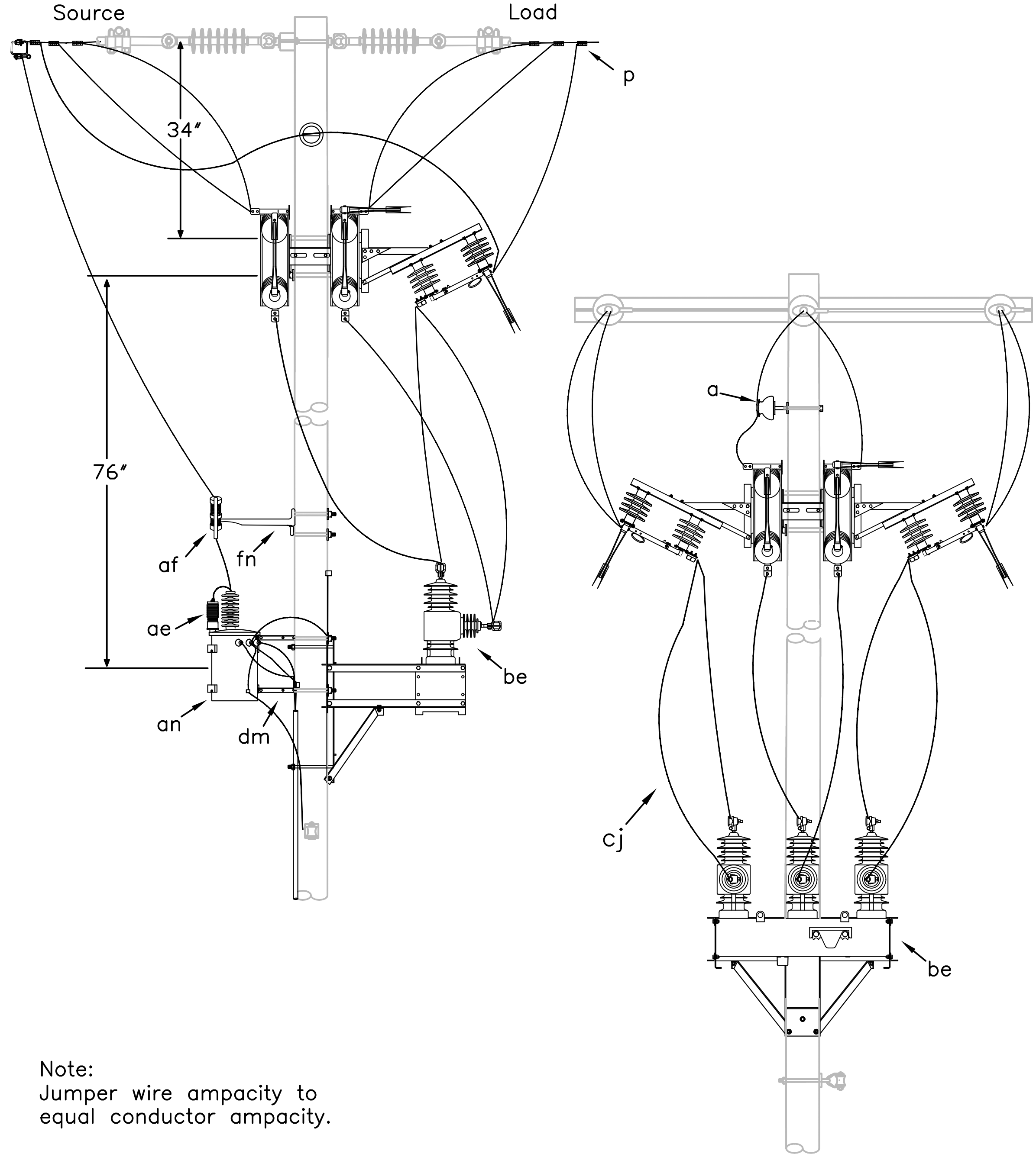


Note:
Jumper wire ampacity to equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	dm	1	Bracket, adapter for VWE frame
c	4	Bolt, machine 3/4" x req'd length	dm	1	Bracket, three phase cluster
c	7	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	4	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
ae	1	Arrestor, lightning 18kV protection		3	SLB, 900 amp
af	1	Cutout, 100 amp line protection		1	Control panel
an	1	Transformer 1.5 kva		1	Control cable
ap	1	Clamp, hot line copper all		1	Adpater, insulator pin
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
be	1	Recloser, 3 phase type: Nova 15kV		*	Connectors, as required
cj	10	Conductor, No 4 S D copper		3	Conduit, 1" pvc-sch 40
dm	1	Bracket, single position for trans			

12.5/7.2 kV
3 PHASE NOVA
ELECTRONIC RECLOSER

OCT 2018	CHELCO	M32P-NOVA

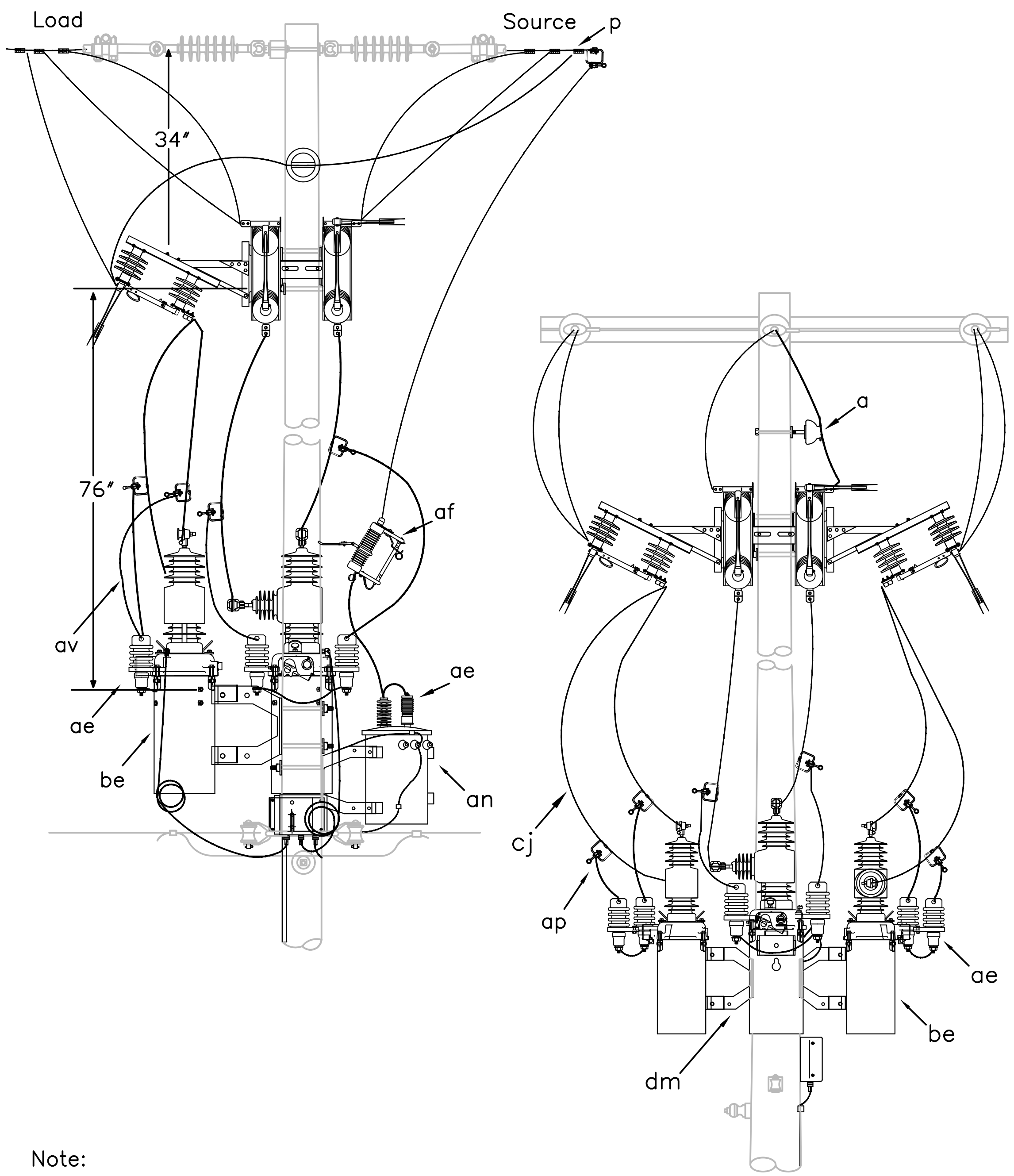


Note:
Jumper wire ampacity to
equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	dm	1	Bracket, adapter for VWE frame
c	4	Bolt, machine 3/4" x req'd length	dm	1	Bracket, three phase cluster
c	7	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	4	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
ae	1	Arrestor, lightning 18kV protection		3	SLB, 900 amp
af	1	Cutout, 100 amp line protection		1	Control panel
an	1	Transformer 1.5 kva		1	Control cable
ap	1	Clamp, hot line copper all		1	Adpater, insulator pin
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
be	1	Recloser, 3 phase type: Nova 15kV		*	Connectors, as required
cj	10	Conductor, No 4 S D copper		3	Conduit, 1" pvc–sch 40
dm	1	Bracket, single position for trans			

12.5/7.2 kV
3 PHASE NOVA
ELECTRONIC RECLOSER

OCT 2018	CHELCO	VM32P–NOVA

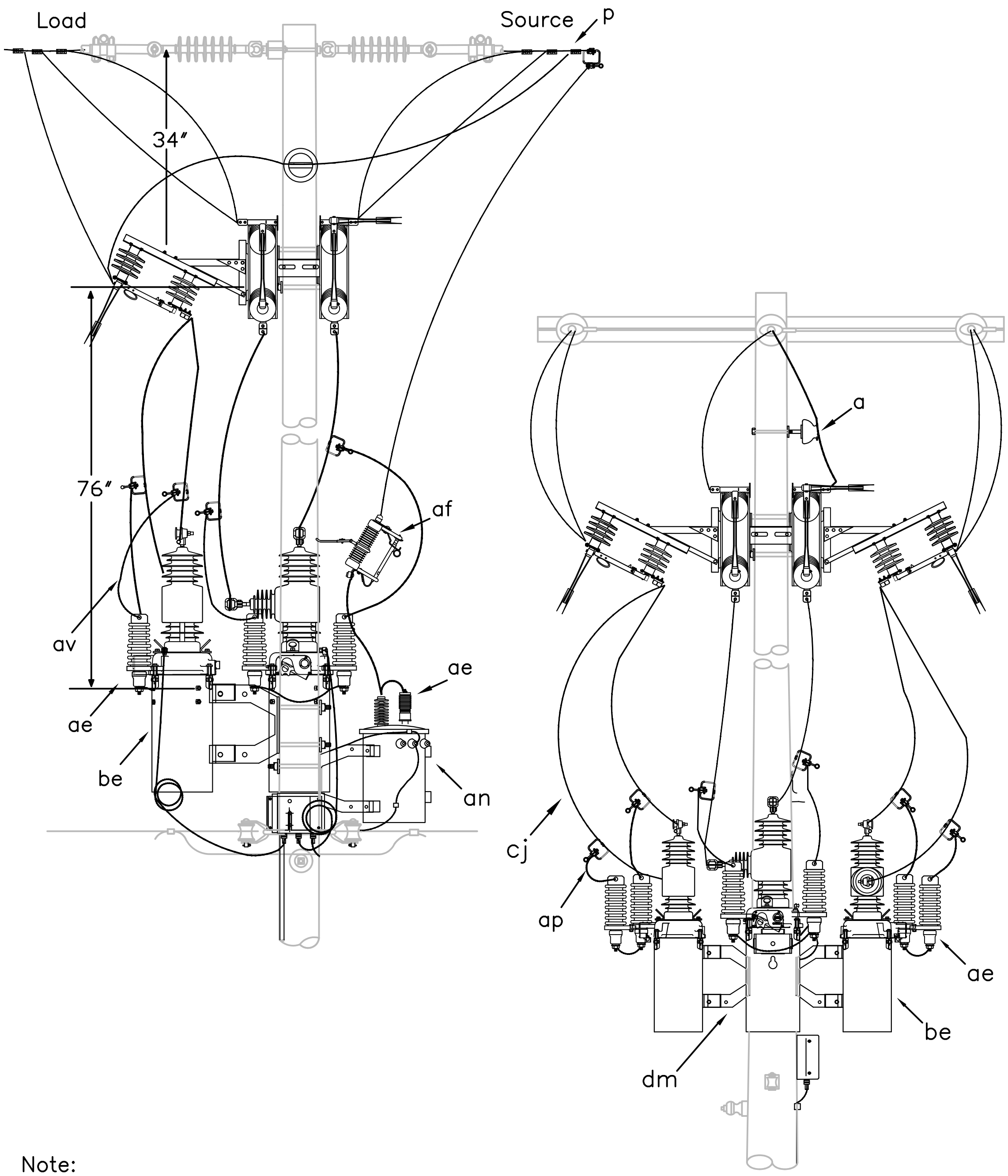


Note:
Jumper wire ampacity to equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	dm	1	Bracket, adapter for VWE frame
c	4	Bolt, machine 3/4" x req'd length	dm	1	Bracket, three phase cluster
c	7	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
ae	7	Arrestor, lightning 9kV protection		3	SLB, 900 amp
af	1	Cutout 100 amp line protection		1	Control panel
an	1	Transformer 1.5 kva		1	Control cable
ap	7	Clamp, hot line copper all		7	Stirrup, burndy wejtap
av	*	Jumpers, as required		1	Adapter, insulator pin
be	1	Recloser, CPS triple-single		3	Conduit, 1" pvc-sch 40
cj	30	Conductor, No 4 S D copper		*	Connectors, as required
dm	1	Bracket, single position for trans			

12.5/7.2 kV
NOVA TRIPLE SINGLE
ELECTRONIC RECLOSER

OCT 2018	CHELCO	M32P-NOVA-TRIPLE

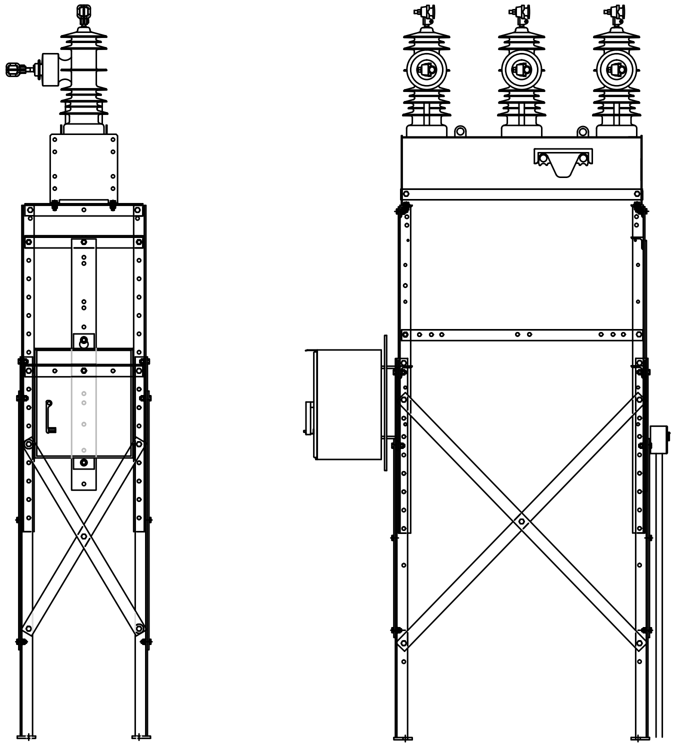


Note:
Jumper wire ampacity to
equal conductor ampacity.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
a	1	Insulator, pin type 15kV	dm	1	Bracket, adapter for VWE frame
c	4	Bolt, machine 3/4" x req'd length	dm	1	Bracket, three phase cluster
c	7	Bolt, machine 5/8" x req'd length	ek	*	Locknuts, as required
d	10	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
ae	7	Arrestor, lightning 18kV protection		3	SLB, 900 amp
af	1	Cutout 100 amp line protection		1	Control panel
an	1	Transformer 1.5 kva		1	Control cable
ap	7	Clamp, hot line copper all		7	Stirrup, burndy wejtap
av	*	Jumpers, as required		1	Adapter, insulator pin
be	1	Recloser, CPS triple-single		3	Conduit, 1" pvc-sch 40
cj	30	Conductor, No 4 S D copper		*	Connectors, as required
dm	1	Bracket, single position for trans			

12.5/7.2 kV
NOVA TRIPLE SINGLE
ELECTRONIC RECLOSER

OCT 2018	CHELCO	VM32P-NOVA-TRIPLE



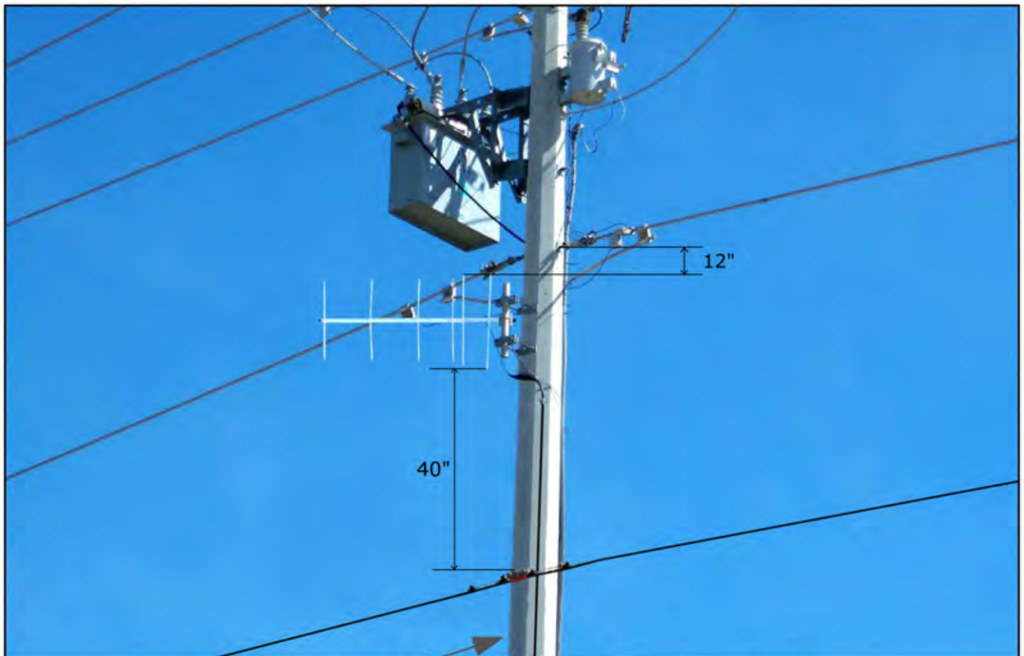
ITEM	ASSEMBLY UNIT M32S-1	M32S-1 800	M32S-2	M32S-2 800
Bracket adapter for VWE frame	1		1	
Conductor, no 4 S D copper	60	60	60	60
Recloser– 3ph type NOVA	1		1	
Recloser– 3ph NOVA 800 amp		1		1
Recloser frame		1		1
Recloser control	1	1	1	1
Control cable	1	1	1	1

12.5/7.2 kV
NOVA ELECTRONIC RECLOSER
FOR SUBSTATION

DEC. 2008	CHELCO	M32S–1–NOVA M32S–1–NOVA800 M32S–2–NOVA M32S–2–NOVA800

FORM 6 CONTROL PANEL FOR
CPS RECLOSER–TYPE PERFORMA6PA–KME6

JUNE 2011	CHELCO	COOPER–F6–CP



Cable extends to Radio control box

215–225MHz 9dB 6 Element Yagi Antennae

SCADA RADIO DOWN–LINE UNIT

Power Supply

SEL–3505(behind)*

MDS Radio(front)

Circuit Protection Module

Fiber–Optic Transceivers

Bluetooth Antennae*

Note:
Optional equipment–not present at all down–line locations

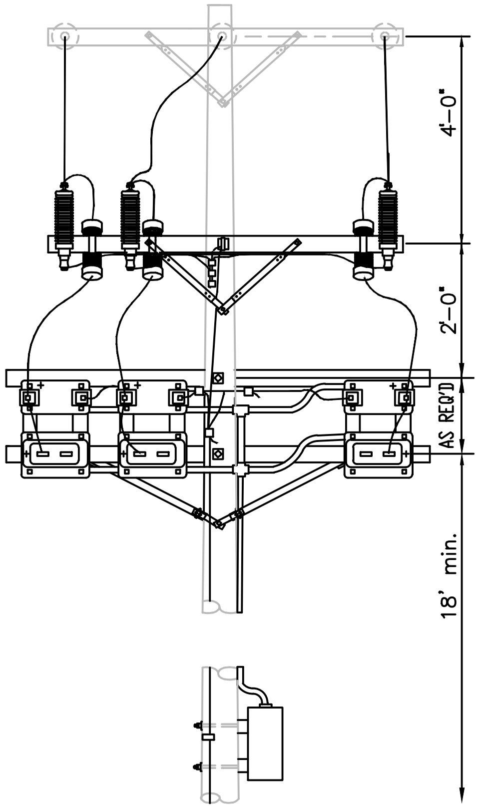
OCT. 2013	CHELCO	SCADA RADIO DOWN–LINE

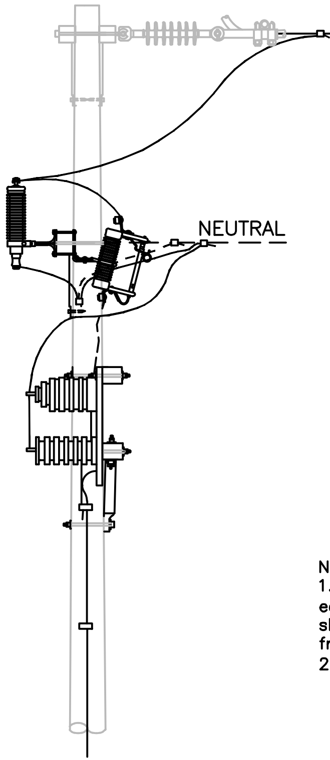
CT Metering - Primary

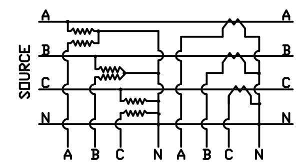
Description	Ratio	Quantity	Installation Type	Assembly	Item Number
CT Metering	5:5	1	Primary	CTP5-1	E786004
CT Metering	5:5	1	Primary	CTP5	E786004
CT Metering	15:5	1	Primary	CTP15-1	E788321
CT Metering	15:5	1	Primary	CTP15	E788321
CT Metering	25:5	1	Primary	CTP25-1	E788000
CT Metering	25:5	1	Primary	CTP25	E788000
CT Metering	50:5	1	Primary	CTP50-1	E788107
CT Metering	50:5	1	Primary	CTP50	E788107
CT Metering	100/200:5	1	Primary	CTP100/200-1	E789560
CT Metering	100/200:5	1	Primary	CTP100/200	E789560

PT Metering - Primary

Description	Ratio	Quantity	Installation Type	Assembly	Item Number
PT 2400V:120V	20:1	1	Primary	PTP20	E792937
PT 7200V:120V	60:1	1	Primary	PTP60	E793018



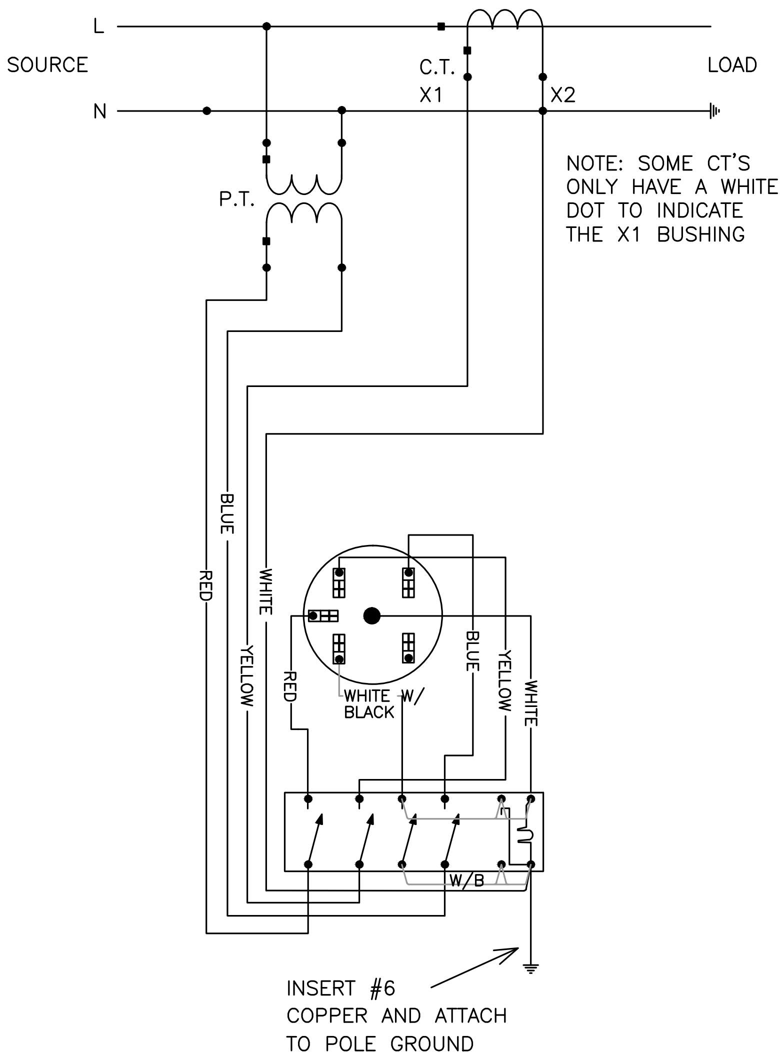




WIRING DIAGRAM
8 Conductor metering cable in conduit

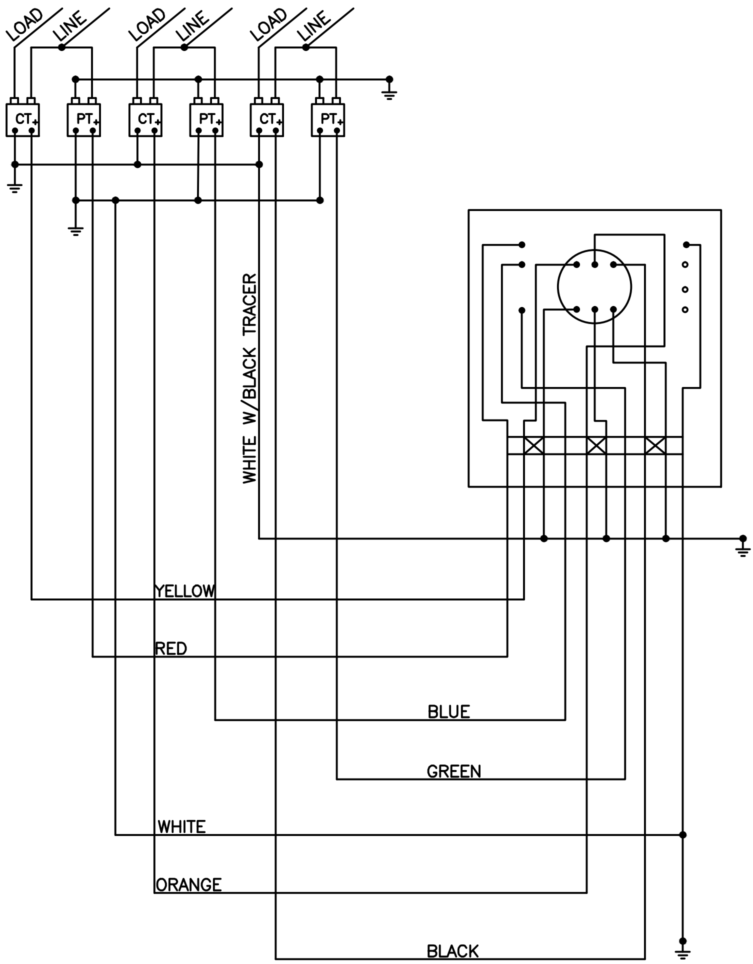
Note:
1. Customer owned, installed and maintained equipment, including "point of attachment" shall be located a minimum of 5 feet away from this assembly.
2. Position Dot on CT/PT toward source.

12.5/7.2 kV PRIMARY METERING GUIDE THREE PHASE 4 WIRE WYE		
MAY 2014	CHELCO	



FORM 3S METER
5 TERMINAL METER SOCKET
1 C.T.
1 P.T. (TRANSFORMER)
10 TERMINAL TEST SWITCH

SINGLE PHASE, PRIMARY METERING		
DEC. 2009	CHELCO	P.T. METERING SCHEMATIC



Note:
1. Customer owned, installed and maintained equipment, including "point of attachment" shall be located a minimum of 5 feet away from this assembly.
2. Position Dot on CT/PT toward source.

FORM 9S METER
13 TERMINAL METER SOCKET
3 PRIMARY C.T.'S
3 PRIMARY P.T.'S
10 TERMINAL TEST SWITCH

THREE PHASE, WYE PRIMARY METERING

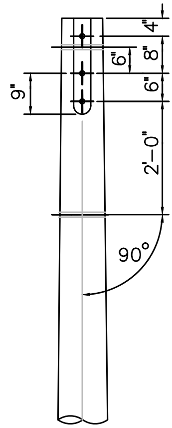
MAY 2014	CHELCO	P.T. METERING SCHEMATIC

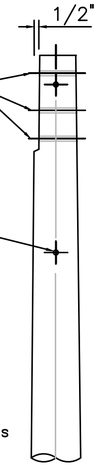
Wood Poles

Description	Assembly	Item Number
Wood Pole - 25 foot Class 4	P25/4	E332905
Wood Pole - 25 foot Class 5	P25/5	E332906
Wood Pole - 25 foot Class 6	P25/6	E332907
Wood Pole - 25 foot Class 7	P25/7	E332904
Wood Pole - 30 foot Class 1	P30/1	E333313
Wood Pole - 30 foot Class 2	P30/2	E333314
Wood Pole - 30 foot Class 4	P30/4	E333161
Wood Pole - 30 foot Class 5	P30/5	E332908
Wood Pole - 30 foot Class 6	P30/6	E333088
Wood Pole - 35 foot Class 1	P35/1	E333465
Wood Pole - 35 foot Class 2	P35/2	E333466
Wood Pole - 35 foot Class 3	P35/3	E333796
Wood Pole - 35 foot Class 4	P35/4	E335067
Wood Pole - 35 foot Class 5	P35/5	E338038
Wood Pole - 35 foot Class 6	P35/6	E338039
Wood Pole - 40 foot Class 1	P40/1	E344217
Wood Pole - 40 foot Class 2	P40/2	E344218
Wood Pole - 40 foot Class 3	P40/3	E344051
Wood Pole - 40 foot Class 4	P40/4	E343061
Wood Pole - 40 foot Class 5	P40/5	E342071
Wood Pole - 40 foot Class 6	P40/6	E342568
Wood Pole - 45 foot Class 1	P45/1	E348517
Wood Pole - 45 foot Class 2	P45/2	E348276
Wood Pole - 45 foot Class 3	P45/3	E348011
Wood Pole - 45 foot Class 4	P45/4	E347021
Wood Pole - 45 foot Class 5	P45/5	E346031
Wood Pole - 50 foot Class 1	P50/1	E350277
Wood Pole - 50 foot Class 2	P50/2	E350140
Wood Pole - 50 foot Class 3	P50/3	E350066
Wood Pole - 50 foot Class 4	P50/4	E349001
Wood Pole - 50 foot Class 5	P50/5	E352533
Wood Pole - 55 foot Class 1	P55/1	E352534
Wood Pole - 55 foot Class 2	P55/2	E352047
Wood Pole - 55 foot Class 3	P55/3	E351544
Wood Pole - 60 foot Class 1	P60/1	E350430
Wood Pole - 60 foot Class 2	P60/2	E353037
Wood Pole - 60 foot Class 3	P60/3	E353038
Wood Pole - 65 foot Class 1	P65/1	E353055
Wood Pole - 65 foot Class 2	P65/2	E354027
Wood Pole - 70 foot Class 1	P70/1	E354500
Wood Pole - 70 foot Class 2	P70/2	E354501
Wood Pole - 75 foot Class 1	P75/1	E354510
Wood Pole - 80 foot Class 1	P80/1	E354520
Wood Pole - 90 foot Class 2	P90/2	E354530

Concrete Poles

Description	Assembly	Item Number
Concrete Pole - 30 foot Class 6	PC30/6	E331805
Concrete Pole - 35 foot Class 1	PC35/1	E331807
Concrete Pole - 35 foot Class 3	PC35/3	E331809
Concrete Pole - 35 foot Class 5	PC35/5	E331811
Concrete Pole - 30 foot Class 9	PC35/6	E331812
Concrete Pole - 40 foot Class 1	PC40/1	E331607
Concrete Pole - 40 foot Class 3	PC40/3	E331609
Concrete Pole - 45 foot Class 3	PC45/3	E331509
Concrete Pole - 46 foot Class 5	PC46/5	E331520
Concrete Pole - 50 foot Class 2	PC50/2	E331109
Concrete Pole - 50 foot Class 5	PC50/5	E331112
Concrete Pole - 51 foot Class 5	PC51/5	E331114
Concrete Pole - 52 foot Class H6	PC52/H6	E331115
Concrete Pole - 54 foot Class H1	PC54/H1	E331125
Concrete Pole - 55 foot Class 1	PC55/1	E331009
Concrete Pole - 55 foot Class 2	PC55/2	E331010
Concrete Pole - 55 foot Class 3	PC55/3	E331045
Concrete Pole - 55 foot Class H1	PC55/H1	E331050
Concrete Pole - 55 foot Class H9	PC55/H9	E331055
Concrte Pole - 59 foot Class H1	PC59/H1	E331060
Concrete Pole - 55 foot Class 7	PC59/K	E331065
Concrete Pole - 60 foot Class 1	PC60/1	E355057
Concrete Pole - 60 foot Class 5	PC60/5	E355061
Concrete Pole - 60 foot Class H1	PC60/H1	E355070
Concrete Pole - 60 foot Class H2	PC60/H2	E355071
Concrete Pole - 65 foot Class 1	PC65/1	E331683
Concrete Pole - 65 foot Class H1	PC65/H1	E331690
Concrete Pole - 70 foot Class 1	PC70/1	E332366
Concrete Pole - 70 foot Class H1	PC70/H1	E332370
Concrete Pole - 70 foot Class H2	PC70/H2	E332371
Concrete Pole - 70 foot Class H3	PC70/H3	E332444
Concrete Pole - 75 foot Class 1	PC75/1	E332392
Concrete Pole - 75 foot Class G	PC75/G	E332393
Concrete Pole - 75 foot Class J	PC75/J	E332394
Concrete Pole - 75 foot Class O	PC75/O	E332395
Concrete Pole - 80 foot Class 1	PC80/1	E332187
Concrete Pole - 80 foot Class J	PC80/J	E332190
Concrete Pole - 80 foot Class O	PC80/O	E332191
Concrete Pole - 85 foot Class O	PC85/O	E332195
Concrete Pole - 88 foot Class O	PC88/O	E332199
Concrete Pole - 90 foot Class 2	PC90/2	E332202
Concrete Pole - 90 foot Class O	PC90/O	E332300
Concrete Pole - 95 foot Class O	PC95/O	E332205





Through–bolt holes must be parallel and in the same plane

HOLES: Drill 11/16" diameter

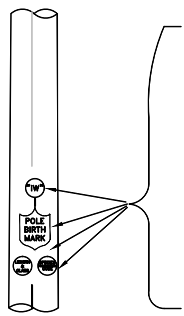
GAINS: Gains are to be flat with plane at right angles to the bolt holes

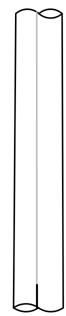
Neutral bolt hole must be at 90° angle with through–bolt holes

All poles shorter than 50' must be bored, roofed and gained before treatment , except that Class 7 and smaller poles need not be gained unless requested by purchaser. Roofs

option.

may be flat or at 15° angle at the producer's





*

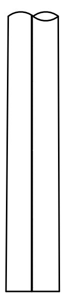
Bottom of brand or center of metal disk shall be 10'+– 1" from pole butt; 14'+– mark for poles 55' and longer.

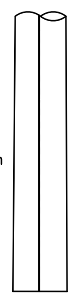
If insured warranted pole, Brand "IW".

Manufacturer's Mark and Date of Treatment, (Month and Year).

Brand with proper length and class.

Brand with species, preservative code and retention.





<u>TOLERANCES</u>

HOLES:

On the gain: ±1/8" from the centerline of the holes.

On the side opposite the gain: ±1/4" from the centerlines of the holes.

Location (measured from the roof):

Gain side ±1/4"

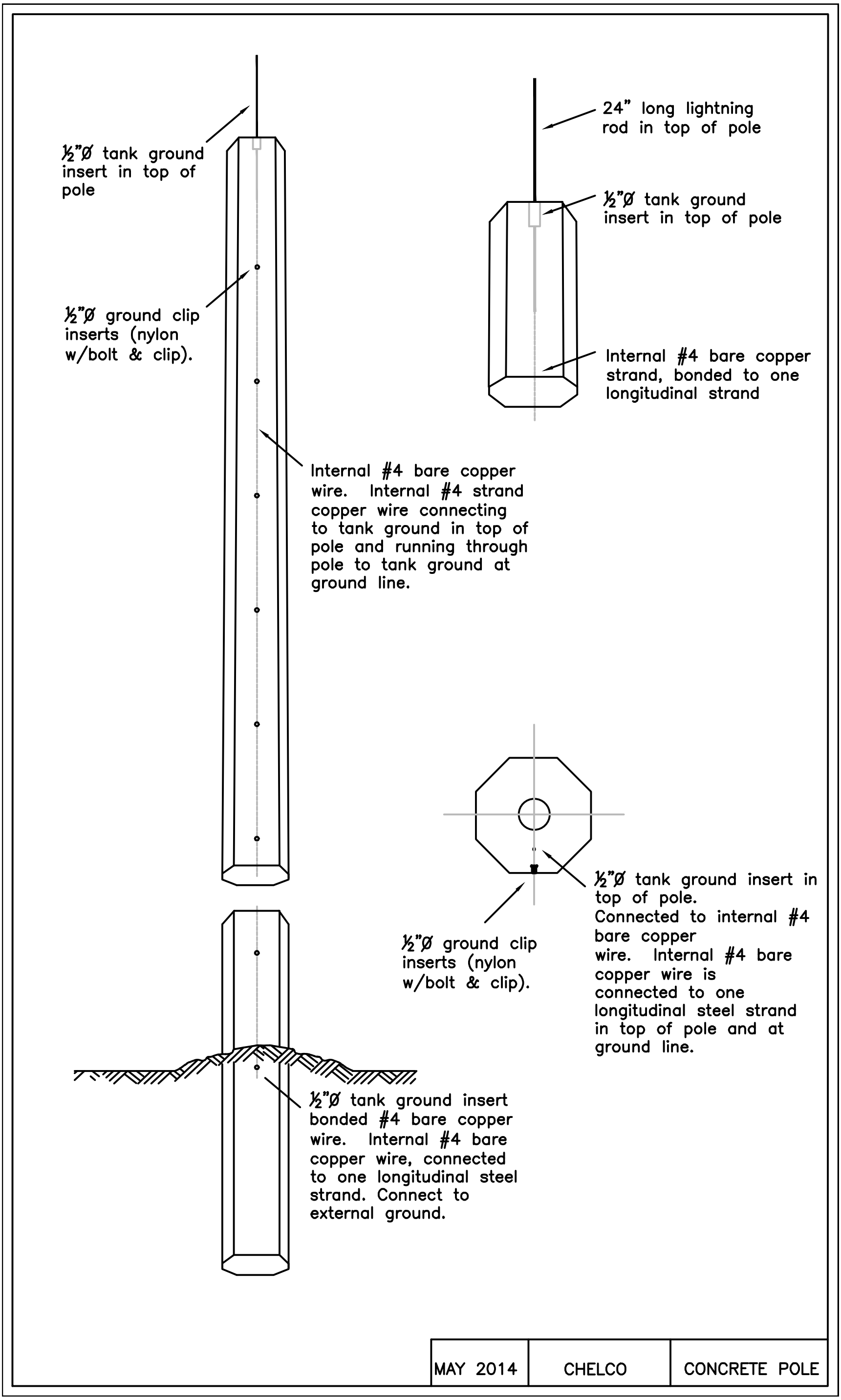
Opposite side ±1/2"

Diameter ±1/16 "

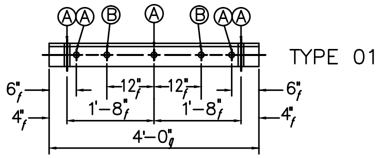
Gains out of parallel ±1"/2

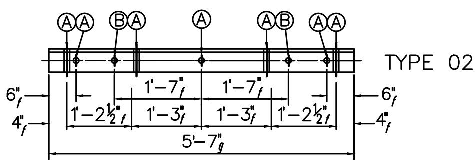
Anti–split bolt hole is optional and is to be drilled only when so specified by the purchaser.

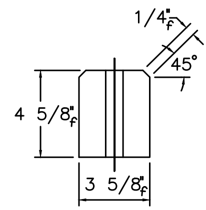
DEC. 2008	CHELCO	POLE FRAMING GUIDE


½"Ø tank ground insert in top of pole
½"Ø ground clip inserts (nylon w/bolt & clip).
Internal #4 bare copper wire. Internal #4 strand copper wire connecting to tank ground in top of pole and running through pole to tank ground at ground line.
½"Ø tank ground insert bonded #4 bare copper wire. Internal #4 bare copper wire, connected to one longitudinal steel strand. Connect to external ground.
24" long lightning rod in top of pole
½"Ø tank ground insert in top of pole
Internal #4 bare copper strand, bonded to one longitudinal strand
½"Ø tank ground insert in top of pole. Connected to internal #4 bare copper wire. Internal #4 bare copper wire is connected to one longitudinal steel strand in top of pole and at ground line.
½"Ø ground clip inserts (nylon w/bolt & clip).
MAY 2014
CHELCO
CONCRETE POLE

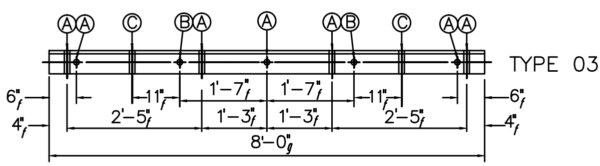
TOLERANCES AND SIZES OF HOLES			
NOMINAL		GO	NO GO
A	11/16"	5/8"	3/4"
B	7/16"	3/8"	1/2"
C	9/16"	1/2"	5/8"



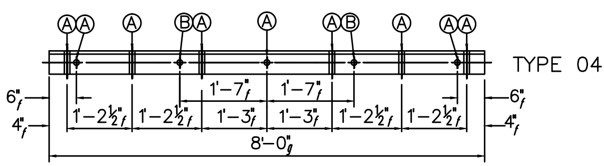


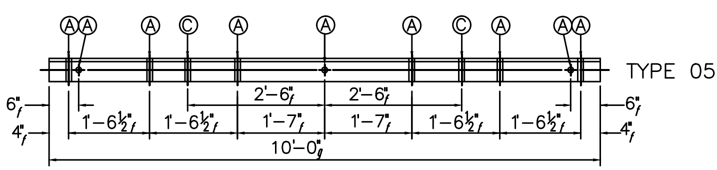


TYPICAL END SECTION ENLARGED

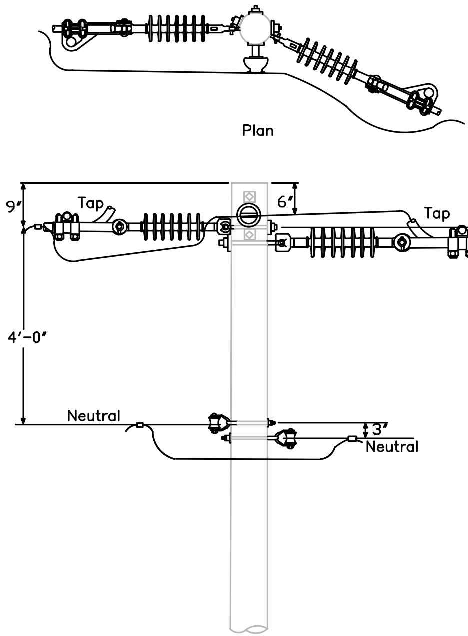


f--- ± 1/8"
g--- ± 1/4"

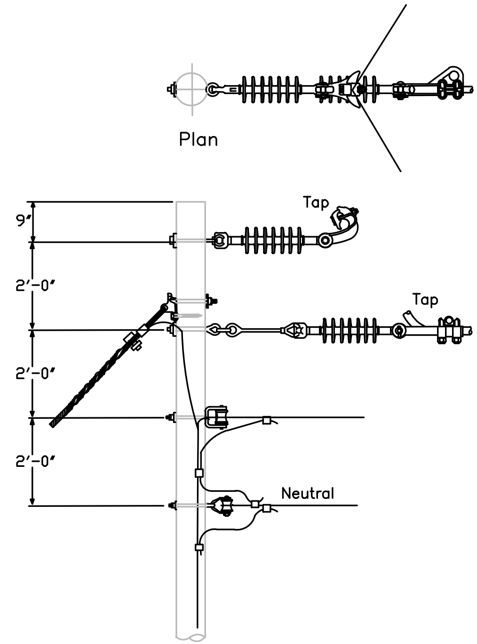




DEC. 2008	CHELCO	CROSSARM DRILLING GUIDE



COMPLETE ASSEMBLY
A5-1, A5 AND M5-4

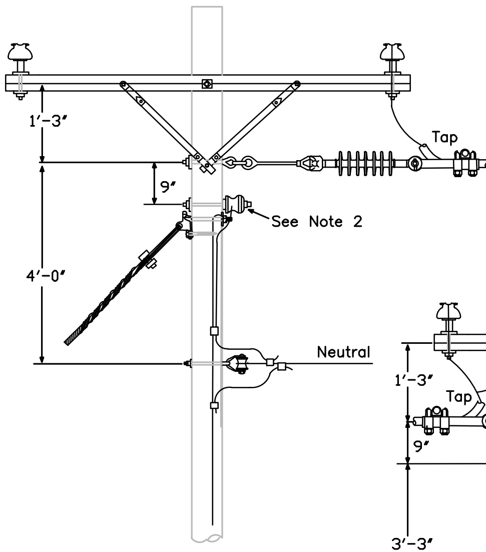


COMPLETE ASSEMBLY
A5-2 AND A3

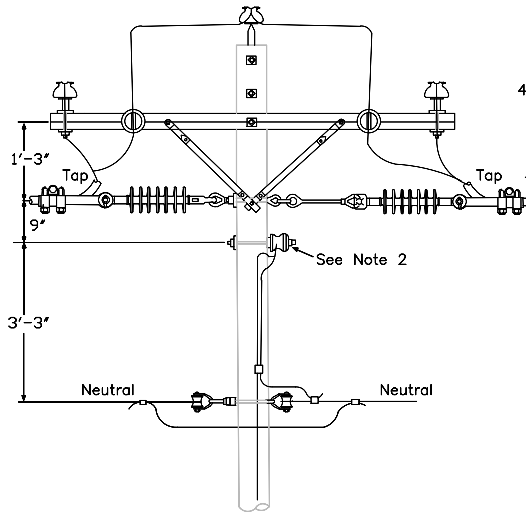
NOTES:

1. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.
2. Where ground clearance permits mount all neutrals at lower level.

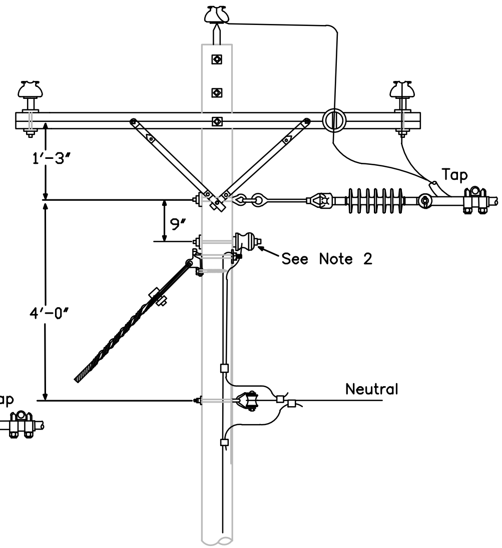
MAY 2014	TAP ASSEMBLY GUIDE



COMPLETE ASSEMBLY
A5-2 AND B1



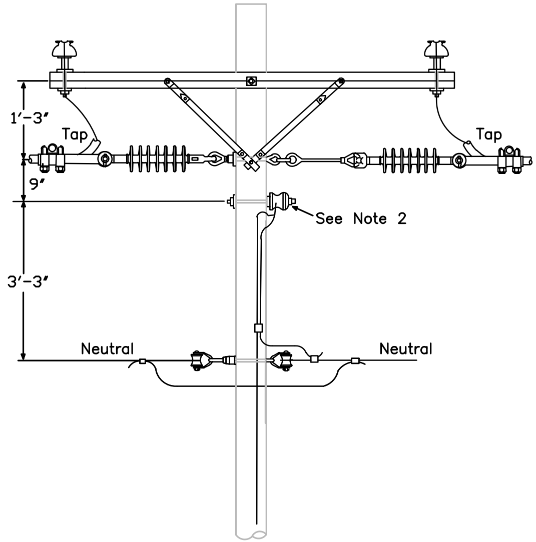
COMPLETE ASSEMBLY
A5-2, A5-3, C1 AND M5-4 (If needed)



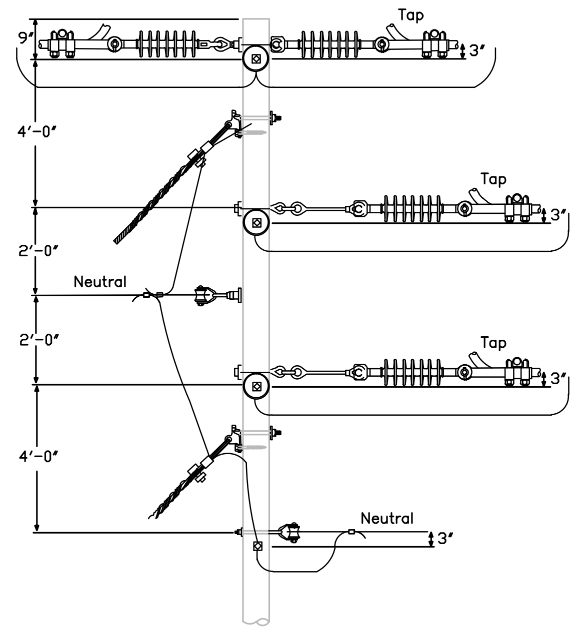
COMPLETE ASSEMBLY
A5-2, C1 AND M5-4 (If needed)

NOTES:
1. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.
2. Where ground clearance permits mount all neutrals at lower level.

MAY 2014	TAP ASSEMBLY GUIDE



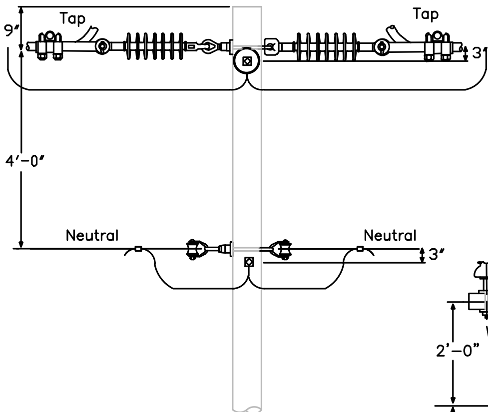
COMPLETE ASSEMBLY
A5-2, A5-3 AND B1



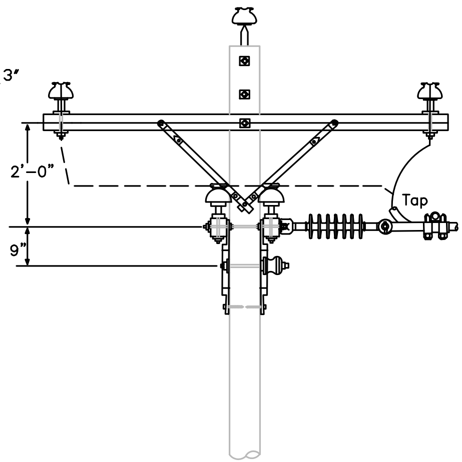
COMPLETE ASSEMBLY
A5-3 AND C4-1

NOTES:
1. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.
2. Where ground clearance permits mount all neutrals at lower level.

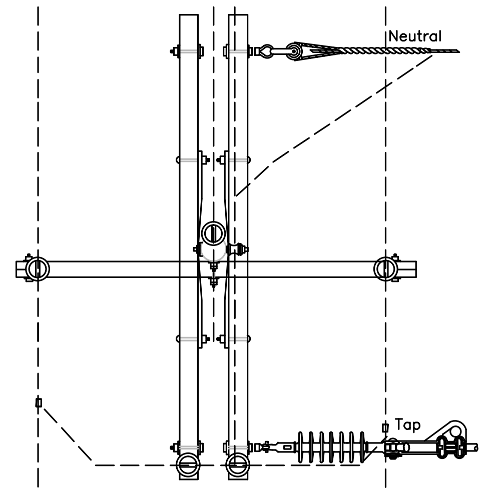
MAY 2014	TAP ASSEMBLY GUIDE



COMPLETE ASSEMBLY
A5-3 AND A4

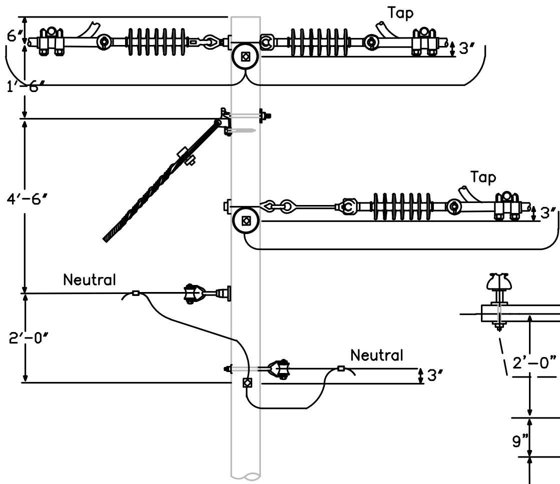


COMPLETE ASSEMBLY
C1, A7 AND M5-5

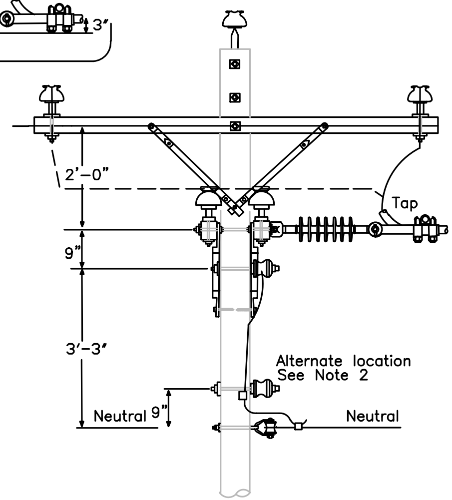


NOTES:
1. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.
2. Where ground clearance permits mount all neutrals at lower level.

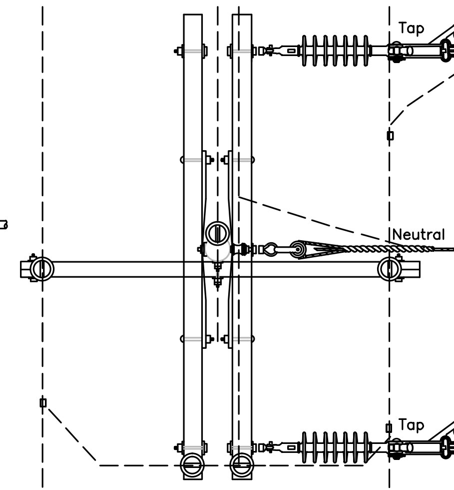
MAY 2014	TAP ASSEMBLY GUIDE



COMPLETE ASSEMBLY
A5–3 AND B4–1



COMPLETE ASSEMBLY
C1, B7 AND M5–5



NOTES:
1. Maintain 2" minimum spacing between ground wire and hardware associated with energized conductors.
2. Where ground clearance permits mount all neutrals at lower level.

MAY 2014	TAP ASSEMBLY GUIDE

Right of Way Clearing Assemblies

Description	Assembly
Cut 10 foot (ground to sky) with no clean-up	R10
Cut 10 foot (ground to sky) with chippings blown on site	R10C
Cut 10 foot (ground to sky) with complete clean-up and haul away	R10H
Cut 20 foot (ground to sky) with no clean-up	R20
Cut 20 foot (ground to sky) with chippings blown on site	R20C
Cut 20 foot (ground to sky) with complete clean-up and haul away	R20H

Note: CHELCO's standard cut is to clear from ground to sky, 10 foot on either side of the pole line.

Overhead Wire

Description	Assembly	Item Number
Primary - #8 AAAC	W8AAAC	E149020
Primary - #8 ACSR	W8ACSR	E149502
Primary - #8A Copperweld	W8ACU	E123095
Primary - 740.8 AAAC	W741AAAC	E174326
Primary - #6 ACSR	W6ACSR	E149470
Primary - #6 Copperweld	W6ACU	E122335
Primary - #6 Hard-Drawn Copper	W6HDCU	E121575
Primary - #4 AAAC	W4AAAC	E149021
Primary - #4 ACSR	W4ACSR	E149469
Primary - #4 Copperweld	W4ACU	E122330
Primary - #4 Hard-Drawn Copper	W4HDCU	E120815
Primary - 477 ACSR	W477ACSR	E173923
Primary - 4/0 AAAC	W4/0AAAC	E173682
Primary - 4/0 ACSR	W4/0ACSR	E173683
Primary - 397.5 ACSR	W397.5ACSR	E173925
Primary - 394.5 AAAC	W394AAAC	E173922
Primary - 336 AAAC	W336AAAC	E173920
Primary - 336 ACSR	W336ACSR	E173921
Primary - 3/0 ACSR	W3/0ACSR	E169078
Primary - #2 AAAC	W2AAAC	E153056
Primary - #2 ACSR	W2ACSR	E149501
Primary - #2 Hard-Drawn Copper	W2HDCU	E120814
Primary - 2/0 ACSR	W2/0ACSR	E169075
Primary - #1 ACSR	W1ACSR	E149500
Primary - 1/0 AAAC	W1/0AAAC	E163030
Primary - 1/0 ACSR	W1/0ACSR	E163031
Primary - 1/0 Copper	W1/0CU	E162500

Overhead Wire (Con't)

Description	Assembly	Item Number
Secondary - #8 Triplex	W8TPX	E149543
Secondary - #6 Duplex	W6DPX	E144568
Secondary - #6 Triplex	W6TPX	E149540
Secondary - #6 ACSR Duplex	W6ACSRDPX	E149535
Secondary - #6 ACSR Triplex	W6ACSRTPX	E149536
Secondary - 500 Copper Quadruplex	W500CUQPX-OH	E149530
Secondary - #4 Duplex	W4DPX	E144565
Secondary - #4 Triplex	W4TPX	E158025
Secondary - #4 Quadruplex	W4QPX-OH	E159096
Secondary - #4 Copper Triplex	W4CUTPX	E149526
Secondary - 4/0 Triplex	W4/0TPX	E173765
Secondary - 4/0 Quadruplex	W4/0QPX-OH	E173849
Secondary - #2 Triplex	W2TPX	E158006
Secondary - #2 ACSR Triplex	W2ACSRTPX	E158010
Secondary - #2 Quadruplex	W2QPX-OH	E159095
Secondary - 2/0 Triplex	W2/0TPX	E166365
Secondary - 2/0 Qudruplex	W2/0QPX-OH	E166370
Secondary - 2/0 ACSR Quadruplex	W2/0ACSRQPX-OH	E167095
Secondary - 2/0 Copper Triplex	W2/0CUTPX	E164014
Secondary - 1/0 Triplex	W1/0TPX	E164020
Secondary - 1/0 ACSR Triplex	W1/0ACSRTPX	E164021
Secondary - 1/0 Quadruplex	W1/0QPX-OH	E165019

Overhead Wire (Con't)

Description	Assembly	Item Number
Service - #6 Duplex	W6DPX-OH-SVC	E144568
Service - #6 Triplex	W6TPX-OH-SVC	E149540
Service - 500 Copper Triplex	W500CUTPX-OH-SVC	E149531
Service - 500 Copper Quadruplex	W500CUQPX-OH-SVC	E149530
Service - #4 Duplex	W4DPX-OH-SVC	E144565
Service - #4 Triplex	W4TPX-OH-SVC	E158025
Service - #4 Quadruplex	W4QPX-OH-SVC	E159096
Service - #4 Copper Quadruplex	W4CUQPX-OH-SVC	E149525
Service - 4/0 Triplex	W4/0TPX-OH-SVC	E173765
Service - 4/0 Quadruplex	W4/0QPX-OH-SVC	E173849
Service - 4/0 ACSR Quadruplex	W4/0ACSRQPX-OH-SVC	E149515
Service - 4/0 Copper Quadruplex	W4/0CUQPX-OH-SVC	E149520
Service - 3/0 Quadruplex	W3/0QPX-OH-SVC	E149510
Service - #2 Triplex	W2TPX-OH-SVC	E158006
Service - #2 Quadruplex	W2QPX-OH-SVC	E159095
Service - #2 Copper Triplex	W2CUTPX-OH-SVC	E149506
Serivce - #2 Copper Quadruplex	W2CUQPX-OH-SVC	E149505
Service - 2/0 Triplex	W2/0TPX-OH-SVC	E166365
Service - 2/0 Quadruplex	W2/0QPX-OH-SVC	E166370
Service - 1/0 Triplex	W1/0TPX-OH-SVC	E164020
Service - 1/0 Quadruplex	W1/0QPX-OH-SVC	E165019
Service - 1/0 ACSR Quadruplex	W1/0ACSRQPX-OH-SVC	E165018
Service - 1/0 Copper Quadruplex	W1/0CUQPX-OH-SVC	E164015

Ampacity Rating for OH Conductors*				
	Southwire Rating	Normal		Emergency
	N/A	Summer	Winter	Summer
Ambient temp	77°F	95°F	32°F	95°F
Conductor temp	167°F	120°F	120°F	167°F
Overhead Primary Conductors - CWC				
#8A CWC	96	51	113	N/A
#6A CWC	128	66	148	N/A
#4A CWC	170	69	157	N/A
Overhead Primary Conductors - Hd Cu				
#8 Hd Cu	100	48	101	N/A
#6 Hd Cu	140	63	135	N/A
#4 Hd Cu	170	83	182	N/A
#2 Hd Cu	225	122	273	N/A
1/0 Cu	311	143	335	276
Overhead Primary Conductors - ACSR				
#6 ACSR	105	51	113	N/A
#4 ACSR	140	67	150	N/A
#2 ACSR	184	87	201	N/A
#1 ACSR	212	100	232	N/A
1/0 ACSR	242	114	268	214
2/0 ACSR	276	129	310	246
3/0 ACSR	315	146	357	382
4/0 ACSR	357	166	412	323
336 ACSR	519	221	568	459
397 ACSR	587	244	645	518
397.5 ACSR	576	242	632	509
477 ACSR	646	267	710	570
Overhead Primary Conductors - AAAC				
#6 AAAC	97	47	103	N/A
#4 AAAC	130	62	138	N/A
#2 AAAC	173	81	185	N/A
1/0 AAAC	232	106	249	205
3/0 AAAC	310	139	334	274
4/0 AAAC	359	158	388	318
336 AAAC (312.8 Butte)	533	197	500	407
394 AAAC	533	223	580	470
741 AAAC	790	312	868	696

*Based on IEEE Standard 738

Values Used:

Wind Speed	2	Latitude	30.721
Wind Angle	90	Atmosphere	Clear
Height Above Sea Leve	259	Emissivity	0.5
Line Direction	E-W	Absorptivity	0.5
		Date/Time:	
		Summer	Jul 15: 15:00
		Winter	Jan 15: 6:00

APR 2018	CHELCO	EGLIN AMPACITY RATINGS

Ampacity Rating for OH Conductors*			
	Southwire Rating N/A	Max Allowable Rating	Emergency Summer
Ambient temp	77°F	104°F	95°F
Conductor temp	167°F	167°F	167 F
Overhead Secondary Conductors-Poly			
#8 Triplex Cu	70	70	N/A
#6 Duplex	70	70	N/A
#6 Triplex	70	70	N/A
#6 ACSR Duplex	70	70	N/A
#6 ACSR Triplex	70	70	N/A
#4 Quadruplex	80	80	N/A
#4 Duplex	90	90	N/A
#4 Triplex	90	90	N/A
#4 Triplex	90	90	N/A
#2 Triplex	120	120	N/A
#2 Quadruplex	105	105	N/A
#2 ACSR Triplex	120	120	N/A
1/0 Triplex	160	160	N/A
1/0 Quadraplex	140	140	N/A
1/0 ACSR Triplex	160	160	N/A
1/0 ACSR Quadruplex	140	140	N/A
2/0 Triplex	185	185	N/A
2/0 ACSR Quadruplex	160	160	N/A
2/0 Quadruplex	160	160	N/A
3/0 Quadruplex	185	185	N/A
4/0 Triplex	245	245	N/A
4/0 Quadraplex	210	210	N/A
	Southwire Rating N/A	Max Allowable Rating	Emergency Summer
Ambient temp	77°F	104°F	95°F
Conductor temp	167°F	194°F	194°F
*Overhead Secondary Conductors-XLP			
#4 Cu Triplex	115	115	N/A
#4 Cu Quadruplex	100	100	N/A
#2 Cu Triplex	155	150	N/A
#2 Cu Quadruplex	135	135	N/A
1/0 Cu Quadruplex	180	180	N/A
2/0 Cu Triplex	235	235	N/A
4/0 Cu Quadruplex	270	270	N/A
500 Cu Triplex	472	472	N/A
500 Cu Quadruplex	472	472	N/A

Conductor temperature of 90°C for XLP, 75°C for Poly; ambient temperature of 40°C; emissivity 0.9; 2ft./sec. wind in sun

Conductor ampacity ratings pulled from Southwire duplex, triplex, and quadruplex service drop specifications

Based on previous values, copper service drops assumed to be XLP.

APR 2018	CHELCO	EGLIN AMPACITY RATINGS

Ampacity Ratings for Underground Conductors*			
	Installation Method (77°F, Rho=90)		
	Direct Buried	Conduit	Unventilated Riser Pole
Conductor Temp.	194°F	194°F	194°F
Load Factor	75%	75%	75%
Underground Primary Conductors - 15kV Cu			
#6 Cu 15kV	139	104	69
#4 Cu 15kV	180	135	91
#2 Cu 15kV	213	160	131
#1 Cu 15kV	242	185	153
1/0 Cu 15kV	275	210	174
3/0 Cu 15kV	350	268	222
4/0 Cu 15kV	393	300	250
250 MCM Cu 15kV	439	336	280
350 MCM Cu 15kV	519	398	332
500 MCM Cu 15kV	609	476	395
750 MCM Cu 15kV	696	547	441
Underground Primary Conductors - 15kV Al			
#2 Al 15kV	167	125	103
1/0 Al 15 kV	216	165	137
2/0 Al 15kV	245	188	155
4/0 Al 15kV	315	244	203
350 MCM Al 15kV	417	266	268
750 MCM Al 15kV	604	476	398
1000 MCM Al 15kV	716	580	485
Underground Primary Conductors - 25kV Cu			
1/0 Cu 25kV	269	212	175
4/0 Cu 25kV	387	309	256
350 MCM Cu 25kV	508	407	338
500 MCM Cu 25kV	597	476	393
750 MCM Cu 25kV	695	565	455
Underground Primary Conductors - 25kV Al			
1/0 Al 25kV	211	167	137
4/0 Al 25kV	309	247	204
350 MCM Al 25kV	407	326	271
750 MCM Al 25kV	596	486	405
1000 MCM Al 25kV	704	573	478

Underground conductors have a maximum allowable ampacity, however, these values are limited by current flowing through the connected elbows (200A or 600A elbows).

Neutral size assumptions: #6-4/0, Full Neutral; 250 MCM-750 MCM, 1/3 Neutral; 1000 MCM, 1/6 Neutral

Assumed full sun and wind for unventilated riser

Table is based on IEEE Standard 835

APR 2018	CHELCO	EGLIN AMPACITY RATINGS

	Installation Method (68°F, Rho=90)		
	Direct Buried	Conduit	Unventilated Riser Pole
Conductor Temp.	194°F	194°F	194°F
Load Factor	100%	100%	100%
Underground Secondary Conductors - Cu			
10/2 UF	56	31	25
#2 Cu Triplex	197	146	108
#1 Cu Triplex	223	168	128
1/0 Cu Triplex	255	193	147
350 Cu Triplex	490	387	317
500 MCM Cu Triplex UD	592	471	389
Underground Secondary Conductors - Al			
#2 Triplex	153	114	84
1/0 Triplex	198	150	115
2/0 Triplex	226	172	132
4/0 Quadraplex	290	225	181
4/0 Triplex	291	226	181
250 Triplex	319	250	250
350 Triplex	385	304	250
500 MCM Triplex UD	467	372	310

Ampacities from Okonite's Engineering Handbook, 2018.

APR 2018	CHELCO	EGLIN AMPACITY RATINGS

Choctawhatchee Electric Cooperative, Inc. (CHELCO)

December 23, 2009

SUBJECT: Specifications and Drawings for Underground Electric Distribution

I. Purpose: To announce the issuance of CHELCO Specifications and Drawings for 12.5/7.2 kV and 14.4/25 kV Line Construction.

II. General: CHELCO primarily uses REA Bulletin 50-6(Standard D-806), (May 26, 2000) "Specifications and Drawings for Underground Electric Distribution". However, CHELCO has added to and revised many of the construction standards to reflect a variation in some of the assemblies.

All drawings conform to the latest edition of the
National Electrical Safety Code (NESC).

SPECIFICATIONS FOR CONSTRUCTION

1. General

These specifications provide for the construction of underground distribution power facilities, as specified by the Owner.

All construction work shall be done in a thorough and workmanlike manner in accordance with the staking sheets, plans and specifications.

If construction work is performed by the Owner’s crews instead of a contractor, any reference to “Contractor” in the narrative portions or drawings of this bulletin shall apply to the Owner’s crews.

The edition of the NESC (ANSI C2) which is in effect in accordance with the “Effective Date” rule of ANSI C2 shall be followed, except where local, state, federal, CHELCO or other regulations are more stringent, in which case those regulations shall govern.

2. Storage of Material and Equipment

All material and equipment to be used in construction shall be stored so as to be protected from deteriorating effects of the elements. If outdoor storage cannot be avoided, the material and equipment shall be stacked on supports well above the ground line and protected from the elements as appropriate, and with due regard to public safety.

3. Handling of Cable

Cable shall be handled carefully at all times to avoid damage, and shall not be dragged across the ground, fences or sharp projections. Care shall be exercised to avoid excessive bending of the cable. The ends of the cable shall be sealed with suitable end caps at all times to prevent the intrusion of moisture. Where it is necessary to cut the cable, the ends shall be terminated or sealed immediately after the cutting operation.

4. Trenching

All trenching depths specified are minimum as measured from the final grade to the top surface of the cable. The routing shall be a shown on the staking sheets and plans and specifications unless conditions encountered are such that changes are necessary to accomplish the work. In such event, the Owner shall be notified promptly. If rock or other difficult digging is involved, the Contractor shall determine the nature and extent of the difficulty, and the Owner will determine whether rerouting, rock trenching, directional boring or other changes are necessary. Loose soil or crumbly rock will not be considered as “difficult digging.” The trench widths specified are minimum and should be increased as necessary to obtain the required depths in loose soils.

Where trenches are intended to more than one cable, particular care must be taken to provide for extra depth and width to allow for soil falling into the trench during the laying of the first cables.

Care shall be exercised to minimize the likelihood of water-flow since this may cause trench damage and reduction in trench depth. If this occurs, the trench must be cleared to the specified depth before installing the cable.

All trenches shall follow straight lines between staked points to the extent possible. Secondary and service trenches shall extend in a straight line from takeoff points wherever possible. The trenches shall be dug so that the bottom has a smooth grade, to the extent possible. Large rocks, stones and gravel in excess of one (1) inch shall be removed from the bottom of the trench. Where this cannot be done, a two (2) inch bed of sand or clean soil shall be placed in the bottom of the trench.

Construction shall be arranged so that trenches will be left open for the shortest practical time to avoid creating a hazard to the public and to minimize the likelihood of collapse of the trench due to other construction activity, rain, accumulation of water in the trench, etc.

5. Installing Cable in Trench (Direct Burial)

The cable shall be placed in the trench as soon after the trenching operation as feasible. Wherever possible, cable shall be payed off the reel mounted on a moving vehicle or trailer. The reel shall be supported so that it can turn easily without undue strain on the cable. The cable shall be carefully placed in the trench by hand. All cable placement shall be performed under constant supervision to ensure the cable is never damaged.

The cable shall be inspected carefully as it is removed from the reel in the laying operations to be certain that it is free from visible defects. The Owner shall decide upon corrective action when defects are discovered.

Where more than one cable is to be placed in a trench, the spacing required by the specifications shall be observed. Care must be taken that any soil falling into the trench during the laying of the first cable does not reduce the clearances of the last cable below that specified. Should this occur, the excess soil must be removed carefully by hand or with equipment without damaging the installed cables.

Sufficient slack, and in no case less than six (6) feet, shall be left at all risers, transformer pads, pedestals and terminal points so that movements of cable after backfilling will not cause damaging strain on the cable or terminals. The cable trench shall be mechanically compacted three (3) feet minimum from all riser poles, pads, pedestals and terminal points.

When a hole contains equipment with a metal tank, cable shall be dressed carefully. It shall not be coiled at the bottom of the hole. The coiling of a cable around a metal equipment tank provides an undesirable electrical shield which prevents proper cathodic protection of the tank. Furthermore, the cable shall be positioned so that it neither lies on nor rubs against the equipment tank.

The ends of all secondary cable terminated below ground shall be long enough to reach at least twelve (12) inches above the top of the underground enclosure.

6. Minimum Bending Radius of Cable

The minimum bending radius of primary cable is twelve (12) times the overall diameter of the cable. The minimum bending radius of secondary and service cable is six times the overall diameter of the cable. In all cases the minimum radius specified is measured to the surface of the cable on the inside of the bend. No cable bends shall be made within six (6) inches of a cable terminal base.

7. Conduit

All exposed ends of conduit shall be plugged during construction to prevent the intrusion of foreign matter and moisture. Burrs or sharp projections shall be removed to prevent damage to the cable. Riser shield or conduit shall extend a minimum of eighteen (18) inches below grade at all riser poles. If full round conduit is used as a riser shield, an end bell shall be installed on the lower end to prevent damage to the cable.

8. Method of Calculating Minimum Conduit Size

Tables 1 through 4 lists the minimum size of conduit necessary to accommodate certain numbers and sizes of underground power and secondary cables. The tables are based on the maximum fill requirements of the National Electrical Code (NEC) which are 53%

maximum fill for one (1) cable in a conduit, 31% maximum fill for two (2) cables in a conduit, and 40% maximum fill for 3 or more cables in a conduit. The trade sizes, inside diameters, and maximum areas of fill for various sizes of conduit are as follows:

Trade Size (Inches)	Inside Dia.	Area (Square Inches)	Area x 53%	Area x 31%	Area x 40%
2	2.067	3.36	1.78	1.04	1.34
2 1/2	2.469	4.79	2.54	1.48	1.92
3	3.068	7.39	3.92	2.29	2.96
3 1/2	3.548	9.89	5.24	3.06	3.95
4	4.026	12.73	6.75	3.95	5.09
5	5.047	20.01	10.6	6.2	8
6	6.065	28.89	15.31	8.96	11.56

The cables shown in Tables 1 through 4 all have ICEA Class B concentric stranded conductors, unless an "S" indicating solid conductor appears beside the conductor AWG size. The listed cables have standard thicknesses of conductor shield, insulation, insulation shield, and jacket, as well as standard numbers and size of concentric neutral wires in accordance with ICEA and AEIC Specifications. If anything other than standard specifications are used for cable or if anything other than stranded or solid conductor is used, the overall cross-sectional area of the cable should be calculated as follows:

For 15 kV or 25 kV Power Cable:
Diameter = C + 2CS + A + 2I + 0.030 + 2IS + 2N + 2J

Where, C = Diameter of the conductor.

CS = Thickness of the conductor shield.

Conductor Size (AWG or MCM)	Conductor Shield (Inches)
#2 - #4/0	0.015
250 - 500	0.020
600 – 1000	0.025

A = Addition factor

0.010 inches for 25 kV cable with conductor larger than #4/0

0 for all other cable constructions

I = Insulation wall thickness

IS = Insulation shield thickness

Diameter Over Insulation*	Insulation Shield (Inches)
0 – 1.0	0.040
1.001 – 1.5	0.060
1.501 –	0.080

*Diameter Over Insulation = C + 2CS + A + 2I

N = Diameter of Concentric Neutral Wires

Conductor (AWG or MCM) Full Neutral	1/3 Neutral	Neutral Wire Size (AWG)	Diameter (Inches)
Through #1/0	Through 350	#14	0.0641
#2/0, #3/0	500	#12	0.0808
#4/0, 250	750	#10	0.1019
350	1000	#9	0.1144

J = Thickness of Outer Jacket

0.080 inches for conductors through 350 MCM

0.110 inches for conductors larger than 350 MCM

For 600 Volt Secondary Cable:

Diameter = C + 2I

Where, C = Diameter of the conductor.

I = Insulation wall thickness

Conductor Size (AWG or MCM)	Insulation Thickness (Inches) Regular	Ruggedized
#4 - #2	0.060	0.060
#1 - #4/0	0.080	0.080
225 – 500	0.095	0.080

TABLE 1
Minimum Size of Conduit Necessary
To Accommodate Primary Underground Power Cable

15 kV Cable - 220 Mil Insulation Wall

Conductor		Cables per Conduit / Neutral					
		1 Cable per Conduit		2 Cables per Conduit		3 Cables per Conduit	
AWG or MCM	Diameter (In.)	Full	1/3	Full	1/3	Full	1/3
2S*	0.2576	2	2	2	2	2	2
2	0.2920	2	2	2	2	2	2
1S	0.2893	2	2	2	2	2	2
1	0.3320	2	2	2	2	2	2
1/0S	0.3249	2	2	2	2	2	2
1/0	0.3720	2	2	2	2	2	2
2/0	0.4180	2	2	2 1/2	2	2 1/2	2 1/2
3/0	0.4700	2	2	2 1/2	2	2 1/2	2 1/2
4/0	0.5280	2	2	2 1/2	2	3	2 1/2
250	0.5750	2	2	3	3	3	3
350	0.6810	2	2	3	3	3 1/2	3
500	0.8130		2		3 1/2		4
750	0.9980		2 1/2		4		5
1000	1.1520		2 1/2		5		5

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three cables in a conduit.

* S = Solid Conductor. Unless notes, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see Method of Calculating Minimum Conduit Size.

TABLE 2
Minimum Size of Conduit Necessary
To Accommodate Primary Underground Power Cable

15 kV Cable - 260 Mil Insulation Wall

Conductor		Cables per Conduit / Neutral					
		1 Cable per Conduit		2 Cables per Conduit		3 Cables per Conduit	
AWG or MCM	Diameter (In.)	Full	1/3	Full	1/3	Full	1/3
1S	0.2893	2	2	3	3	3 1/2	3 1/2
1	0.3320	2	2	3	3	3 1/2	3 1/2
1/0S	0.3249	2	2	3	3	3 1/2	3 1/2
1/0	0.3720	2	2	3 1/2	3 1/2	3 1/2	3 1/2
2/0	0.4180	2	2	3 1/2	3 1/2	4	3 1/2
3/0	0.4700	2	2	4	3 1/2	4	4
4/0	0.5280	2 1/2	2	4	4	5	4
250	0.5750	2 1/2	2	4	4	5	5
350	0.6810	2 1/2	2 1/2	5	5	5	5
500	0.8130		3		5		5
750	0.9980		3		6		6
1000	1.1520		3 1/2		6		#

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three cables in a conduit.

* S = Solid Conductor. Unless notes, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see Method of Calculating Minimum Conduit Size.

# Indicates that a six (6)-inch conduit is not of sufficient size to accommodate three cables of this size without exceeding the maximum fill requirement.

TABLE 3
Minimum Size of Conduit Necessary
To Accommodate Primary Underground Power Cable

25 kV Cable - 345 Mil Insulation Wall

Conductor		Cables per Conduit / Neutral					
		1 Cable per Conduit		2 Cables per Conduit		3 Cables per Conduit	
AWG or MCM	Diameter (In.)	Full	1/3	Full	1/3	Full	1/3
1S	0.2893	2	2	3 1/2	3 1/2	3 1/2	3 1/2
1	0.3320	2	2	3 1/2	3 1/2	4	4
1/0S	0.3249	2	2	3 1/2	3 1/2	4	4
1/0	0.3720	2	2	3 1/2	3 1/2	4	4
2/0	0.4180	2	2	4	4	4	4
3/0	0.4700	2	2	4	4	5	4
4/0	0.5280	2 1/2	2 1/2	5	4	5	5
250	0.5750	2 1/2	2 1/2	5	4	5	5
350	0.6810	2 1/2	2 1/2	5	5	5	5
500	0.8130		3		5		6
750	0.9980		3		6		6
1000	1.1520		3 1/2		6		#

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three cables in a conduit.

* S = Solid Conductor. Unless notes, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see Method of Calculating Minimum Conduit Size.

# Indicates that a six (6)-inch conduit is not of sufficient size to accommodate three cables of this size without exceeding the maximum fill requirement.

TABLE 4
Minimum Size of Conduit Necessary
To Accommodate Primary Underground Power Cable

600 Volt Secondary Cable

Conductor		Cables per Conduit / Insulation Type					
		1 Cable per Conduit		2 Cables per Conduit		3 Cables per Conduit	
AWG or MCM	Diameter (In.)	Full	1/3	Full	1/3	Full	1/3
2S*	0.2576	2	2	2	2	2	2
2	0.2920	2	2	2	2	2	2
1S	0.2893	2	2	2	2	2	2
1	0.3320	2	2	2	2	2	2
1/0S	0.3249	2	2	2	2	2	2
1/0	0.3720	2	2	2	2	2	2
2/0	0.4180	2	2	2 1/2	2	2 1/2	2 1/2
3/0	0.4700	2	2	2 1/2	2	2 1/2	2 1/2
4/0	0.5280	2	2	2 1/2	2	3	2 1/2
250	0.5750	2	2	3	3	3	3
350	0.6810	2	2	3	3	3 1/2	3
500	0.8130		2		3 1/2		4
750	0.9980		2 1/2		4		5
1000	1.1520		2 1/2		5		5

Table is based on National Electrical Code requirements. Maximum conduit fill is 53% for one cable, 31% for two cables, and 40% for three cables in a conduit.

* S = Solid Conductor. Unless notes, conductors are concentric stranded. If different conductors, i.e. compressed or compacted, are used, see Method of Calculating Minimum Conduit Size.

9. Cable Installation in Conduit or Duct

Where cable must be pulled through conduit or duct, the operation shall be performed in such a way that the cable will not be damaged from strain or dragging. If required, the cable shall be lubricated with a suitable cable lubricant prior to pulling cable into conduit or duct.

In placing primary cables, the stress applied while pulling into ducts or during other pulling operations shall not exceed the least of the following:

a. Where pulling eye is attached to the conductor, the maximum pulling strain in pounds shall not exceed 0.006 times the circular mil area for aluminum or 0.008 times the circular mil area for copper.

b. Where a basket grip is placed over the cable, the pulling strain shall not exceed the lesser of (1) that calculated in above or (2) one thousand (1000) pounds. The cable under the cable grip and 1 foot following it shall be severed and discarded after the pulling operation.

c. In no case shall the maximum pulling tension exceed that recommended by the specific cable manufacturer.

d. At bends, the maximum sidewall pressure recommended by the cable manufacturer shall not be exceeded.

10. Tagging of Cables at Termination Points

As the cables are laid, they shall be identified and tagged. The identification shall be of a permanent type, such as that done on plastic or corrosion resistant metal tags. The tag shall be securely attached to the cable. Paper or cloth tags are not acceptable.

11. Splices

Cable splices shall be of the pre-molded rubber, heat-shrink, or cold-shrink type, of the correct voltage rating and shall be installed in accordance with the splice manufacturer's instructions. Splices that depend solely on tape for a moisture barrier shall not be used.

Not more than one splice shall be permitted for each two thousand (2000) feet of cable installed unless authorized by the Owner. No bends shall be permitted within twelve (12) inches of the ends of a splice. The cable or circuit numbers and the exact location of all splices shall be noted on the staking sheets (as built).

12. Primary Cable Termination and Stress Cones

Prefabricated stress cones or terminations shall be installed in accordance with the manufacturer's instructions at all primary cable terminals. They shall be suitable for the size and type of cable that they are used with and for the environment in which they will operate. Any indication of misfit, such as a loose or exceptionally tight fit, shall be called to the Owner's attention. The outer conductive surface of the termination shall be bonded to the system neutral. A heat-shrink or cold-shrink sleeve shall be installed to seal between the body of the termination and the cable jacket.

13. Special Precautions for Cable Splices and Terminations

A portable covering or shelter shall be available for use when splices or terminations are being prepared and when prefabricated terminations are being switched. The shelter shall be used as necessary to keep rain, snow and windblown dust off the insulating surfaces of these devices. Since cleanliness is essential in the preparation and installation of primary cable fittings, care shall be exercised to prevent the transfer of conducting particles from the hands to insulating surfaces. Mating surfaces shall be wiped with a solvent such as denatured alcohol to remove any possible accumulation of dirt, moisture or other conducting materials. A silicone grease or similar lubricant shall be applied afterwards in accordance with the manufacturer's recommendations. Whenever prefabricated cable devices are opened, the un-energized mating surfaces shall be lubricated with silicone grease before the fittings are reconnected.

14. Secondary and Service Connections

A suitable inhibiting compound shall be used with all secondary and service connections.

All secondary cable connections in secondary pedestals shall be made with pre-insulated secondary connector blocks. Diving bells with open terminals insulating boots or moisture barriers that depend solely on tape are not acceptable.

All secondary cable splices located below ground shall be performed with pre-insulated splice kits. Diving bells with open terminal insulating boots or moisture barriers that depend solely on tape are not acceptable.

All transformer secondary phase terminal connections shall be completely insulated. If the secondary phase terminals are threaded studs, the connection shall be made with a pre-insulated secondary transformer connection block. If the transformer secondary phase terminals are insulated cable leads, connection shall be made with a pre-insulated secondary connector block or with a secondary prefabricated splice when the transformer leads continue directly to the service.

If a transformer is so large that it must have secondary spades, the spades shall be insulated. Boots used for insulation shall be taped so that they cannot be readily slipped off.

Secondary connections to terminals of pole-mounted transformers shall be made so that moisture cannot get inside the cable insulation. This may be accomplished by covering the terminals and bare conductor ends with an appropriate moisture sealant.
The secondary connections and insulation shall have accommodations for all future and existing services as shown on the plans and specifications.

15. Pedestals

All pedestals should be approximately at the same height above finished grade.

16. Inspection and Inventory of Buried Units

Before any backfilling operations are begun, the Contractor and Owner shall jointly inspect all trenches, cable placement, risers, pedestal stakes, and other construction that will not be accessible after backfilling, and an inventory of units shall be taken. If corrections are required, a second inspection shall be made after completion of the changes.

17. Backfilling

The first six (6) inches of trench backfill shall be free from rock, gravel or other material which might damage the cable jacket. In lieu of cleaning the trench, the Contractor may, at the Contractor's option, place a two (2) inch bed of clean sand or soil under the cable and four (4) inches of clean soil above the cable. Cleaned soil backfill when used shall contain no solid material larger than one (1) inch. This soil layer shall be carefully compacted so that the cable will not be damaged.

Backfilling shall be completed in such a manner that voids will be minimized. Excess soil shall be piled on top and shall be well tamped. All rock and debris shall be removed from the site, and any damage to the premises repaired immediately.

Pieces of scrap cable or other material remaining after installation shall not be buried in the trench as a means of disposal. All such material shall be disposed of properly.

18. Equipment Pads (Ground Sleeves)

The site for the pad should be adjacent to the trench and not over the trench if at all possible. The site shall be cleared of all debris and excavated to the specified depth. The pad shall be installed level at the specified elevation.

19. Transformers

Transformers shall be handled carefully to avoid damage to the finish and shall be positioned in accordance with the staking sheets and the plans and specifications. Only qualified and experienced personnel shall be allowed to make connections and cable terminations. For single phase transformers, the maximum number of cables pulled into the transformer shall be six (6) runs (18 cables) of 500 MCM. For three phase transformers, the maximum number of cables pulled into the transformer shall be twelve (12) runs (48 cables) of 750 MCM.

20. Equipment Enclosures

Excavations for sleeve-type transformer pads and other below-grade enclosures shall be made so as to disturb the surrounding earth as little as possible. Enclosures shall be installed with side walls plumb. When enclosures are of fiber, plastic, or other semi-flexible material, backfilling should be done with covers in place and with careful tamping so as to avoid distortion of the enclosure. When installations are complete, the cover of the enclosure shall not be lower than and not more than two (2) inches higher than the grade specified by the Owner. Soil in the immediate vicinity shall be tamped and sloped away from the enclosure. At the Owner's option, the excess soil shall be removed from the site or spread evenly over the surface of the ground to the satisfaction of the Owner.

21. Warning Signs

Each equipment enclosure shall display a "Caution" sign placed so that it is visible to anyone attempting entry to the enclosure. Also, the equipment inside the enclosure shall display a "Danger" sign so that it is visible when the enclosure is open.

22. Grounding

All neutral conductors, ground electrodes and groundable parts of equipment shall be interconnected. All interconnections shall be made as shown on the construction drawings. A galvanize ground rod(s) with minimum length of eight (8) feet shall be installed at all equipment locations as shown in the construction drawings and at all cable splices and taps.

All pad-mounted equipment enclosures, including transformers, shall be grounded in such a manner that two separate connections exist between the enclosure and the ground rod(s).

23. Cable Location Markers

Location of permanent cable markers shall be as shown on the staking sheets.

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"UM1"

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- **UM3E-SC-210** S & C Vista Switchgear, 2 Way
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    - **UM50-4RB-2PH** Continuous-4” PVC, SDR 13.5 with pull rope (2 runs)
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- **USR3** Service Riser-3”
- **UM50-P-3M** Service Riser-3” riser with 2” reducer
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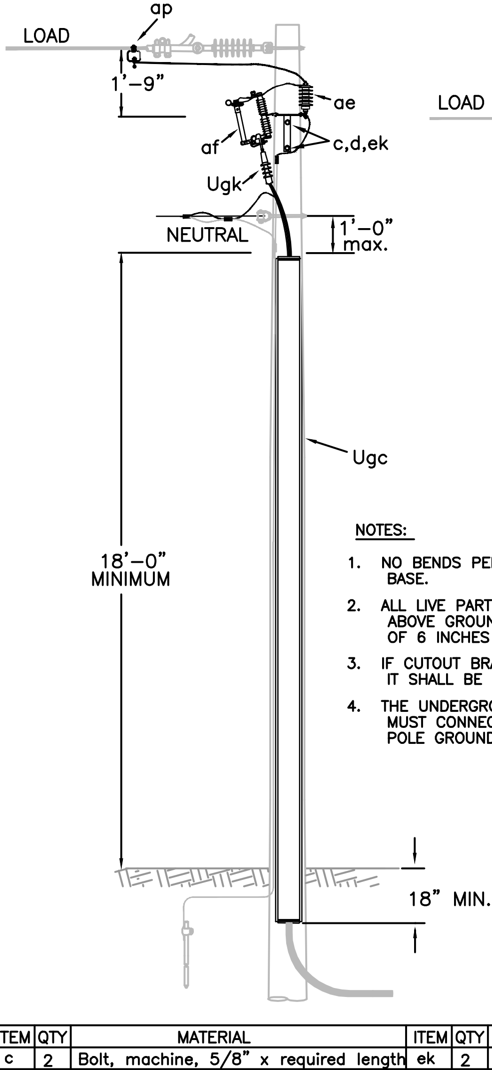
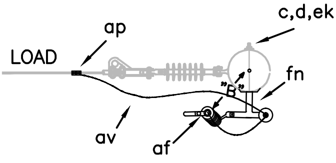
    - **W750MCM** Primary-750 MCM 15kV UD
    - **W1000MCM** Primary-1000 MCM 15kV UD
    - **W2TPX-UG** Secondary-#2 Triplex 600V UD
    - **W2/0TPX-UG** Secondary-2/0 Triplex 600V UD
    - **W4/0TPX-UG** Secondary-4/0 Triplex 600V UD
    - **W4/0QPX-UG** Secondary-4/0 Quadruplex 600V UD
    - **W350MCMTPX** Secondary-350 MCM 600V UD
    - **W2TPX-UG-SVC** Service-#2 Triplex 600V UD
    - **W1/0TPX-UG-SVC** Service-1/0 Triplex 600V UD
    - **W2/0TPX-UG-SVC** Service-2/0 Triplex 600V UD
    - **W4/0TPX-UG-SVC** Service-4/0 Triplex 600V UD
    - **W4/0QPX-UG-SVC** Service-4/0 Quadruplex 600V UD
    - **W350MCMTPX-UG-SVC** Service-350 MCM 600V UD

- **“MISCELLANEOUS”**
  - **Coordination Chart**
  - **Make-up Wire**
  - **Transformer Connections**
  - **Common Clearance Codes**

- **“MAJOR MATERIAL”**

- **“SPECIAL EQUIPMENT”**





PLAN

"B" MINIMUM	
7.2/12.5 kv	15"

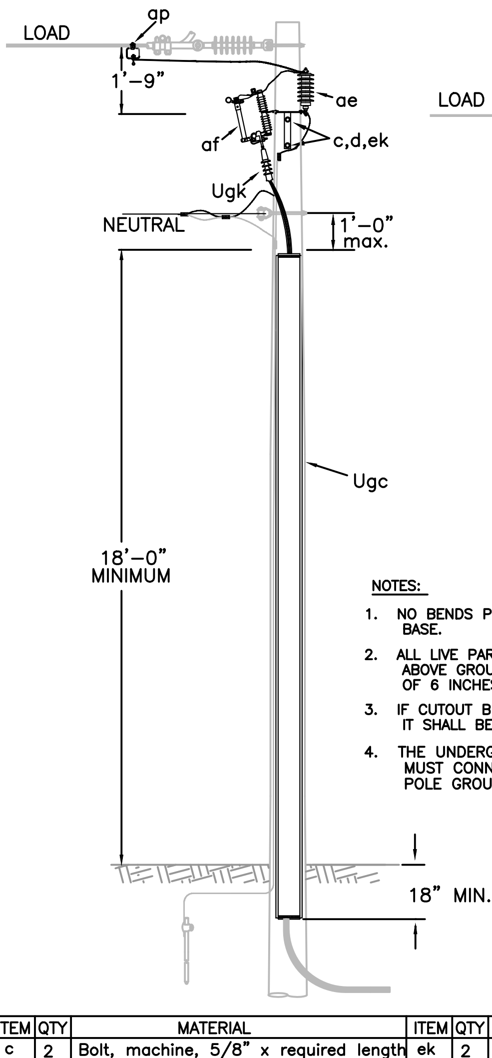
NOTES:

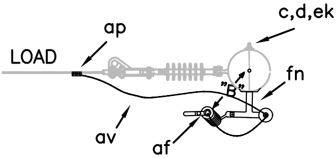
1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x required length	ek	2	Locknuts
d	2	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
j	8	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 15kV
ae	1	Arrester, lightning 9kV		1	Coldshrink sealing kit
af	1	Cutout 100 amp		1	Conduit seal
ap	1	Clamp, hot line copper all		3	Shield backing plate
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
cj	10	Conductor, No 4 S D copper			Fusing as required

1 PHASE CABLE TERMINAL POLE

MAY 2014	CHELCO	UA1





PLAN

"B" MINIMUM	
7.2/12.5 kv	15"

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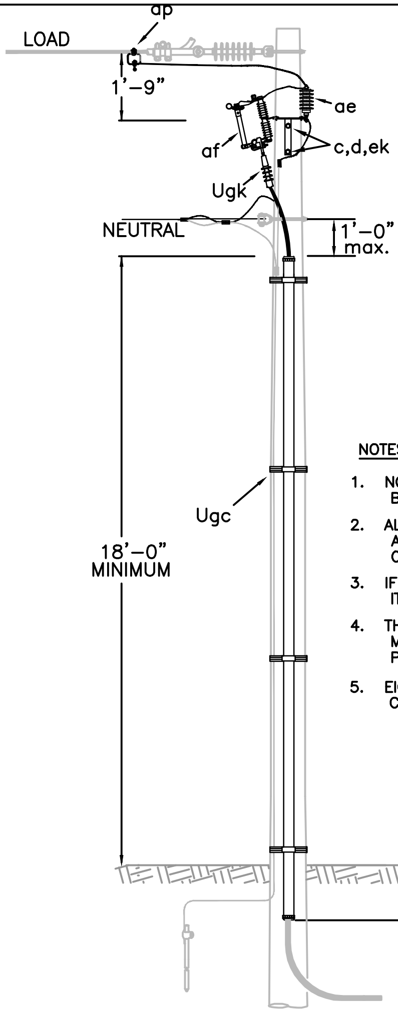
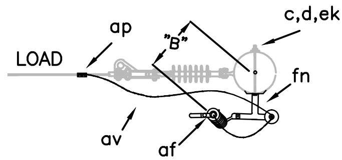
d	2	Washer, square 2 1/4"	fn	1	Bracket, cutout 1 phase 'T'
j	8	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 25kV
ae	1	Arrester, lightning 18kV		1	Coldshrink sealing kit
af	1	Cutout 100 amp		1	Conduit seal
ap	1	Clamp, hot line copper all		3	Shield backing plate
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
cj	10	Conductor, No 4 S D copper			Fusing as required

1 PHASE CABLE TERMINAL POLE

AUG 2018	CHELCO	VUA1





PLAN

"B" MINIMUM	
7.2/12.5 kv	15"

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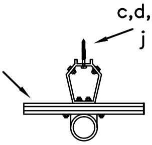
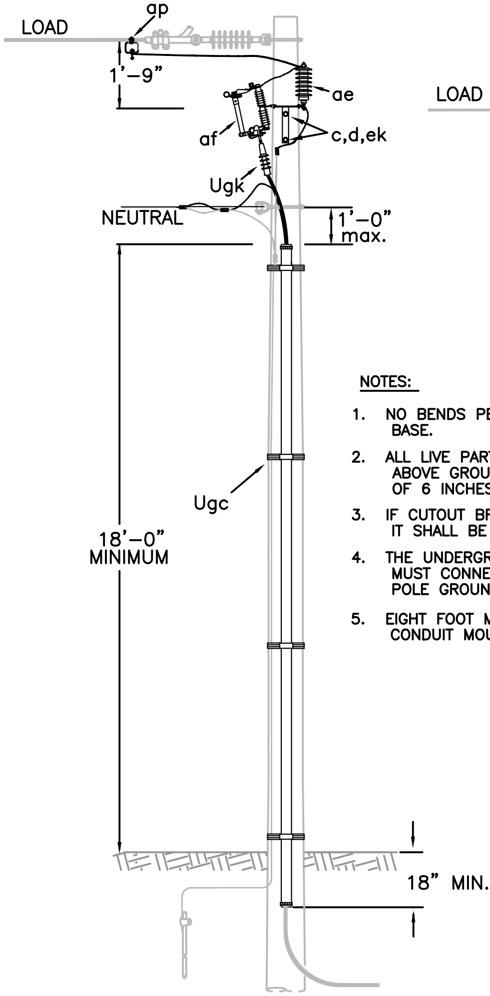
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

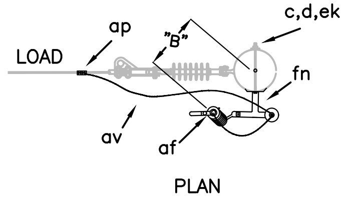


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 1 phase 'T'
d	6	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 15kV
j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 9kV		10	Conduit 2" pvc–sch 80
af	1	Cutout 100 amp		20	Conduit 2" pvc–sch 40
ap	1	Clamp, hot line copper all		1	Conduit seal
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
cj	12	Conductor, no 4 S D copper			Fusing as required
ek	6	Locknuts			

1 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

MAY 2014	CHELCO	UA2





"B" MINIMUM	
7.2/12.5 kv	15"

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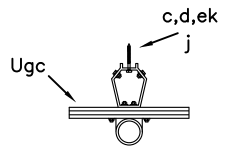
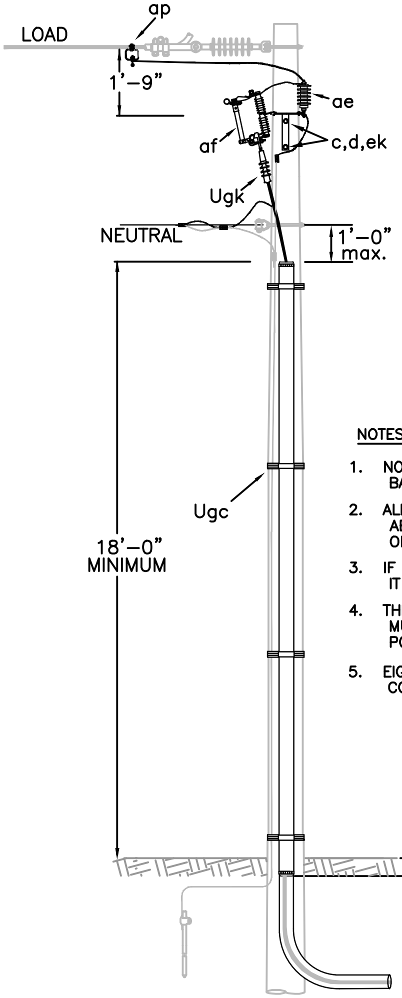
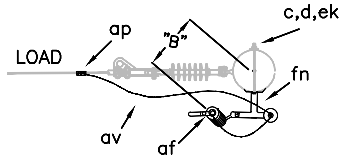


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 1 phase 'T'
d	6	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 25kV
j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 18kV		10	Conduit 2" pvc–sch 80
af	1	Cutout 100 amp		20	Conduit 2" pvc–sch 40
ap	1	Clamp, hot line copper all		1	Conduit seal
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
cj	12	Conductor, no 4 S D copper			Fusing as required
ek	6	Locknuts			

1 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

AUG 2018	CHELCO	VUA2





PLAN

"B" MINIMUM	
7.2/12.5 kv	15"

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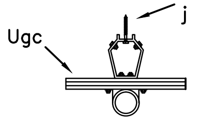

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 1 phase 'T'
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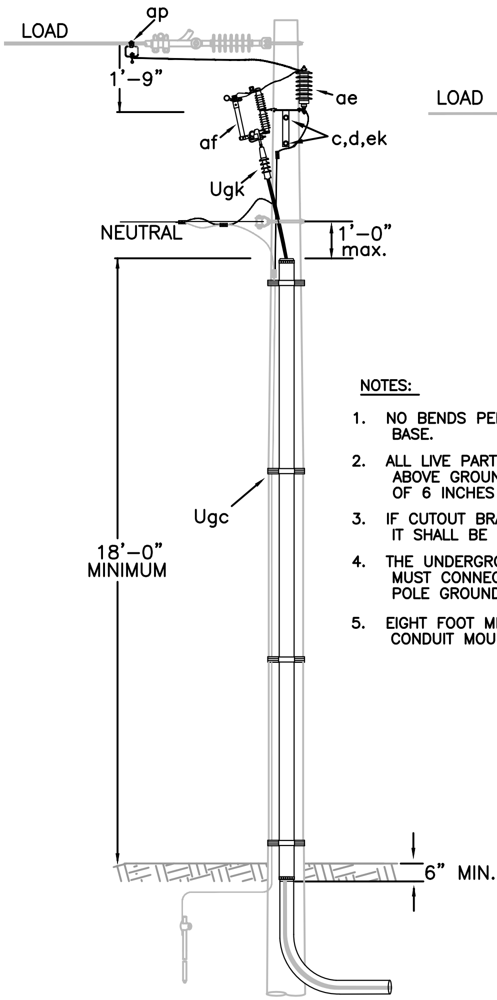
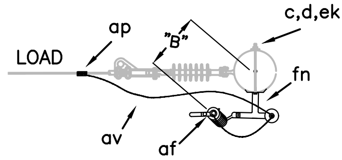
j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 9kV		10	Conduit 3" pvc–sch 80
af	1	Cutout 100 amp		20	Conduit 3" pvc–sch 40
ap	1	Clamp, hot line copper all		1	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		1	Conduit seal
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	6	Locknuts			Fusing as required

1 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

MAY 2014	CHELCO	UA3





PLAN

"B" MINIMUM	
7.2/12.5 kv	15"

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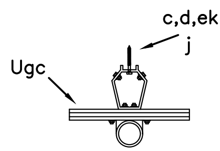
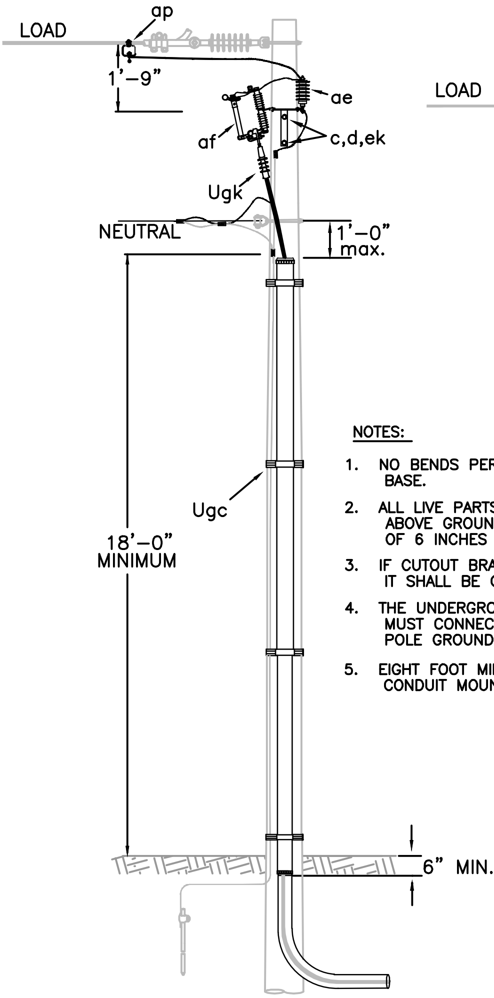
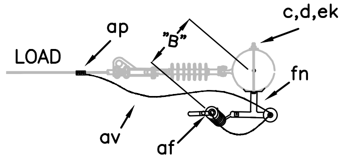


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	6	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 1 phase 'T'
d	6	Washer, square 2 1/4"	Ugc	3	Bracket, standoff conduit 12"
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 25kV
j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 18kV		10	Conduit 3" pvc–sch 80
af	1	Cutout 100 amp		20	Conduit 3" pvc–sch 40
ap	1	Clamp, hot line copper all		1	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		1	Conduit seal
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	6	Locknuts			Fusing as required

1 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

AUG 2018	CHELCO	VUA3





PLAN

"B" MINIMUM	
7.2/12.5 kv	15"

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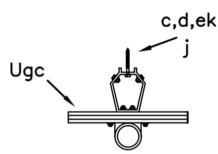

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
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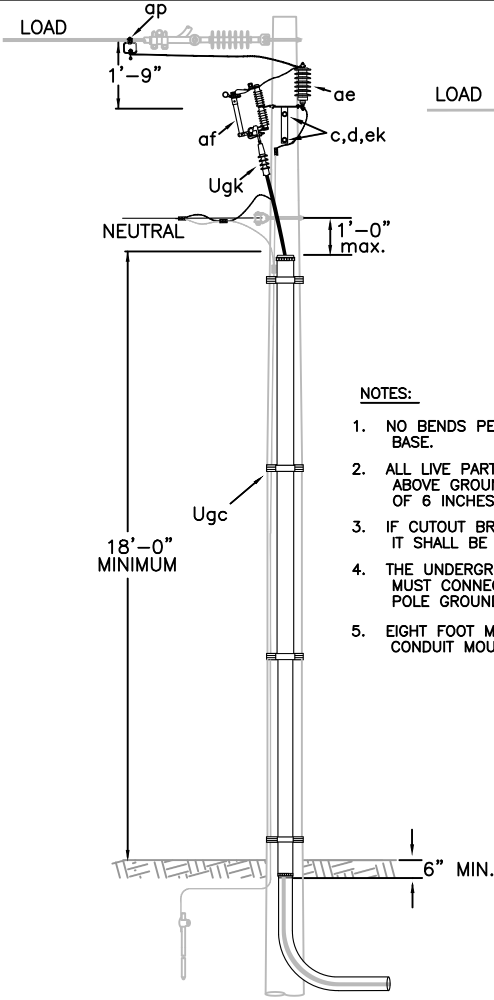
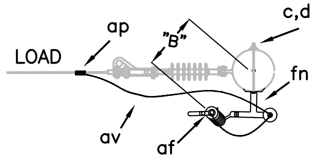
j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 9kV		10	Conduit 4" pvc–sch 80
af	1	Cutout 100 amp		20	Conduit 4" pvc–sch 40
ap	1	Clamp, hot line copper all		1	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		1	Conduit seal
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	6	Locknuts			Fusing as required

1 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	UA4





PLAN

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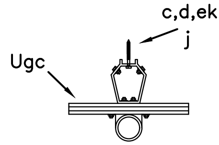

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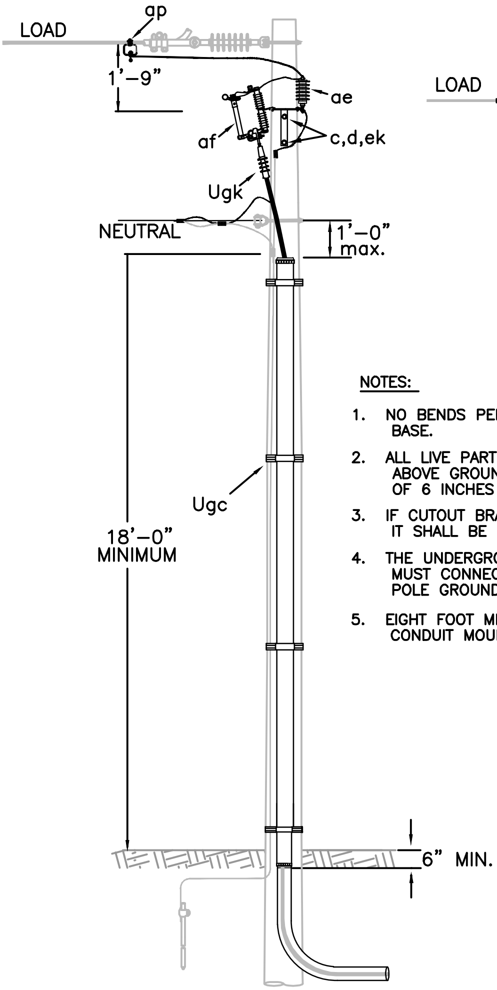
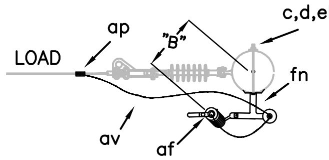
j	3	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 18kV		10	Conduit 4" pvc-sch 80
af	1	Cutout 100 amp		20	Conduit 4" pvc-sch 40
ap	1	Clamp, hot line copper all		1	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		1	Conduit seal
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	6	Locknuts			Fusing as required

1 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

AUG 2018	CHELCO	VUA4





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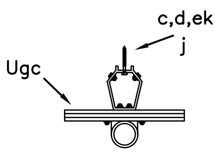

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
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j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 9kV		10	Conduit 4" pvc–sch 80
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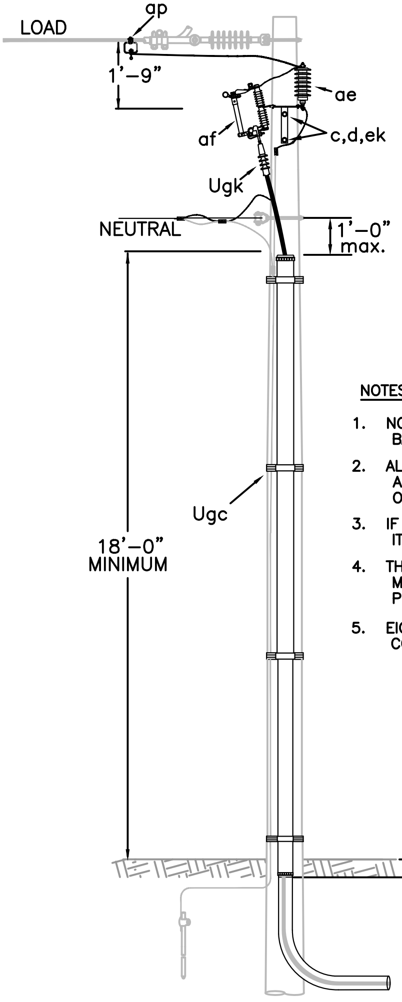
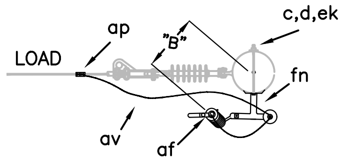
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	6	Locknuts			Fusing as required

1 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	UA4–4





PLAN

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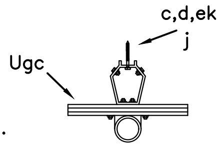

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c	6	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 1 phase 'T'
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j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 18kV		10	Conduit 4" pvc-sch 80
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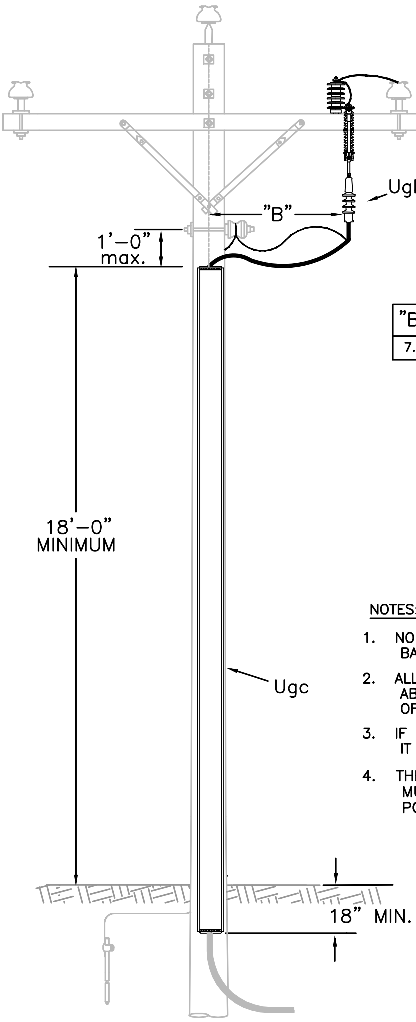
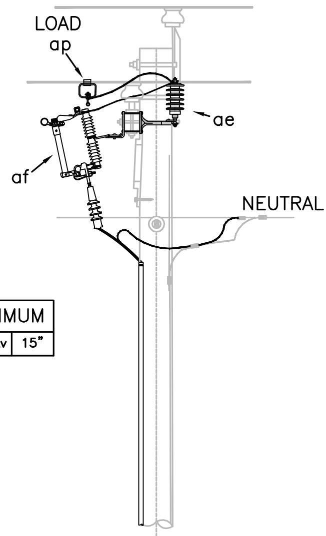
av	*	Jumpers, as required		1	Conduit seal
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	6	Locknuts			Fusing as required

1 PHASE CABLE TERMINAL POLE

4 INCH CONDUIT

AUG 2018	CHELCO	VUA4-4





"B" MINIMUM	
7.2/12.5 kv	15"

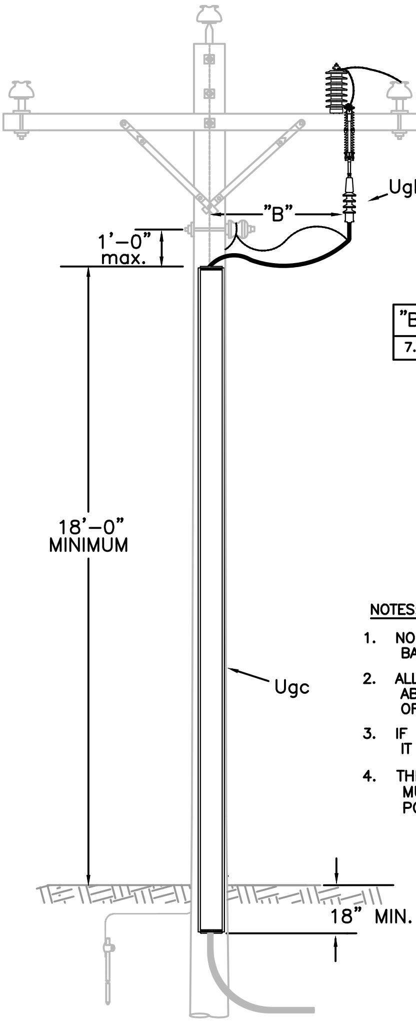
NOTES:

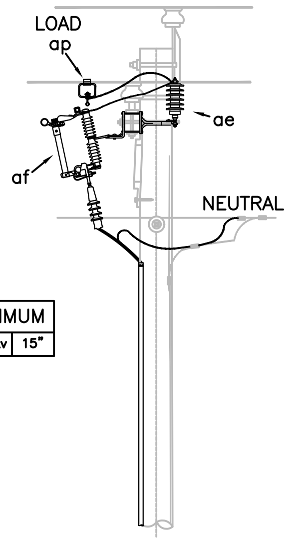
1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
j	8	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 15kV
ae	1	Arrester, lightning 9kV		1	Coldshrink sealing kit
af	1	Cutout 100 amp		3	Shield backing plate
ap	1	Clamp, hot line copper all		1	Stirrup, burndy wejtap WSM1PB
av	*	Jumpers, as required		1	Stirrup, burndy wejtap WSS2PB
cj	12	Conductor, no 4 S D copper			Fusing as required

1 PHASE CABLE TERMINAL POLE
SHIELD

MAY 2014	CHELCO	UA5





"B" MINIMUM	
7.2/12.5 kv	15"

NOTES:

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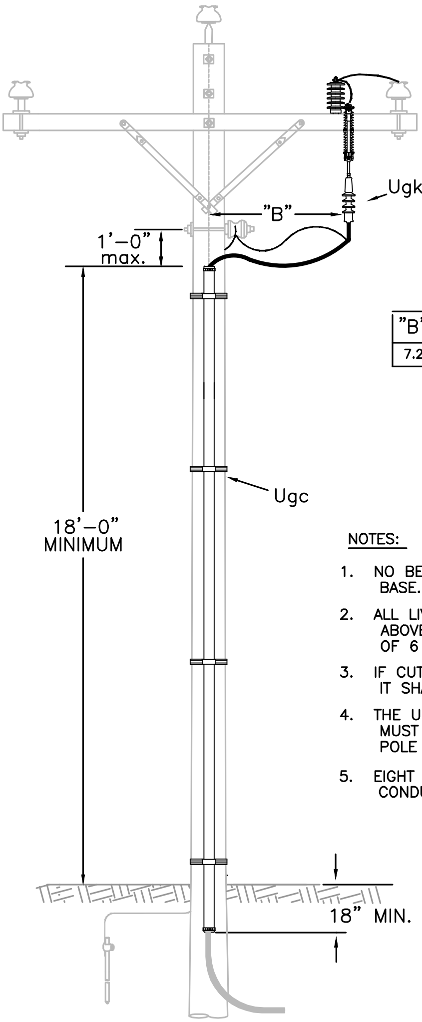
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

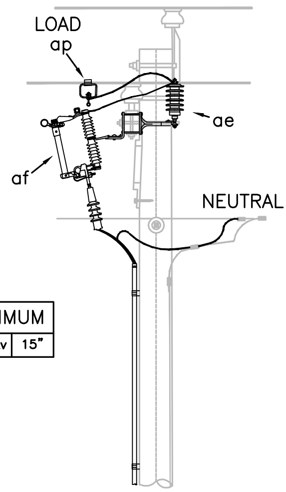
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
j	8	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 25kV
ae	1	Arrester, lightning 18kV		1	Coldshrink sealing kit
af	1	Cutout 100 amp		3	Shield backing plate
ap	1	Clamp, hot line copper all		1	Stirrup, burndy wejtap WSM1PB
av	*	Jumpers, as required		1	Stirrup, burndy wejtap WSS2PB
cj	12	Conductor, no 4 S D copper			Fusing as required

1 PHASE CABLE TERMINAL POLE

SHIELD

AUG 2018	CHELCO	VUA5





"B" MINIMUM	
7.2/12.5 kv	15"

NOTES:

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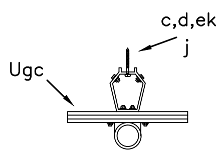
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

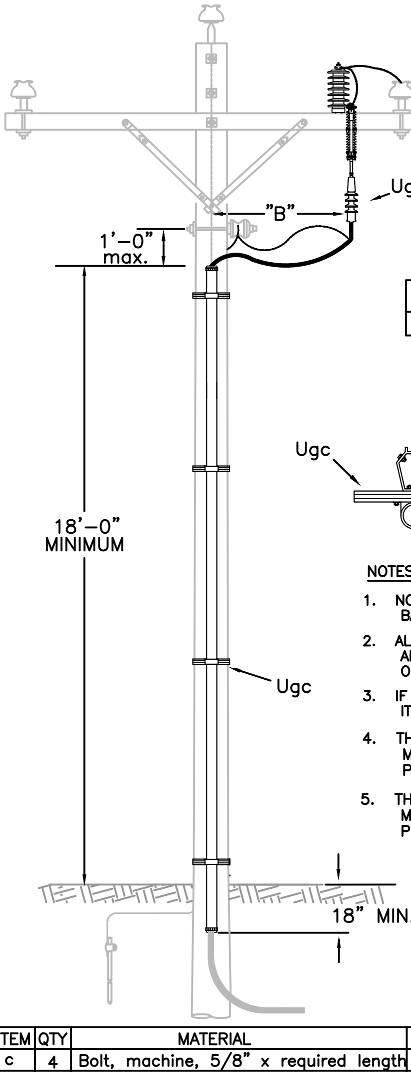


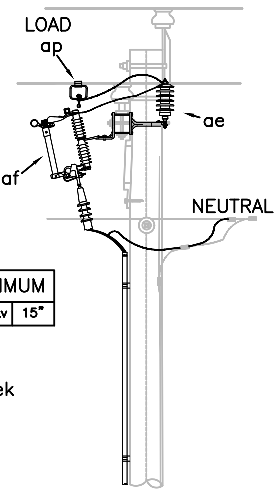
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x required length	ek	4	Locknuts
d	4	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
p	*	Connectors, as required	Ugk	1	Termination 1/0 al 15kV
j	4	Screw, lag, 1/2" x 4"		1	Coldshrink sealing kit
ae	1	Arrester, lightning 9kV		10	Conduit 2" pvc–sch 80
af	1	Cutout 100 amp		20	Conduit 2" pvc–sch 40
ap	1	Clamp, hot line copper all		1	Conduit seal
av	*	Jumpers, as required			Fusing as required
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap

1 PHASE CABLE TERMINAL POLE

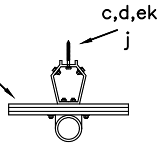
2 INCH CONDUIT

MAY 2014	CHELCO	UA5–2





"B" MINIMUM	
7.2/12.5 kv	15"



NOTES:

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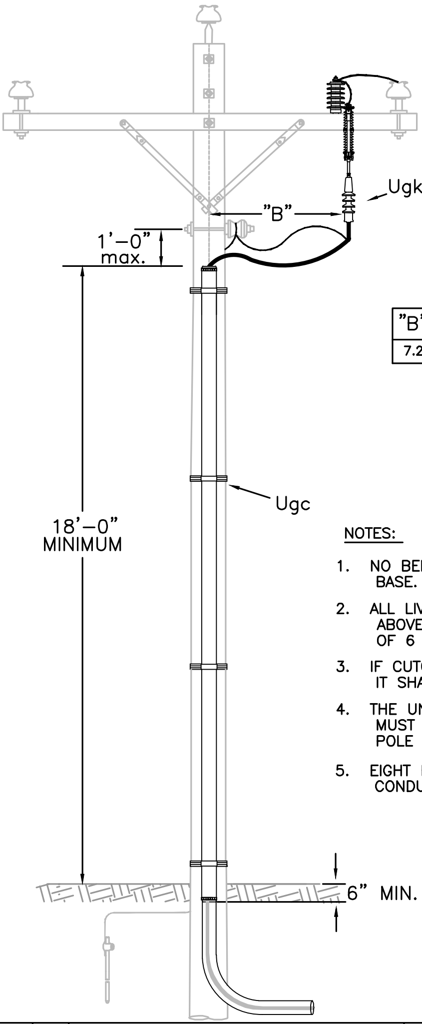
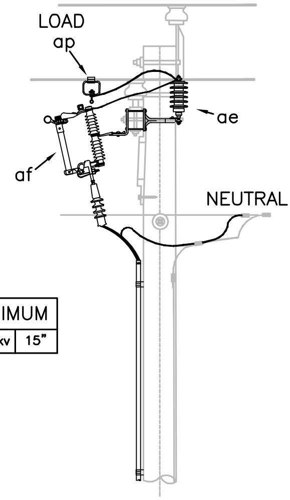
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x required length	Ugc	4	Bracket, standoff conduit 12"
d	4	Washer, square 2 1/4"	Ugk	1	Termination 1/0 al 25kV
p	*	Connectors, as required		1	Coldshrink sealing kit
j	4	Screw, lag, 1/2" x 4"		10	Conduit 2" pvc-sch 80
ae	1	Arrester, lightning 18kV		20	Conduit 2" pvc-sch 40
af	1	Cutout 100 amp		1	Conduit seal
ap	1	Clamp, hot line copper all			Fusing as required
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
cj	12	Conductor, no 4 S D copper			
ek	4	Locknuts			

1 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

AUG 2018	CHELCO	VUA5–2





"B" MINIMUM	
7.2/12.5 kv	15"

NOTES:

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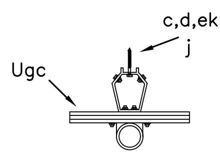
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

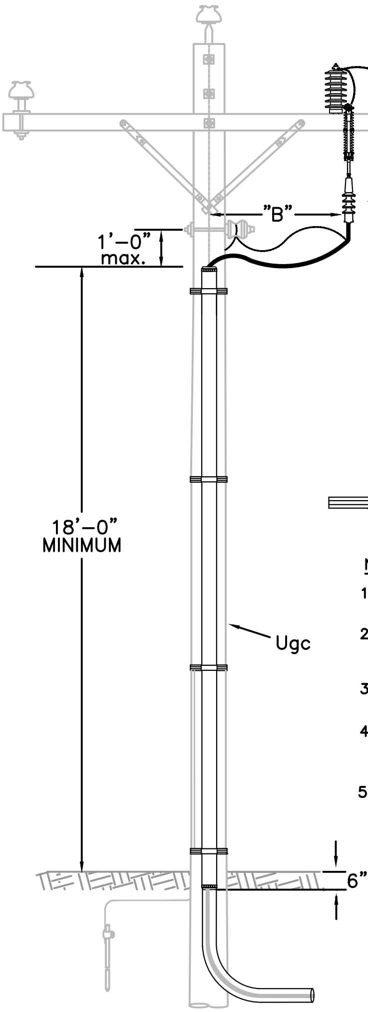


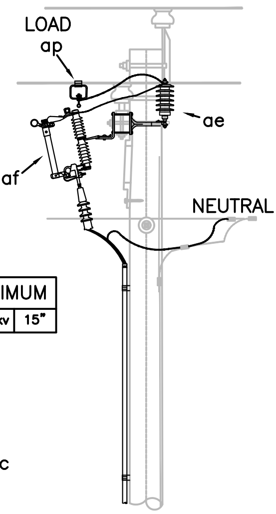
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x required length	Ugc	4	Bracket, standoff conduit 12"
d	4	Washer, square 2 1/4"	Ugk	1	Termination 1/0 al 15kV
p	*	Connectors, as required		1	Coldshrink sealing kit
j	4	Screw, lag, 1/2" x 4"		10	Conduit 3" pvc–sch 80
ae	1	Arrester, lightning 9kV		20	Conduit 3" pvc–sch 40
af	1	Cutout 100 amp		1	Conduit 3" sweep sch 40 pvc
ap	1	Clamp, hot line copper all		1	Conduit seal
av	*	Jumpers, as required			Fusing as required
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	4	Locknuts			

1 PHASE CABLE TERMINAL POLE

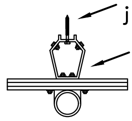
3 INCH CONDUIT

MAY 2014	CHELCO	UA5–3





"B" MINIMUM	
7.2/12.5 kv	15"



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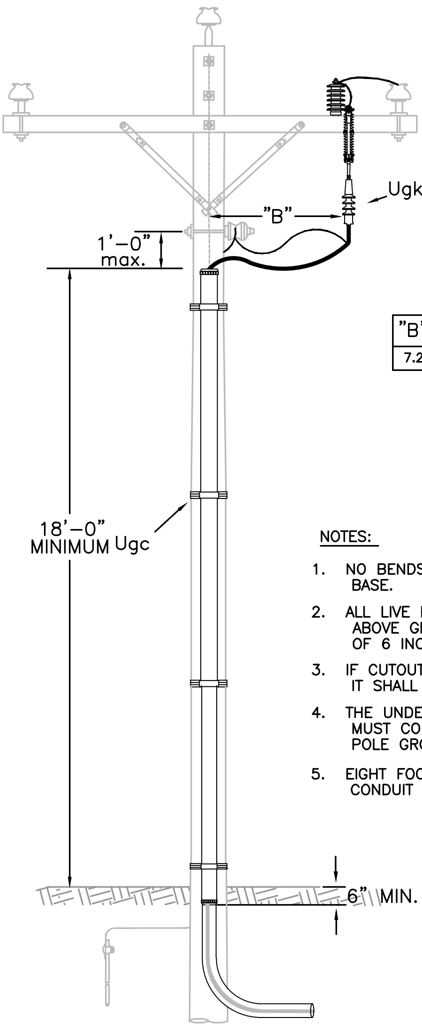
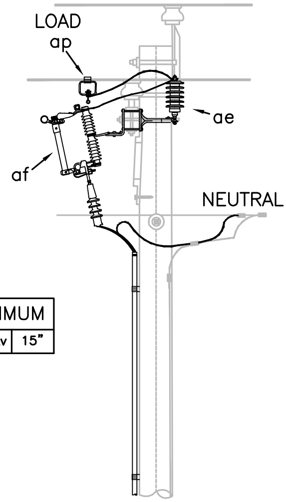
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x required length	Ugc	3	Bracket, standoff conduit 12"
d	4	Washer, square 2 1/4"	Ugk	1	Termination 1/0 al 25kV
p	*	Connectors, as required		1	Coldshrink sealing kit
j	4	Screw, lag, 1/2" x 4"		10	Conduit 3" pvc–sch 80
ae	1	Arrester, lightning 18kV		20	Conduit 3" pvc–sch 40
af	1	Cutout 100 amp		1	Conduit 3" sweep sch 40 pvc
ap	1	Clamp, hot line copper all		1	Conduit seal
av	*	Jumpers, as required			Fusing as required
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	4	Locknuts			

1 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

AUG 2018	CHELCO	VUA5–3





"B" MINIMUM	
7.2/12.5 kv	15"

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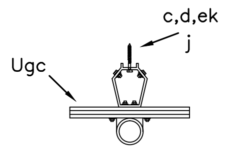
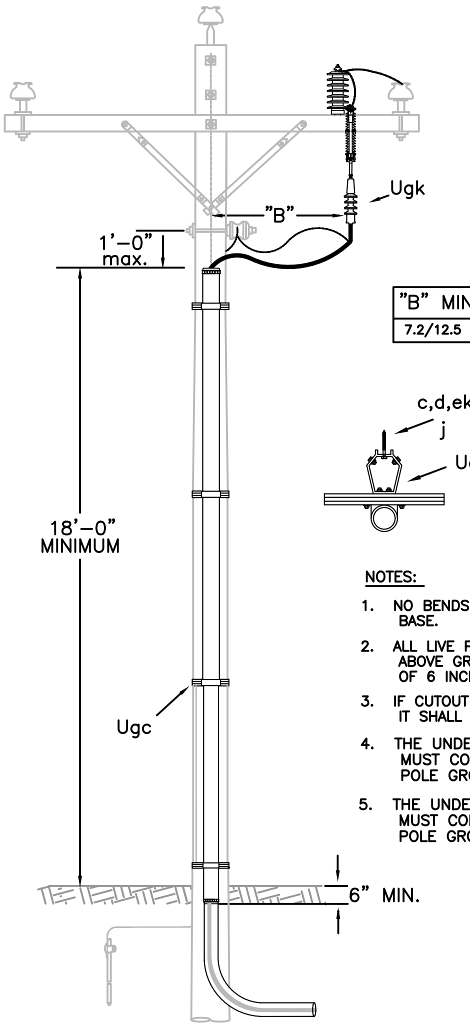
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

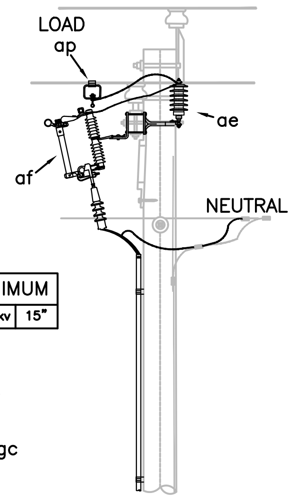


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x required length	Ugc	3	Bracket, standoff conduit 12"
d	4	Washer, square 2 1/4"	Ugk	1	Termination 4/0 al 15kV
p	*	Connectors, as required		1	Coldshrink sealing kit
j	4	Screw, lag, 1/2" x 4"		10	Conduit 4" pvc–sch 80
ae	1	Arrester, lightning 9kV		20	Conduit 4" pvc–sch 40
af	1	Cutout 100 amp		1	Conduit 4" sweep sch 40 pvc
ap	1	Clamp, hot line copper all		1	Conduit seal
av	*	Jumpers, as required		1	Stirrup, burndy wejtap
cj	12	Conductor, no 4 S D copper			Fusing as required
ek	4	Locknuts			

1 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	UA5–4





"B" MINIMUM	
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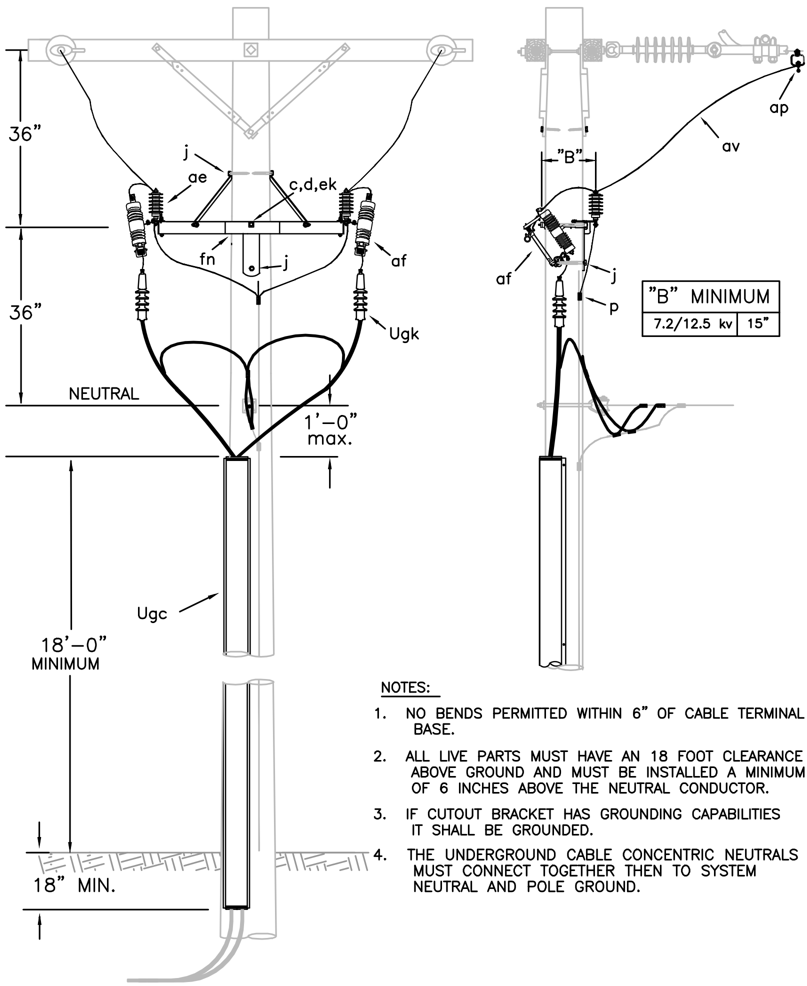
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x required length	Ugc	3	Bracket, standoff conduit 12"
d	4	Washer, square 2 1/4"	Ugk	1	Termination 4/0 al 25kV
p	*	Connectors, as required		1	Coldshrink sealing kit
j	4	Screw, lag, 1/2" x 4"		10	Conduit 4" pvc–sch 80
ae	1	Arrester, lightning 18kV		20	Conduit 4" pvc–sch 40
af	1	Cutout 100 amp		1	Conduit 4" sweep sch 40 pvc
ap	1	Clamp, hot line copper all		1	Conduit seal
av	*	Jumpers, as required			Fusing as required
cj	12	Conductor, no 4 S D copper		1	Stirrup, burndy wejtap
ek	4	Locknuts			

1 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

AUG 2018	CHELCO	VUA5–4



"B" MINIMUM	
7.2/12.5 kv	15"

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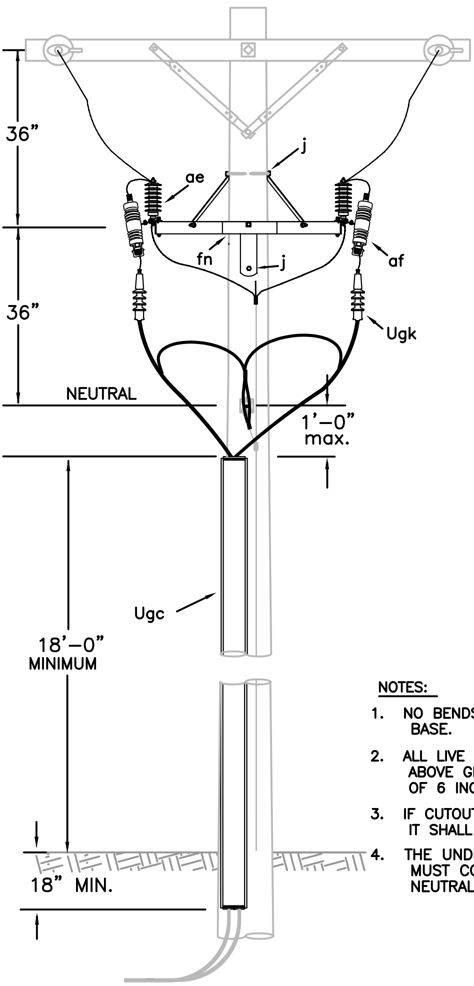
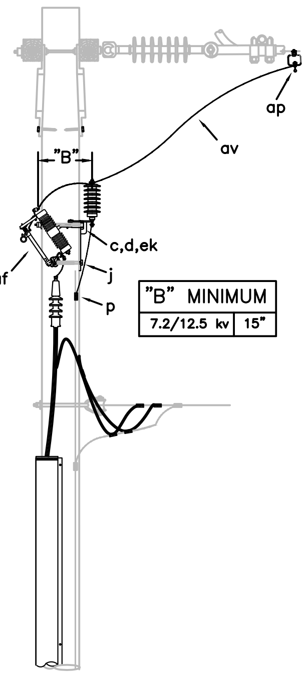
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknuts
d	1	Washer, square 2 1/4"	fn	1	Bracket, cutout 3 phase
j	3	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	2	Termination 1/0 al 15kV
ae	2	Arrester, lightning 9kV		2	Coldshrink sealing kit
af	2	Cutout 100 amp		1	Conduit seal
ap	2	Clamp, hot line copper all		3	Shield backing plate
av	*	Jumpers, as required		2	Stirrup, burndy wejtap
cj	20	Conductor, No 4 S D copper			Fusing as required

2 PHASE CABLE TERMINAL POLE

MAY 2014	CHELCO	UB1





"B" MINIMUM	
7.2/12.5 kv	15"

NOTES:

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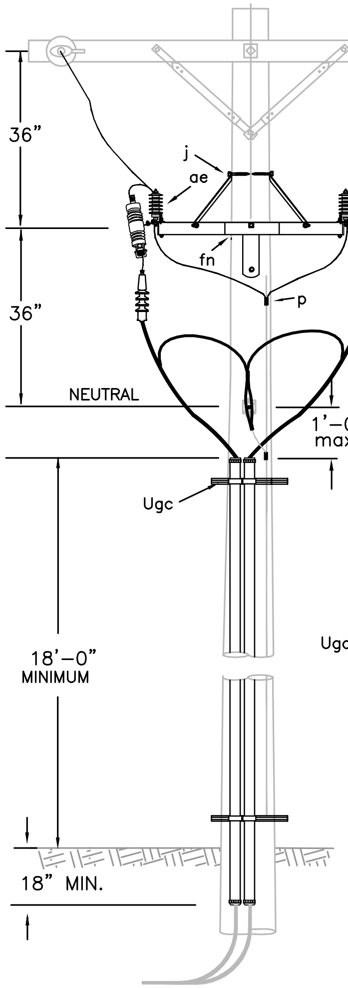
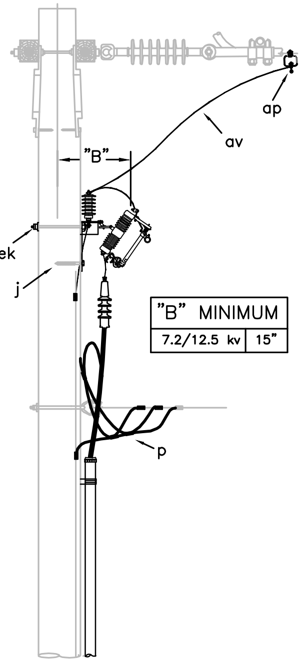
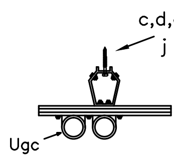
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknuts
d	1	Washer, square 2 1/4"	fn	1	Bracket, cutout 3 phase
j	3	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	2	Termination 1/0 al 25kV
ae	2	Arrester, lightning 18kV		2	Coldshrink sealing kit
af	2	Cutout 100 amp		1	Conduit seal
ap	2	Clamp, hot line copper all		3	Shield backing plate
av	*	Jumpers, as required		2	Stirrup, burndy wejtap
cj	20	Conductor, No 4 S D copper			Fusing as required

2 PHASE CABLE TERMINAL POLE

AUG 2018	CHELCO	VUB1







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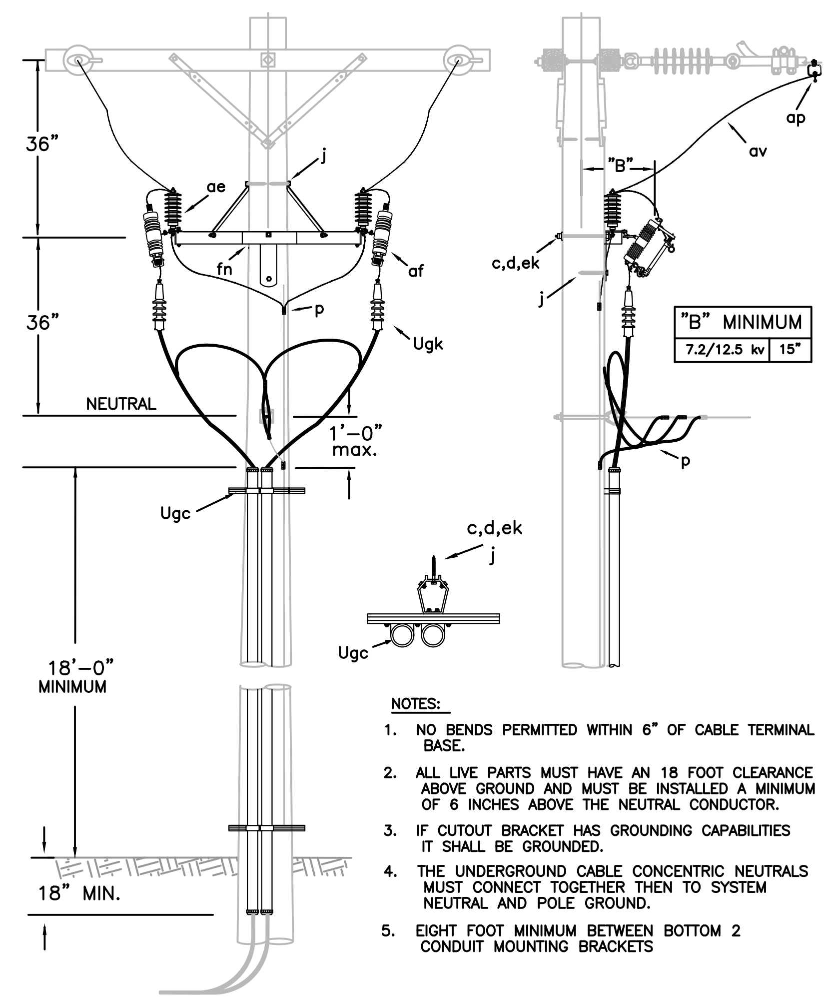
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 15kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 9kV		20	Conduit 2" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 2" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit seal
av	*	Jumpers, as required		2	Stirrup, burndy wejtap
cj	20	Conductor, No 4 S D copper			Fusing as required
ek	5	Locknuts			

2 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

MAY 2014	CHELCO	UB2



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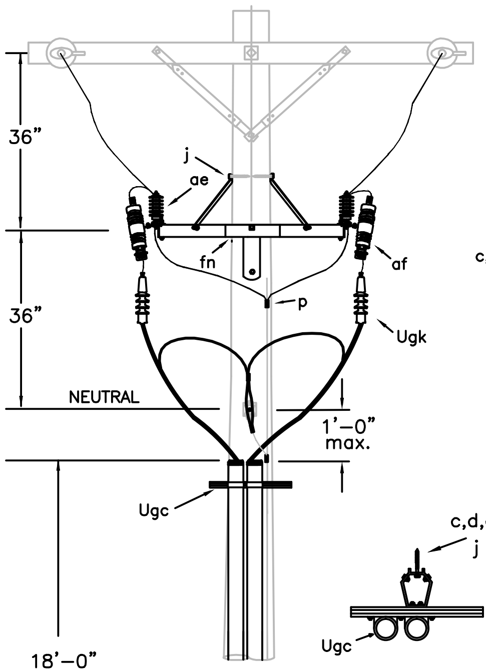
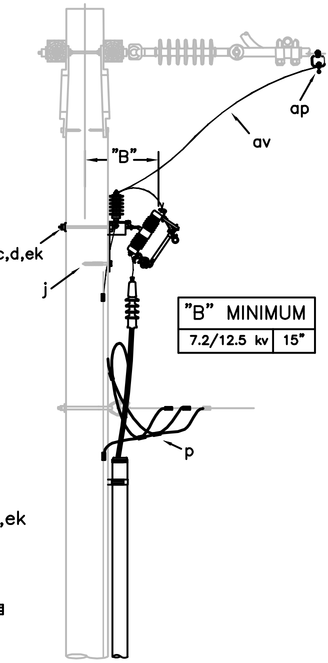
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

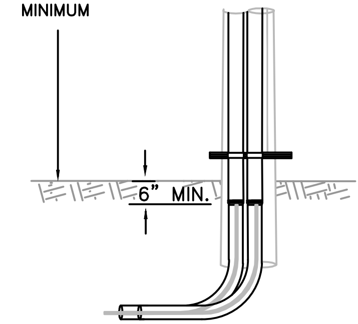
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 25kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 18kV		20	Conduit 2" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 2" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit seal
av	*	Jumpers, as required		2	Stirrup, burndy wejtap
cj	20	Conductor, No 4 S D copper			Fusing as required
ek	5	Locknuts			

2 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

AUG 2018	CHELCO	VUB2







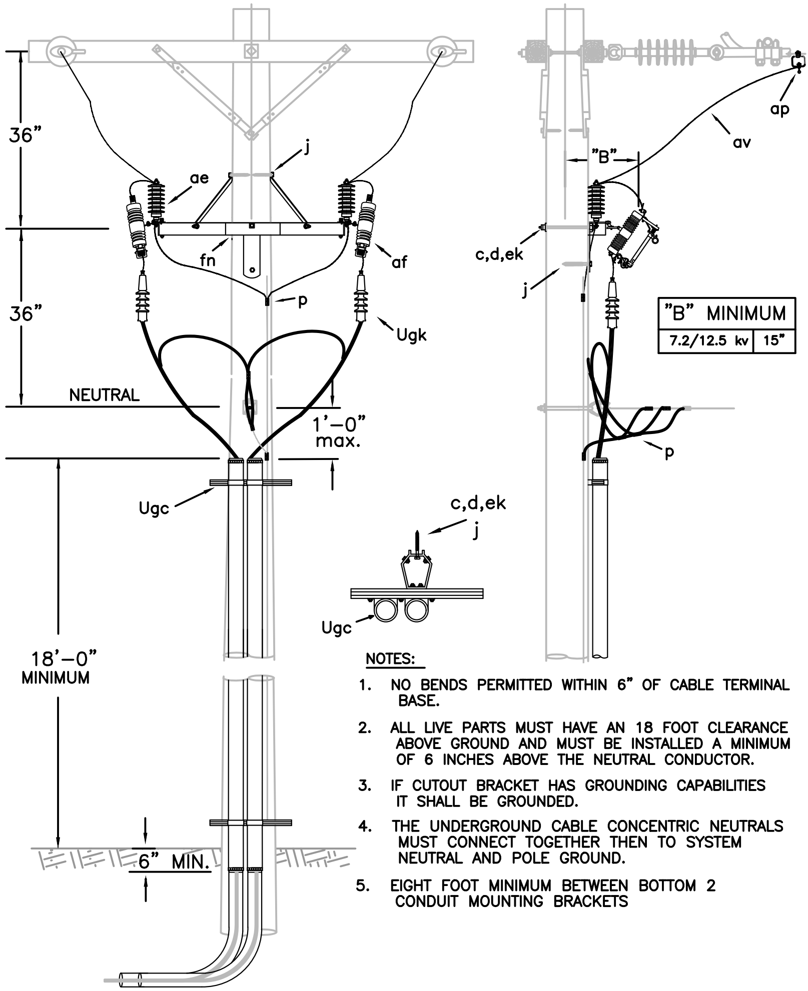
NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 15kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 9kV		20	Conduit 3" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 3" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		2	Conduit seal
cj	20	Conductor, No 4 S D copper		2	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

2 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

MAY 2014	CHELCO	UB3



NOTES:

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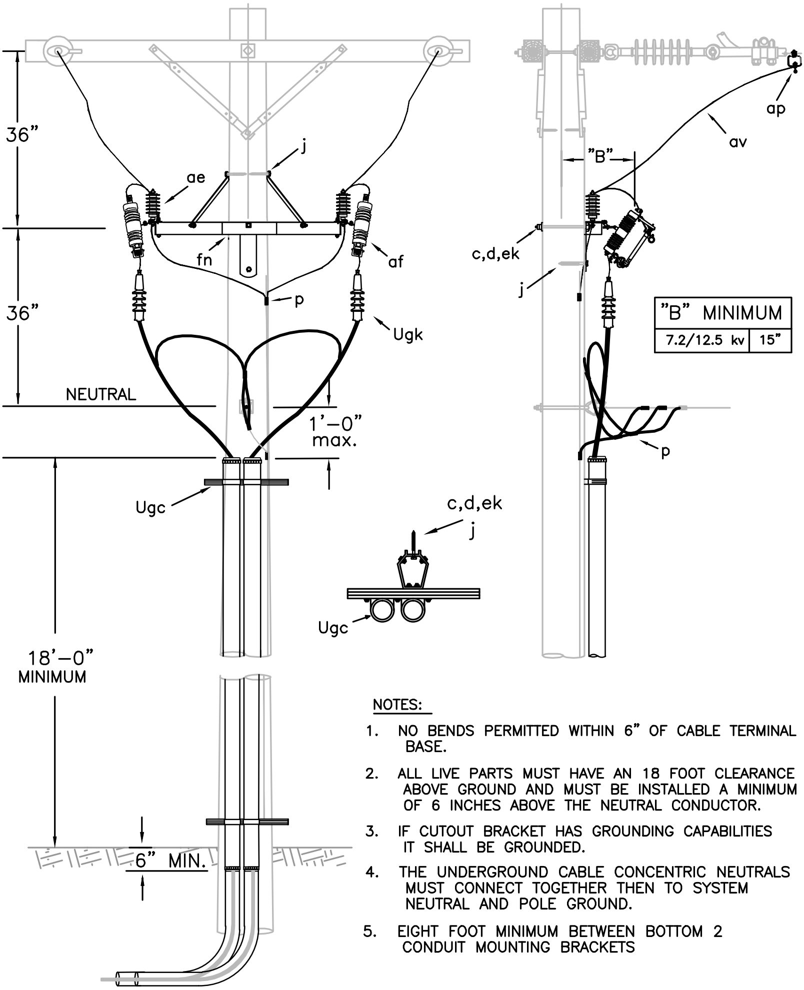
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 25kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 18kV		20	Conduit 3" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 3" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		2	Conduit seal
cj	20	Conductor, No 4 S D copper		2	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

2 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

AUG 2018	CHELCO	VUB3



NOTES:

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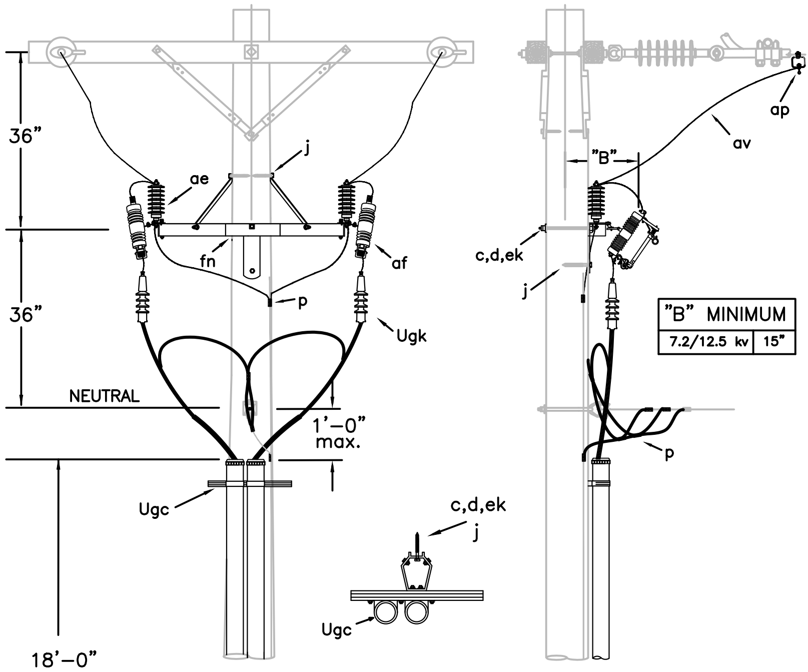
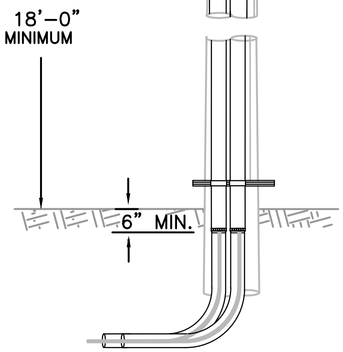
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 15kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 9kV		20	Conduit 4" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 4" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		2	Conduit seal
cj	20	Conductor, No 4 S D copper		2	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

2 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	UB4





NOTES:

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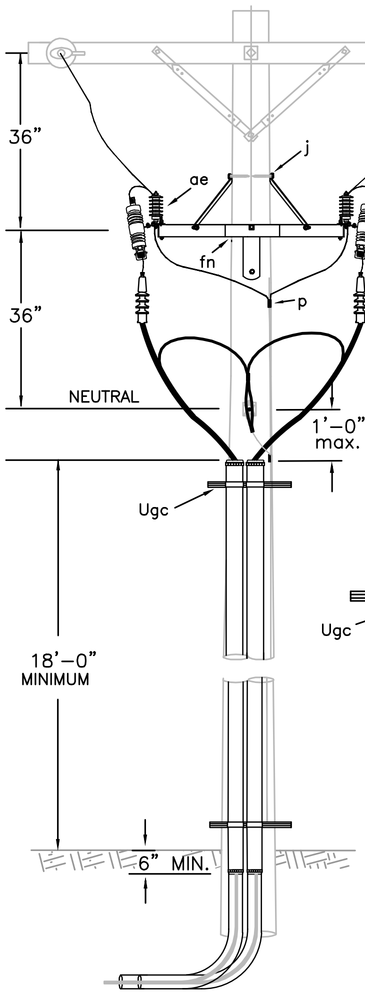
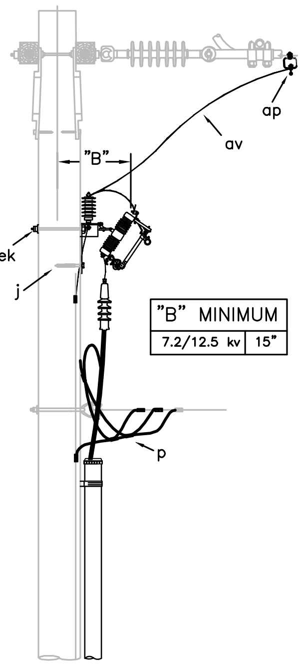
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

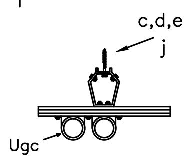
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 25kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 18kV		20	Conduit 4" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 4" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		2	Conduit seal
cj	20	Conductor, No 4 S D copper		2	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

2 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

AUG 2018	CHELCO	VUB4







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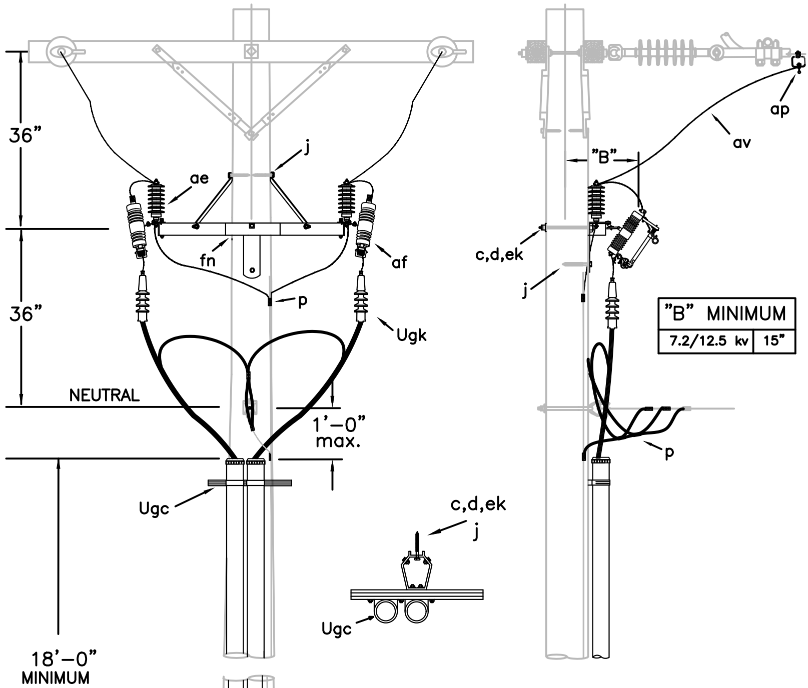
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

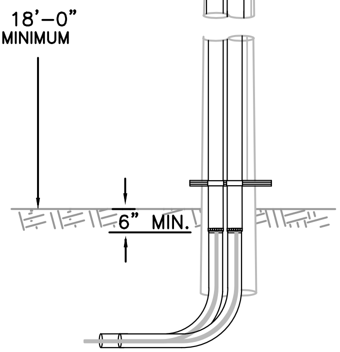
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 4/0 al 15kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 9kV		20	Conduit 4" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 4" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		2	Conduit seal
cj	20	Conductor, No 4 S D copper		2	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

2 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	UB4-4



"B" MINIMUM	
7.2/12.5 kv	15"



NOTES:

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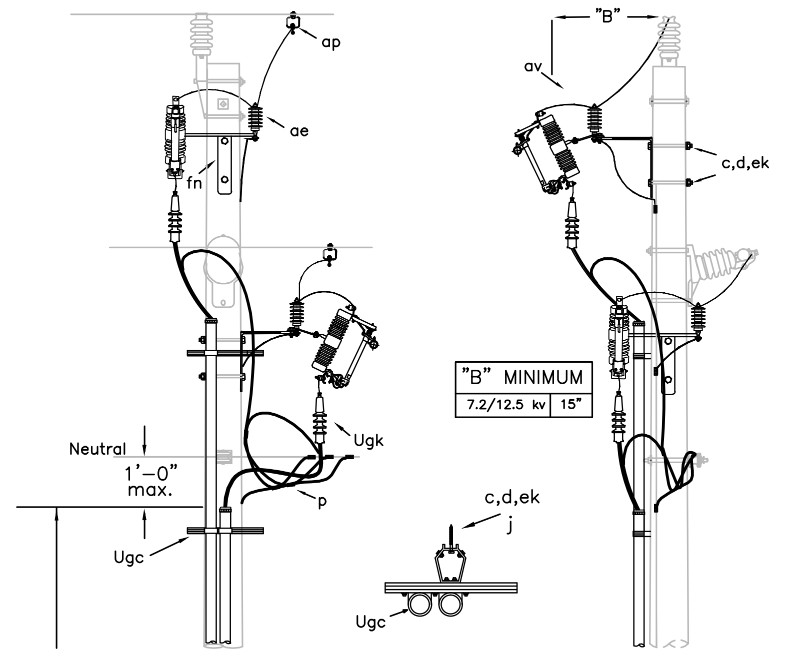
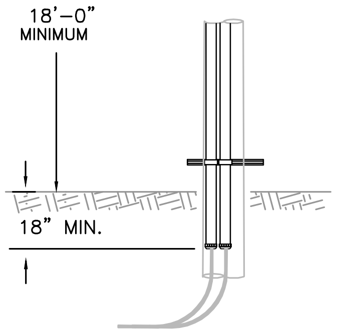
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	2	Termination 4/0 al 25kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 18kV		20	Conduit 4" pvc-sch 80
af	2	Cutout 100 amp		40	Conduit 4" pvc-sch 40
ap	2	Clamp, hot line copper all		2	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		2	Conduit seal
cj	20	Conductor, No 4 S D copper		2	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

2 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

AUG 2018	CHELCO	VUB4-4





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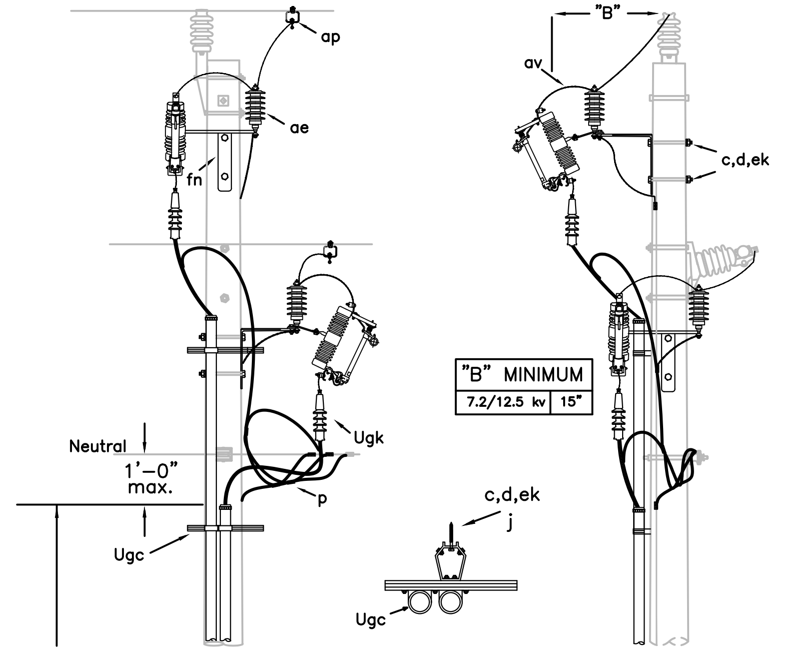
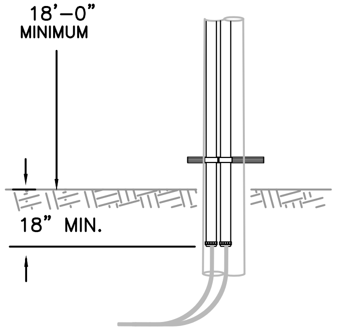
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	8	Bolt, machine, 5/8" x required length	fn	2	Bracket, cutout 1 phase
d	8	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
j	4	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 15kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 9kV		20	Conduit 2" pvc–sch 80
af	2	Cutout 100 amp		60	Conduit 2" pvc–sch 40
ap	2	Clamp, hot line copper all		2	Conduit seal
av	*	Jumpers, as required		2	Stirrup, burndy wejtap
cj	20	Conductor, No 4 S D copper			Fusing as required
ek	8	Locknuts			

2 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

MAY 2014	CHELCO	UB5–2





NOTES:

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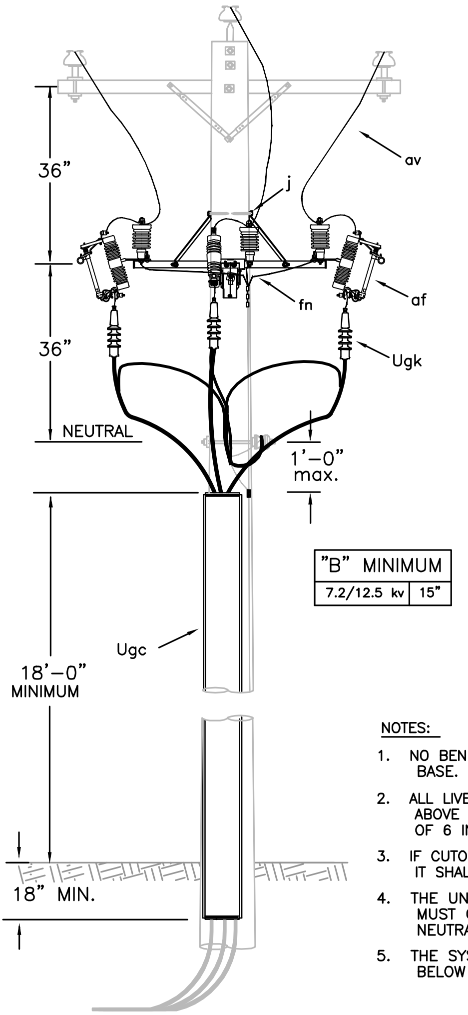
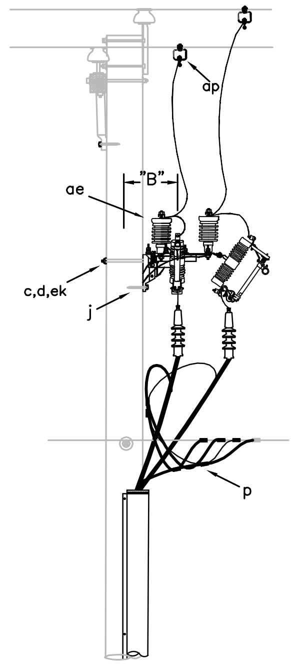
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	8	Bolt, machine, 5/8" x required length	fn	2	Bracket, cutout 1 phase
d	8	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 12"
j	4	Screw, lag, 1/2" x 4"	Ugk	2	Termination 1/0 al 25kV
p	*	Connectors, as required		2	Coldshrink sealing kit
ae	2	Arrester, lightning 18kV		20	Conduit 2" pvc–sch 80
af	2	Cutout 100 amp		60	Conduit 2" pvc–sch 40
ap	2	Clamp, hot line copper all		2	Conduit seal
av	*	Jumpers, as required		2	Stirrup, burndy wejtap
cj	20	Conductor, No 4 S D copper			Fusing as required
ek	8	Locknuts			

2 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

AUG 2018	CHELCO	VUB5–2





"B" MINIMUM	
7.2/12.5 kv	15"

NOTES:

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2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
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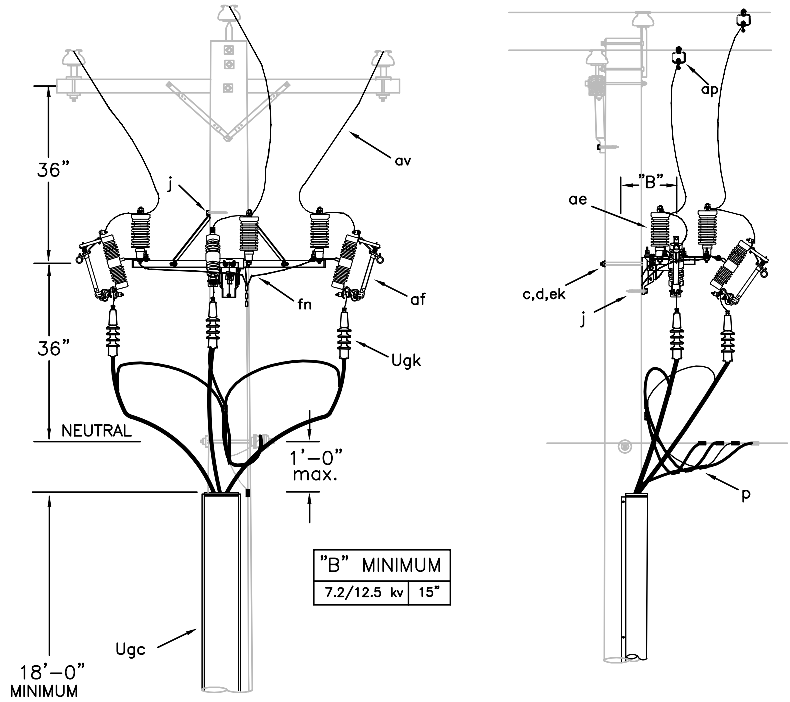
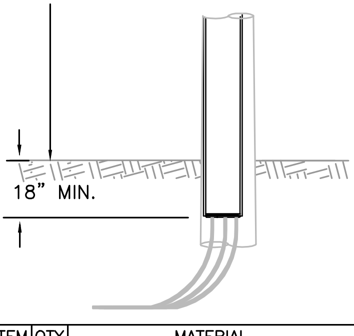
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. THE SYSTEM NEUTRAL WILL BE LOCATED 6' BELOW THE OVERHEAD PRIMARY.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknuts
d	1	Washer, square 2 1/4"	fn	1	Bracket, cutout 3 phase
j	3	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	3	Termination 1/0 al 15kV
ae	3	Arrester, lightning 9kV		3	Coldshrink sealing kit
af	3	Cutout 100 amp		3	Conduit seal
ap	3	Clamp, hot line copper all		3	Shield backing plate
av	*	Jumpers, as required		3	Stirrup, burndy wejtap
cj	25	Conductor, No 4 S D copper			Fusing as required

3 PHASE CABLE TERMINAL POLE

MAY 2014	CHELCO	UC1





NOTES:

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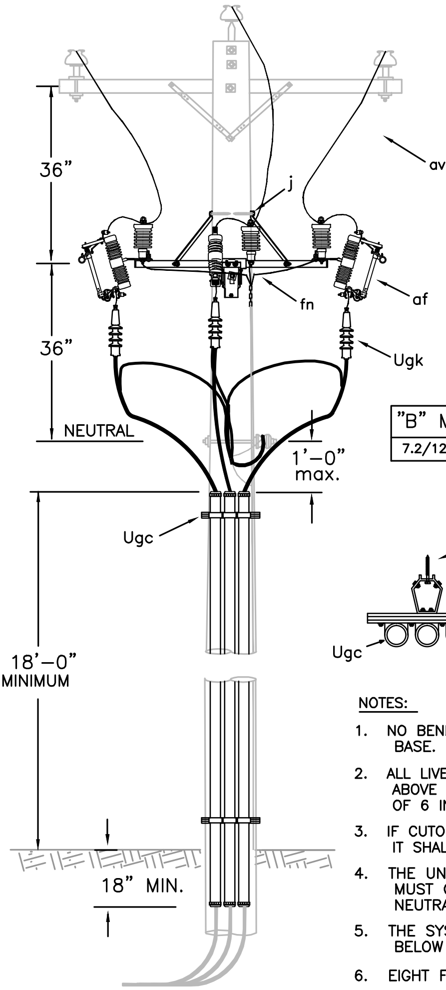
5. THE SYSTEM NEUTRAL WILL BE LOCATED 6' BELOW THE OVERHEAD PRIMARY.

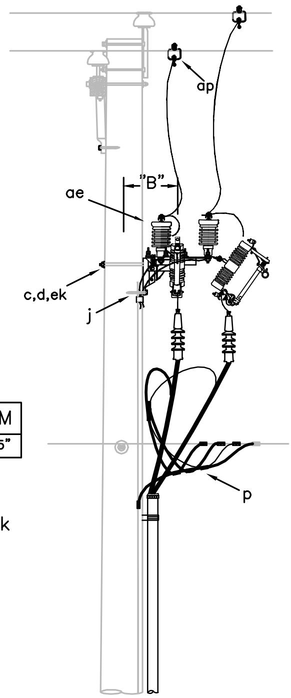
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	1	Bolt, machine, 5/8" x required length	ek	1	Locknuts
d	1	Washer, square 2 1/4"	fn	1	Bracket, cutout 3 phase
j	3	Screw, lag, 1/2" x 4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	3	Termination 1/0 al 15kV
ae	3	Arrester, lightning 18kV		3	Coldshrink sealing kit
af	3	Cutout 100 amp		3	Conduit seal
ap	3	Clamp, hot line copper all		3	Shield backing plate
av	*	Jumpers, as required		3	Stirrup, burndy wejtap
cj	25	Conductor, No 4 S D copper			Fusing as required

3 PHASE CABLE TERMINAL POLE

MAY 2014	CHELCO	VUC1



"B" MINIMUM	
7.2/12.5 kv	15"



NOTES:

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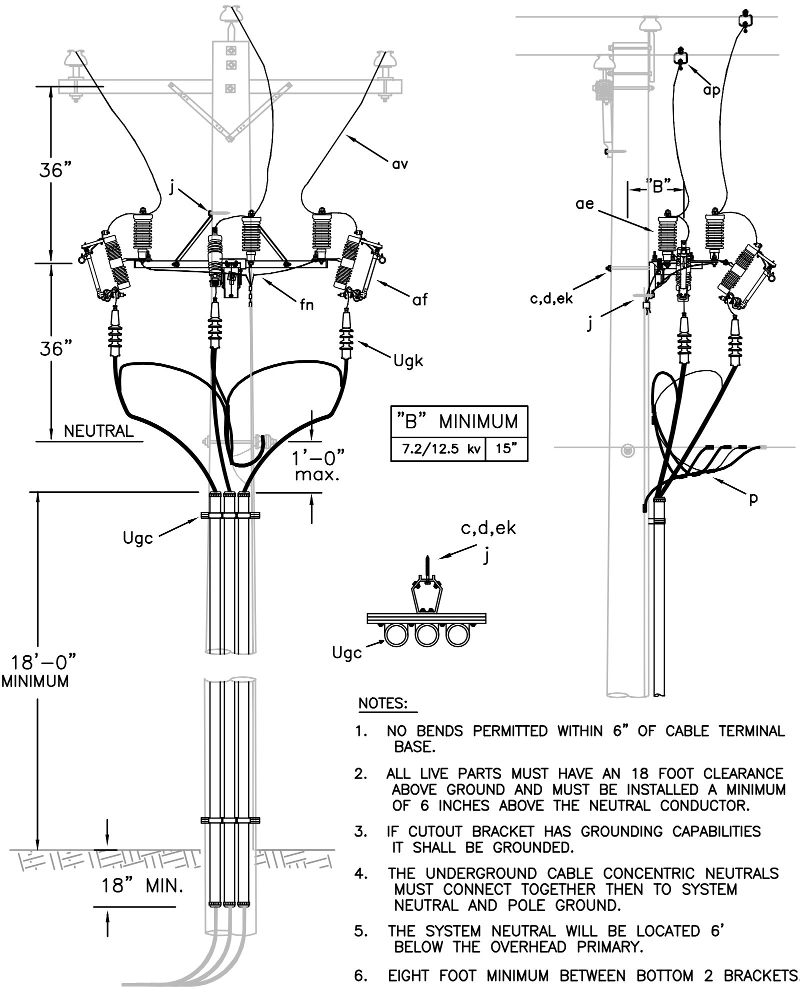
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. THE SYSTEM NEUTRAL WILL BE LOCATED 6' BELOW THE OVERHEAD PRIMARY.
6. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 BRACKETS.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	9	Screw, lag, 1/2" x 4"	Ugk	3	Termination 1/0 al 15kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 2" pvc-sch 80
af	3	Cutout 100 amp		60	Conduit 2" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit seal
av	*	Jumpers, as required		3	Stirrup, burndy wejtap
cj	25	Conductor, No 4 S D copper			Fusing as required
ek	5	Locknuts			

3 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

MAY 2014	CHELCO	UC2



"B" MINIMUM	
7.2/12.5 kv	15"

NOTES:

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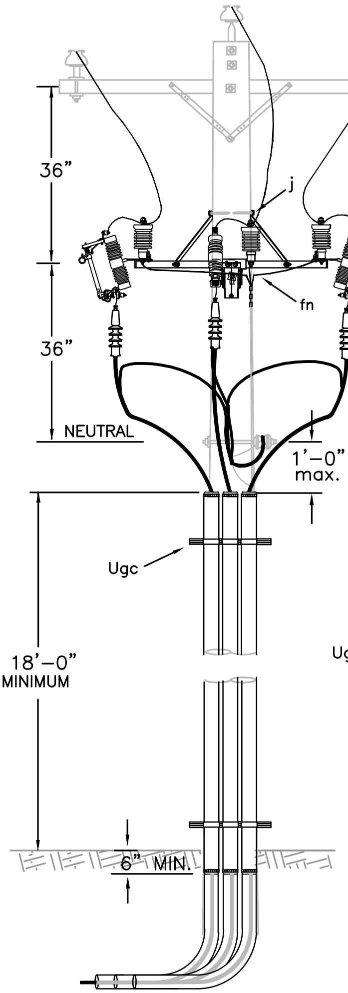
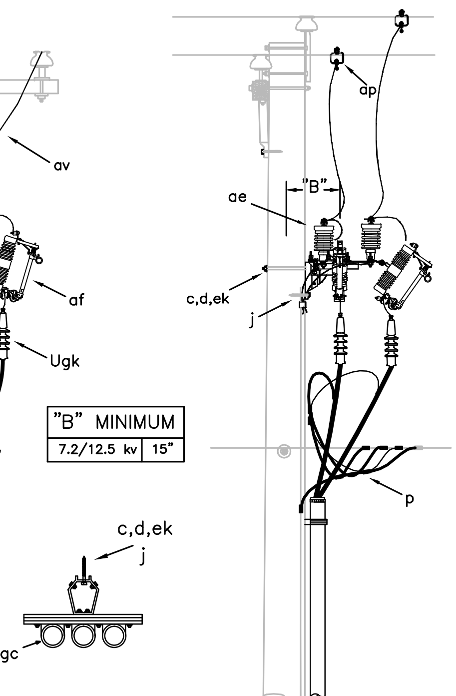
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	3	Termination 1/0 al 15kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 2" pvc-sch 80
af	3	Cutout 100 amp		60	Conduit 2" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit seal
av	*	Jumpers, as required		3	Stirrup, burndy wejtap
cj	25	Conductor, No 4 S D copper			Fusing as required
ek	5	Locknuts			

3 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT

MAY 2014	CHELCO	VUC2





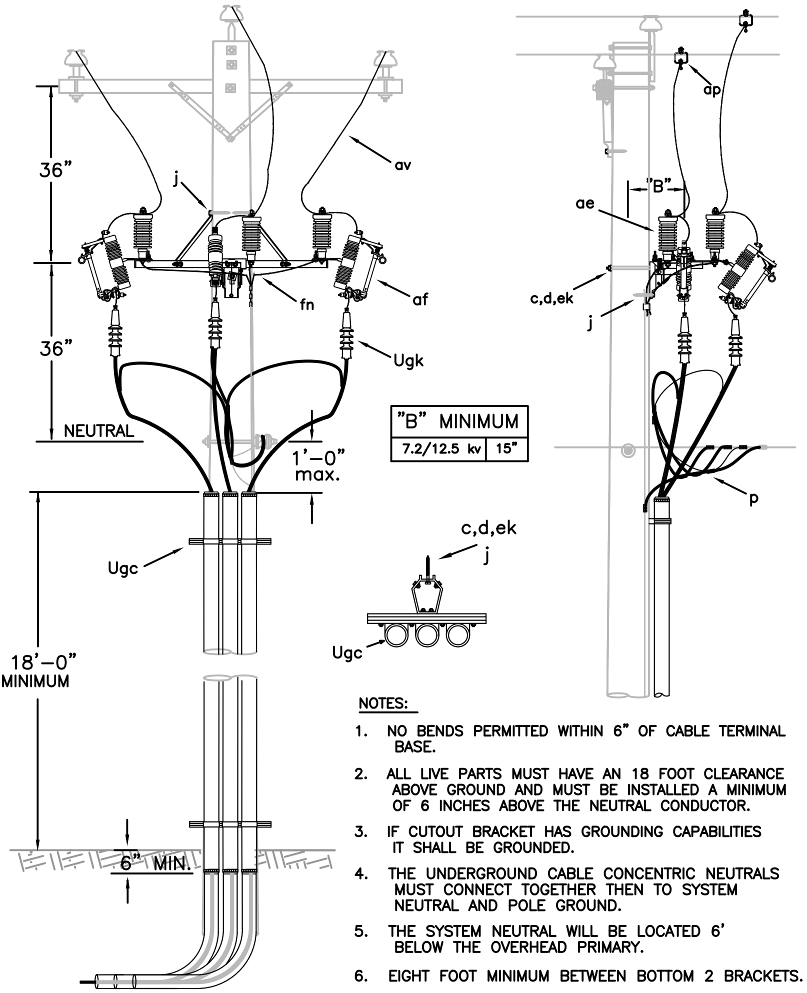
NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. THE UNDERGROUND CABLE CONCENTRIC NEUTRALS MUST CONNECT TOGETHER THEN TO SYSTEM NEUTRAL AND POLE GROUND.
5. THE SYSTEM NEUTRAL WILL BE LOCATED 6' BELOW THE OVERHEAD PRIMARY.
6. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 BRACKETS.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	3	Termination 1/0 al 15kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 3" pvc–sch 80
af	3	Cutout 100 amp		60	Conduit 3" pvc–sch 40
ap	3	Clamp, hot line copper all		3	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		3	Conduit seal
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

MAY 2014	CHELCO	UC3



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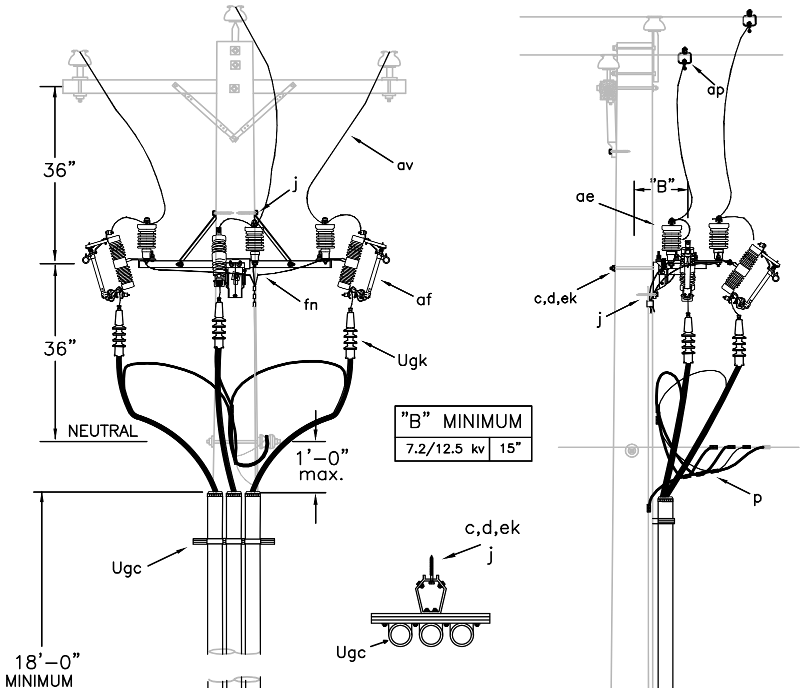
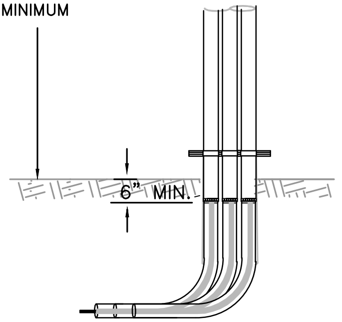
6. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 BRACKETS.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	3	Termination 1/0 al 25kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 3" pvc-sch 80
af	3	Cutout 100 amp		60	Conduit 3" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		3	Conduit seal
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

AUG 2018	CHELCO	VUC3





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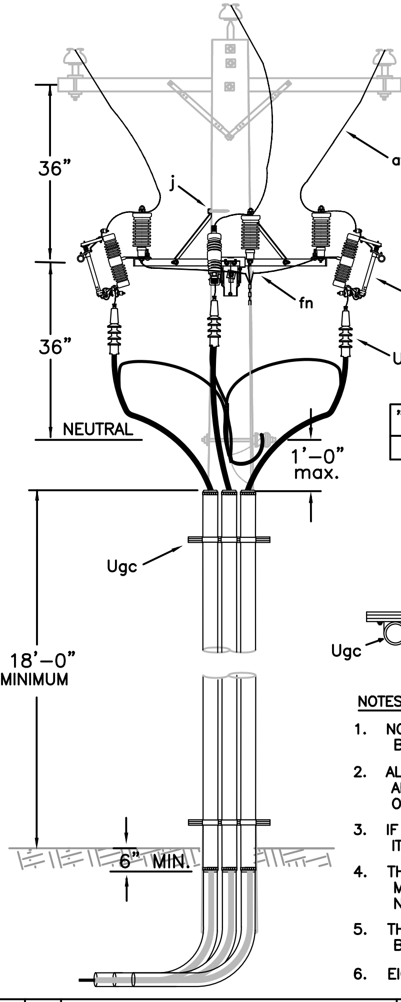
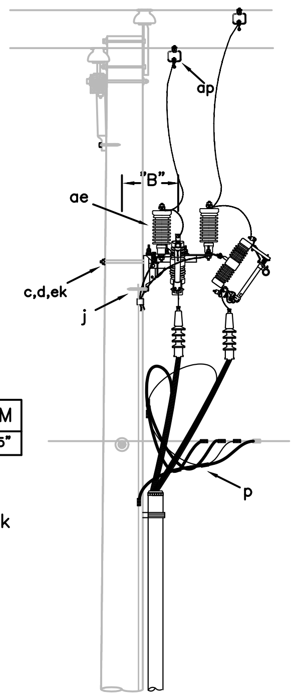
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	3	Termination 4/0 al 15kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 3" pvc-sch 80
af	3	Cutout 100 amp		60	Conduit 3" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		3	Conduit seal
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

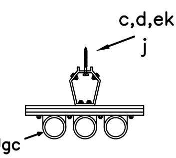
3 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

MAY 2014	CHELCO	UC3-4



"B" MINIMUM	
7.2/12.5 kv	15"





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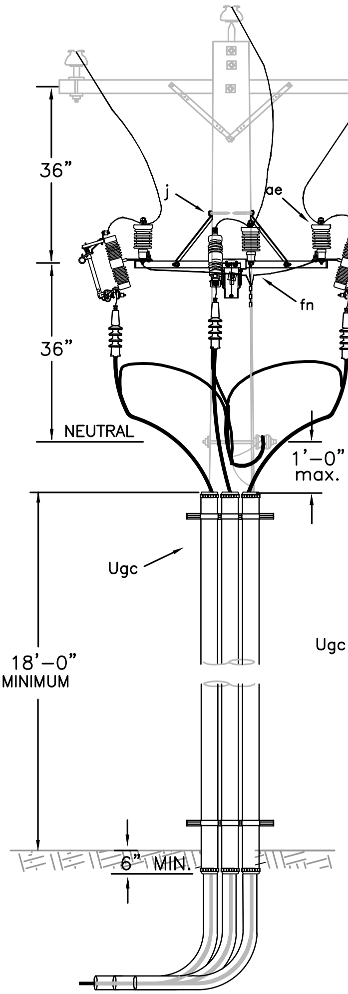
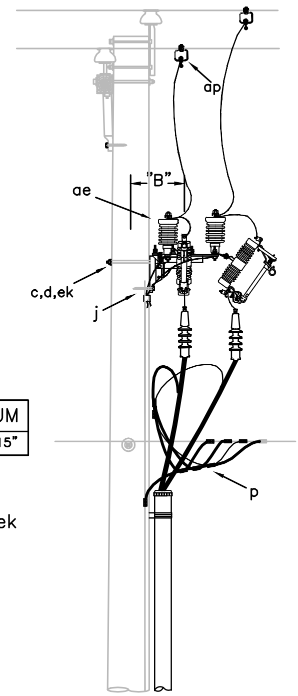
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	fn	1	Bracket, cutout 3 phase
d	5	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	7	Screw, lag, 1/2" x 4"	Ugk	3	Termination 4/0 al 25kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 3" pvc-sch 80
af	3	Cutout 100 amp		60	Conduit 3" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit 3" sweep sch 40 pvc
av	*	Jumpers, as required		3	Conduit seal
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

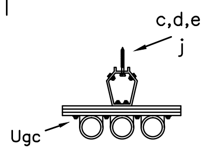
3 PHASE CABLE TERMINAL POLE
3 INCH CONDUIT

AUG 2018	CHELCO	VUC3-4





"B" MINIMUM	
7.2/12.5 kv	15"



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p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 4" pvc–sch 80
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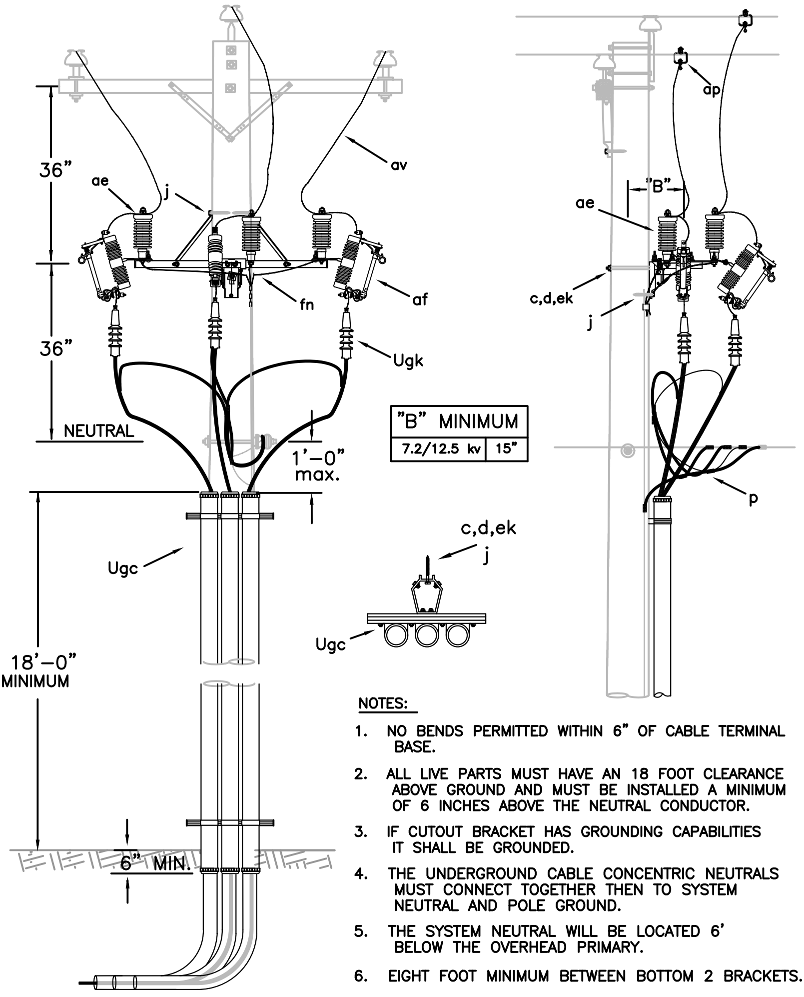
ap	3	Clamp, hot line copper all		3	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		3	Conduit seal
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	UC4



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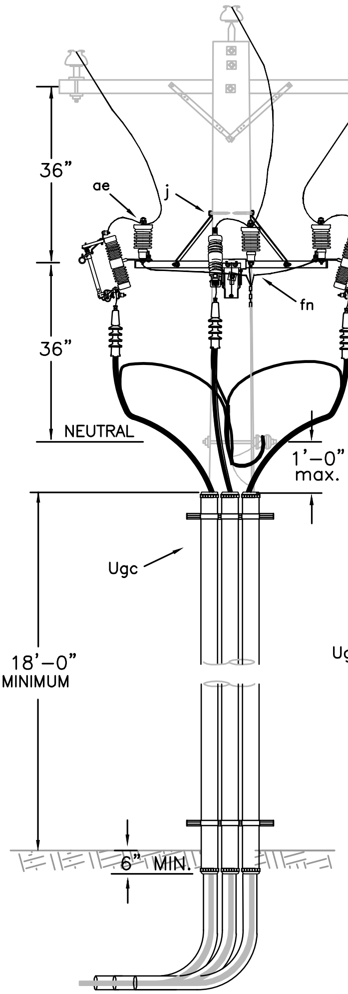
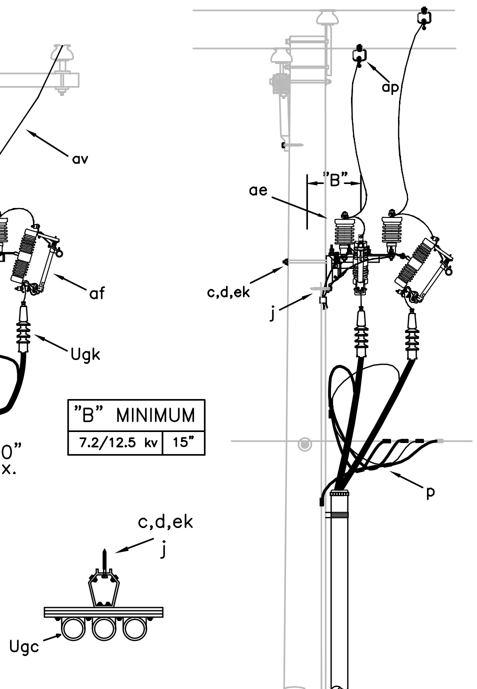
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 4" pvc-sch 80
af	3	Cutout 100 amp		60	Conduit 4" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit 4" sweep sch 40 pvc
av	*	Jumpers, as required		3	Conduit seal
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

AUG 2018	CHELCO	VUC4





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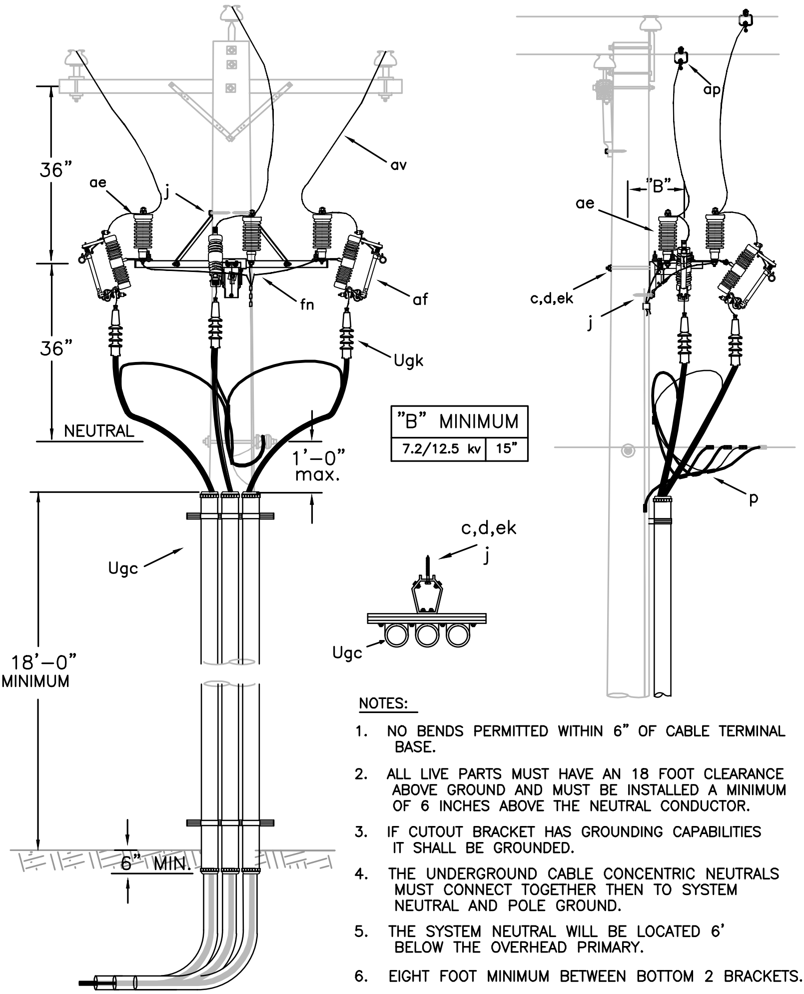
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	UC4-4



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7.2/12.5 kv	15"

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p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 4" pvc-sch 80
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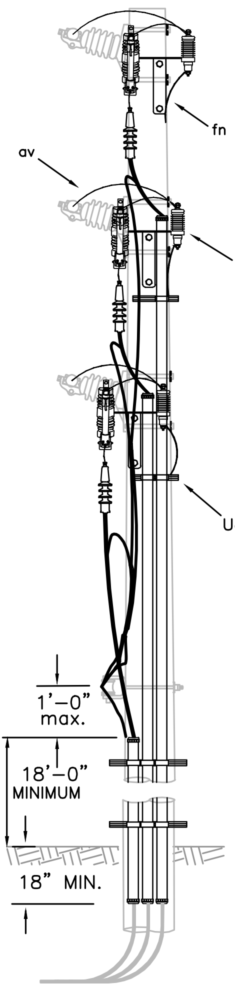
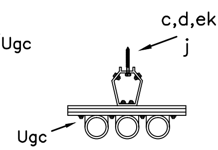
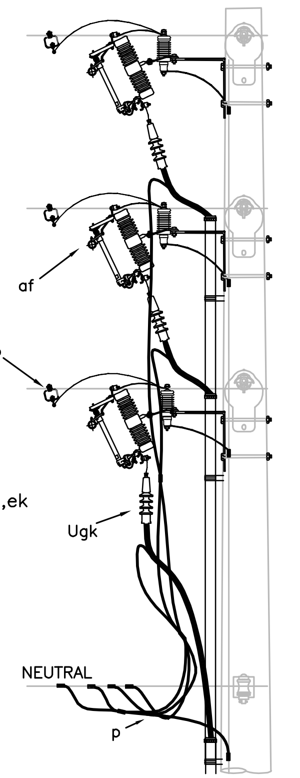
av	*	Jumpers, as required		3	Conduit seal
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	5	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT

MAY 2014	CHELCO	VUC4-4







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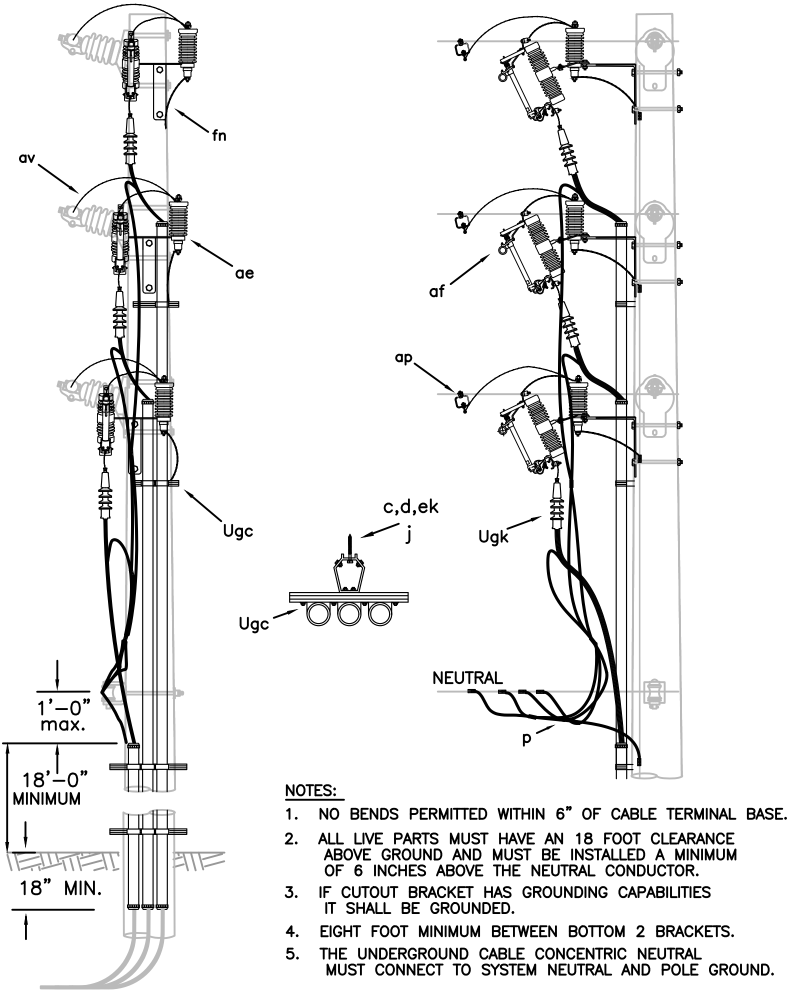
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	12	Bolt, machine, 5/8" x required length	fn	3	Bracket, cutout 1 phase 'T'
d	12	Washer, square 2 1/4"	Ugc	2	Bracket, standoff conduit 12"
j	6	Screw, lag, 1/2" x 4"	Ugc	4	Bracket, standoff conduit 24"
p	*	Connectors, as required	Ugk	3	Termination 1/0 al 15kV
ae	3	Arrester, lightning 9kV		3	Coldshrink sealing kit
af	3	Cutout 100 amp		30	Conduit 2" pvc–sch 80
ap	3	Clamp, hot line copper all		80	Conduit 2" pvc–sch 40
av	*	Jumpers, as required		3	Conduit seal
cj	20	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	12	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT, VERTICAL

MAY 2014	CHELCO	UC5–1A



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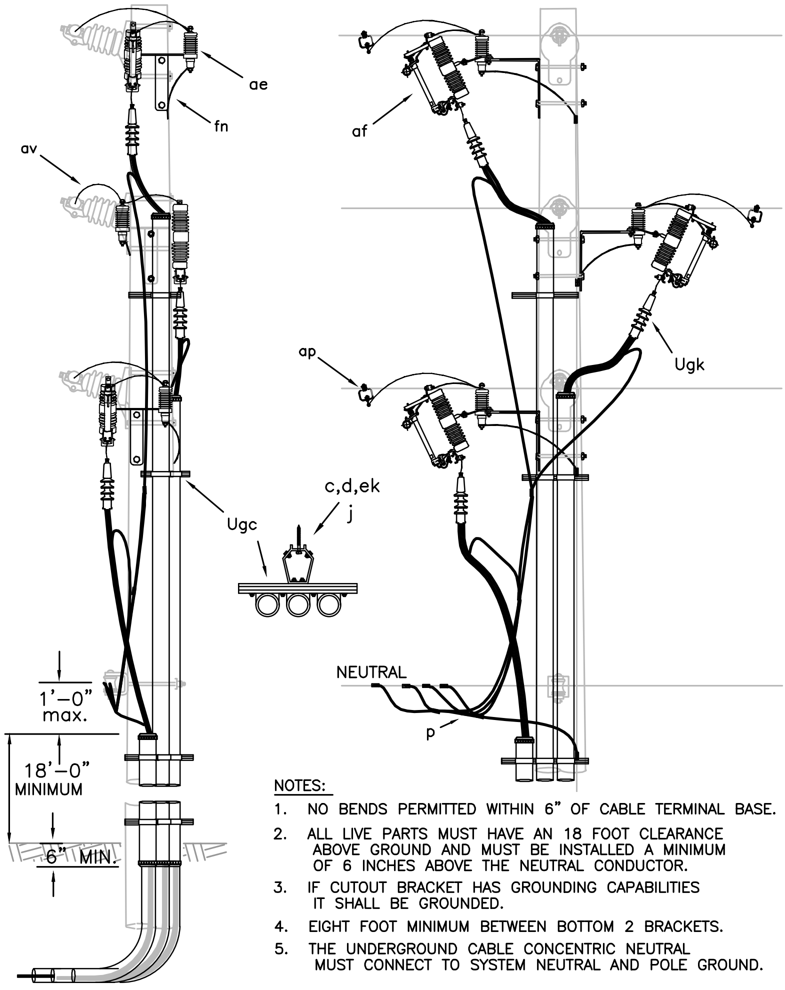
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	12	Bolt, machine, 5/8" x required length	fn	3	Bracket, cutout 1 phase 'T'
d	12	Washer, square 2 1/4"	Ugc	2	Bracket, standoff conduit 12"
j	6	Screw, lag, 1/2" x 4"	Ugc	4	Bracket, standoff conduit 24"
p	*	Connectors, as required	Ugk	3	Termination 1/0 al 25kV
ae	3	Arrester, lightning 18kV		3	Coldshrink sealing kit
af	3	Cutout 100 amp		30	Conduit 2" pvc–sch 80
ap	3	Clamp, hot line copper all		80	Conduit 2" pvc–sch 40
av	*	Jumpers, as required		3	Conduit seal
cj	20	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	12	Locknuts			Fusing as required

3 PHASE CABLE TERMINAL POLE
2 INCH CONDUIT, VERTICAL

AUG 2018	CHELCO	VUC5–1A



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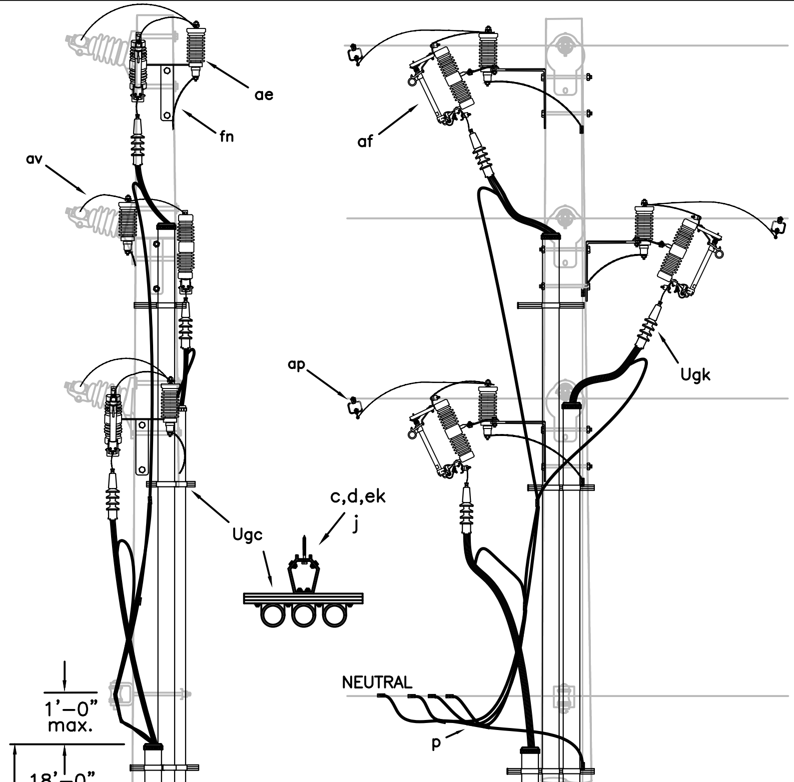
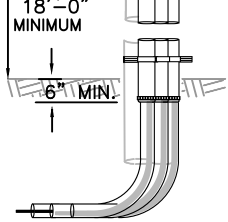
d	12	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	6	Screw, lag, 1/2" x 4"	Ugk	3	Termination 4/0 al 15kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 4" pvc-sch 80
af	3	Cutout 100 amp		80	Conduit 4" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit 4" sweeps pvc-sch 40
av	*	Jumpers, as required		3	Conduit seal
cj	20	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	12	Locknuts			Fusing as required
fn	3	Bracket, cutout 1 phase 'T'			

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT, STAGGERED

MAY 2014	CHELCO	UC5-4





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j	6	Screw, lag, 1/2" x 4"	Ugk	3	Termination 4/0 al 25kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 4" pvc-sch 80
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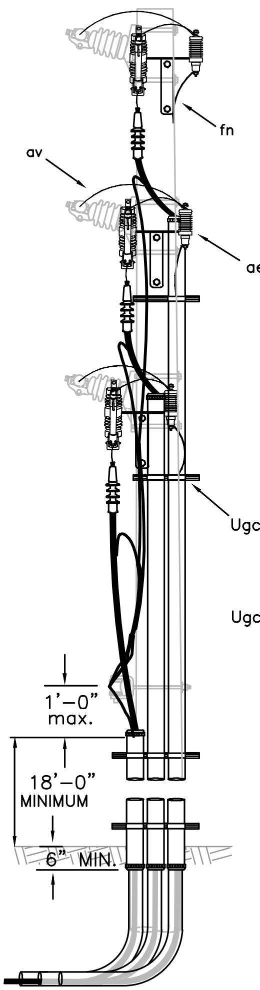
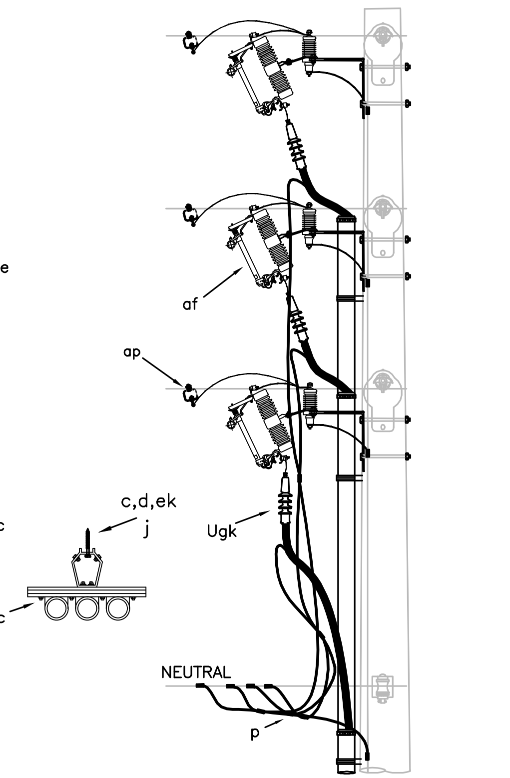
ap	3	Clamp, hot line copper all		3	Conduit 4" sweeps pvc-sch 40
av	*	Jumpers, as required		3	Conduit seal
cj	20	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	12	Locknuts			Fusing as required
fn	3	Bracket, cutout 1 phase 'T'			

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT, STAGGERED

AUG 2018	CHELCO	VUC5-4





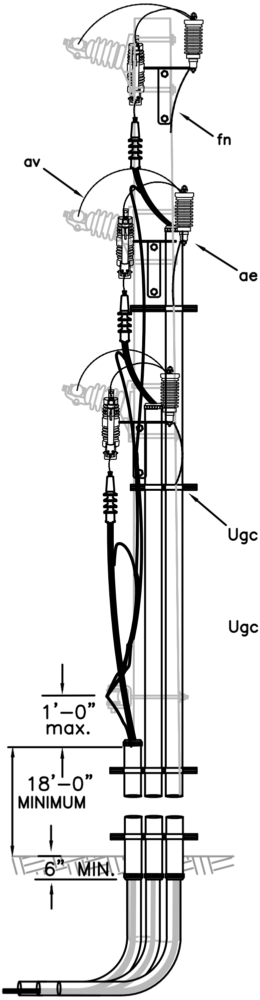
NOTES:

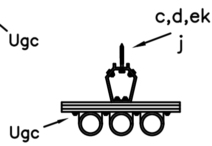
1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. IF CUTOUT BRACKET HAS GROUNDING CAPABILITIES IT SHALL BE GROUNDED.
4. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 BRACKETS.
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

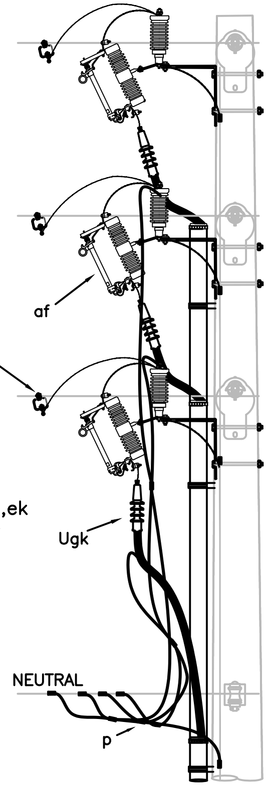
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	12	Bolt, machine, 5/8" x required length	Ugc	2	Bracket, standoff conduit 12"
d	12	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	6	Screw, lag, 1/2" x 4"	Ugk	3	Termination 4/0 al 15kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 4" pvc–sch 80
af	3	Cutout 100 amp		80	Conduit 4" pvc–sch 40
ap	3	Clamp, hot line copper all		3	Conduit 4" sweeps pvc–sch 40
av	*	Jumpers, as required		3	Conduit seal
cj	20	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	12	Locknuts			Fusing as required
fn	3	Bracket, cutout 1 phase 'T'			

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT, VERTICAL

MAY 2014	CHELCO	UC5–4A







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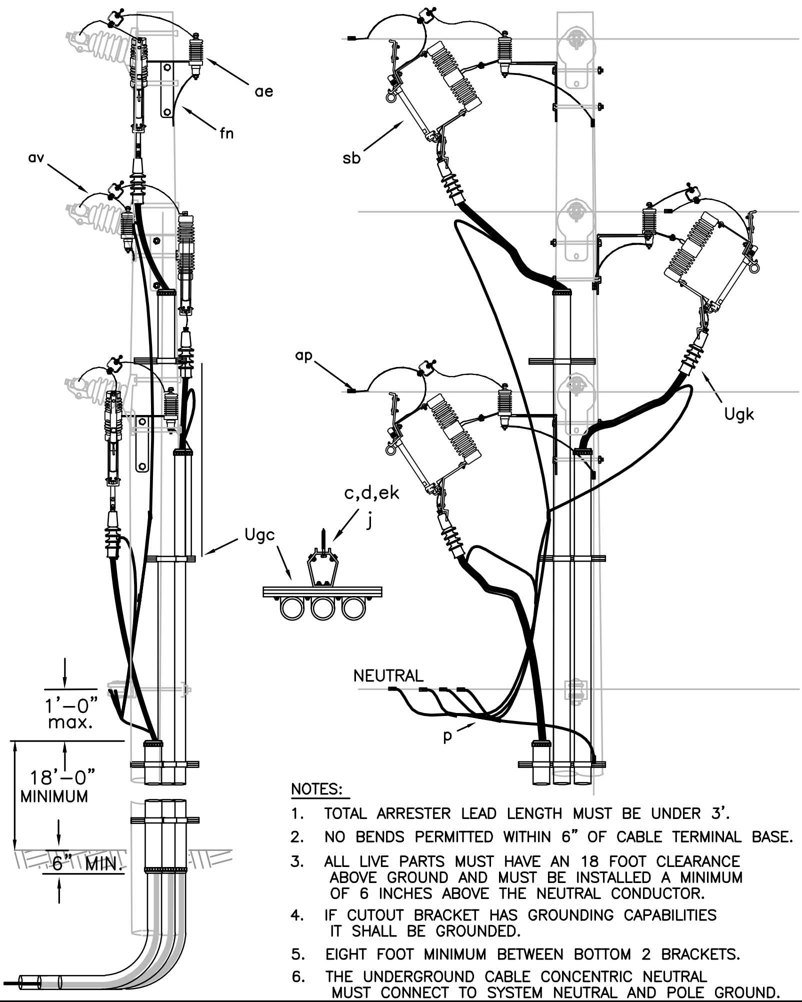
c	12	Bolt, machine, 5/8" x required length	Ugc	2	Bracket, standoff conduit 12"
d	12	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	6	Screw, lag, 1/2" x 4"	Ugk	3	Termination 4/0 al 25kV
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 4" pvc-sch 80
af	3	Cutout 100 amp		80	Conduit 4" pvc-sch 40
ap	3	Clamp, hot line copper all		3	Conduit 4" sweeps pvc-sch 40
av	*	Jumpers, as required		3	Conduit seal
cj	20	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	12	Locknuts			Fusing as required
fn	3	Bracket, cutout 1 phase 'T'			

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT, VERTICAL

AUG 2018	CHELCO	VUC5-4A



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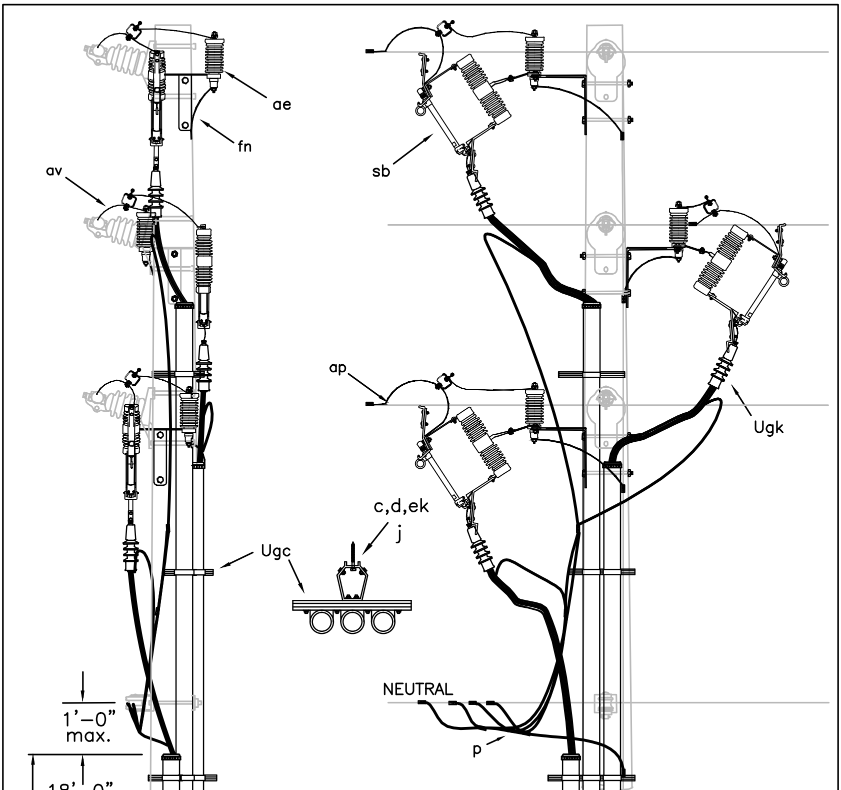
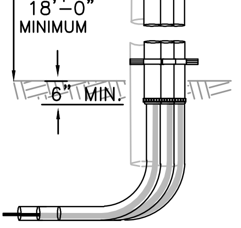
d	12	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	6	Screw, lag, 1/2" x 4"	Ugk	3	Termination kit 3M 750 MCM
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 4" pvc–sch 80
ap	3	Clamp, hot line copper all		80	Conduit 4" pvc–sch 40
av	*	Jumpers, as required		3	Conduit 4" sweeps pvc–sch 40
cj	20	Conductor, No 4 S D copper		3	Conduit seal
ek	12	Locknuts		3	Stirrup, burndy wejtap
fn	3	Bracket, cutout 1 phase 'T'			Fusing as required
sb	3	Switch, disconnect 900 amp			

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT, STAGGERED

DEC 2009 | CHELCO | UC5–7





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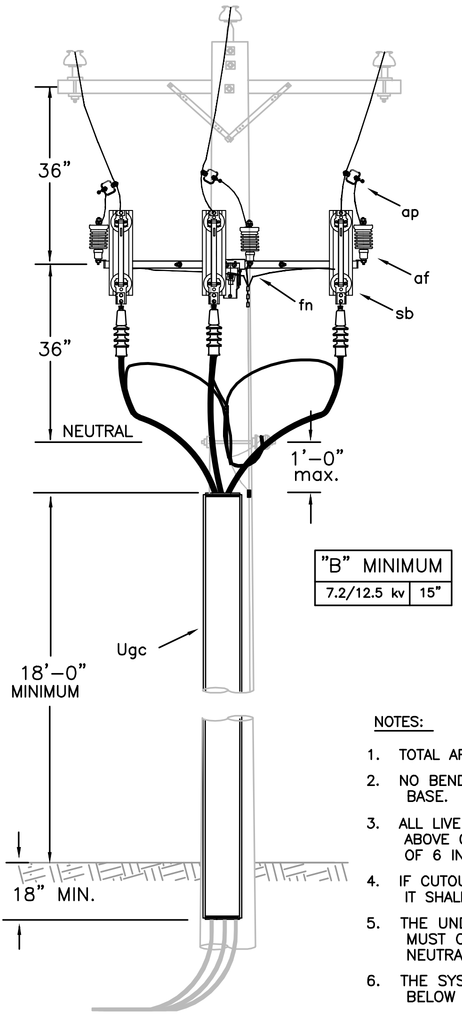
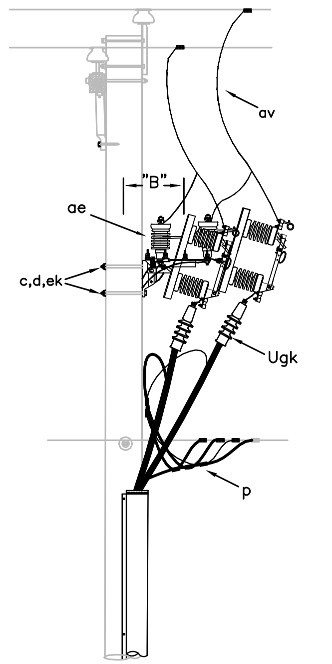
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	12	Bolt, machine, 5/8" x required length	Ugc	2	Bracket, standoff conduit 12"
d	12	Washer, square 2 1/4"	Ugc	4	Bracket, standoff conduit 24"
j	6	Screw, lag, 1/2" x 4"	Ugk	3	Termination kit 3M 750 MCM
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 4" pvc–sch 80
ap	3	Clamp, hot line copper all		80	Conduit 4" pvc–sch 40
av	*	Jumpers, as required		3	Conduit 4" sweeps pvc–sch 40
cj	20	Conductor, No 4 S D copper		3	Conduit seal
ek	12	Locknuts		3	Stirrup, burndy wejtap
fn	3	Bracket, cutout 1 phase 'T'			Fusing as required
sb	3	Switch disconnect 900 amp			

3 PHASE CABLE TERMINAL POLE
4 INCH CONDUIT, STAGGERED

DEC 2009	CHELCO	VUC5–7





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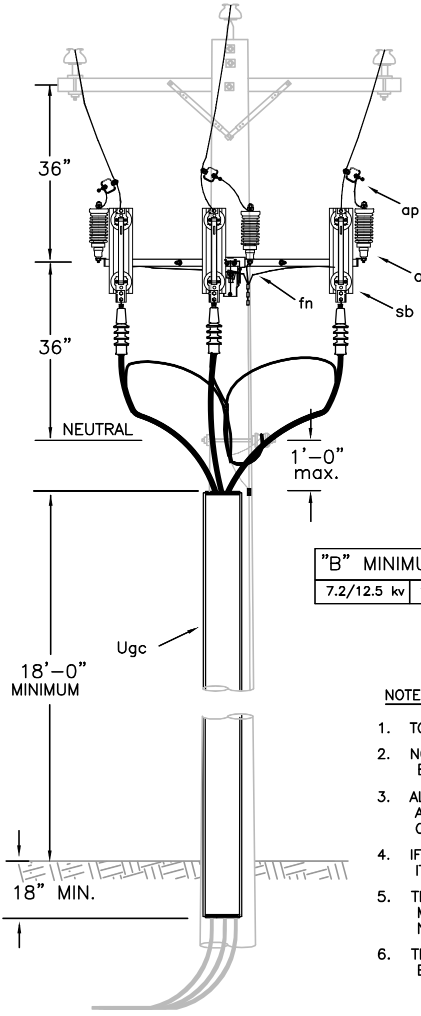
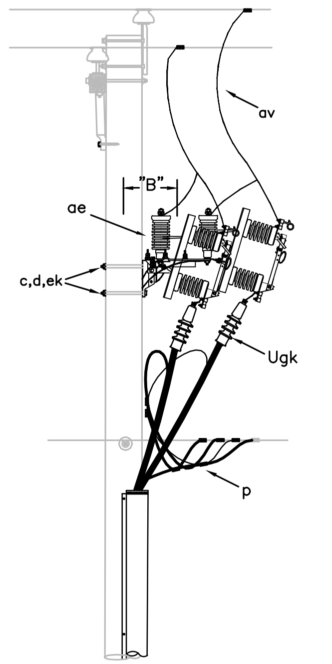
6. THE SYSTEM NEUTRAL WILL BE LOCATED 6' BELOW THE OVERHEAD PRIMARY.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x required length	sb	3	Switch, disconnect 900 amp
d	2	Washer, square 2 1/4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	3	Termination kit 3M 750 MCM
ae	3	Arrester, lightning 9kV		3	Coldshrink sealing kit
ap	3	Clamp, hot line copper all		3	Conduit seal
av	*	Jumpers, as required		3	Shield backing plate
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	2	Locknuts			Fusing as required
fn	1	Bracket, switch disconnect			

3 PHASE CABLE TERMINAL POLE WITH HOOK OPERATED DISCONNECT SWITCHES

MAY 2014	CHELCO	UC6





"B" MINIMUM	
7.2/12.5 kv	15"

NOTES:

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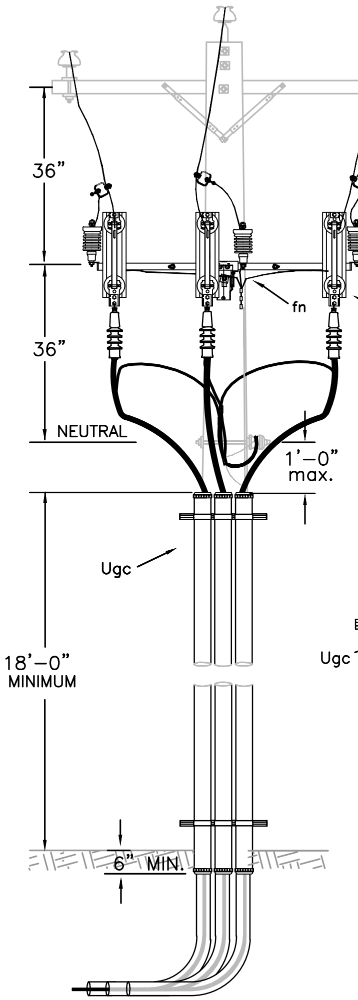
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x required length	sb	3	Switch, disconnect 900 amp
d	2	Washer, square 2 1/4"	Ugc	3	Shield cable riser sch 40
p	*	Connectors, as required	Ugk	3	Termination kit 3M 750 MCM
ae	3	Arrester, lightning 18kV		3	Coldshrink sealing kit
ap	3	Clamp, hot line copper all		3	Conduit seal
av	*	Jumpers, as required		3	Shield backing plate
cj	25	Conductor, No 4 S D copper		3	Stirrup, burndy wejtap
ek	2	Locknuts			Fusing as required
fn	1	Bracket, switch disconnect			

3 PHASE CABLE TERMINAL POLE WITH HOOK OPERATED DISCONNECT SWITCHES

MAY 2014	CHELCO	VUC6



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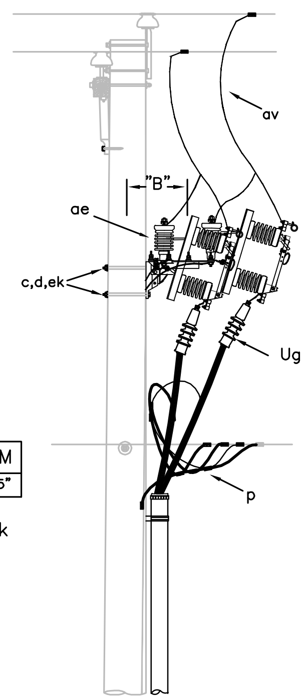

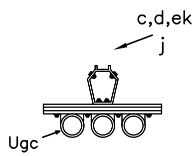

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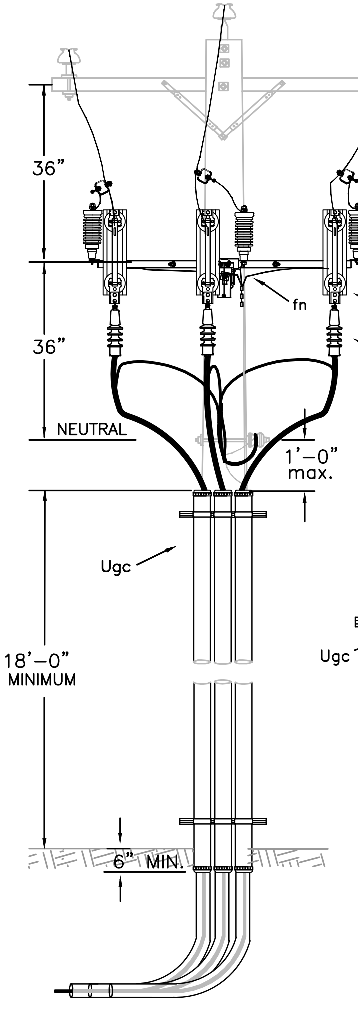
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	Ugc	4	Bracket, standoff conduit 24"
d	5	Washer, square 2 1/4"	Ugk	3	Termination kit 3M 750 MCM
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 4" pvc–sch 80
ap	3	Clamp, hot line copper all		60	Conduit 4" pvc–sch 40
av	*	Jumpers, as required		3	Conduit 4" sweep sch 40 pvc
cj	25	Conductor, No 4 S D copper		3	Conduit seal
ek	5	Locknuts		3	Stirrup, burndy wejtap
fn	1	Bracket, cutout 3 phase			Fusing as required
sb	3	Switch, disconnect 900 amp			

3 PHASE CABLE TERMINAL POLE WITH HOOK OPERATED DISCONNECT SWITCHES

APR 2014	CHELCO	UC6–750



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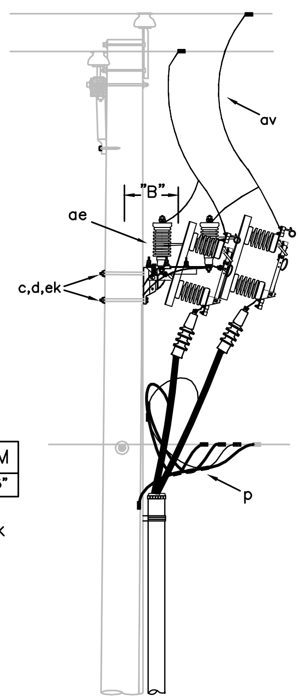
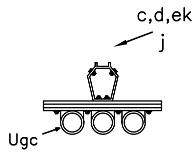
7.2/12.5 kv	15"





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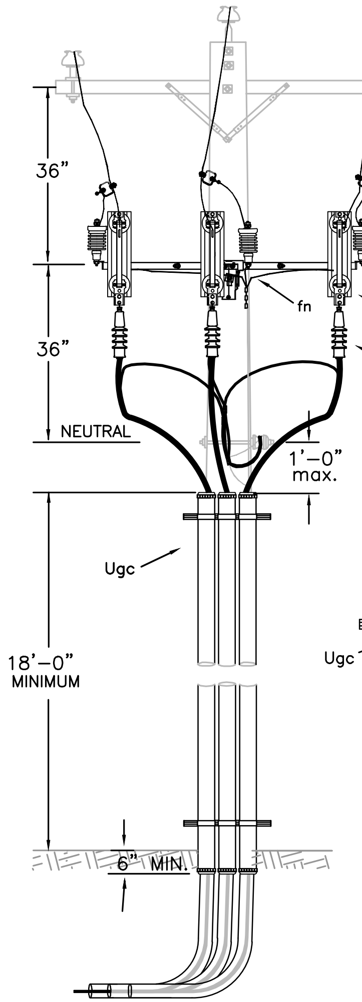
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8" x required length	Ugc	4	Bracket, standoff conduit 24"
d	5	Washer, square 2 1/4"	Ugk	3	Termination kit 3M 750 MCM
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 4" pvc–sch 80
ap	3	Clamp, hot line copper all		60	Conduit 4" pvc–sch 40
av	*	Jumpers, as required		3	Conduit 4" sweep sch 40 pvc
cj	25	Conductor, No 4 S D copper		3	Conduit seal
ek	5	Locknuts		3	Stirrup, burndy wejtap
fn	1	Bracket, cutout 3 phase			Fusing as required
sb	3	Switch, disconnect 900 amp			

3 PHASE CABLE TERMINAL POLE WITH HOOK OPERATED DISCONNECT SWITCHES

APR 2014	CHELCO	VUC6–750



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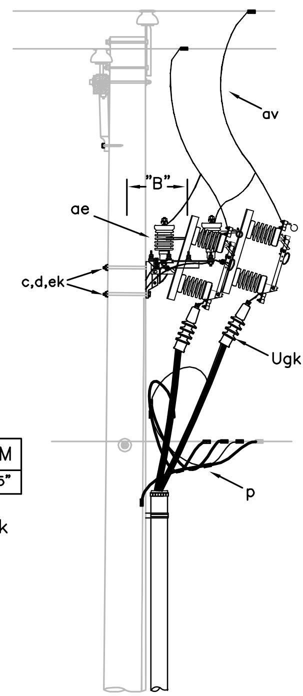

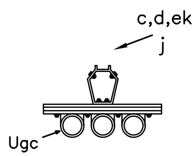

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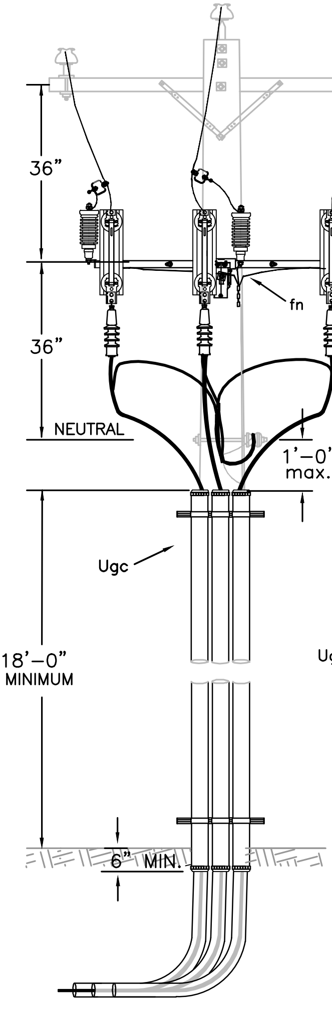
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
c	5	Bolt, machine, 5/8” x required length	Ugc	4	Bracket, standoff conduit 24”
d	5	Washer, square 2 1/4”	Ugk	3	Termination kit 3M 1000 MCM
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 9kV		30	Conduit 4” pvc–sch 80
ap	3	Clamp, hot line copper all		60	Conduit 4” pvc–sch 40
av	*	Jumpers, as required		3	Conduit 4” sweep sch 40 pvc
cj	25	Conductor, No 4 S D copper		3	Conduit seal
ek	5	Locknuts		3	Stirrup, burndy wejtap
fn	1	Bracket, cutout 3 phase			Fusing as required
sb	3	Switch, disconnect 900 amp			

3 PHASE CABLE TERMINAL POLE WITH HOOK OPERATED DISCONNECT SWITCHES

APR 2014	CHELCO	UC6–1000



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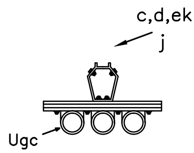

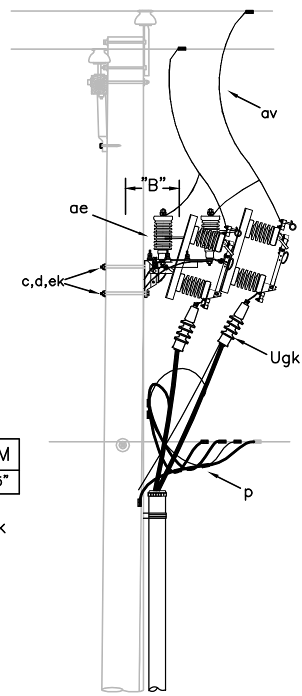

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d	5	Washer, square 2 1/4”	Ugk	3	Termination kit 3M 1000 MCM
p	*	Connectors, as required		3	Coldshrink sealing kit
ae	3	Arrester, lightning 18kV		30	Conduit 4” pvc–sch 80
ap	3	Clamp, hot line copper all		60	Conduit 4” pvc–sch 40
av	*	Jumpers, as required		3	Conduit 4” sweep sch 40 pvc
cj	25	Conductor, No 4 S D copper		3	Conduit seal
ek	5	Locknuts		3	Stirrup, burndy wejtap
fn	1	Bracket, cutout 3 phase			Fusing as required
sb	3	Switch, disconnect 900 amp			

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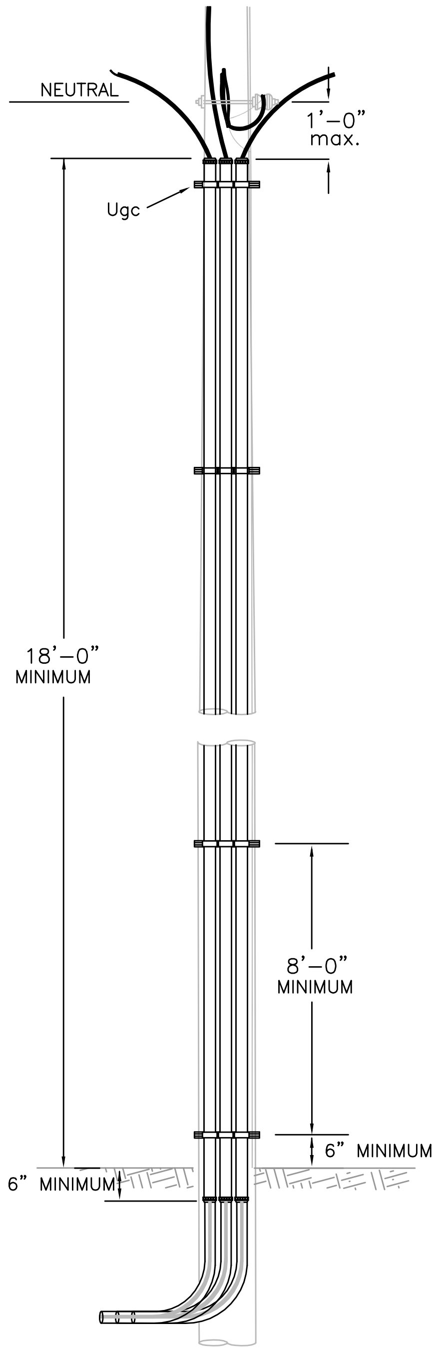
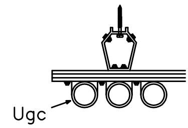
APR 2014	CHELCO	VUC6–1000

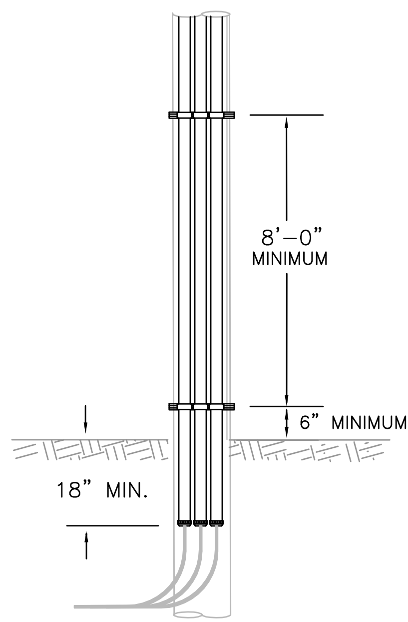




NOTES:

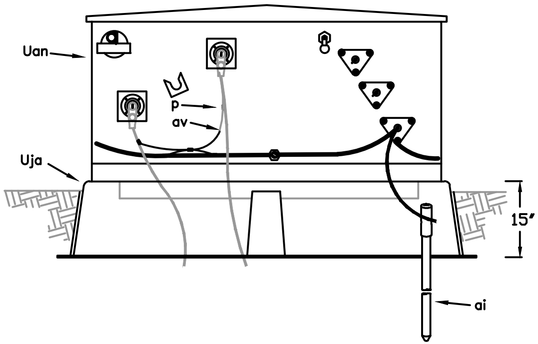
1. USE GUIDE FOR ALL SIZES OF CONDUIT,
2. USE FOR INSTALLATION OF 1, 2, 3 OR MORE CONDUITS.
2. A MINIMUM OF 4 STANDOFF BRACKETS REQUIRED.

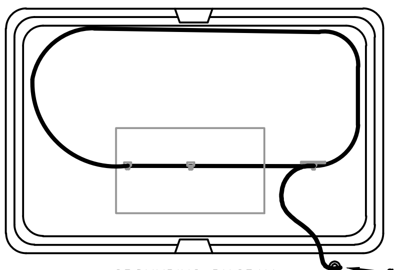
DIRECT BURY



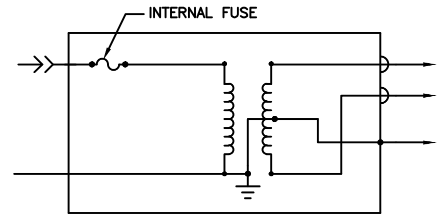
	TERMINATION CONDUIT MOUNTING GUIDE		
	DEC. 2009	CHELCO	

ITEM	QTY	MATERIAL
p	*	Connectors, as required
ai	1	Rod, ground 5/8" x 8'
aj	1	Clamp, ground rod
av	*	Jumpers, as required
cj	20	Conductor No. 4 S.D. copper
Uan	1	Transformer, padmount
Uhb	2	Switch module 15kV 200 amp
Ufz	2	Connector Sec 6 lug insul.
Uja	1	Ground sleeve –15"
	1	Connector bar neutral





GROUNDING DIAGRAM



WIRING DIAGRAM

NOTES:

1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO ALLOW READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
2. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING UNIT.
4. INSTALL "DANGER" SIGN IN TRANSFORMER AND "CAUTION/WORKING SPACE" SIGN ON EXTERIOR OF ENCLOSURE.

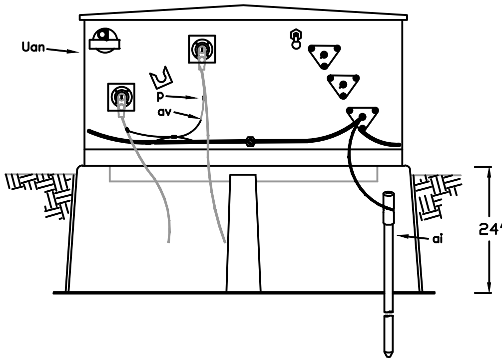
RC = regular conventional

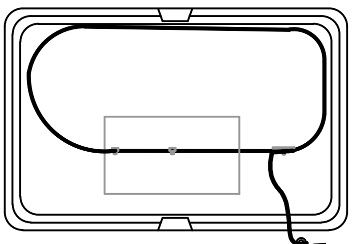
SC = stainless steel conventional

SINGLE PHASE
PAD MOUNTED TRANSFORMER

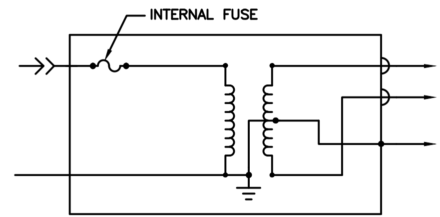
MAY 2014	CHELCO	UG7RC UG7SC

ITEM	QTY	MATERIAL
p	*	Connectors, as required
ai	1	Rod, ground 5/8" x 8'
aj	1	Clamp, ground rod
av	*	Jumpers, as required
cj	20	Conductor No. 4 S.D. copper
Uan	1	Transformer, padmount
Uhb	2	Switch module 15kV 200 amp
Ufz	2	Connector Sec 6 lug insul.
Uja	1	Ground sleeve –24"
	1	Connector bar neutral





GROUNDING DIAGRAM



WIRING DIAGRAM

NOTES:

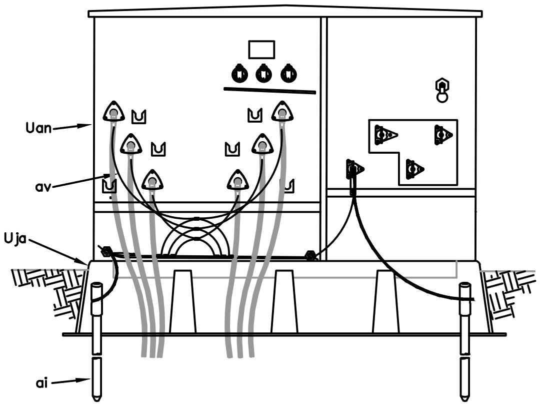
1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO ALLOW READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
2. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING UNIT.
4. INSTALL "DANGER" SIGN IN TRANSFORMER AND "CAUTION/WORKING SPACE" SIGN ON EXTERIOR OF ENCLOSURE.

RC = regular conventional

SC = stainless steel conventional

SINGLE PHASE
PAD MOUNTED TRANSFORMERS

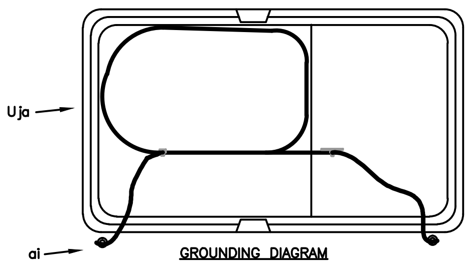
MAY 2014	CHELCO	UG8RC UG8SC



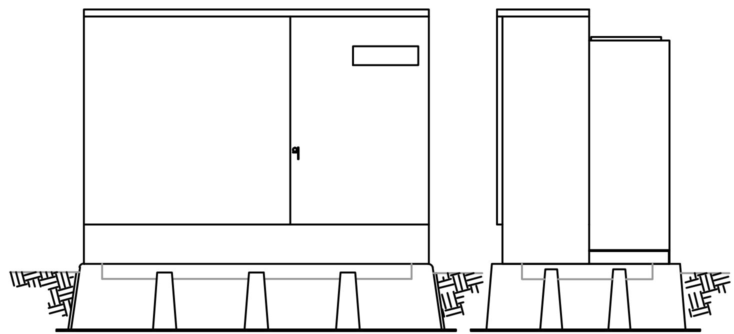
ITEM	QTY	MATERIAL
p	*	Connectors, as required
ai	2	Rod, ground 5/8" x 8'
aj	2	Clamp, ground rod
av	*	Jumpers, as required
cj	20	Conductor No. 4 S.D. copper
Uan	1	Transformer, padmount
Uhb	6	Switch module 15kV 200 amp
Ufz	2	Connector Sec 6 lug insul.
Uja	1	Ground sleeve
	1	Connector bar neutral

NOTES:

1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO ALLOW READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
2. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING UNIT.
4. INSTALL "DANGER" SIGN IN TRANSFORMER AND "CAUTION/WORKING SPACE" SIGN ON EXTERIOR OF ENCLOSURE.



GROUNDING DIAGRAM

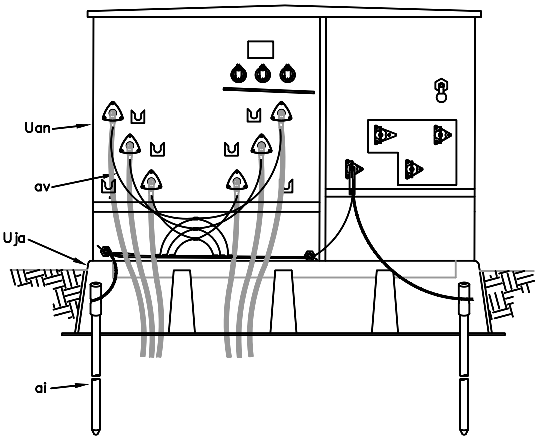


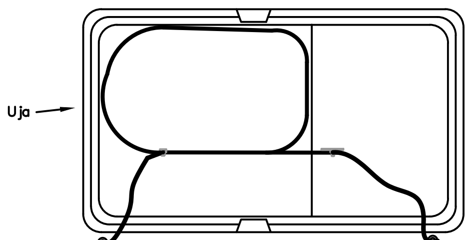
RC = regular conventional

SC = stainless steel conventional

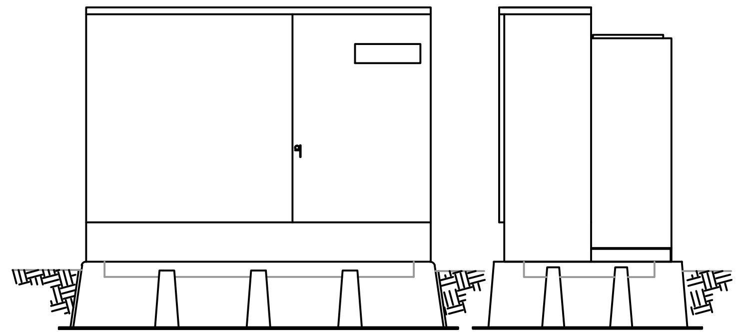
THREE PHASE
PAD MOUNTED TRANSFORMER

MAY 2014	CHELCO	UG17RC UG17SC





GROUNDING DIAGRAM



ITEM	QTY	MATERIAL
p	*	Connectors, as required
ai	2	Rod, ground 5/8" x 8'
aj	2	Clamp, ground rod
av	*	Jumpers, as required
cj	20	Conductor No. 4 S.D. copper
Uan	1	Transformer, padmount
Uhb	6	Switch module 25kV 200 amp
Ufz	2	Connector Sec 6 lug insul.
Uja	1	Ground sleeve
	1	Connector bar neutral

NOTES:

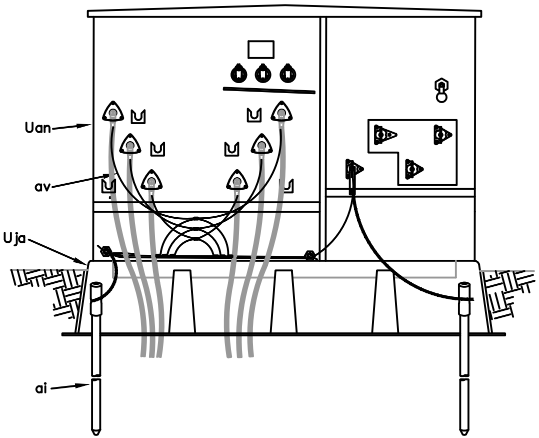
1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO ALLOW READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
2. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING UNIT.
4. INSTALL "DANGER" SIGN IN TRANSFORMER AND "CAUTION/WORKING SPACE" SIGN ON EXTERIOR OF ENCLOSURE.

RC = regular conventional

SC = stainless steel conventional

24.9 – 14.4 kV THREE PHASE PAD MOUNTED TRANSFORMER

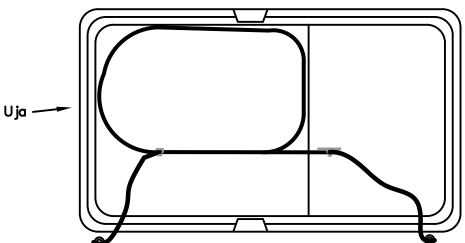
JUNE 2018	CHELCO	VUG17RC VUG17SC



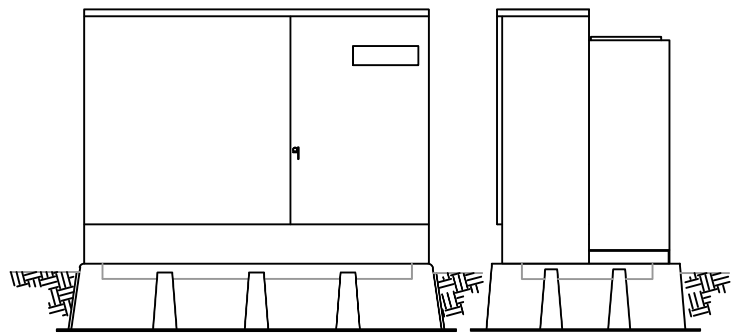
ITEM	QTY	MATERIAL
p	*	Connectors, as required
ai	2	Rod, ground 5/8" x 8'
aj	2	Clamp, ground rod
av	*	Jumpers, as required
cj	20	Conductor No. 4 S.D. copper
Uan	1	Transformer, padmount
Uhb	6	Switch module 25kV 200 amp
Ufz	2	Connector Sec 6 lug insul.
Uja	1	Ground sleeve
	1	Connector bar neutral

NOTES:

1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO ALLOW READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
2. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING UNIT.
4. INSTALL "DANGER" SIGN IN TRANSFORMER AND "CAUTION/WORKING SPACE" SIGN ON EXTERIOR OF ENCLOSURE.



GROUNDING DIAGRAM

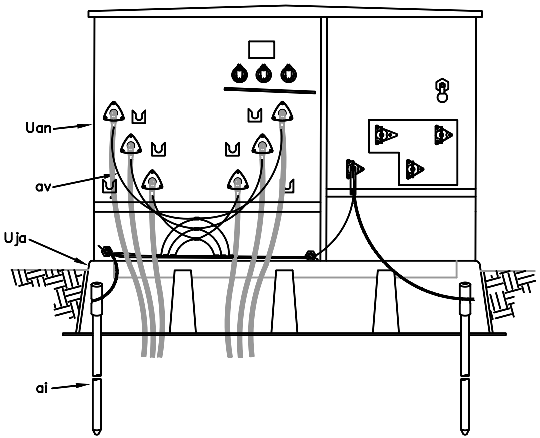


RC = regular conventional

SC = stainless steel conventional

DELTA
THREE PHASE
PAD MOUNTED TRANSFORMER

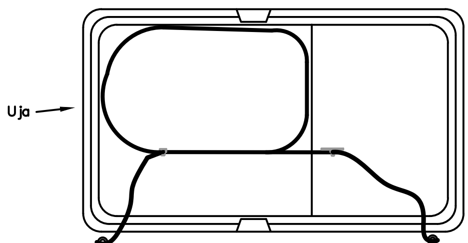
JUNE 2018	CHELCO	UG18RC UG18SC



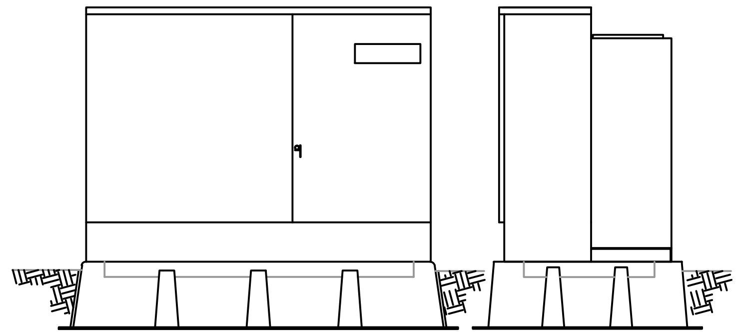
ITEM	QTY	MATERIAL
p	*	Connectors, as required
ai	2	Rod, ground 5/8" x 8'
aj	2	Clamp, ground rod
av	*	Jumpers, as required
cj	20	Conductor No. 4 S.D. copper
Uan	1	Transformer, padmount
Uhb	6	Switch module 25kV 200 amp
Ufz	2	Connector Sec 6 lug insul.
Uja	1	Ground sleeve
	1	Connector bar neutral

NOTES:

1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO ALLOW READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
2. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING UNIT.
4. INSTALL "DANGER" SIGN IN TRANSFORMER AND "CAUTION/WORKING SPACE" SIGN ON EXTERIOR OF ENCLOSURE.



GROUNDING DIAGRAM

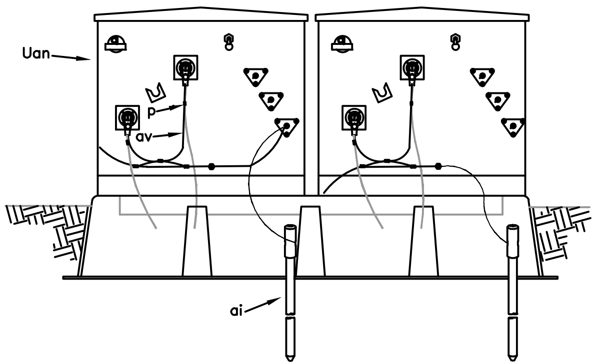


RC = regular conventional

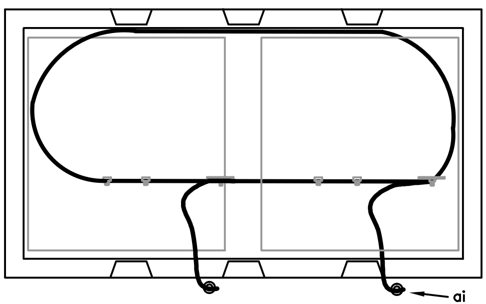
SC = stainless steel conventional

DELTA
24.9 – 14.4 kV THREE PHASE
PAD MOUNTED TRANSFORMER

JUNE 2018	CHELCO	VUG18RC VUG18SC



ITEM	QTY	MATERIAL
p	*	Connectors, as required
ai	2	Rod, ground 5/8" x 8'
aj	2	Clamp, ground rod
av	*	Jumpers, as required
cj	20	Conductor No. 4 S.D. copper
Uae	2	Arrester, padmount 9kV
Uan	2	Transformer, padmount 120/240
Uhb	4	Switch module 15kV 200 amp
Ufz	2	Connector Sec 6 lug insul.
Uja	1	Ground sleeve
	1	Connector bar neutral



GROUNDING DIAGRAM

NOTES:

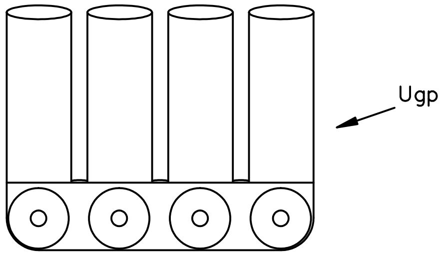
1. PROVIDE SUFFICIENT PRIMARY NEUTRAL PIGTAIL AND CABLE SLACK TO ALLOW READY DISCONNECTION OF ELBOW AND MOUNTING ON PARKING STAND.
2. TRAIN CABLES AS SHOWN.
3. INSTALL WITH GROUNDING UNIT.
4. INSTALL "DANGER" SIGN IN TRANSFORMER AND "CAUTION/WORKING SPACE" SIGN ON EXTERIOR OF ENCLOSURE.

RC = regular conventional

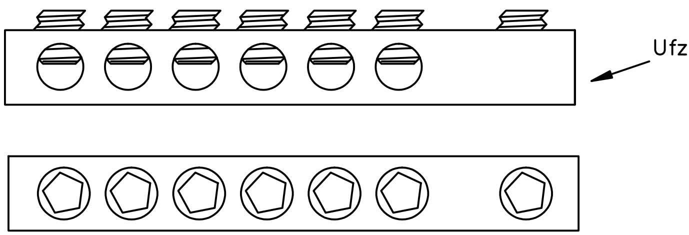
SC = stainless steel conventional

TWO SINGLE PHASE
PAD MOUNTED TRANSFORMERS

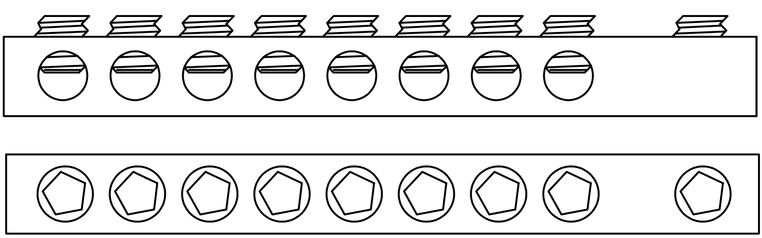
MAY 2014	CHELCO	UG210RC UG210SC



UJ1–4
CONNECTOR BLOCK



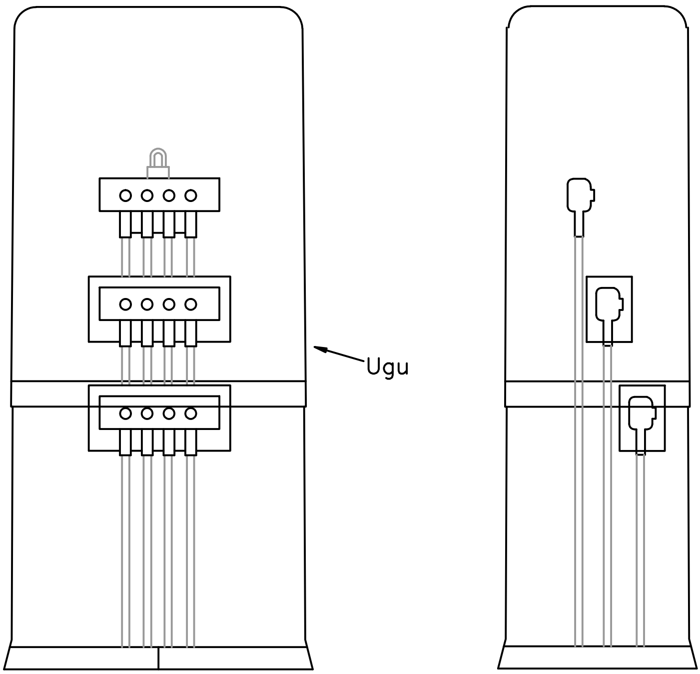
UJ2–6
CONNECTOR BLOCK



UJ2–8
CONNECTOR BLOCK

Ufz

	MISCELLANEOUS ASSEMBLIES		
	AUG. 2009	CHELCO	UJ1–4 UJ2–6 UJ2–8

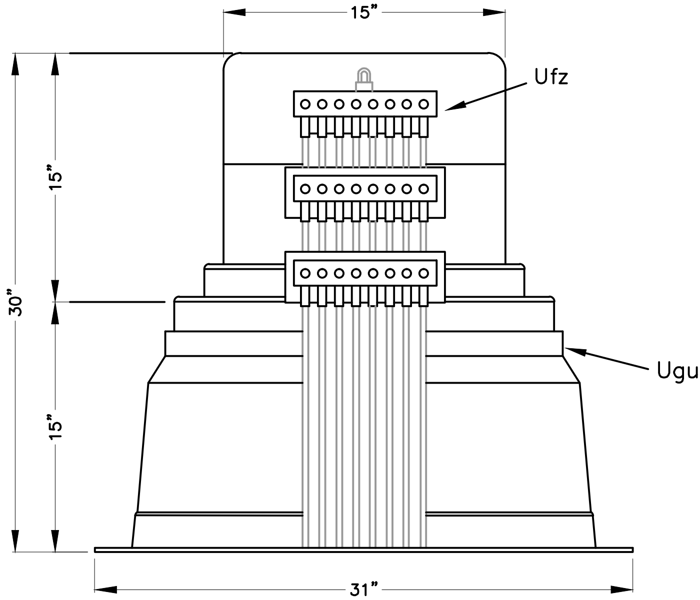


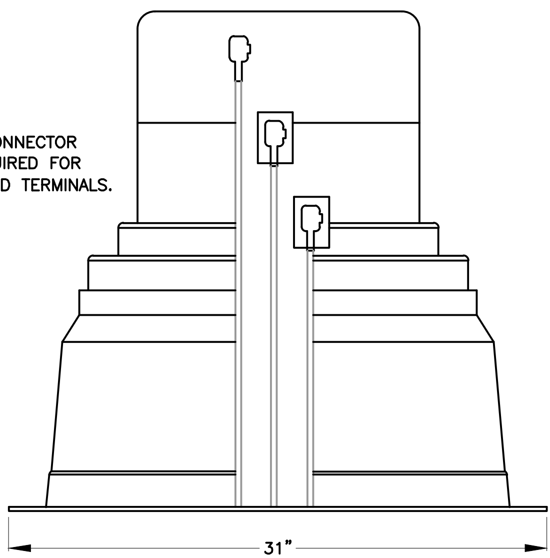
INSULATED CONNECTOR
BLOCKS REQUIRED FOR
ALL ENERGIZED TERMINALS.

ITEM	QTY	MATERIAL
Ugu	1	Pedestal, secondary
	3	Connectors, pedestal insulated

SECONDARY PEDESTAL & CONNECTOR

AUG. 2009	CHELCO	UK–5



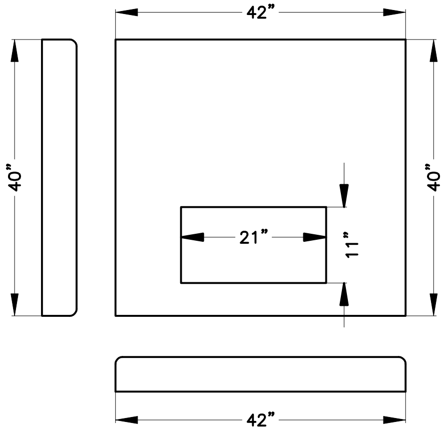


INSULATED CONNECTOR BLOCKS REQUIRED FOR ALL ENERGIZED TERMINALS.

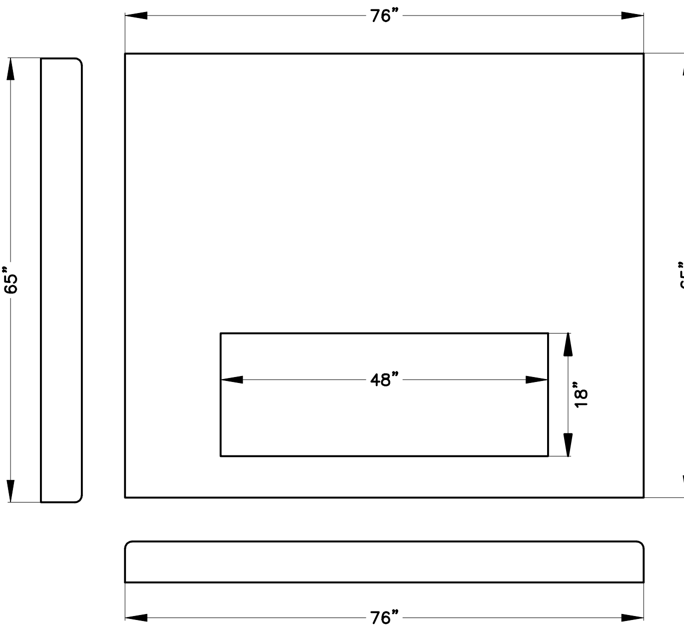
ITEM	QTY	MATERIAL
Ugu	1	Pedestal, secondary
Ufz	3	Connectors, pedestal insulated

LARGE SECONDARY PEDESTAL & CONNECTORS

OCT. 2015	CHELCO	UK-5L

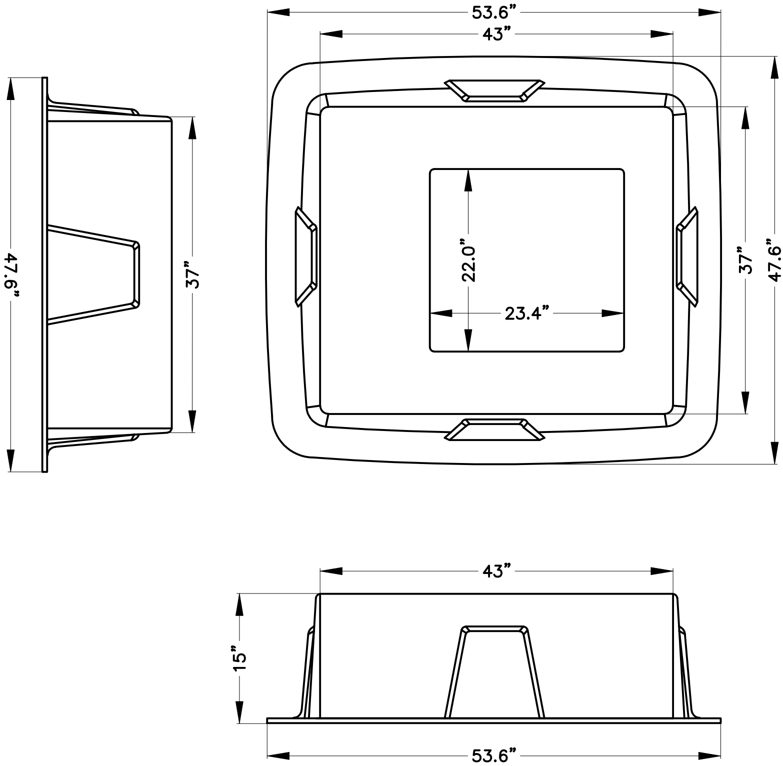


UM1-5
SINGLE PHASE TRANSFORMER
ITEM #474072



UM1-5NCC
THREE PHASE TRANSFORMER
ITEM #474155

ITEM # 474072 474155	COMPOSITE GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1-5 UM1-5NCC



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474170</td><td colspan="3">25–167 KVA SINGLE PHASE TRANSFORMER
GROUND SLEEVE</td></tr>
<tr><td>AUG. 2009</td><td>CHELCO</td><td>UM1–5NC</td></tr>
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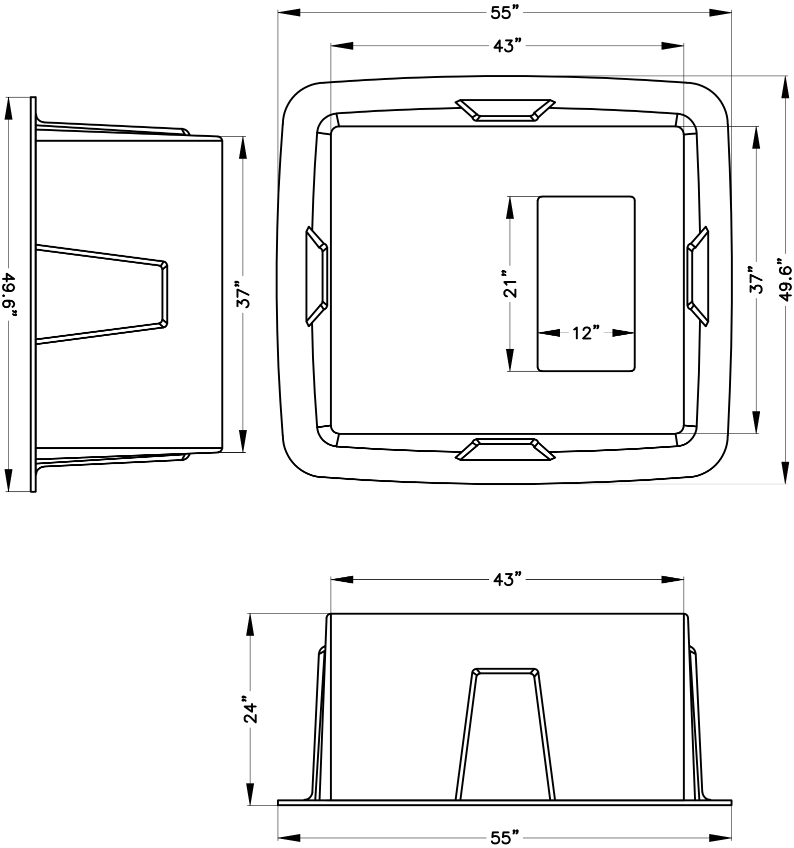
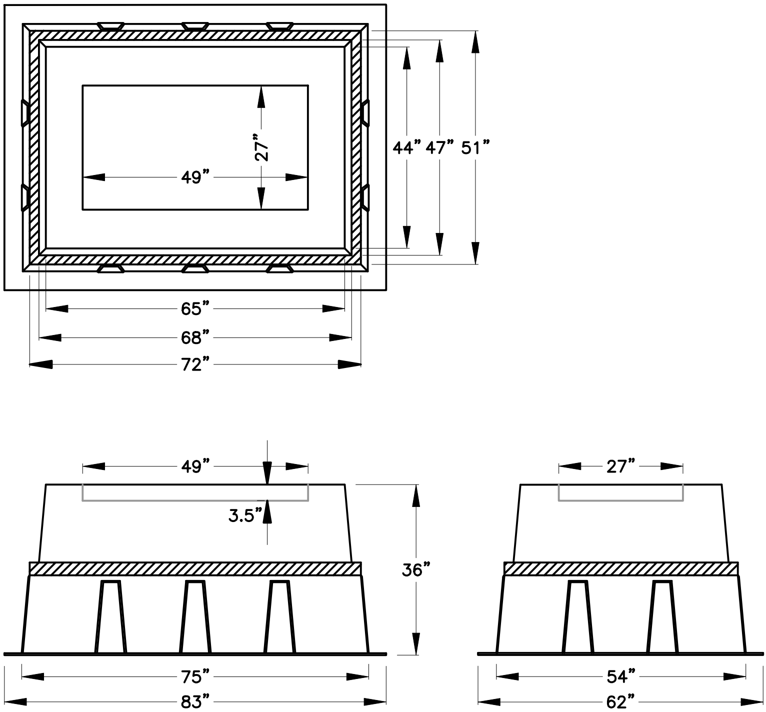
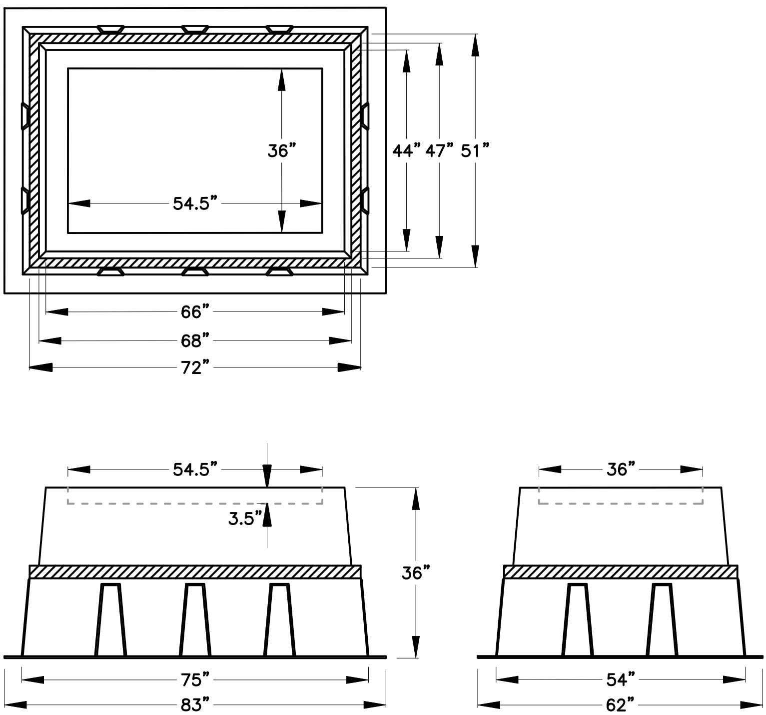


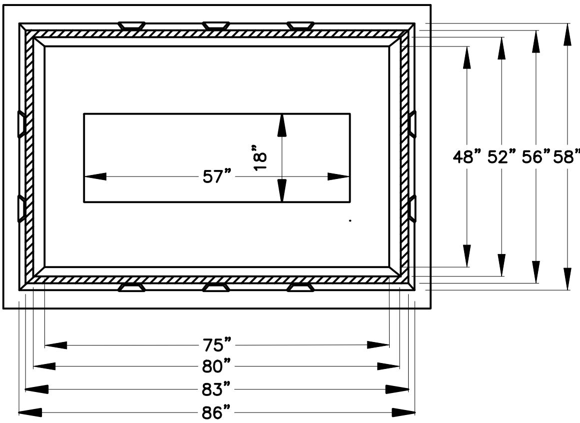
ITEM # 474200	25–167 KVA SINGLE PHASE TRANSFORMER 24" GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1–7NC

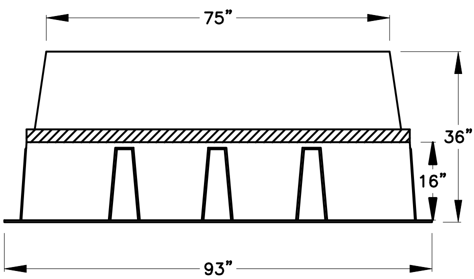


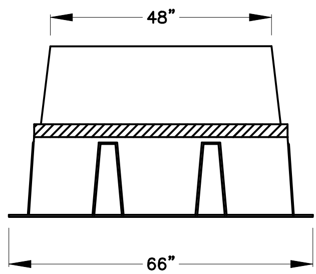
ITEM # 474396	S & C MODEL 200 GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1–7NC200



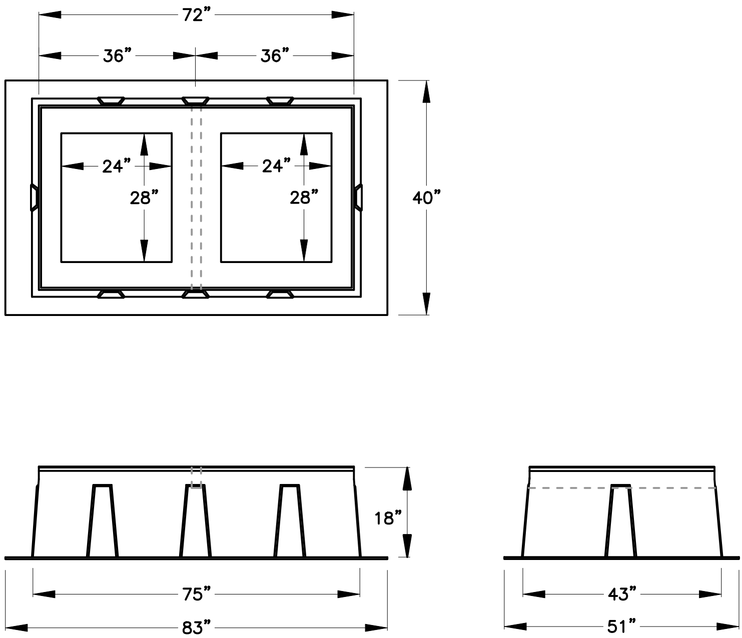
ITEM # 474215	THREE PHASE 600 AMP FUSED SWITCHES GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1-7NC-3



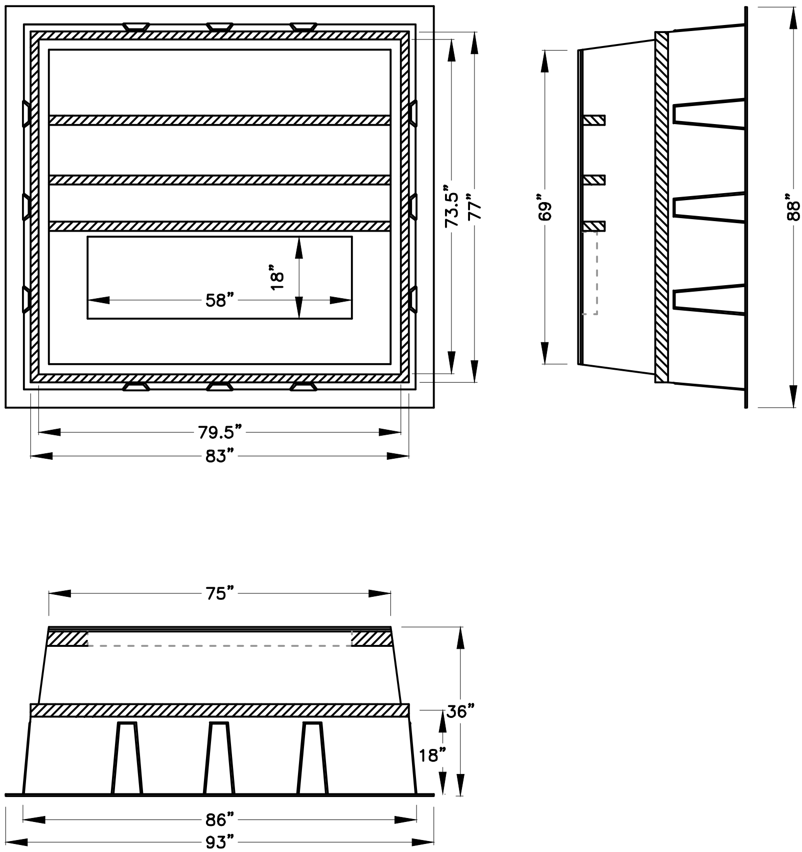




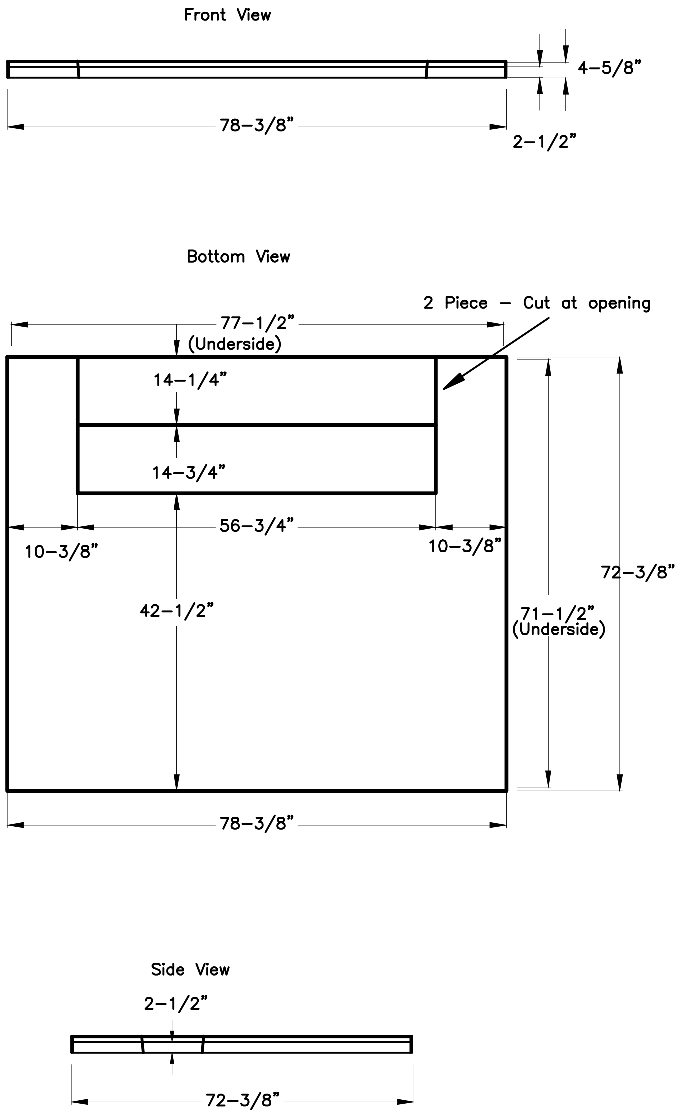
ITEM # 474319	THREE PHASE PULL BOX GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1-7NC34



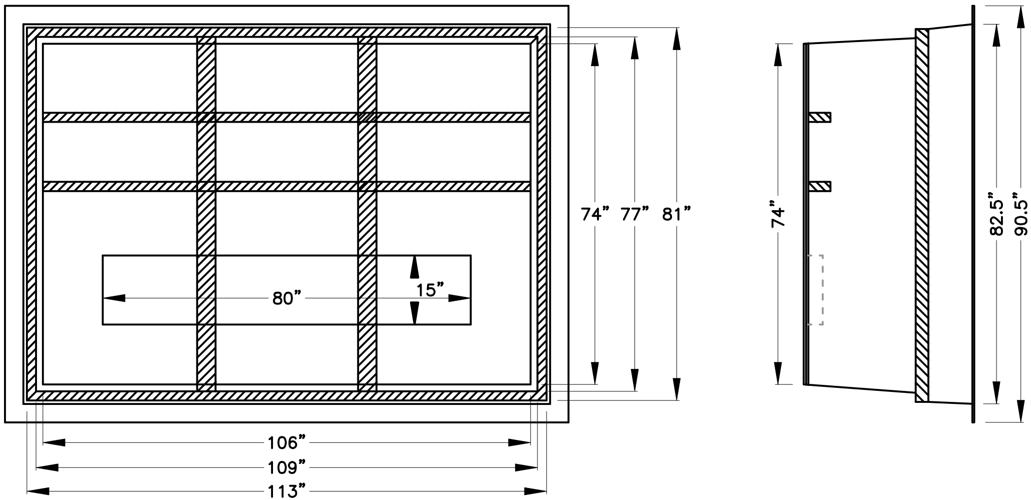
ITEM # 474013	PAD FOR TWO SINGLE PHASE PADMOUNT TRANSFORMERS GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1-7NC35

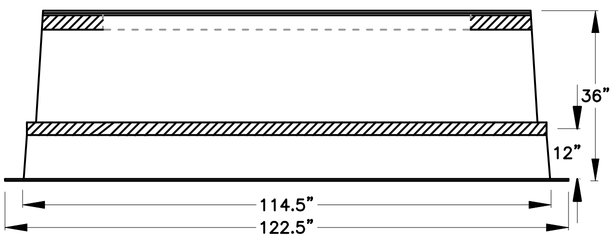


ITEM # 474484	S & C MODELS 300 AND 400 GROUND SLEEVE		
	SEP. 2013	CHELCO	UM1-7NC400

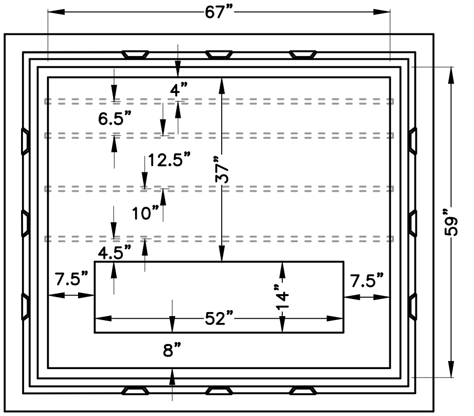


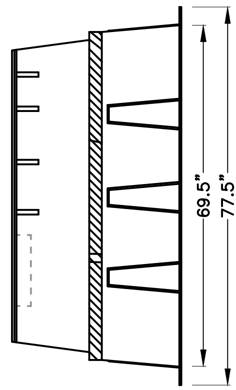
ITEM # 474225	GROUND SLEEVE ADAPTER PLATE		
	SEP. 2013	CHELCO	UM1–7NC400AP





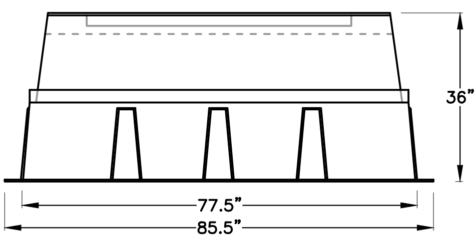
ITEM # 474482	S & C MODEL 500 GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1-7NC500



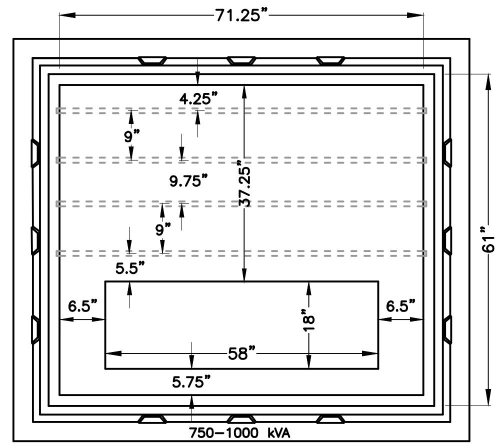


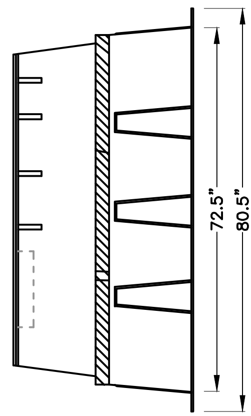
NOTES:
1. Box pad is rated for 7000 lbs.

2. Nordic Catalogue NO. GS-67-59-36RT-CHELCO-MG-52x14



ITEM # 474220	THREE PHASE TRANSFORMERS 45-500kVA		
	Jan. 2019	CHELCO	UM1-7NC-45-500

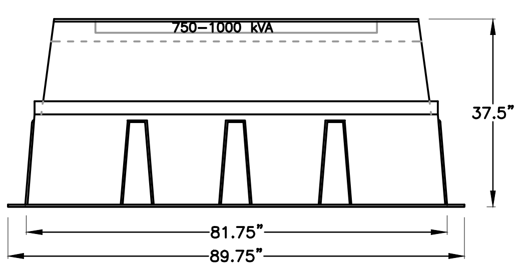




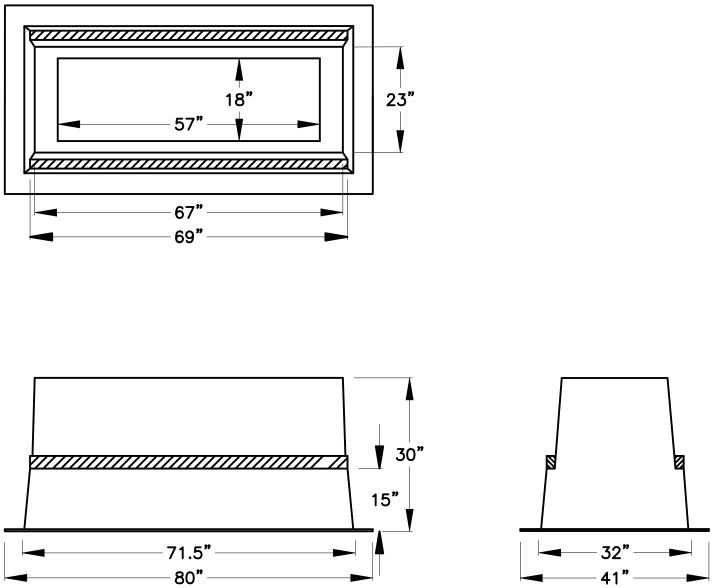
NOTES:

1. Proper installation of a box pad for transforms over 10,000lbs. requires the soil to have a compaction level of 98% prior to setting the box pad. If that is not achievable a cement pad/footing must be poured underneath the box pad prior to installation.

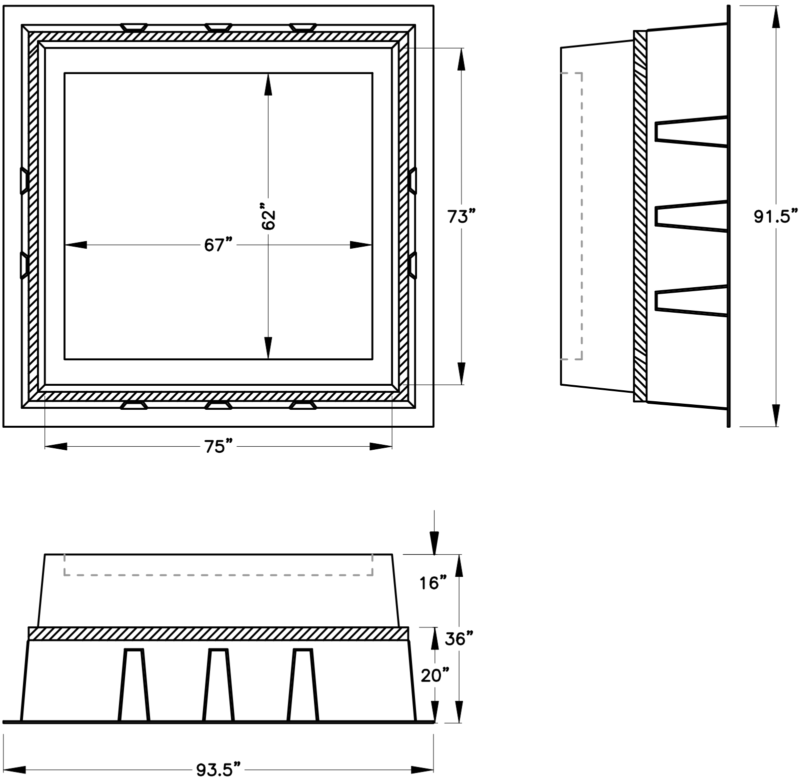
2. Nordic Catalogue N0. GS–72–62–36RT–2X–CHELCO–M6–58x18



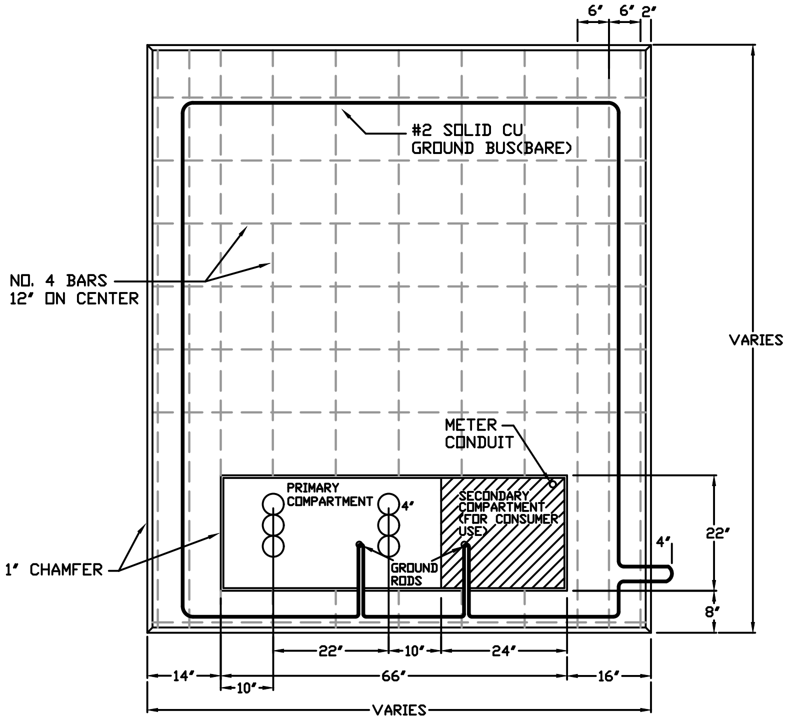
ITEM # 474493	THREE PHASE TRANSFORMERS 750–1000kVA		
	AUG. 2015	CHELCO	UM1–7NC–750–1000



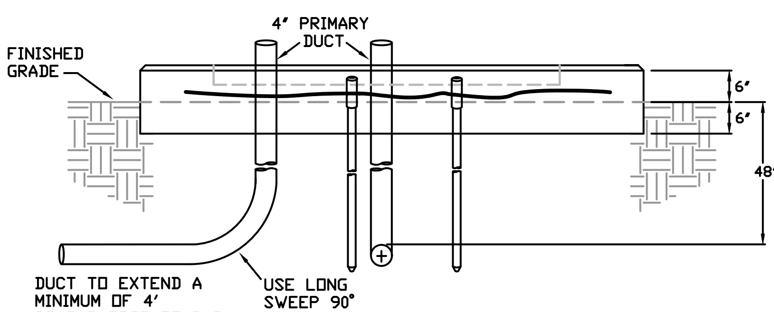
ITEM # 474205	3 PHASE PULL BOX (UM33) GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1-7NCC



ITEM # 474230	MALTON FUSED CABINET GROUND SLEEVE		
	AUG. 2009	CHELCO	UM1-7NCME

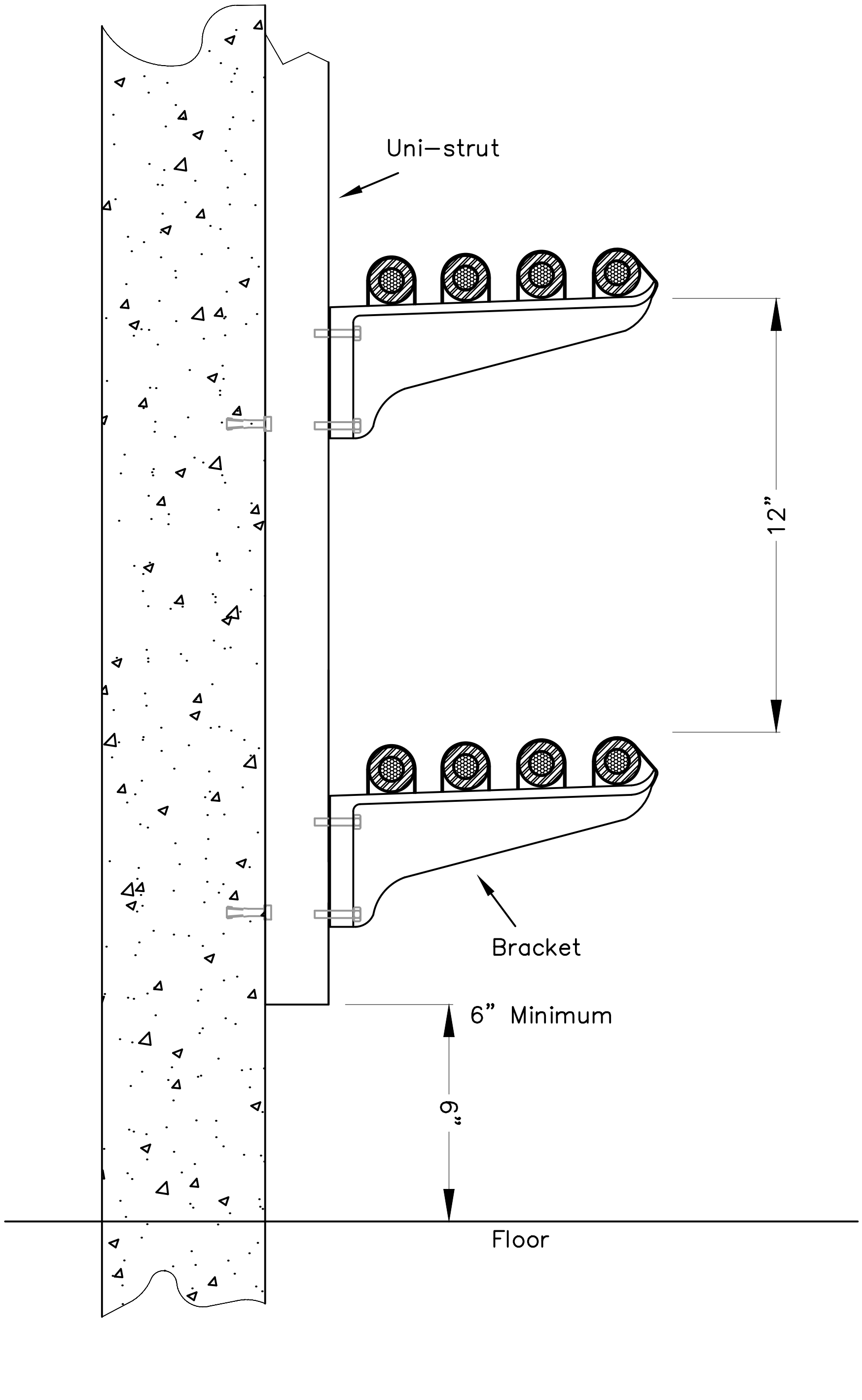


TOP VIEW



SIDE VIEW

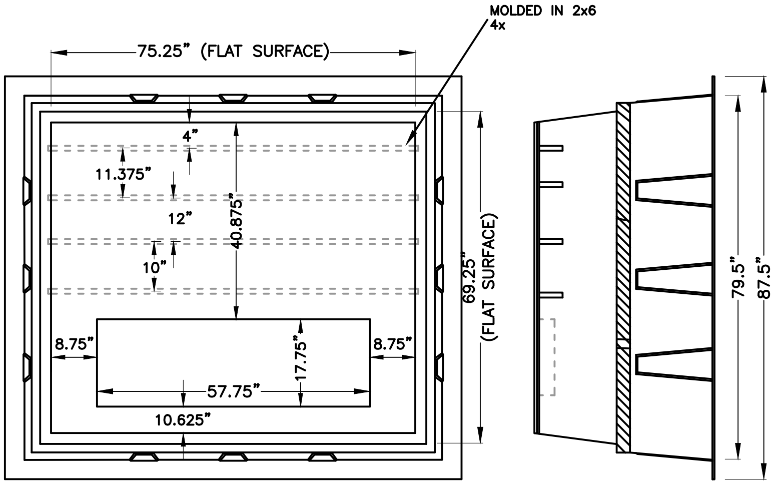
	CONCRETE PAD FOR PAD MOUNTED TRANSFORMER		
	AUG. 2018	CHELCO	UM1–CONC



ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required		2	14" MM14 Bracket
	1	Uni-strut			

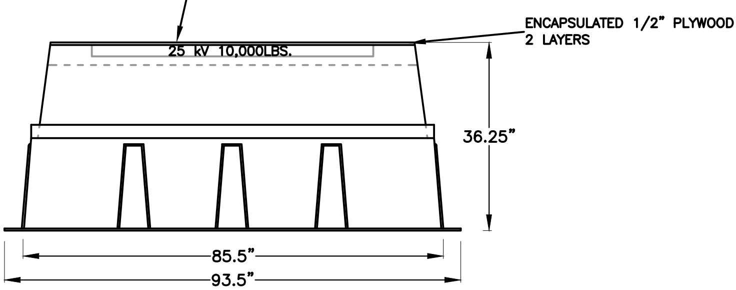
MULTI MOUNT CABLE ARMS

AUG 2018	CHELCO	UM1-MHR-14 UM1-MHR-14X

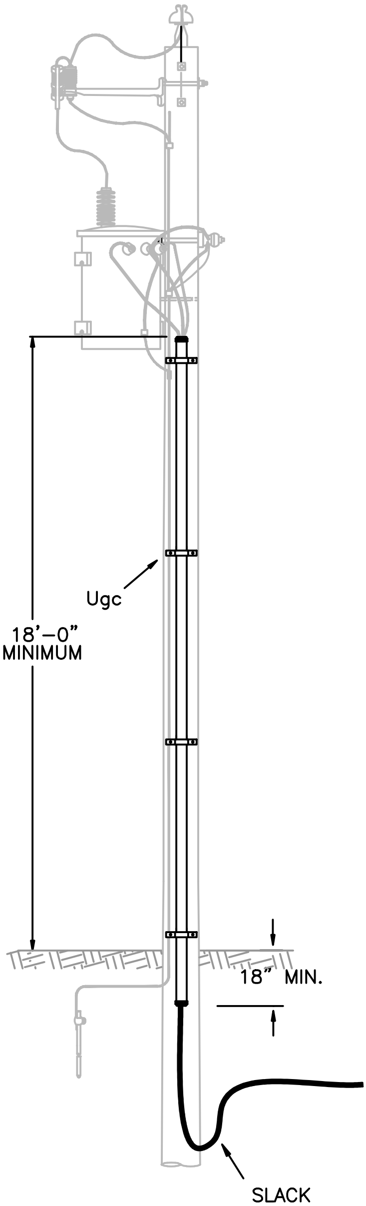


NOTES:

1. Proper installation of a box pad for transforms over 10,000lbs. requires the soil to have a compaction level of 98% prior to setting the box pad. If that is not achievable a cement pad/footing must be poured underneath the box pad prior to installation.
2. Nordic Catalogue N0. GS–75–69–36RT–2X–CHELCO–MG–58x18



ITEM # E474491	THREE PHASE TRANSFORMERS 250–1000kVA 25 kV		
	MAR. 2019	CHELCO	VUM1–7NC–250–1000



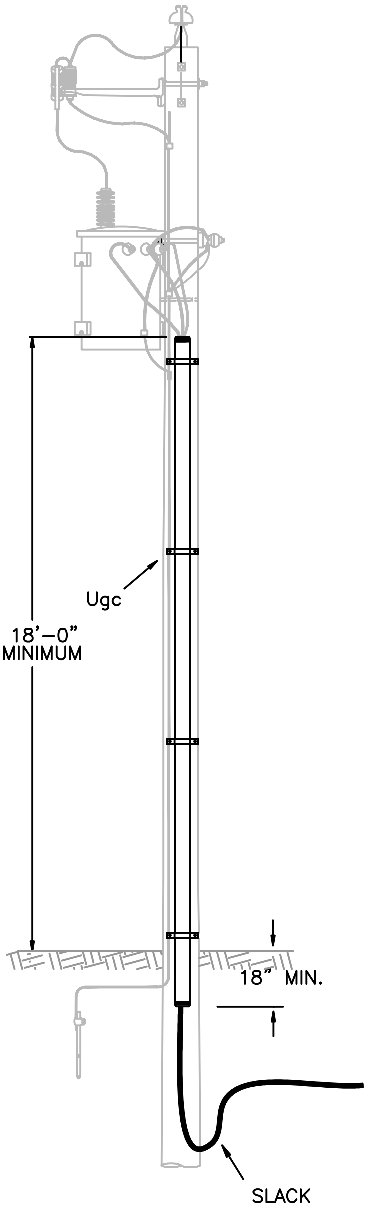
NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.
4. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL
c	6	Bolt, machine, 5/8" x required length
d	6	Washer, square 2 1/4"
j	4	Screw, lag, 1/2" x 4"
ek	6	Locknuts
Ugc	4	Strap, nail on
	1	Coldshrink sealing kit
	10	Conduit 2" pvc-sch 80
	20	Conduit 2" pvc-sch 40
	1	Conduit seal

2 INCH SECONDARY RISER

JUNE 2009	CHELCO	UM2S



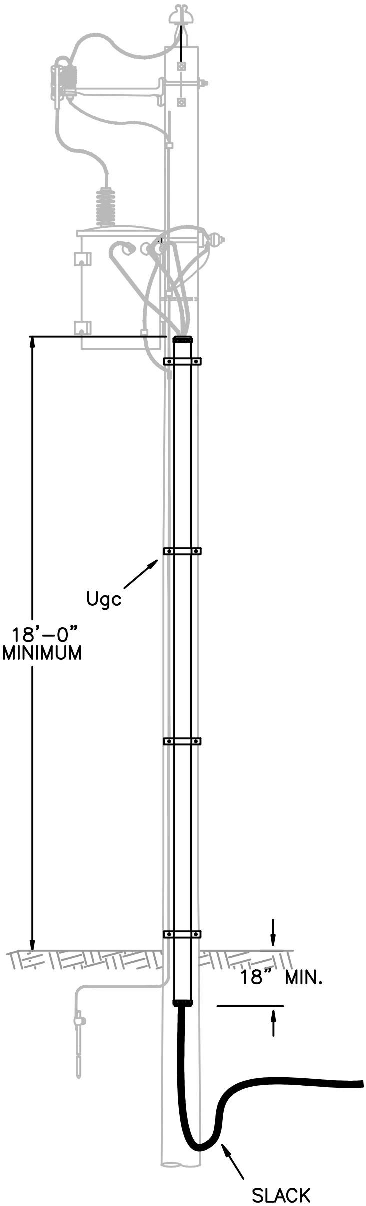
NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.
4. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL
c	6	Bolt, machine, 5/8" x required length
d	6	Washer, square 2 1/4"
j	4	Screw, lag, 1/2" x 4"
ek	6	Locknuts
Ugc	4	Strap, nail on
	1	Coldshrink sealing kit
	10	Conduit 3" pvc–sch 80
	20	Conduit 3" pvc–sch 40
	1	Conduit seal

3 INCH SECONDARY RISER

JUNE 2009	CHELCO	UM3S



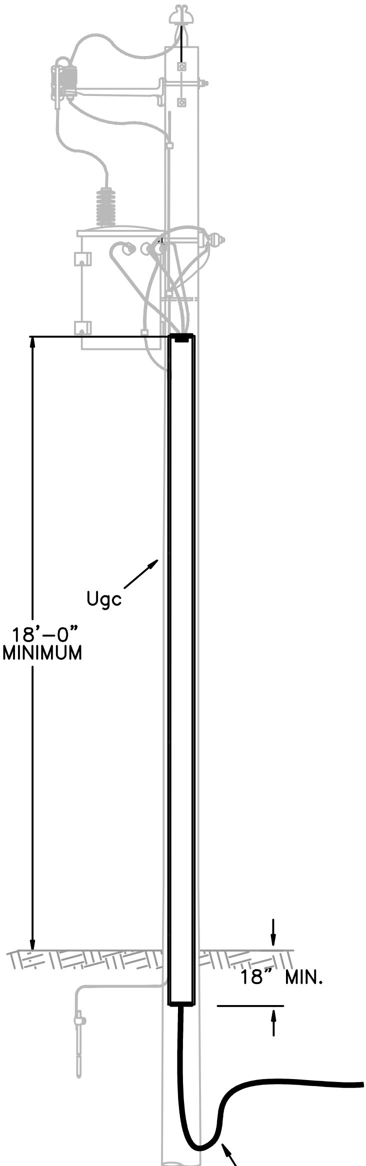
NOTES:

1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.
4. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL
c	6	Bolt, machine, 5/8" x required length
d	6	Washer, square 2 1/4"
j	4	Screw, lag, 1/2" x 4"
ek	6	Locknuts
Ugc	4	Strap, nail on
	1	Coldshrink sealing kit
	10	Conduit 4" pvc–sch 80
	20	Conduit 4" pvc–sch 40
	1	Conduit seal

4 INCH SECONDARY RISER

JUNE 2009	CHELCO	UM4S



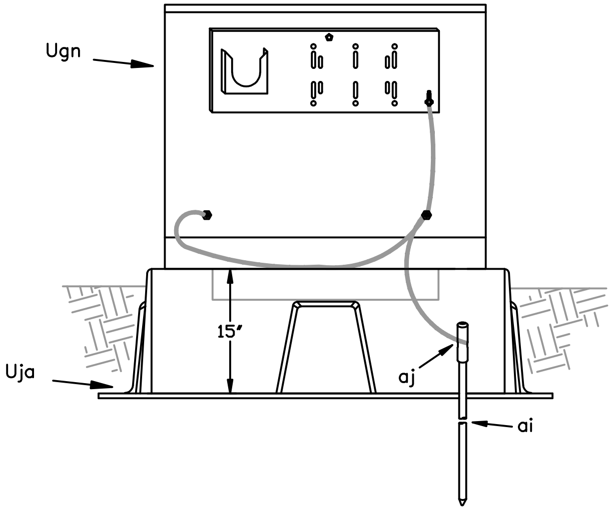
NOTES:

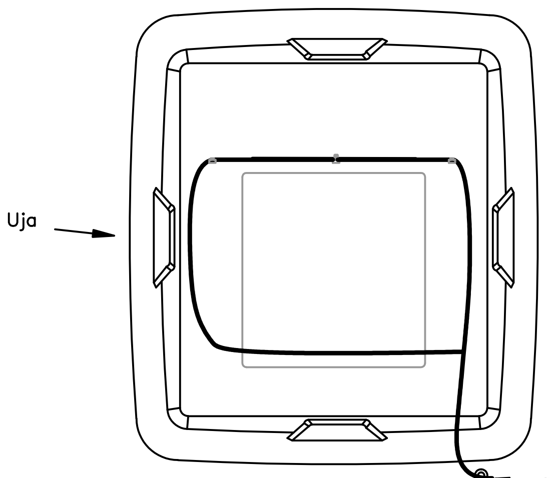
1. NO BENDS PERMITTED WITHIN 6" OF CABLE TERMINAL BASE.
2. ALL LIVE PARTS MUST HAVE AN 18 FOOT CLEARANCE ABOVE GROUND AND MUST BE INSTALLED A MINIMUM OF 6 INCHES ABOVE THE NEUTRAL CONDUCTOR.
3. ALLOW MINIMUM CABLE SLACK OF 24" AT BOTTOM OF RISER.
4. EIGHT FOOT MINIMUM BETWEEN BOTTOM 2 CONDUIT MOUNTING BRACKETS
5. THE UNDERGROUND CABLE CONCENTRIC NEUTRAL MUST CONNECT TO SYSTEM NEUTRAL AND POLE GROUND.

ITEM	QTY	MATERIAL
Ugc	3	Shield cable riser sch 40
	1	Coldshrink sealing kit
	3	Shield backing plate
	1	Conduit seal

SECONDARY RISER

JUNE 2009	CHELCO	UM5S



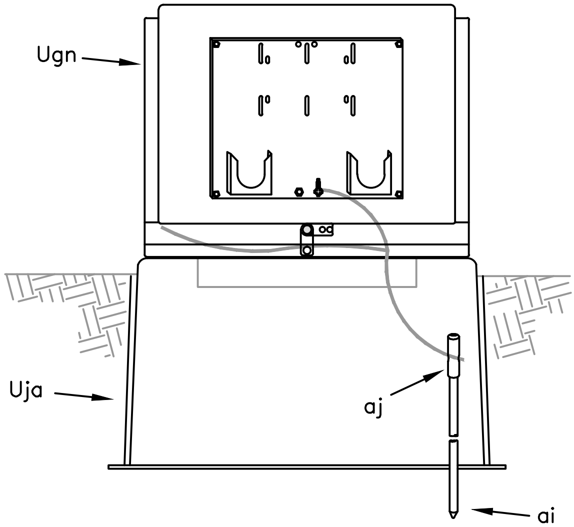


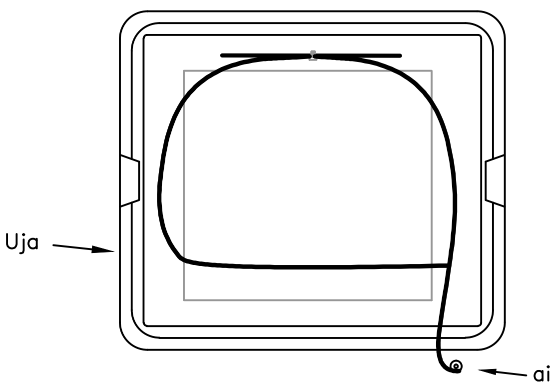
GROUNDING DIAGRAM

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	10	Conductor No. 4 S.D. copper
ai	1	Rod, ground 5/8" x 8'	Ugn	1	Pedestal, single phase
aj	1	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required		1	Pad adapter for single phase

SECTIONALIZING ENCLOSURE
SINGLE PHASE 200 AMP

SEP. 2009	CHELCO	UM3-14



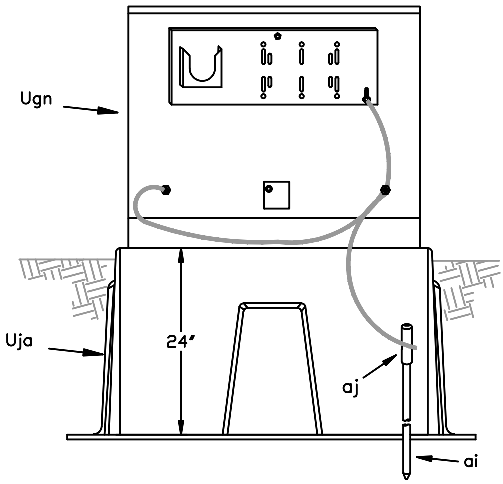


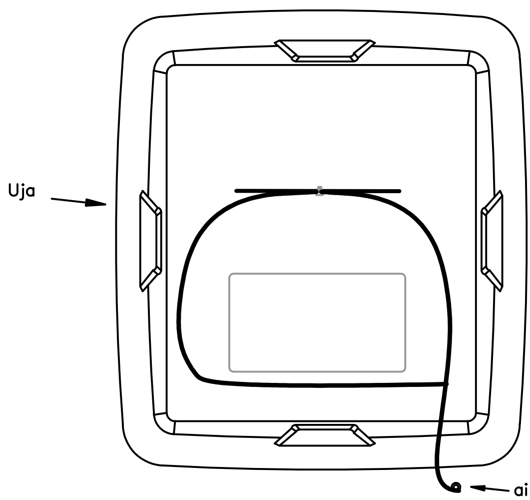
GROUNDING DIAGRAM

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	10	Conductor No. 4 S.D. copper
ai	1	Rod, ground 5/8" x 8'	Ugn	1	Pedestal, single phase fiberglass
aj	1	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

SECTIONALIZING ENCLOSURE
SINGLE PHASE 200 AMP
FIBERGLASS

MAY 2014	CHELCO	UM3-14F



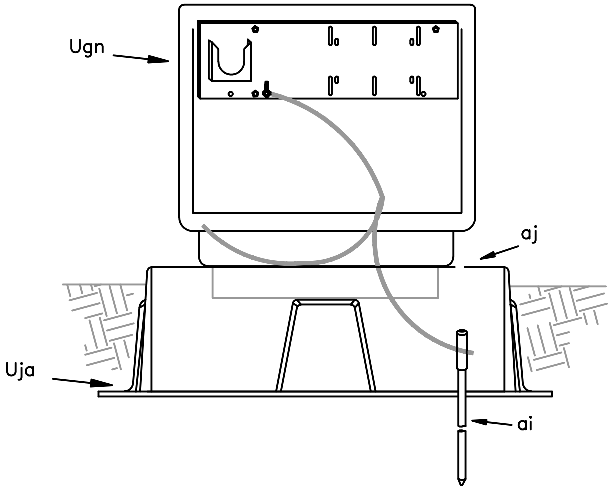


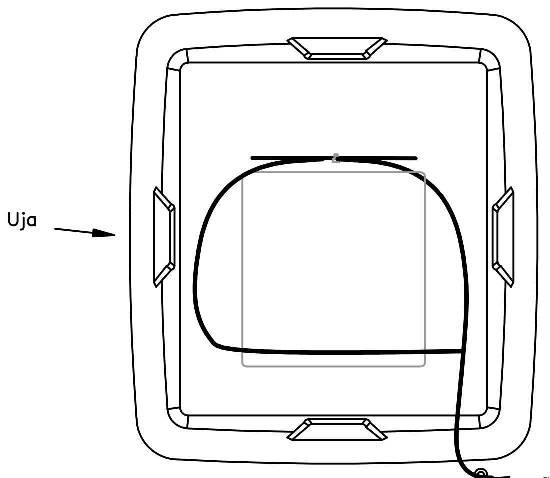
GROUNDING DIAGRAM

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	10	Conductor No. 4 S.D. copper
ai	1	Rod, ground 5/8" x 8'	Ugn	1	Pedestal, single phase dummy
aj	1	Clamp, ground rod	Uja	1	Ground sleeve, 24"
av	*	Jumpers, as required			

SECTIONALIZING ENCLOUSURE
SINGLE PHASE 200 AMP
24" PAD

SEP. 2009	CHELCO	UM3-15



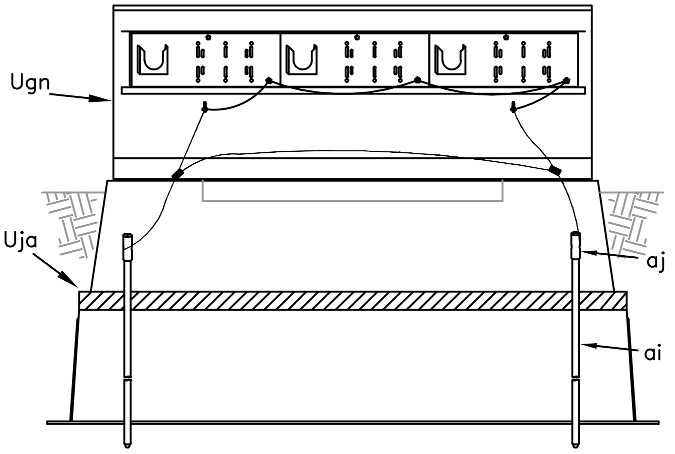


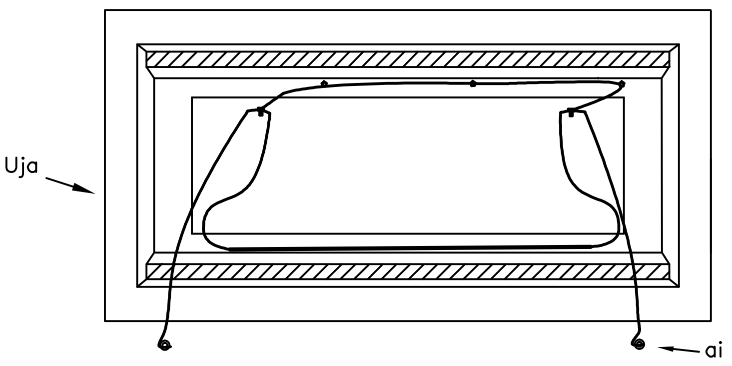
GROUNDING DIAGRAM

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	10	Conductor No. 4 S.D. copper
ai	1	Rod, ground 5/8" x 8'	Ugn	1	Deferral cabinet, single phase
aj	1	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

DEFERRAL CABINET
SINGLE PHASE

SEP. 2009	CHELCO	UM3-16



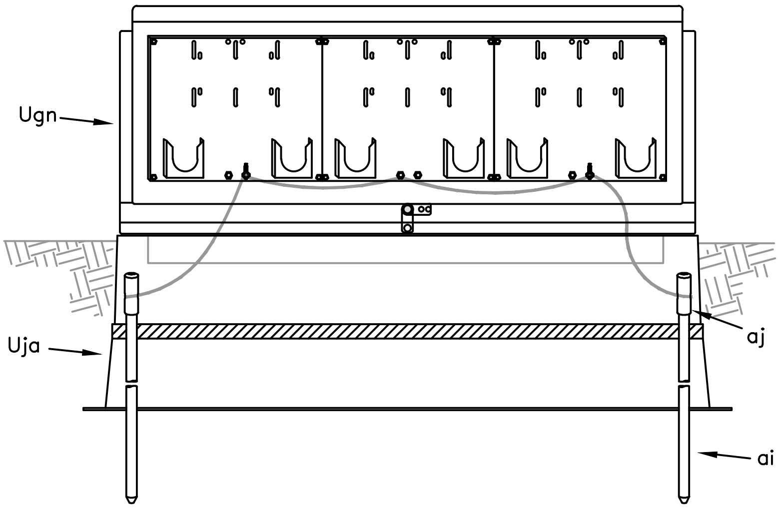


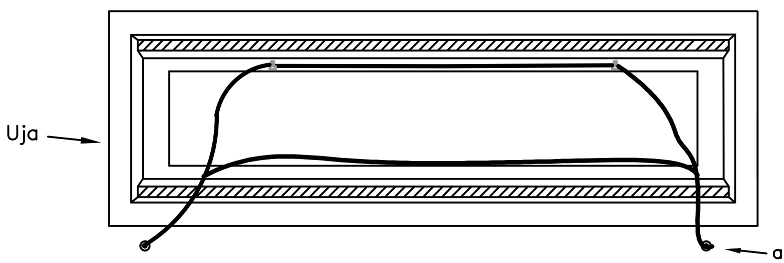
GROUNDING DIAGRAM

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	15	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Enclosure, three phase
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

SECTIONALIZING ENCLOSURE
THREE PHASE

MAY 2014 | CHELCO | UM33



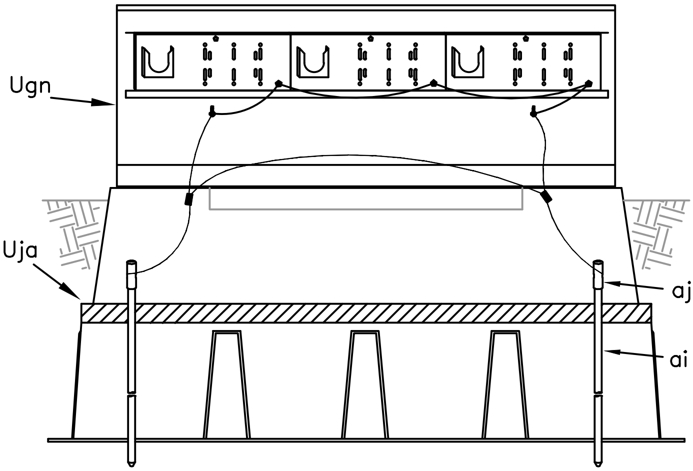


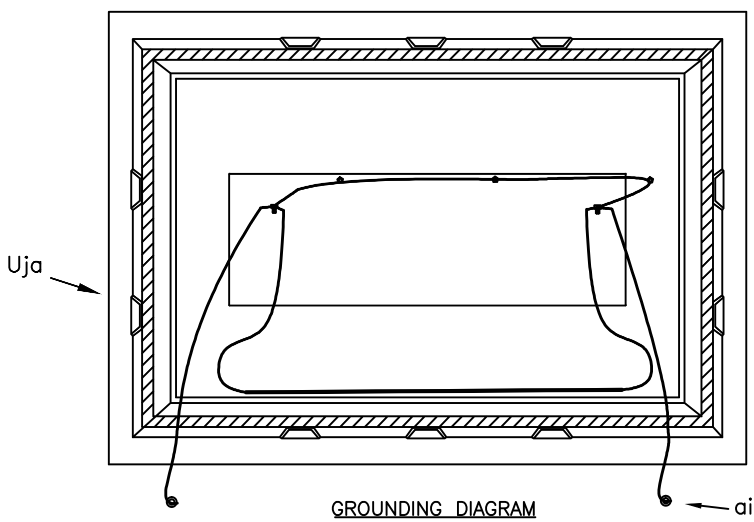
GROUNDING DIAGRAM

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	15	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Pedestal, three phase fiberglass
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

SECTIONALIZING ENCLOSURE
THREE PHASE
FIBERGLASS

MAY 2014 | CHELCO | UM33F



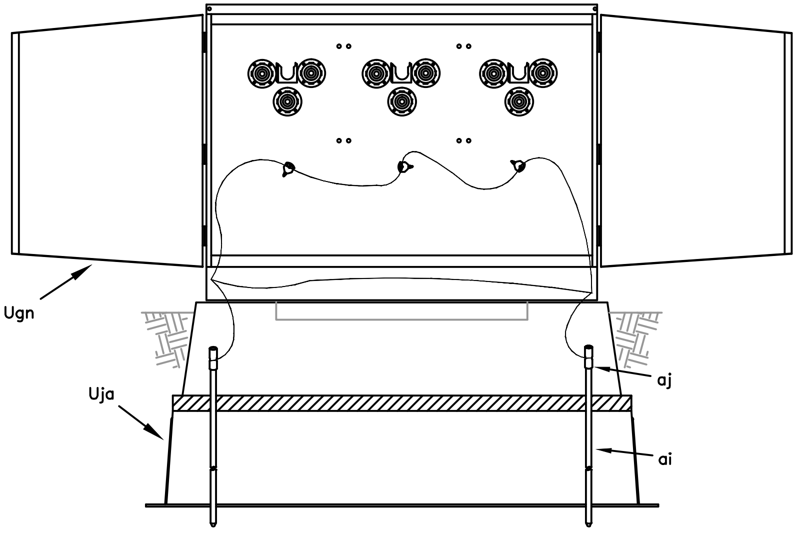


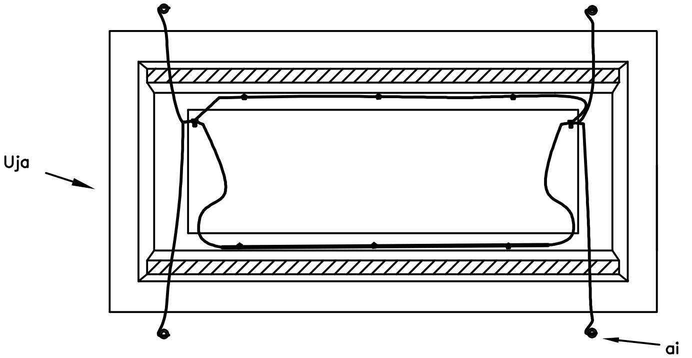
GROUNDING DIAGRAM

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	15	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Enclosure, three phase
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

SECTIONALIZING ENCLOSURE
THREE PHASE

MAY 2014	CHELCO	UM34



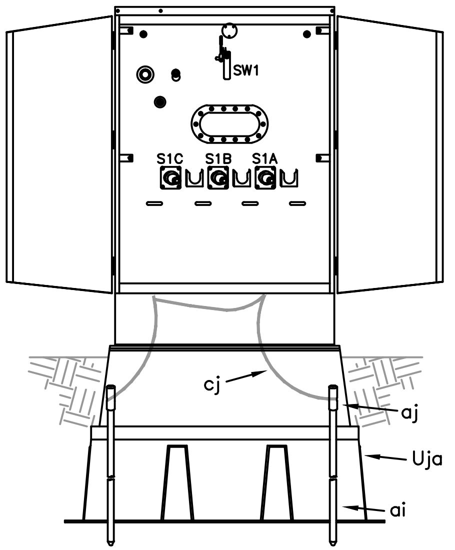


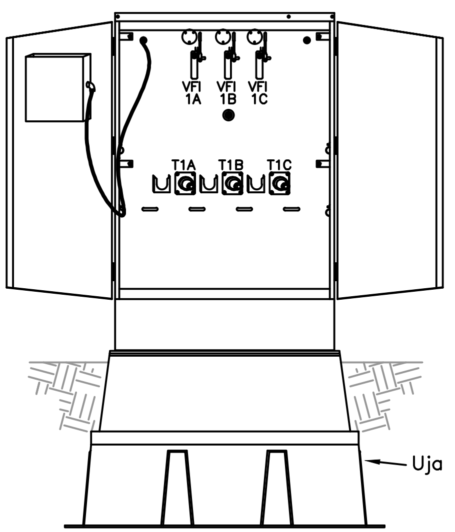
GROUNDING DIAGRAM

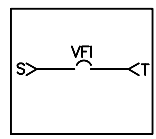
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	30	Conductor No. 2 S.D. copper
ai	4	Rod, ground 5/8" x 8'	Ugn	1	Enclosure, three phase
aj	4	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

SECTIONALIZING ENCLOSURE
DOUBLE CIRCUIT THREE PHASE

MAY 2014	CHELCO	DCUM33







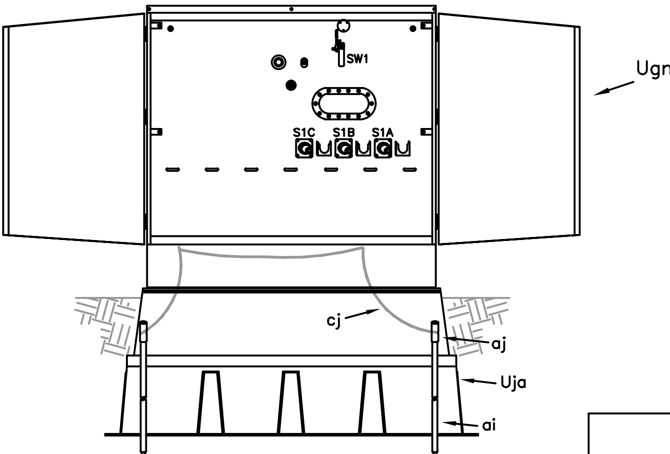
CIRCUIT CONFIGURATION

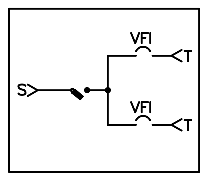
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, VFI model 5, 2 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

1–200 AMP GANGED SWITCH
1–200 AMP VFI TAP

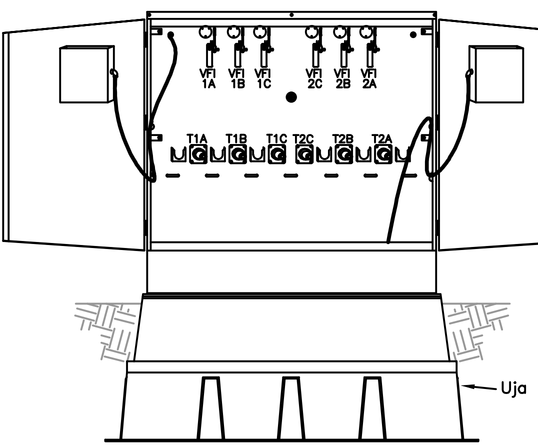
COOPER SWITCHGEAR
2 WAY

OCT. 2009	CHELCO	UM3E–CP–211B



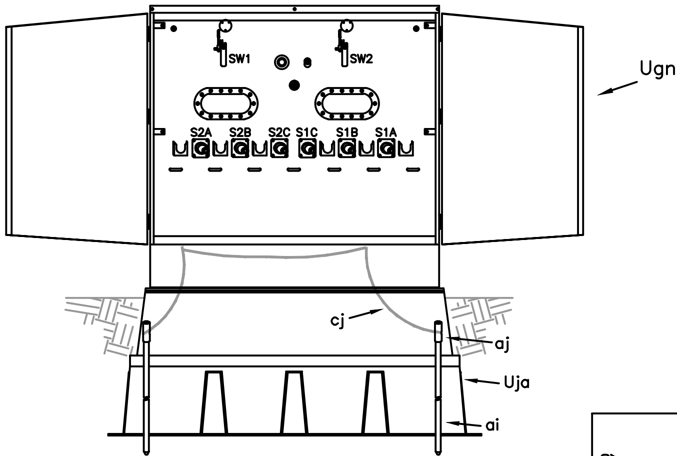


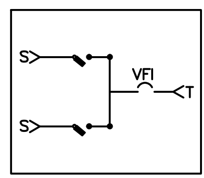
CIRCUIT CONFIGURATION



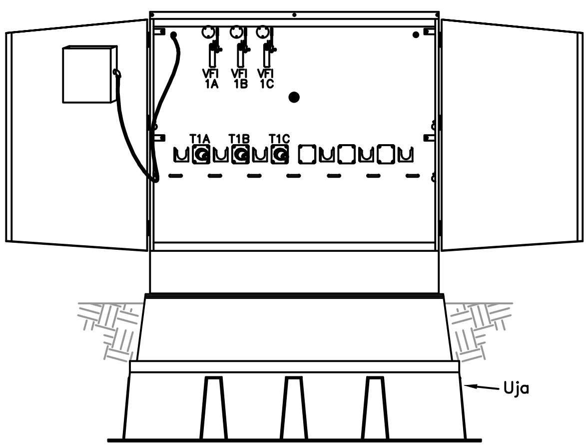
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, VFI model 7, 3 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

1-200 AMP GANGED SWITCH 2-200 AMP VFI TAPS	COOPER SWITCHGEAR 3 WAY		
	OCT. 2009	CHELCO	UM3E-CP-312B





CIRCUIT
CONFIGURATION

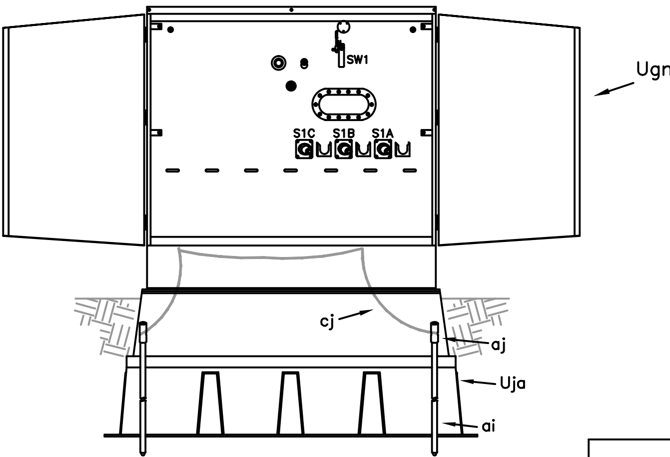


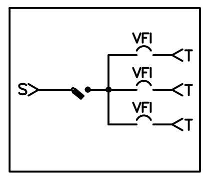
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, VFI model 6, 3 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2–200 AMP GANGED SWITCHES
1–200 AMP VFI TAP

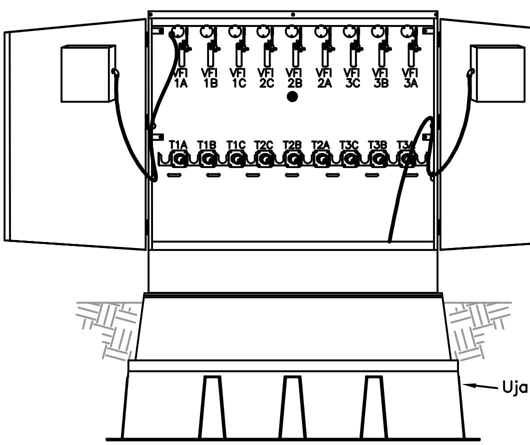
COOPER SWITCHGEAR
3 WAY

OCT. 2009	CHELCO	UM3E–CP–321B





CIRCUIT
CONFIGURATION

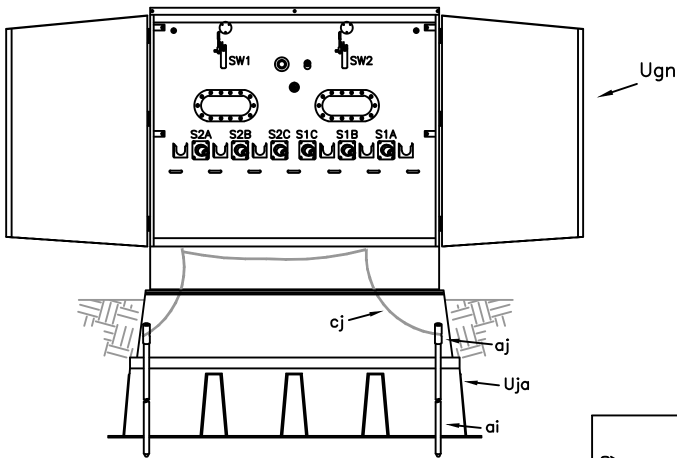


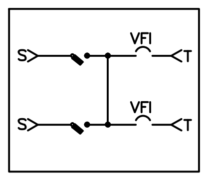
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, VFI model 12, 4 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

1–200 AMP GANGED SWITCH
3–200 AMP VFI TAPS

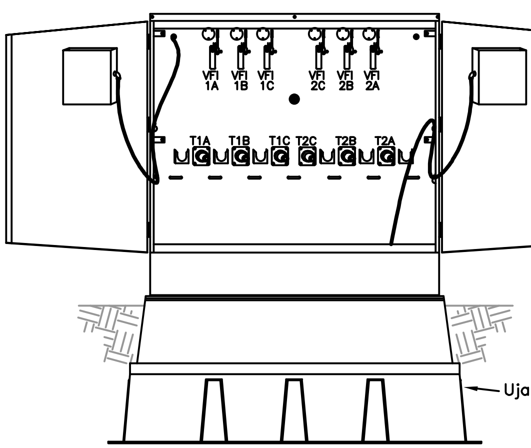
COOPER SWITCHGEAR
4 WAY

OCT. 2009	CHELCO	UM3E–CP–413B





CIRCUIT CONFIGURATION

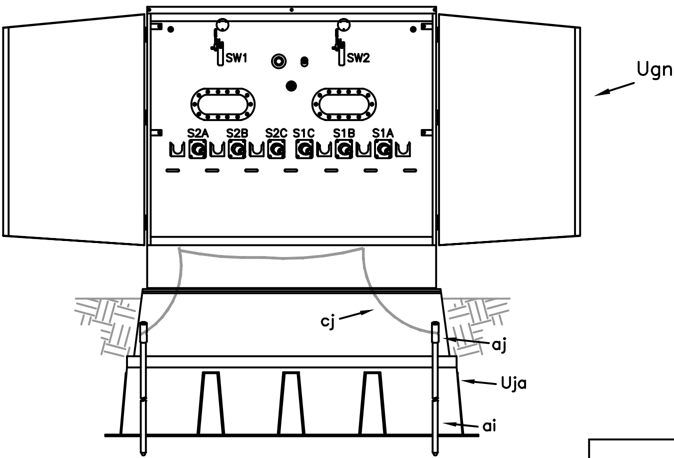


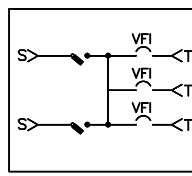
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, VFI model 9, 4 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2–200 AMP GANGED SWITCHES
2–200 AMP VFI TAPS

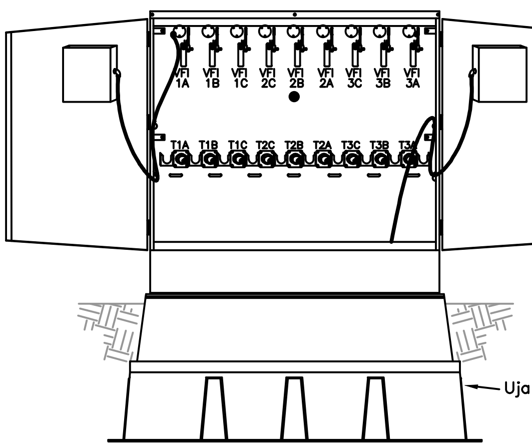
COOPER SWITCHGEAR
4 WAY

OCT. 2009	CHELCO	UM3E-CP-422B





CIRCUIT CONFIGURATION

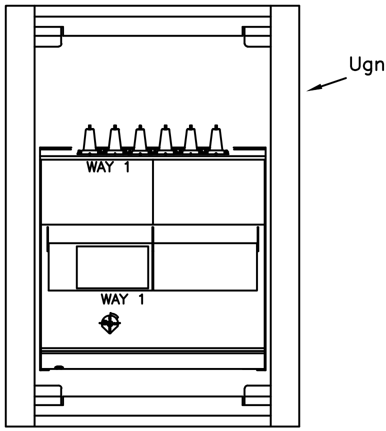


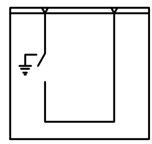
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, VFI model 10, 5 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2-600 AMP GANGED SWITCHES
3-200 AMP VFI TAPS

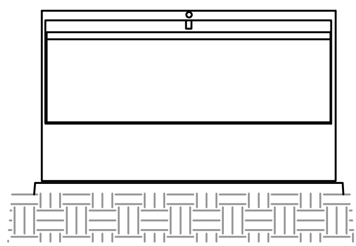
COOPER SWITCHGEAR
5 WAY

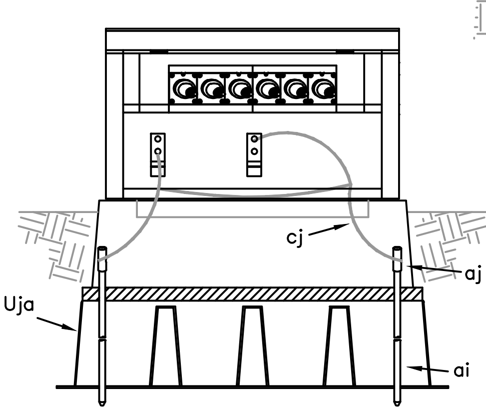
OCT. 2009	CHELCO	UM3E-CP-523A





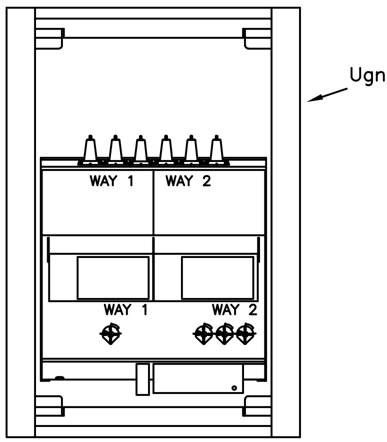
CIRCUIT
CONFIGURATION

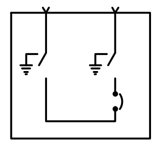




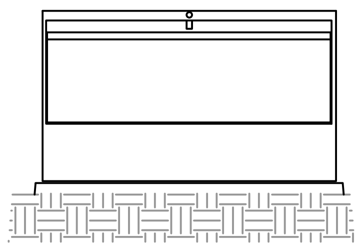
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	10	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 210, 2 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

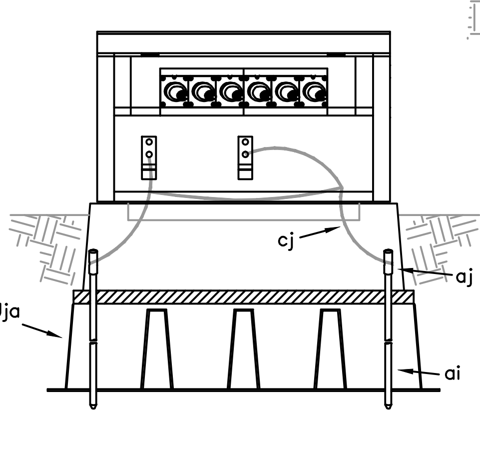
1–600 AMP GANGED SWITCH	S & C VISTA SWITCHGEAR 2 WAY		
	SEP. 2009	CHELCO	UM3E–SC–210





CIRCUIT
CONFIGURATION



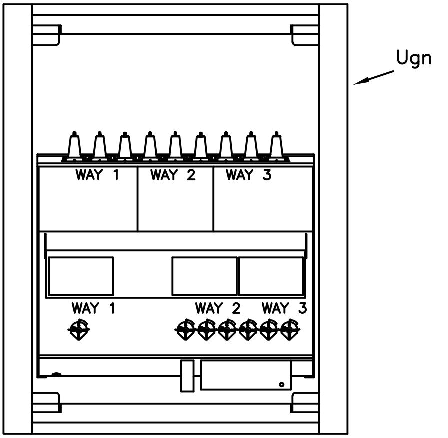


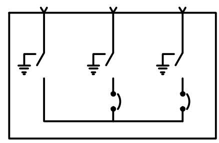
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	10	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 211, 2 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

1-600 AMP GANGED SWITCH
1-600 AMP VFI TAP

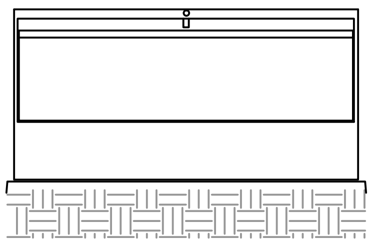
S & C VISTA SWITCHGEAR
2 WAY

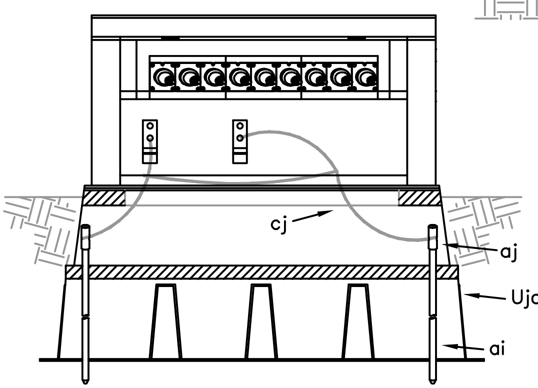
SEP. 2009	CHELCO	UM3E-SC-211





CIRCUIT
CONFIGURATION



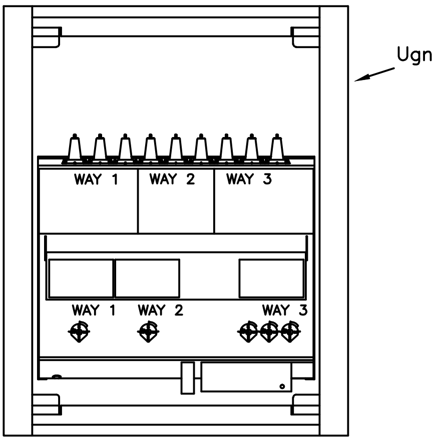


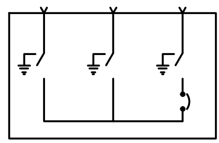
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 312, 3 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

1–600 AMP GANGED SWITCH
2–600 AMP VFI TAPS

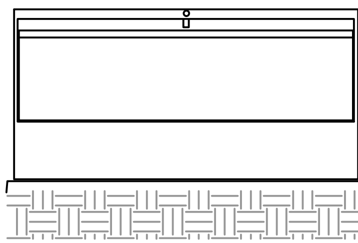
S & C VISTA SWITCHGEAR
3 WAY

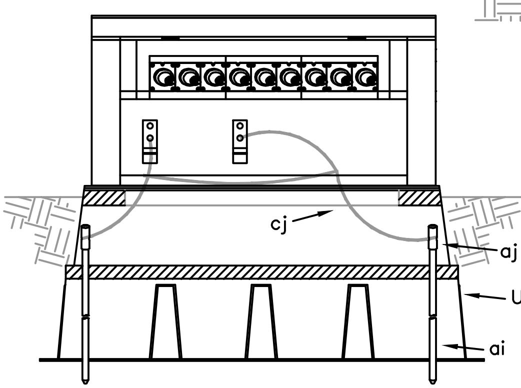
SEP. 2009 | CHELCO | UM3E–SC–312





CIRCUIT
CONFIGURATION





NOTES:

1. 'A' denotes 600 amp ganged switch and 200 amp VFI tap.

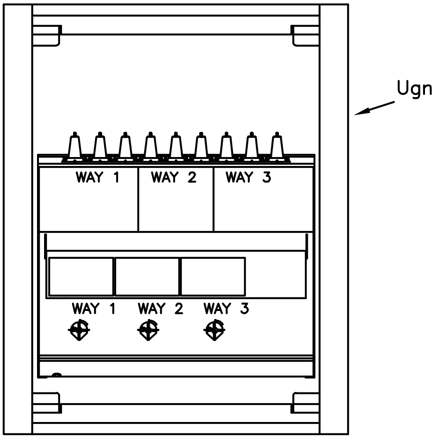
2. 'B' denotes 200 amp ganged switch and 200 amp VFI tap.

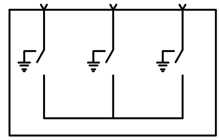
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 321, 3 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2–600 AMP GANGED SWITCHES
1–600 AMP VFI TAP

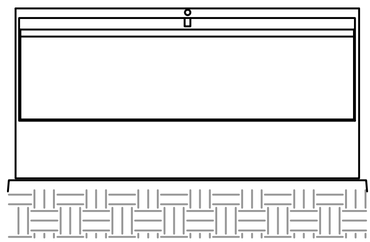
S & C VISTA SWITCHGEAR
3 WAY

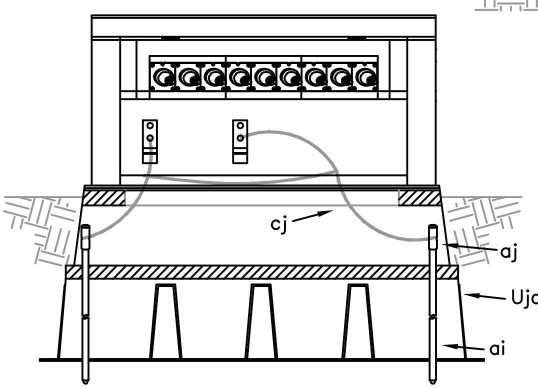
SEP. 2009	CHELCO	UM3E–SC–321 UM3E–SC–321A UM3E–SC–321B





CIRCUIT CONFIGURATION



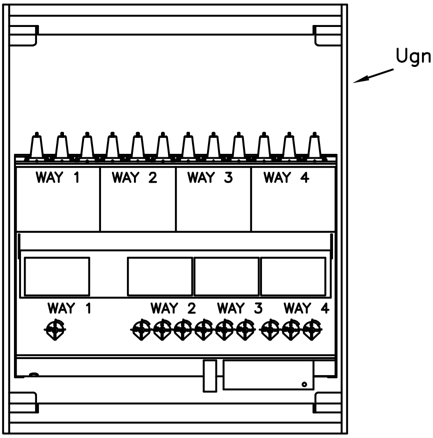


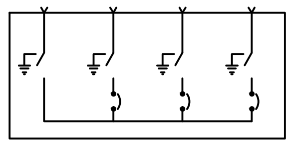
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 330, 3 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

3-600 AMP GANGED SWITCHES

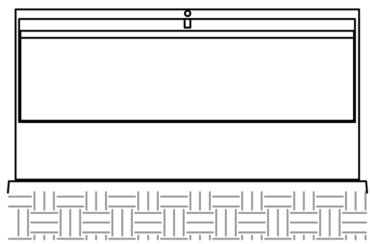
S & C VISTA SWITCHGEAR
3 WAY

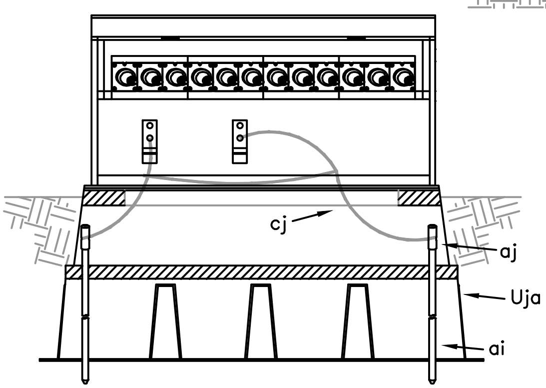
SEP. 2009	CHELCO	UM3E-SC-330





CIRCUIT CONFIGURATION





NOTES:

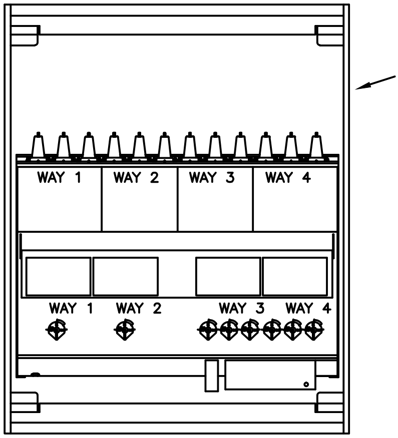
1. 'A' denotes 600 amp ganged switch and 200 amp VFI tap.

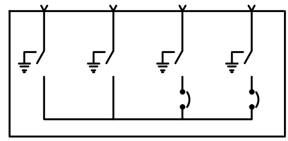
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 413, 4 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

1–600 AMP GANGED SWITCH
3–600 AMP VFI TAPS

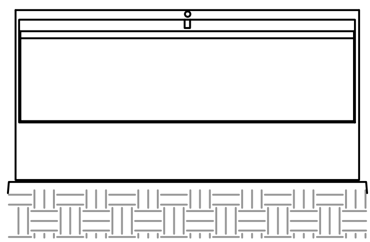
S & C VISTA SWITCHGEAR
4 WAY

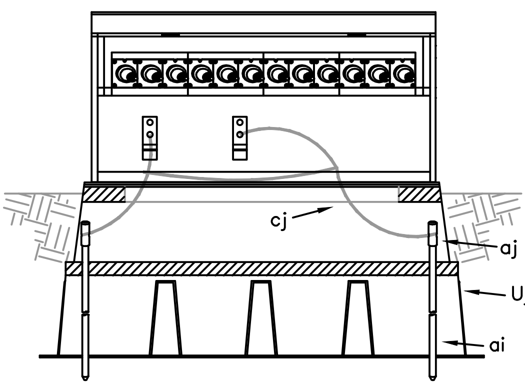
SEP. 2009	CHELCO	UM3E–SC–413 UM3E–SC–413A





CIRCUIT
CONFIGURATION





NOTES:

1. 'A' denotes 600 amp ganged switch and 200 amp VFI tap.

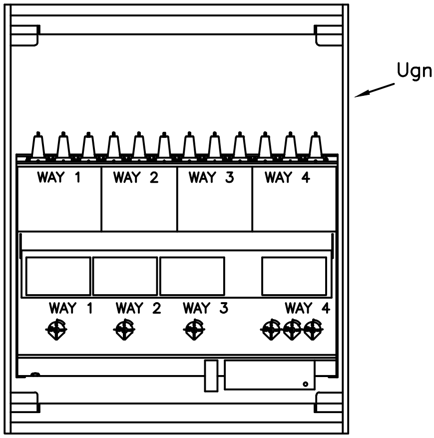
2. 'B' denotes 200 amp ganged switch and 200 amp VFI tap.

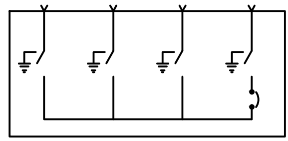
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 422, 4 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2–600 AMP GANGED SWITCHES
2–600 AMP VFI TAPS

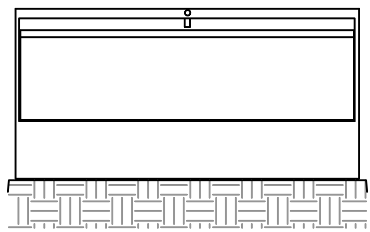
S & C VISTA SWITCHGEAR
4 WAY

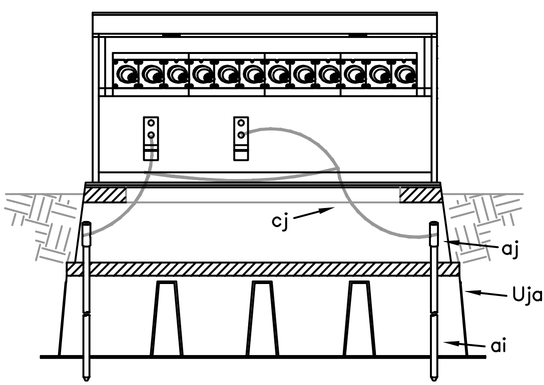
SEP. 2009	CHELCO	UM3E–SC–422 UM3E–SC–422A UM3E–SC–422B





CIRCUIT
CONFIGURATION



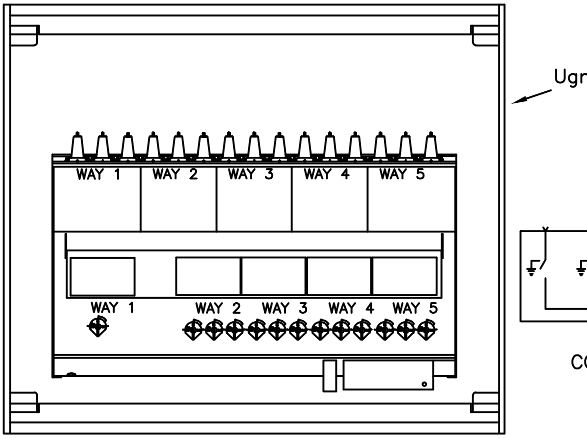


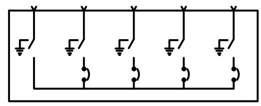
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 431, 4 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

3–600 AMP GANGED SWITCHES
1–600 AMP VFI TAP

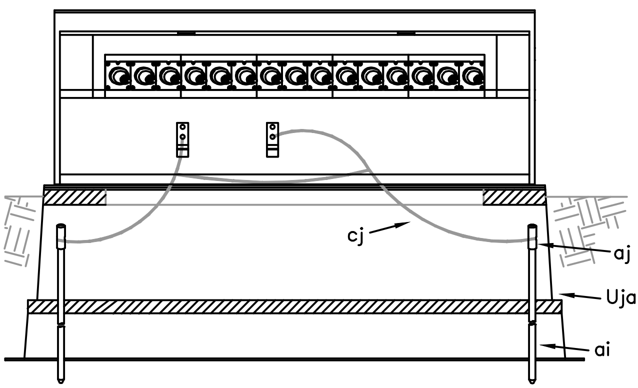
S & C VISTA SWITCHGEAR
4 WAY

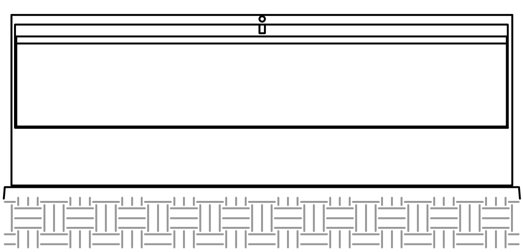
SEP. 2009	CHELCO	UM3E–SC–431





CIRCUIT CONFIGURATION

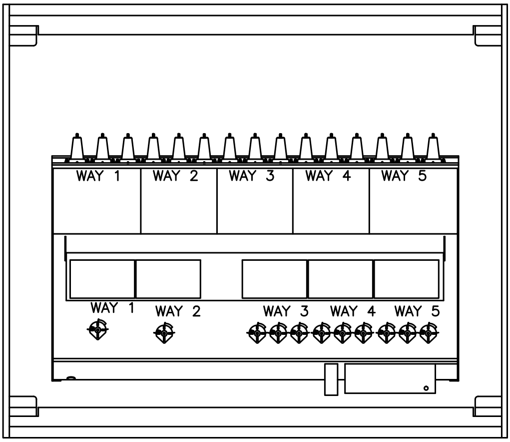


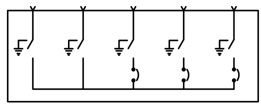


NOTES:
1. 'A' denotes 600 amp ganged switch, and 200 amp VFI tap.

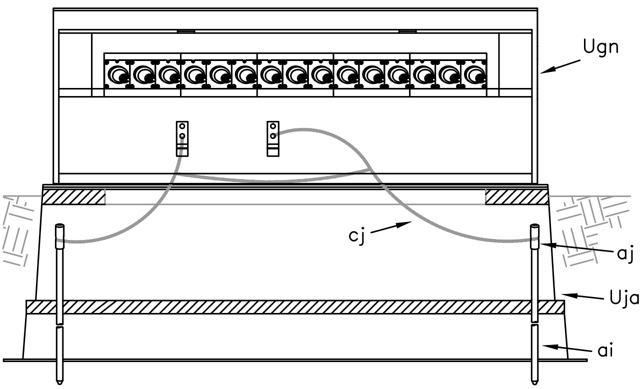
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 514, 5 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

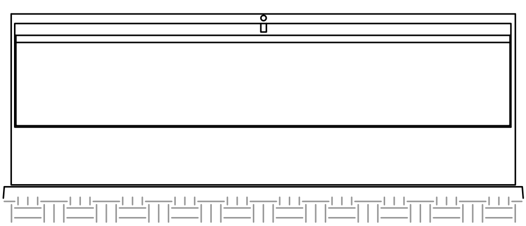
1-600 AMP GANGED SWITCH 4-600 AMP VFI TAPS	S & C VISTA SWITCHGEAR 5 WAY		
	SEP. 2009	CHELCO	UM3E-SC-514 UM3E-SC-514A





CIRCUIT CONFIGURATION





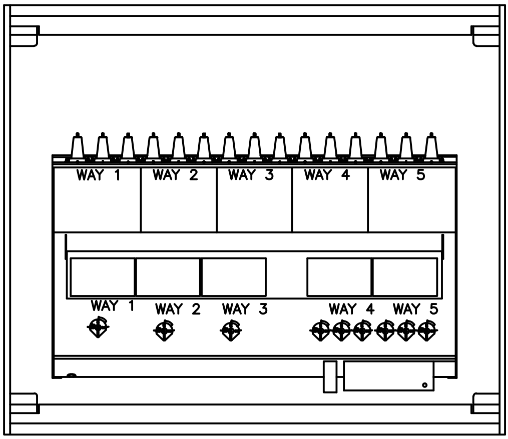
NOTES:
SS indicates stainless steel.

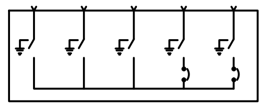
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 523, 5 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2–600 AMP GANGED SWITCHES
3–600 AMP VFI TAPS

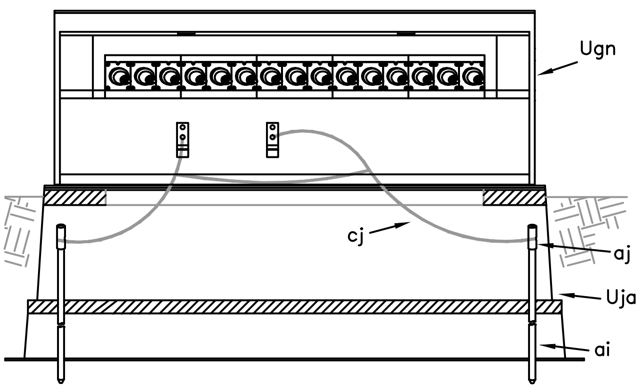
S & C VISTA SWITCHGEAR
5 WAY

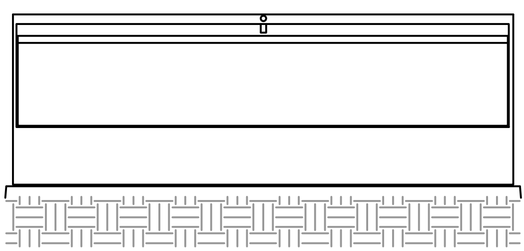
MAR. 2012	CHELCO	UM3E–SC–523 UM3E–SC–523SS





CIRCUIT CONFIGURATION



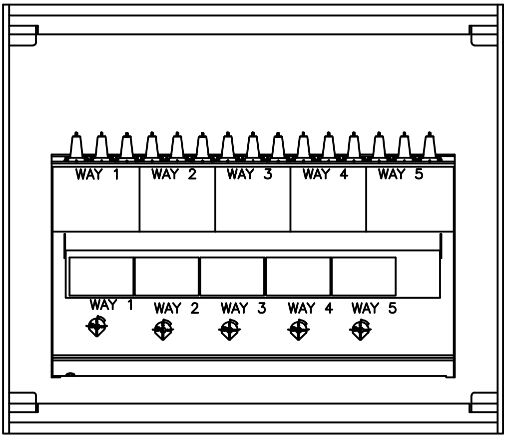


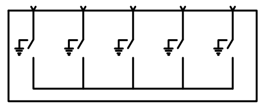
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 532, 5 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

3-600 AMP GANGED SWITCHES
2-600 AMP VFI TAPS

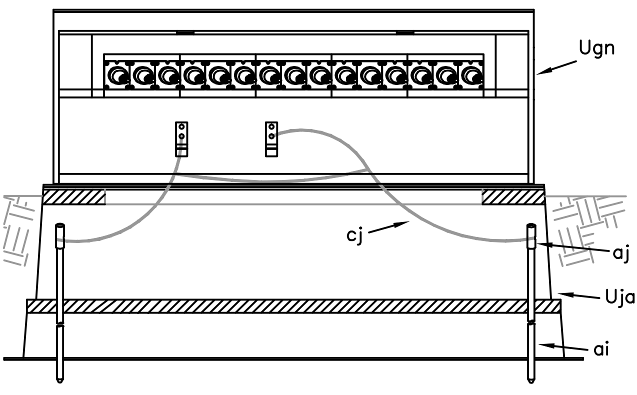
S & C VISTA SWITCHGEAR
5 WAY

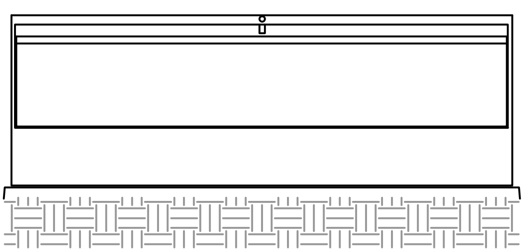
OCT. 2009	CHELCO	UM3E-SC-532





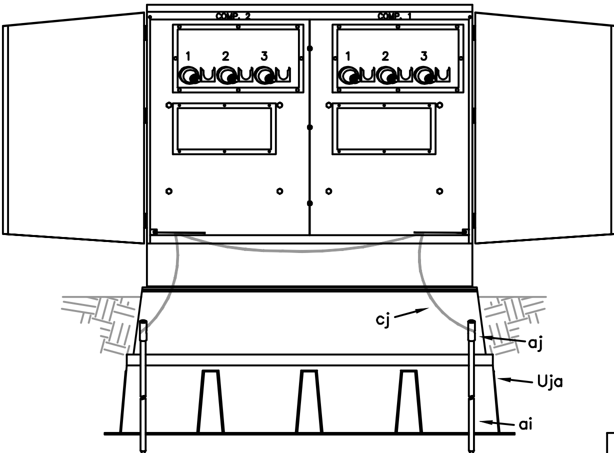
CIRCUIT CONFIGURATION

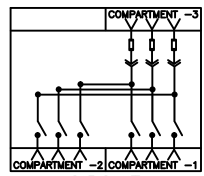




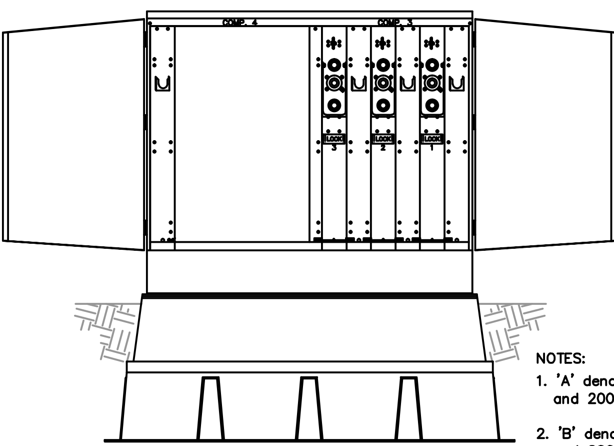
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 550, 5 way
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

5-600 AMP GANGED SWITCHES	S & C VISTA SWITCHGEAR 5 WAY		
	OCT. 2009	CHELCO	UM3E-SC-550





CIRCUIT
CONFIGURATION



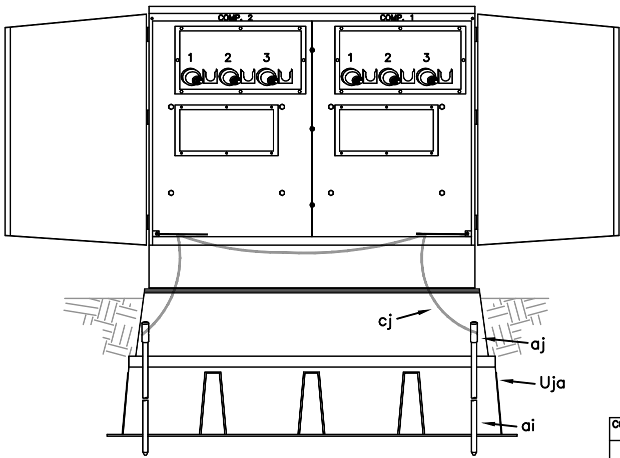
NOTES:

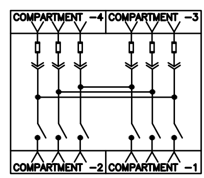
1. 'A' denotes 600 amp ganged switch and 200 amp VFI tap.

2. 'B' denotes 200 amp ganged switch and 200 amp VFI tap.

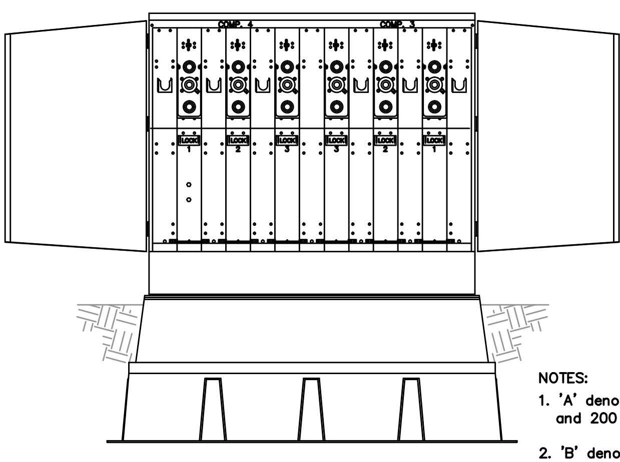
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper, as req'd
ai	2	Rod, ground 5/8" x 8'	cj	20	Conductor No. 4 S.D. copper, as req'd
aj	2	Clamp, ground rod	Ugn	1	Switch, 200 AMP model 6, deadfront
av	*	Jumpers, as required	Uja	1	Ground sleeve

2-GANGED SWITCHES 1-FUSED TAP	FUSED SWITCHGEAR 3 WAY		
	NOV. 2009	CHELCO	UM3F-ME-321A UM3F-ME-321B





CIRCUIT
CONFIGURATION



NOTES:

1. 'A' denotes 600 amp ganged switch and 200 amp fused tap.

2. 'B' denotes 200 amp ganged switch and 200 amp fused tap.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper, as req'd
ai	2	Rod, ground 5/8" x 8'	cj	20	Conductor No. 4 S.D. copper, as req'd
aj	2	Clamp, ground rod	Ugn	1	Switch, model 9, deadfront
av	*	Jumpers, as required	Uja	1	Ground sleeve

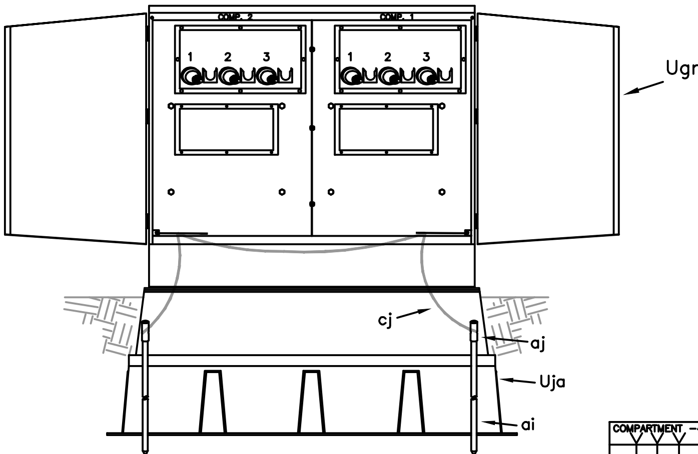
2-GANGED SWITCHES
2-FUSED TAPS

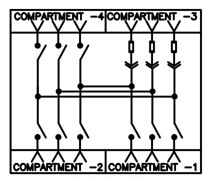
FUSED SWITCHGEAR
4 WAY

NOV. 2009

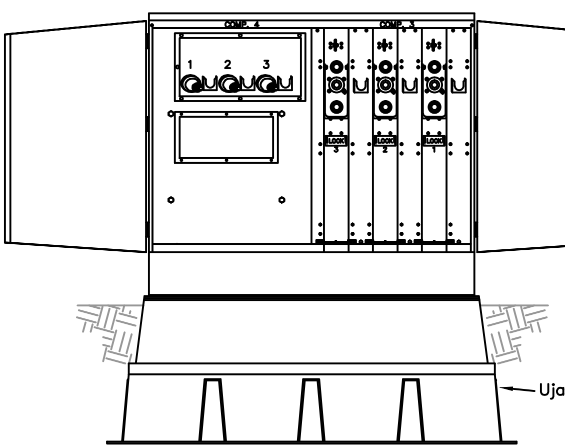
CHELCO

UM3F-ME-422A
UM3F-ME-422B





CIRCUIT CONFIGURATION

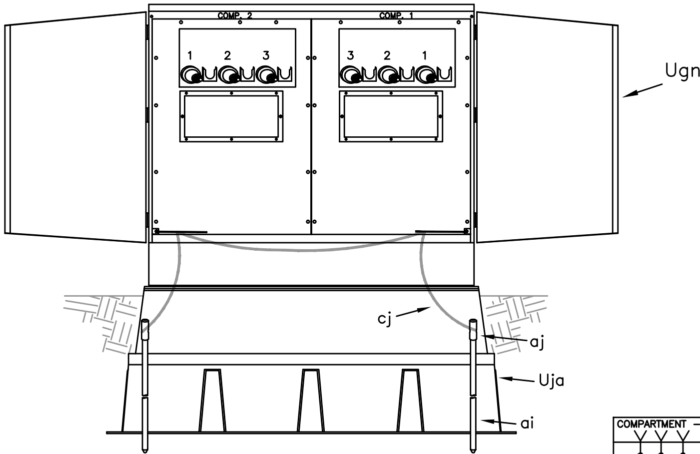


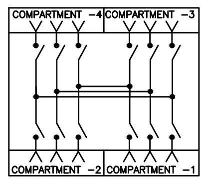
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, 600 AMP model 11, deadfront
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

3-600 AMP GANGED SWITCHES
1-200 AMP FUSED TAP

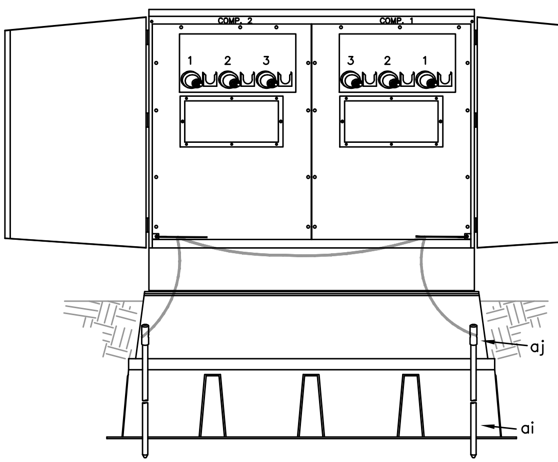
FUSED SWITCHGEAR
4 WAY

NOV. 2009	CHELCO	UM3F-ME-431A





CIRCUIT
CONFIGURATION

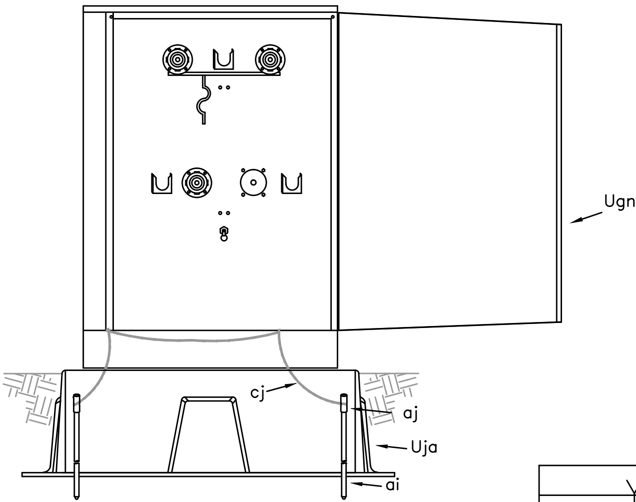


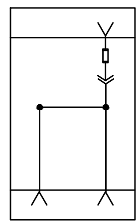
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	30	Conductor No. 2 S.D. copper, as req'd
ai	4	Rod, ground 5/8" x 8'	Ugn	1	Switch, model 10, deadfront
aj	4	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

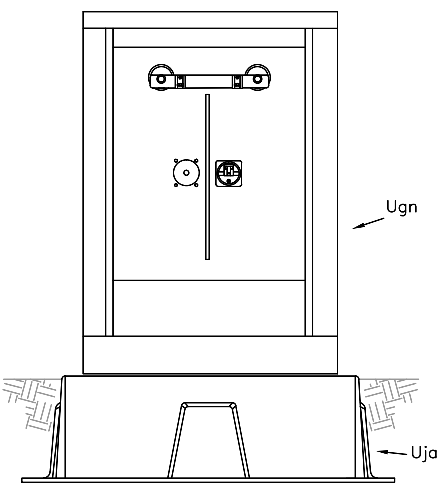
4-600 AMP GANGED SWITCHES

SWITCHGEAR
THREE PHASE

DEC. 2009	CHELCO	UM3F-ME-440

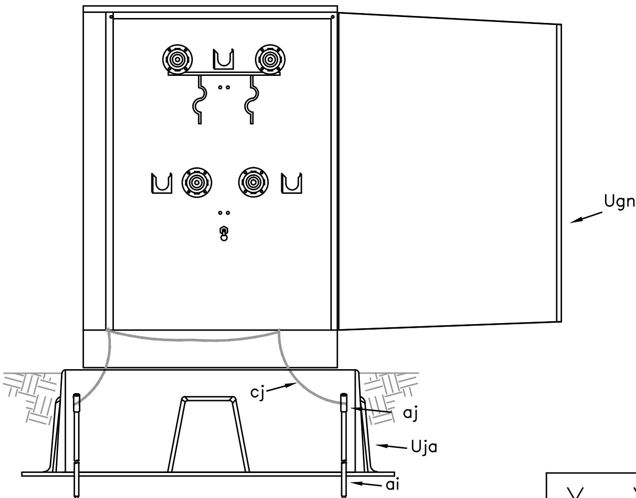


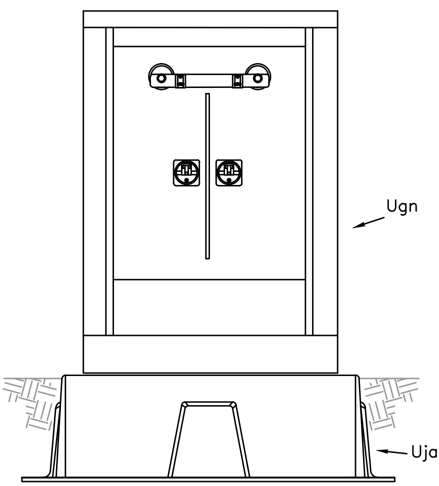


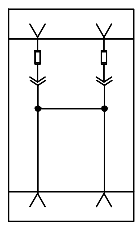


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, 200 amp fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

200 AMP LOOP FEED 1-200 AMP FUSED TAP	FUSED SWITCHGEAR SINGLE PHASE	
DEC. 2009	CHELCO	UM3E-1







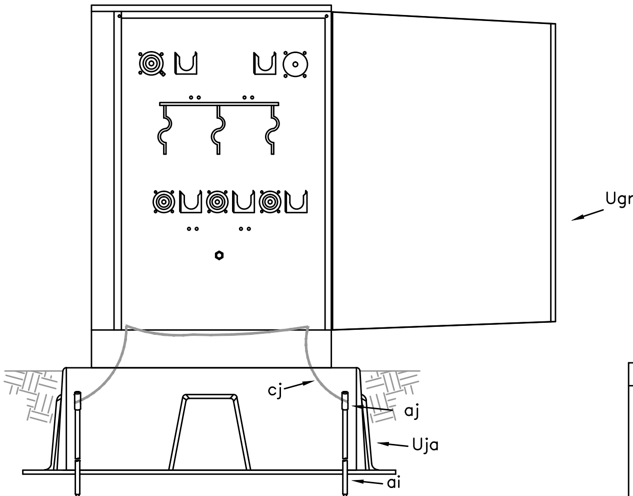
CIRCUIT
CONFIGURATION

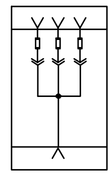
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, 200 amp fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

200 AMP LOOP FEED
2–200 AMP FUSED TAPS

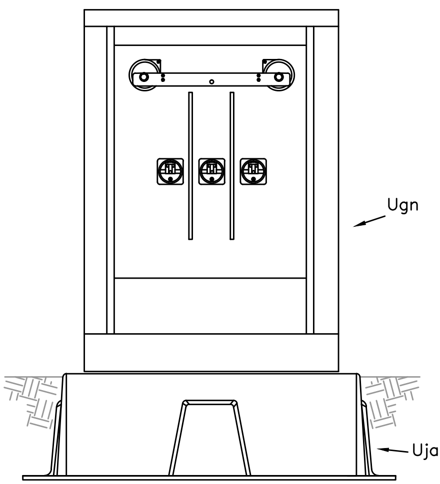
FUSED SWITCHGEAR
SINGLE PHASE

DEC. 2009	CHELCO	UM3E–2





CIRCUIT
CONFIGURATION

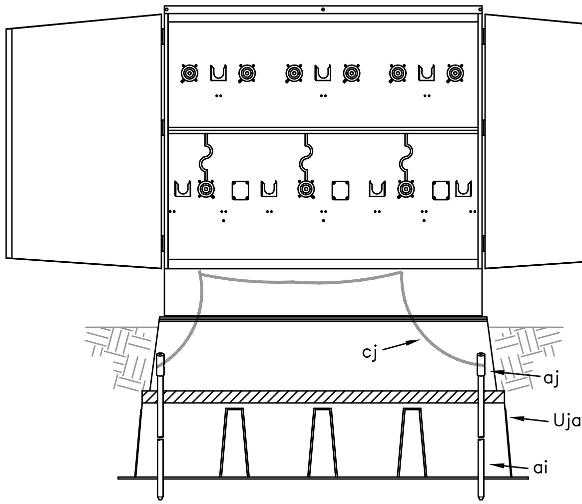


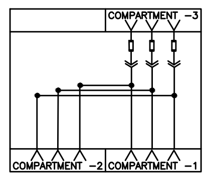
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, 200 amp fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

200 AMP RADIAL FEED
3–200 AMP FUSED TAPS

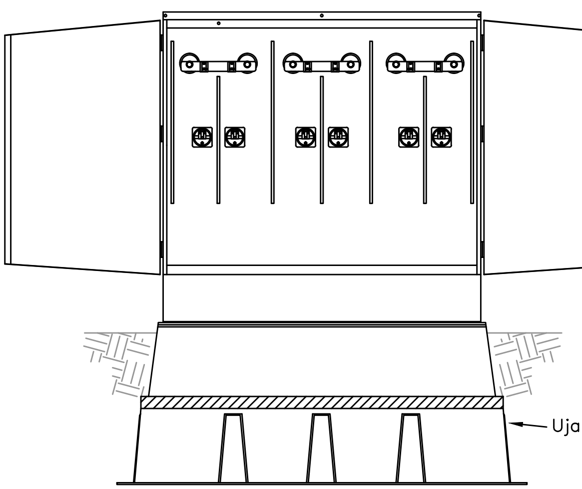
FUSED SWITCHGEAR
SINGLE PHASE

DEC. 2009	CHELCO	UM3F–1D





CIRCUIT CONFIGURATION

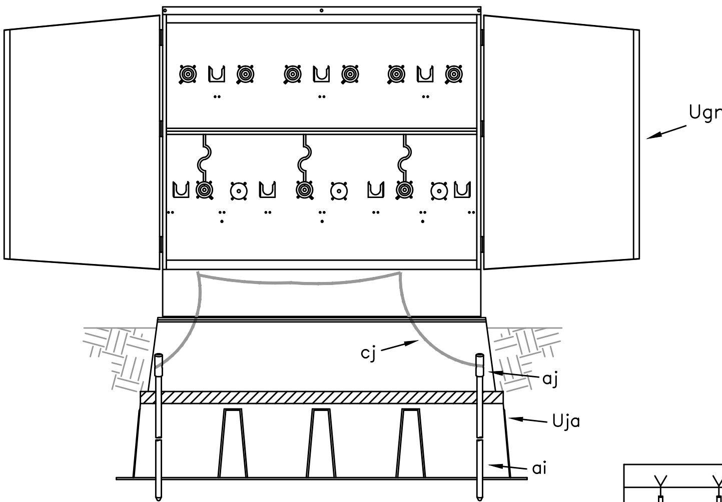


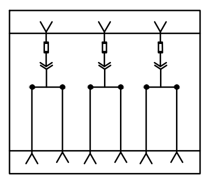
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, 200 amp fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2-200 AMP SWITCHES
1-200 AMP FUSED TAPS

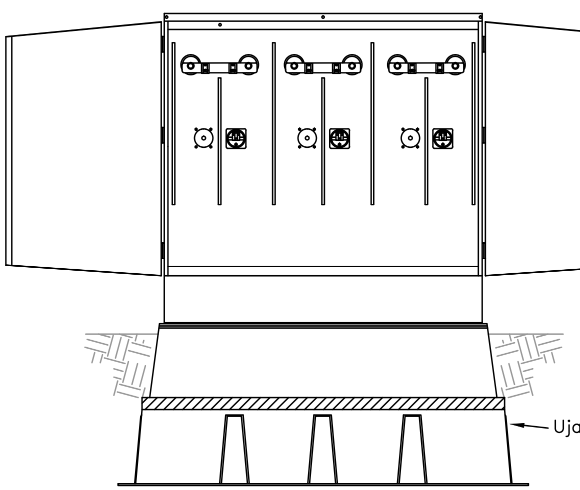
FUSED SWITCHGEAR
3 WAY

DEC. 2009	CHELCO	UM3E-3-3C





CIRCUIT
CONFIGURATION

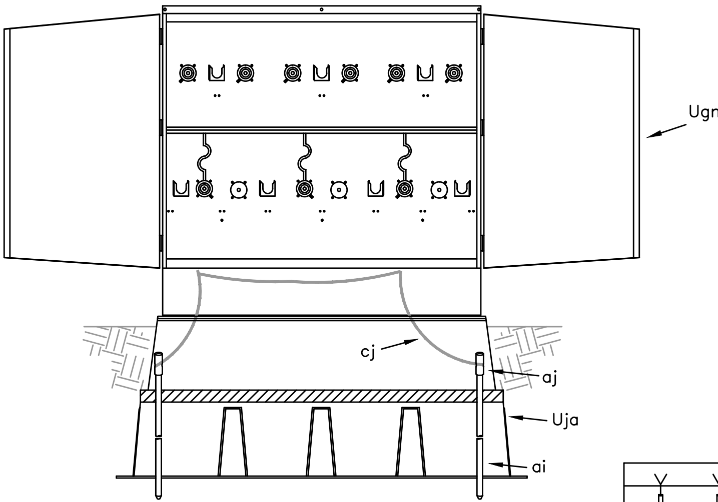


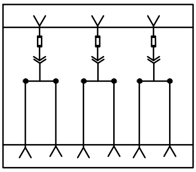
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, 200 amp fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

200 AMP LOOP FEED
1-200 AMP FUSED TAP PER PHASE

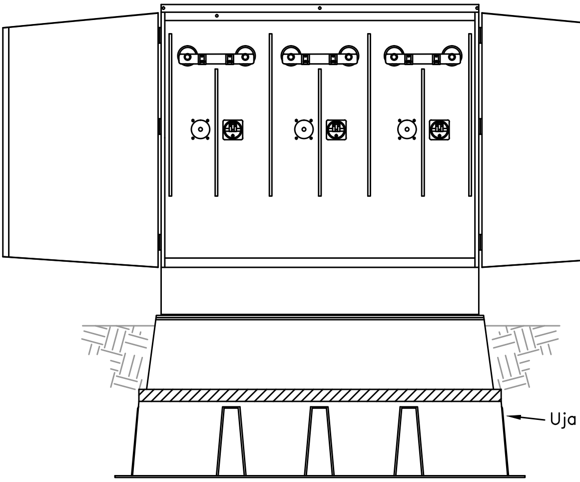
FUSED SWITCHGEAR
THREE PHASE

DEC. 2009	CHELCO	UM3E-3-3C2





CIRCUIT
CONFIGURATION

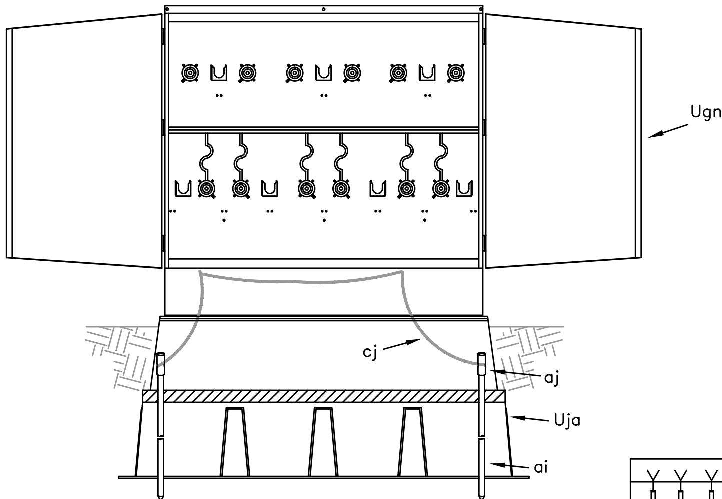


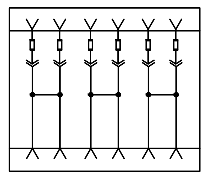
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

600 AMP LOOP FEED
1-200 AMP FUSED TAP PER PHASE

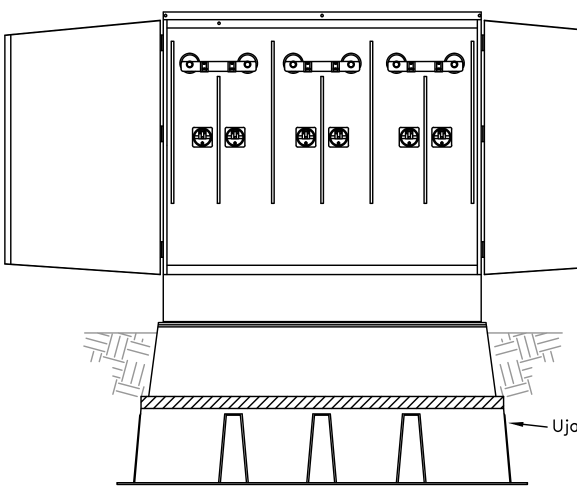
FUSED SWITCHGEAR
THREE PHASE

DEC. 2009 | CHELCO | UM3E-3-3C6





CIRCUIT CONFIGURATION

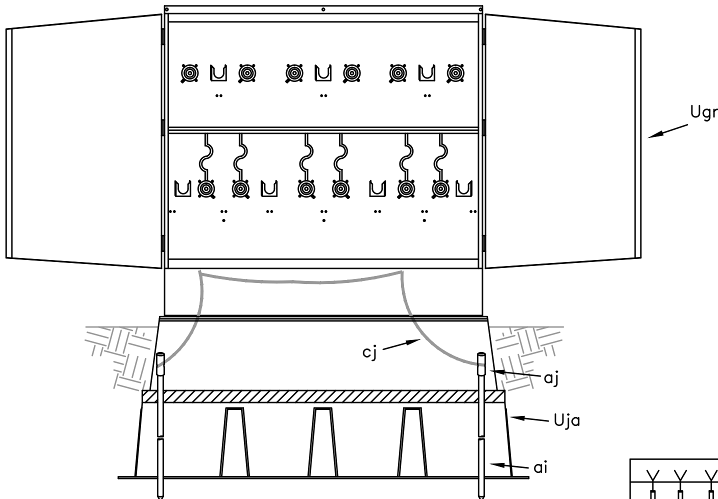


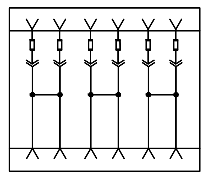
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 4 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, 200 amp fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2-200 AMP LOOP FEED
2-200 AMP FUSED TAPS PER PHASE

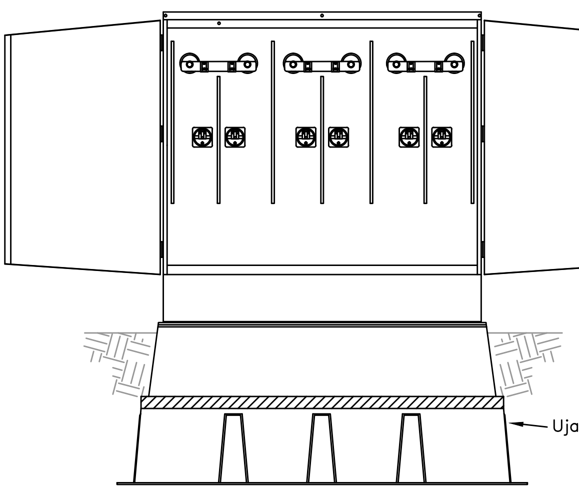
FUSED SWITCHGEAR
THREE PHASE

DEC. 2009	CHELCO	UM3E-3-3D2



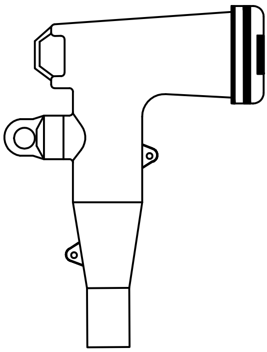


CIRCUIT CONFIGURATION

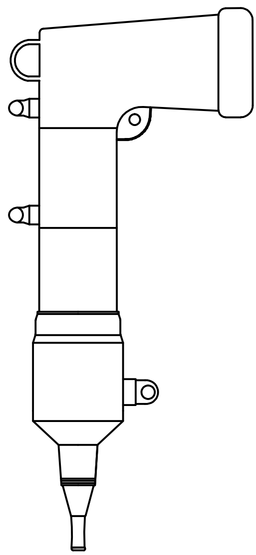


ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	cj	20	Conductor No. 2 S.D. copper
ai	2	Rod, ground 5/8" x 8'	Ugn	1	Switch, fused
aj	2	Clamp, ground rod	Uja	1	Ground sleeve
av	*	Jumpers, as required			

2-600 AMP LOOP FEED 2-200 AMP FUSED TAPS PER PHASE	FUSED SWITCHGEAR THREE PHASE		
	DEC. 2009	CHELCO	UM3E-3-3D6



UM6-1
UM6-1(4/0)
ELBOW MODULE



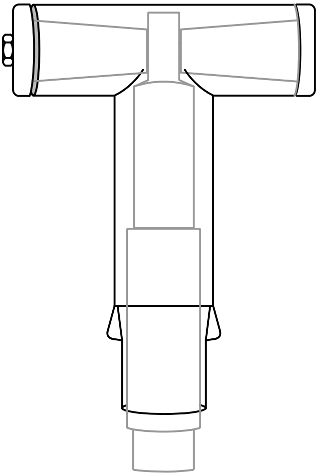
UM6-1/0F
FUSED ELBOW

ITEM	MATERIAL	ASSEMBLY UNIT UM6-1	UM6-1(4/0)	UM6-1/0F
	Coldshrink 8452 Sealing kit	1	1	
Uhp	Elbow Module 1/0 AL 15kV	1		
Uhp	Elbow Module 4/0 AL 15kV		1	
Uhp	Elbow Module 1/0, fused			1
	Fuse, 8 amp for 1/0 elbow			1

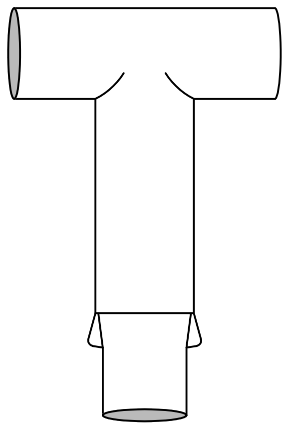
MISCELLANEOUS ASSEMBLIES

JUNE 2009	CHELCO	UM6-1 UM6-1(4/0) UM6-1/0F

Assembled



UM6-1/OT
UM6-1000T
UM6-4/OT
UM6-750T
T-OPP ELBOW MODULE

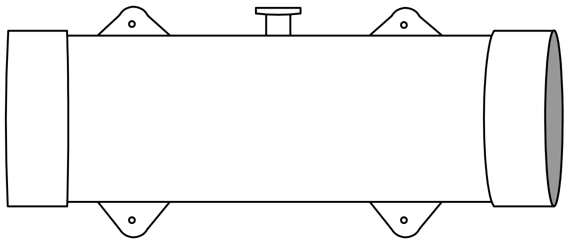


Elbow T body-600 amp
Uhp

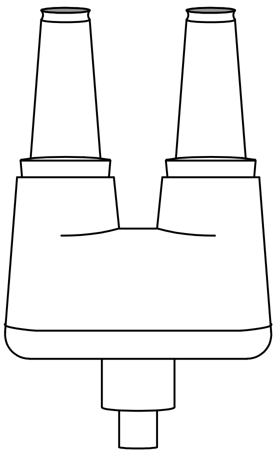
ITEM	MATERIAL	ASSEMBLY UNIT UM6-1/OT	UM6-1000T	UM6-4/OT	UM6-750T
	Adapter cable, size as required	1/0	1000 MCM	4/0	750 MCM
Uhf	Coldshrink seallng kit	8452	8453	8452	8453
	Connector spade, size as required	1/0	1000 MCM	4/0	750 MCM
	Cover, switch module	1	1	1	1
Uhp	Elbow T body-600 amp	1	1	1	1
	Switch module, 15kV 200 amp	1	1	1	1
	Well reducing tap w/stud	1	1	1	1

MISCELLANEOUS ASSEMBLIES

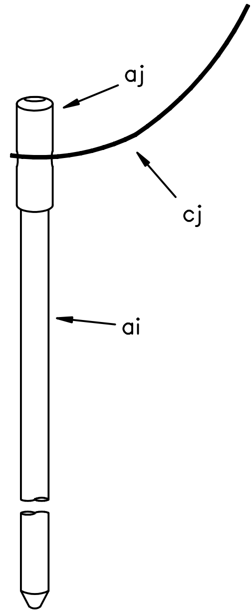
JULY 2009 | CHELCO | UM6-1/OT UM6-4/OT UM6-1000T UM6-750T



UM6-4
BUSHING EXTENDER

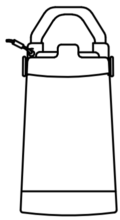


UM6-5
WISHBONE TEE MODULE

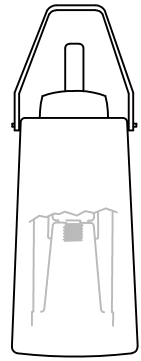


UM6-6
GROUND ROD ASSEMBLY

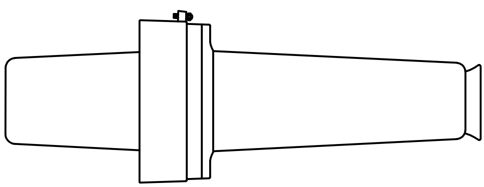
	MISCELLANEOUS ASSEMBLIES		
	SEP. 2009	CHELCO	UM6-4 UM6-5 UM6-6



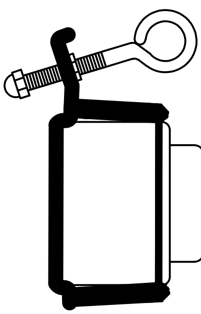
UM6-10 Uhb
INSULATED PROTECTIVE CAP
200 A



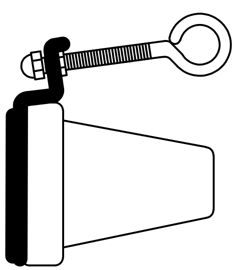
UM6-11 Uhb
INSULATED PROTECTIVE CAP
600 A



UM6-13 Uhb
LOAD BREAK INSERT
200 A

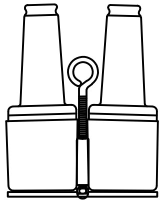


UM6-15 Uhq
PARKING STAND
200 A

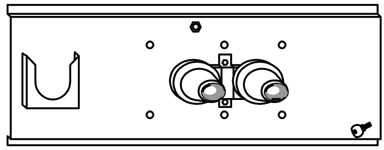


UM6-16 Uhq
PARKING STAND
600 A

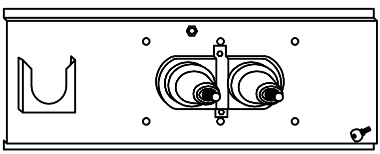
	MISCELLANEOUS ASSEMBLIES		
	JULY 2009	CHELCO	UM6-10 UM6-15 UM6-11 UM6-16 UM6-13



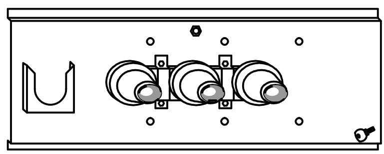
UM6-19 Uhq
FEED THRU-200 AMP
PARKING STAND



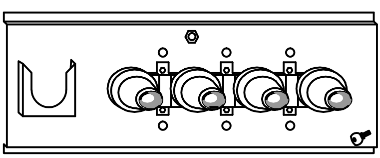
UM6-20 Uhq
FEED THRU-200 AMP, 2 WAY



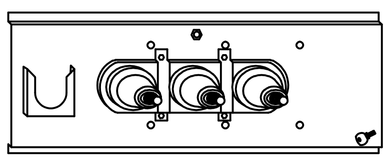
UM6-20X Uhq
FEED THRU-600 AMP, 2 WAY



UM6-21 Uhq
FEED THRU-200 AMP, 3 WAY

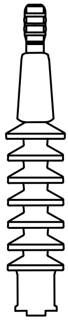


UM6-22 Uhq
FEED THRU-200 AMP, 4 WAY

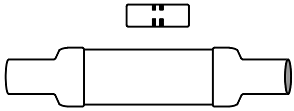


UM6-23 Uhq
FEED THRU-600 AMP, 3 WAY

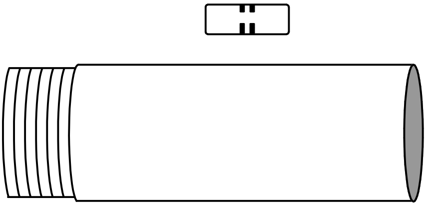
	MISCELLANEOUS ASSEMBLIES			
	JULY 2009	CHELCO	UM6-19 UM6-20 UM6-20X	UM6-21 UM6-22 UM6-23



UM6-25
UM6-26-1000
UM6-26-750
UM6-26-4/0
TERMINATION



UM6-28-1/0
UM6-28-4/0
SPLICE

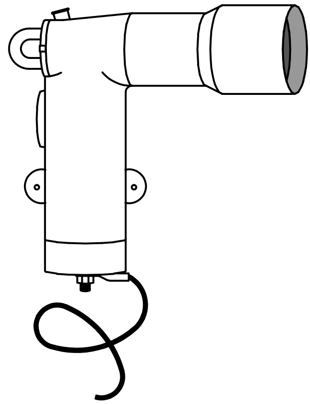


UM6-28-750
SPLICE

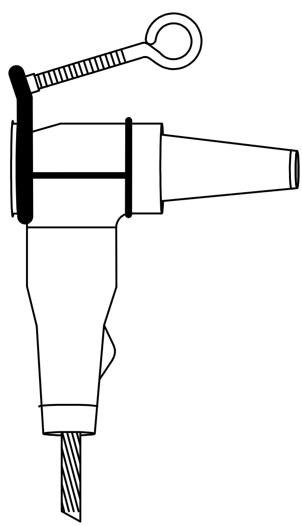
ITEM	MATERIAL	UM6-25	UM6-26 -1000	UM6-26 -750	UM6-26 -4/0	UM6-28 -1/0	UM6-28 -4/0	UM6-28 -750
		ASSEMBLY UNIT						
Ugk	Termination	1/0			4/0			
Ugk	Termination kit		1000 MCM	750 MCM				
Uhf	Coldshrink sealling kit	8452						
Uhy	Splice					1/0	4/0	750 kit
	Coldshrink splice #2 4/0					1	1	
	Coldshrink sealing 3M							1

MISCELLANEOUS ASSEMBLIES

JULY 2009	CHELCO	UM6-25 UM6-26-1000 UM6-26-750 UM6-26-4/0 UM6-28-1/0 UM6-28-4/0 UM6-28-750

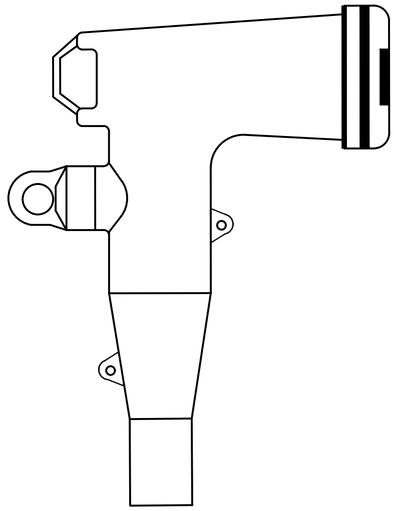


UM6–34
ARRESTER, PDMT 9kV

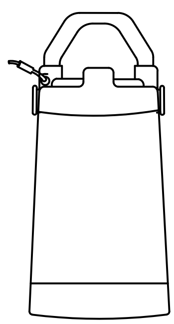


UM6–37
PARKING STAND ARRESTER

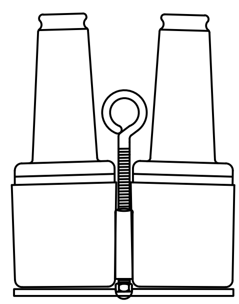
	MISCELLANEOUS ASSEMBLIES		
	JULY 2009	CHELCO	UM6–34 UM6–37



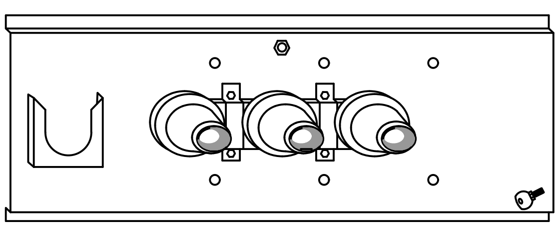
VUM6-1
25kV ELBOW MODULE
COLDSHRINK 8452 SEALING KIT



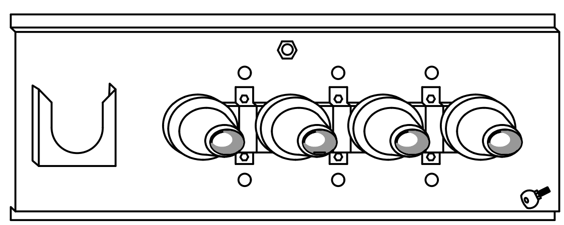
VUM6-10 Uhb
25kV INSULATED PROTECTIVE CAP
200 AMP



VUM6-19 Uhq
25kV FEED THRU-200 AMP
PARKING STAND



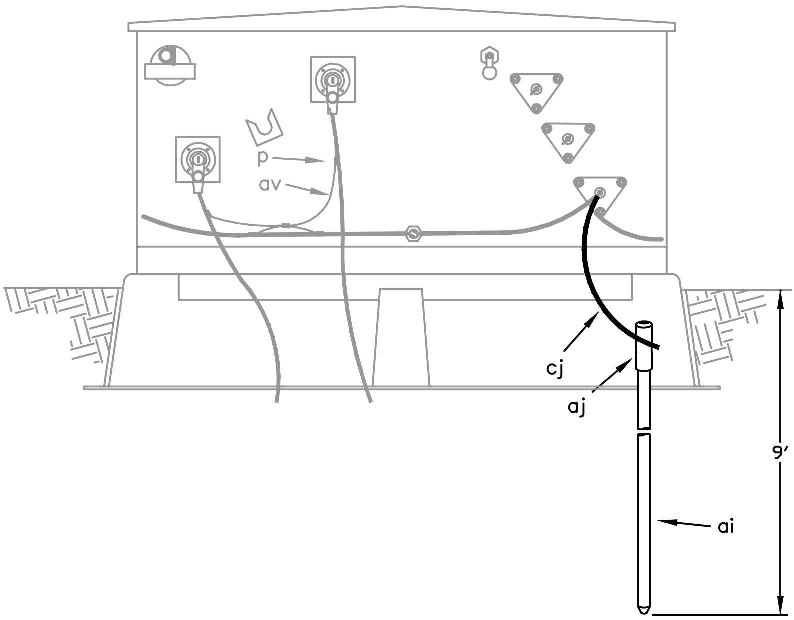
VUM6-21 Uhq
25kV FEED THRU-200 AMP, 3 WAY



VUM6-22 Uhq
25kV FEED THRU-200 AMP, 4 WAY

25kV MISCELLANEOUS ASSEMBLIES

AUG 2018	CHELCO	VUM6-1 VUM6-10 VUM6-19	VUM6-21 VUM6-22



WHEN GROUND
ROD IS OUTSIDE
OF ENCLOSURE,
9' MINIMUM DRIVEN
DEPTH IN EARTH

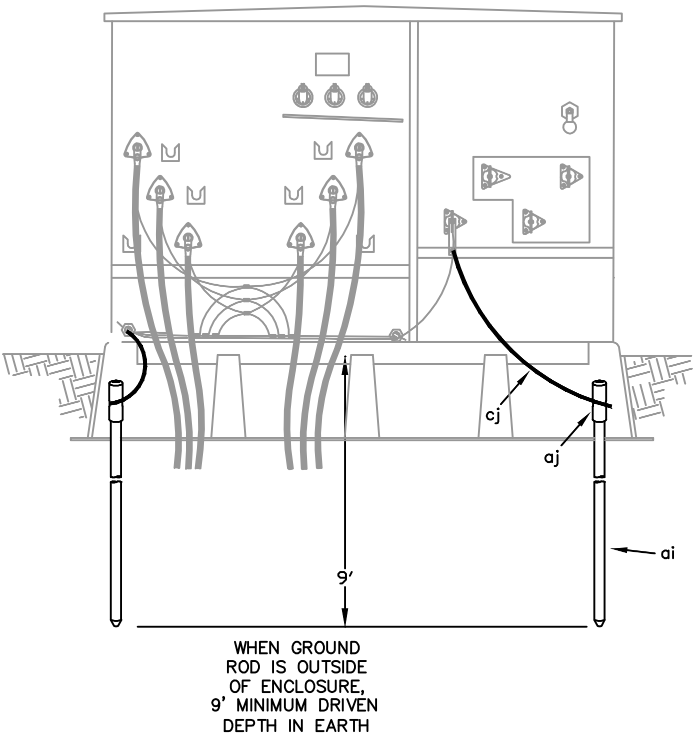
NOTES:

1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
ai	1	Rod, ground 5/8" x 8'	cj	10	Conductor No. 4 S.D. copper
aj	1	Clamp, ground rod			

GROUNDING ASSEMBLY FOR PAD MOUNTED SINGLE PHASE TRANSFORMERS AND ENCLOSURES

MAY 2014	CHELCO	UM48-1



NOTES:

1. TIE CONCENTRIC NEUTRALS TOGETHER BEFORE TAP TO GROUND LOOP TO ASSURE SAME CONDUCTIVITY AS CABLE NEUTRAL.

ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
ai	2	Rod, ground 5/8" x 8'	cj	15	Conductor No. 4 S.D. copper
aj	2	Clamp, ground rod			

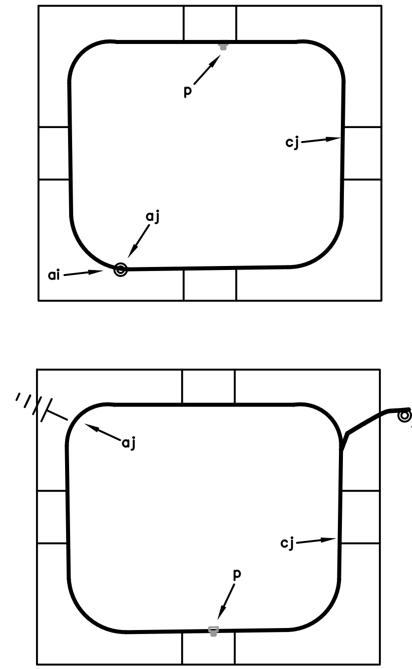
GROUNDING ASSEMBLY FOR PAD MOUNTED MULTI PHASE TRANSFORMERS AND ENCLOSURES

MAY 2014	CHELCO	UM48-2

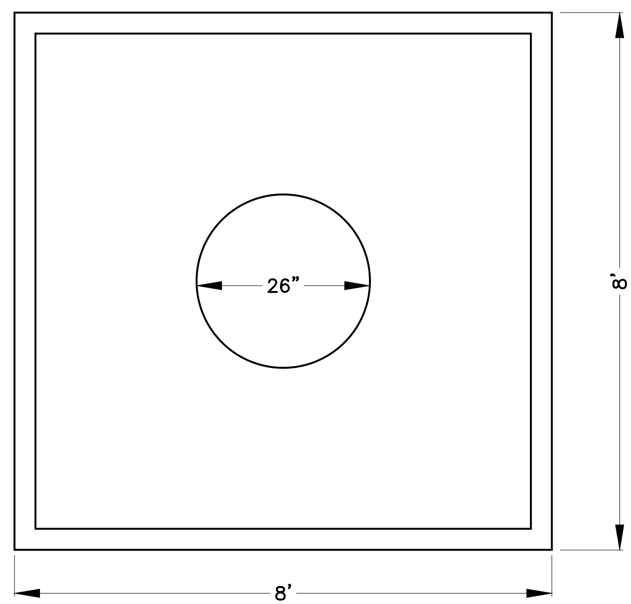
GROUNDING GRID

NEW

RETRO-FIT



EXISTING MANHOLE



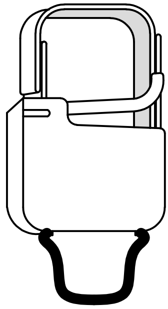
ITEM	QTY	MATERIAL	ITEM	QTY	MATERIAL
p	*	Connectors, as required	aj	1	Clamp, ground rod
ai	1	Rod, ground 5/8" x 8'	cj	40	Conductor No. 4 S.D. copper

MANHOLE GROUND

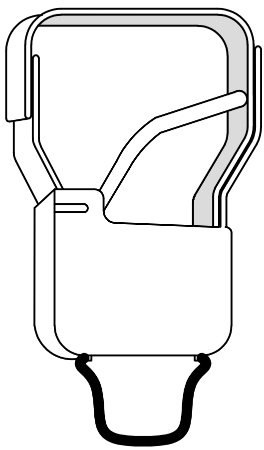
AUG 2018	CHELCO	UM 48-MH

Conduit and Accessories

Description	Assembly	Item Number(s)
Continuous - 2" PVC, SDR 13.5 with pull rope	UM50-2RB	175425
Continuous - 2" PVC, SDR 13.5 with pull rope	UM50-P-2C	175425
Continuous - 3" PVC, SDR 13.5 with pull rope	UM50-3RB	176292
Continuous - 3" PVC, SDR 13.5 with pull rope (2 runs)	UM50-3RB-2PH	176292
Continuous - 3" PVC, SDR 13.5 with pull rope (3 runs)	UM50-3RB-3PH	176292
Continuous - 3" PVC, SDR 13.5 with pull rope (4 runs)	UM50-3RB-4PH	176292
Continuous - 4" PVC, SDR 13.5 with pull rope	UM50-4RB	177450
Continuous - 4" PVC, SDR 13.5 with pull rope	UM50-P-4C	177450
Continuous - 4" PVC, SDR 13.5 with pull rope (2 runs)	UM50-4RB-2PH	177450
Continuous - 4" PVC, SDR 13.5 with pull rope (3 runs)	UM50-4RB-3PH	177450
Continuous - 4" PVC, SDR 13.5 with pull rope (4 runs)	UM50-4RB-4PH	177450
Continuous Flex - 2" Schedule 40	UM50-P-2F	175816
Continuous Flex - 2.5" Schedule 40	UM50-P-2.5F	175882
Continuous for Service - 4" PVC, SDR 13.5 with pull rope	UM50-4RB-SVC	177450
Continuous for Service - 3" PVC, SDR 13.5 with pull rope	UM50-3RB-SVC	176292
Service Riser - 2"	USR2	177500, 175450, 175455, 175475, 175485
Service Riser - 2.5"	USR2.5	176026, 176000, 175974, 175985, 177508, 175485, 175475, 176044
Service Riser - 2.5" Flex conduit	USR2.5F	176026, 176000, 175974, 177508, 176044, 175485, 175475
Service Riser - 3"	USR3	177525, 176496, 176503, 176545, 176565, 175475, 175485, 175100
Service Riser - 3" riser with 2" reducer	UM50-P-3M	176490, 176503, 175475, 175485, 176565, 175100, 177525
Service Riser - 4"	USR4	177550, 177410, 177420, 177402, 177302
Stick - 1" Schedule 40 PVC	UM50-P-1	175114
Stick - 2" Schedule 40 PVC	UM50-P-2	175414
Stick - 2.5" Schedule 40 PVC	UM50-P-2.5	175948
Stick - 3" Schedule 40 PVC	UM50-P-3	176081, 174974
Stick - 3" Schedule 40 PVC (2 runs)	UM50-P-3-2PH	176081, 174974
Stick - 3" Schedule 40 PVC (3 runs)	UM50-P-3-3PH	176081, 174974
Stick - 3" Schedule 40 PVC (4 runs)	UM50-P-3-4PH	176081, 174974
Stick - 4" Schedule 40 PVC	UM50-P-4	177238, 174974
Stick - 4" Schedule 40 PVC (2 runs)	UM50-P-4-2PH	174974, 177238
Stick - 4" Schedule 40 PVC (3 runs)	UM50-P-4-3PH	174974, 177238
Stick - 4" Schedule 40 PVC (4 runs)	UM50-P-4-4PH	174974, 177238
Stick for Service - 3" Schedule 40 PVC	UM50-P-3-SVC	176081
Stick for Service - 4" Schedule 40 PVC	UM50-P-4-SVC	177238
Sweep - 2" Ridged Conduit	UM50-2S	175455
Sweep - 2.5" Ridged Conduit	UM50-2.5S	175985
Sweep - 3" Ridged Conduit	UM50-3S	176503
Sweep - 4" Ridged Conduit	UM50-4S	177402
Sweep for Service - 3" Ridged Conduit	UM50-3S-SVC	176292
Sweep for Service - 4" Ridged Conduit	UM50-4S-SVC	177402



UMFI–1
UMFI–3
1 PHASE AND 3 PHASE
CIRCUIT INDICATOR
1/0 – 4/0



UMFI–3–1000
3 PH FAULT INDICATOR
750/1000 MCM

		ASSEMBLY UNIT		
ITEM	MATERIAL	UMFI–1	UMFI–3	UMFI–3–1000
Ugo	Faulted circuit indicator	1	3	3
	Cable fiber optic for 1 phase	1		
	Cable fiber optic for 3 phase		1	1

MISCELLANEOUS ASSEMBLIES

JULY 2009	CHELCO	UMFI–1 UMFI–3 UMFI–3–1000

Underground Cable

Description	Assembly	Item Number
Lighting Cable - 10/2 UF	W10/2UF	E120055
Primary - 1000MCM 15kV UD	W1000MCM	E174932
Primary - 1000 MCM 25kV	W1000MCM25KV	E174933
Primary - 750 MCM 15kV UD	W750MCM	E174912
Primary - 750 MCM 25kV UD	W750MCM25KV	E174913
Primary - 750 MCM Copper	W750CUMCM	E174780
Primary - #6 Copper 15kV UD	W6CU15KV	E163636
Primary - 500 MCM Copper	W500CUMCM	E174755
Primary - #4 Copper 15kV UD	W4CU15KV	E163634
Primary - 4/0 15kV UD	W4/015KV	E172692
Primary - 4/0 25kV UD	W4/025KV	E172693
Primary - 4/0 Copper 15kV UD	W4/0CU15KV	E163640
Primary - 4/0 Copper 25kV UD	W4/0CU25KV	E163641
Primary - 3/0 Copper 15kV UD	W3/0CU15KV	E163638
Primary - 350 MCM	W350MCM	E174900
Primary - 350 MCM 25kV	W350MCM25KV	E174901
Primary - 350 Copper 15kV UD	W350CU15KV	E173640
Primary - 350 MCM Copper 25kV	W350CUMCM25KV	E174731
Primary - #2 15kV UD	W215KV	E163632
Primary - #2 Copper 15kV UD	W2CU15KV	E163635
Primary - 2/0 Copper 15kV UD	W2/0CU15KV	E163628
Primary - 250 Copper 15kV UD	W250CU15KV	E174725
Primary - #1 Copper 15kV UD	W1CU15KV	E163631
Primary - 1/0 15kV UD	W1/015KV	E163600
Primary - 1/0 25kV UD	W1/025KV	E163605
Primary - 1/0 Copper 15kV UD	W1/0CU15KV	E163601
Primary - 1/0 Copper 25kV UD	W1/0CU25KV	E163626

APR 2018	CHELCO	EGLIN UNDERGROUND WIRE

Underground Cable (Con't)

Description	Assembly	Item Number
Secondary - 500 MCM Triplex UD	W500MCMTPX	E173887
Secondary - 500 MCM Copper Triplex UD	W500CUMCMTPX	E173891
Secondary - 4/0 Triplex 600V UD	W4/0TPX-UG	E172858
Secondary - 4/0 Quadruplex 600V UD	W4/0QPX-UG	E173013
Secondary - 350 MCM 600V UD	W350MCMTPX	E173885
Secondary - #2 Triplex 600V UD	W2TPX-UG	E158592
Secondary - 2/0 Triplex 600V UD	W2/0TPX-UG	E166372
Secondary - 250 Triplex UD	W250ALX-UG	E173880
Service - 4/0 Triplex 600V UD	W4/0TPX-UG-SVC	E172858
Service - 4/0 Quadruplex 600V UD	W4/0QPX-UG-SVC	E173013
Service - 350 MCM 600V UD	W350MCMTPX-UG-SVC	E173885
Service - 350 MCM Copper Triplex UD	W350CUMCMTPX-UG-SVC	E173890
Service - #2 Triplex UD	W2TPX-UG-SVC	E158592
Service - #2 Copper Triplex UD	W2CUTPXUG-SVC	E166376
Service - 2/0 Triplex 600V UD	W2/0TPX-UG-SVC	E166372
Service - 250 Triplex UD	W250TPX-UG-SVC	E173880
Service - #1 Copper Triplex UD	W1CUTPX-UG-SVC	E166375
Service - 1/0 #2 Triplex UD	W1/0TPX-UG-SVC	E166001
Service - 1/0 Copper Triplex UD	W1/0CUTPX-UG-SVC	E166005
Service - 1/0 Triplex 600V UD	W1/0TPX-UG-SVC	E166001

Ampacity Rating for OH Conductors*				
	Southwire Rating	Normal		Emergency
	N/A	Summer	Winter	Summer
Ambient temp	77°F	95°F	32°F	95°F
Conductor temp	167°F	120°F	120°F	167°F
Overhead Primary Conductors - CWC				
#8A CWC	96	51	113	N/A
#6A CWC	128	66	148	N/A
#4A CWC	170	69	157	N/A
Overhead Primary Conductors - Hd Cu				
#8 Hd Cu	100	48	101	N/A
#6 Hd Cu	140	63	135	N/A
#4 Hd Cu	170	83	182	N/A
#2 Hd Cu	225	122	273	N/A
1/0 Cu	311	143	335	276
Overhead Primary Conductors - ACSR				
#6 ACSR	105	51	113	N/A
#4 ACSR	140	67	150	N/A
#2 ACSR	184	87	201	N/A
#1 ACSR	212	100	232	N/A
1/0 ACSR	242	114	268	214
2/0 ACSR	276	129	310	246
3/0 ACSR	315	146	357	382
4/0 ACSR	357	166	412	323
336 ACSR	519	221	568	459
397 ACSR	587	244	645	518
397.5 ACSR	576	242	632	509
477 ACSR	646	267	710	570
Overhead Primary Conductors - AAAC				
#6 AAAC	97	47	103	N/A
#4 AAAC	130	62	138	N/A
#2 AAAC	173	81	185	N/A
1/0 AAAC	232	106	249	205
3/0 AAAC	310	139	334	274
4/0 AAAC	359	158	388	318
336 AAAC (312.8 Butte)	533	197	500	407
394 AAAC	533	223	580	470
741 AAAC	790	312	868	696

*Based on IEEE Standard 738

Values Used:

Wind Speed	2	Latitude	30.721
Wind Angle	90	Atmosphere	Clear
Height Above Sea Leve	259	Emissivity	0.5
Line Direction	E-W	Absorptivity	0.5
		Date/Time:	
		Summer	Jul 15: 15:00
		Winter	Jan 15: 6:00

APR 2018	CHELCO	EGLIN AMPACITY RATINGS

Ampacity Rating for OH Conductors*			
	Southwire Rating N/A	**Max Allowable Rating**	**Emergency Summer**
Ambient temp	**77°F**	**104°F**	**95°F**
Conductor temp	**167°F**	**167°F**	**167 F**
Overhead Secondary Conductors-Poly			
#8 Triplex Cu	70	70	N/A
#6 Duplex	70	70	N/A
#6 Triplex	70	70	N/A
#6 ACSR Duplex	70	70	N/A
#6 ACSR Triplex	70	70	N/A
#4 Quadruplex	80	80	N/A
#4 Duplex	90	90	N/A
#4 Triplex	90	90	N/A
#4 Triplex	90	90	N/A
#2 Triplex	120	120	N/A
#2 Quadruplex	105	105	N/A
#2 ACSR Triplex	120	120	N/A
1/0 Triplex	160	160	N/A
1/0 Quadraplex	140	140	N/A
1/0 ACSR Triplex	160	160	N/A
1/0 ACSR Quadruplex	140	140	N/A
2/0 Triplex	185	185	N/A
2/0 ACSR Quadruplex	160	160	N/A
2/0 Quadruplex	160	160	N/A
3/0 Quadruplex	185	185	N/A
4/0 Triplex	245	245	N/A
4/0 Quadraplex	210	210	N/A
	Southwire Rating N/A	**Max Allowable Rating**	**Emergency Summer**
Ambient temp	**77°F**	**104°F**	**95°F**
Conductor temp	**167°F**	**194°F**	**194°F**
***Overhead Secondary Conductors-XLP**			
#4 Cu Triplex	115	115	N/A
#4 Cu Quadruplex	100	100	N/A
#2 Cu Triplex	155	150	N/A
#2 Cu Quadruplex	135	135	N/A
1/0 Cu Quadruplex	180	180	N/A
2/0 Cu Triplex	235	235	N/A
4/0 Cu Quadruplex	270	270	N/A
500 Cu Triplex	472	472	N/A
500 Cu Quadruplex	472	472	N/A

Conductor temperature of 90°C for XLP, 75°C for Poly; ambient temperature of 40°C; emissivity 0.9; 2ft./sec. wind in sun

Conductor ampacity ratings pulled from Southwire duplex, triplex, and quadruplex service drop specifications

Based on previous values, copper service drops assumed to be XLP.

APR 2018	CHELCO	EGLIN AMPACITY RATINGS

Ampacity Ratings for Underground Conductors*			
	Installation Method (77°F, Rho=90)		
	Direct Buried	Conduit	Unventilated Riser Pole
Conductor Temp.	194°F	194°F	194°F
Load Factor	75%	75%	75%
Underground Primary Conductors - 15kV Cu			
#6 Cu 15kV	139	104	69
#4 Cu 15kV	180	135	91
#2 Cu 15kV	213	160	131
#1 Cu 15kV	242	185	153
1/0 Cu 15kV	275	210	174
3/0 Cu 15kV	350	268	222
4/0 Cu 15kV	393	300	250
250 MCM Cu 15kV	439	336	280
350 MCM Cu 15kV	519	398	332
500 MCM Cu 15kV	609	476	395
750 MCM Cu 15kV	696	547	441
Underground Primary Conductors - 15kV Al			
#2 Al 15kV	167	125	103
1/0 Al 15 kV	216	165	137
2/0 Al 15kV	245	188	155
4/0 Al 15kV	315	244	203
350 MCM Al 15kV	417	266	268
750 MCM Al 15kV	604	476	398
1000 MCM Al 15kV	716	580	485
Underground Primary Conductors - 25kV Cu			
1/0 Cu 25kV	269	212	175
4/0 Cu 25kV	387	309	256
350 MCM Cu 25kV	508	407	338
500 MCM Cu 25kV	597	476	393
750 MCM Cu 25kV	695	565	455
Underground Primary Conductors - 25kV Al			
1/0 Al 25kV	211	167	137
4/0 Al 25kV	309	247	204
350 MCM Al 25kV	407	326	271
750 MCM Al 25kV	596	486	405
1000 MCM Al 25kV	704	573	478

Underground conductors have a maximum allowable ampacity, however, these values are limited by current flowing through the connected elbows (200A or 600A elbows).

Neutral size assumptions: #6-4/0, Full Neutral; 250 MCM-750 MCM, 1/3 Neutral; 1000 MCM, 1/6 Neutral

Assumed full sun and wind for unventilated riser

Table is based on IEEE Standard 835

	Installation Method (68°F, Rho=90)		
	Direct Buried	Conduit	Unventilated Riser Pole
Conductor Temp.	194°F	194°F	194°F
Load Factor	100%	100%	100%
Underground Secondary Conductors - Cu			
10/2 UF	56	31	25
#2 Cu Triplex	197	146	108
#1 Cu Triplex	223	168	128
1/0 Cu Triplex	255	193	147
350 Cu Triplex	490	387	317
500 MCM Cu Triplex UD	592	471	389
Underground Secondary Conductors - Al			
#2 Triplex	153	114	84
1/0 Triplex	198	150	115
2/0 Triplex	226	172	132
4/0 Quadraplex	290	225	181
4/0 Triplex	291	226	181
250 Triplex	319	250	250
350 Triplex	385	304	250
500 MCM Triplex UD	467	372	310

Ampacities from Okonite's Engineering Handbook, 2018.

Type T Fuse to Fuse Coordination

Protected Fuse	Protecting T Fuse	Protecting K Fuse	Protecting NX Fuse
10 T	6 T	8 K	6 NX
12 T	8 T	10 K	6 NX
15 T	10 T	10 K	8 NX
20 T	12 T	12 K	10 NX
25 T	15 T	15 K	12 NX
30 T	20 T	20 K	18 NX
40 T	25 T	25 K	20 NX
50 T	30 T	30 K	25 NX
65 T	40 T	40 K	30 NX
80 T	50 T	65 K	40 NX
100 T	65 T	65 K	50 NX
140 T	100 T	100 K	65 NX

Type K Fuse to Fuse Coordination

Protected Fuse	Protecting K Fuse	Protecting NX Fuse
12 K	6 K	6 NX
15 K	8 K	8 NX
20 K	10 K	10 NX
25 K	12 K	12 NX
30 K	15 K	12 NX
40 K	20 K	18 NX
50 K	25 K	25 NX
65 K	30 K	25 NX
80 K	40 K	30 NX
100 K	50 K	40 NX
140 K	65 K	65 NX

Hydraulic Recloser to Fuse Coordination

Protected Recloser Size/Type	Protecting Fuse: Current Limiting Fuse (NX)	Expulsion Fuse (K)	Expulsion Fuse (T)
15 H	6 NX	-	6 T
25 H	8 NX	6 K	10 T
35 H	10 NX	8 K	12 T
50 H	12 NX	10 K	15 T
25 4H	8 NX	6 K	10 T
35 4H	10 NX	8 K	12T
50 4H	12 NX	12 K	15 T
70 4H	18 NX	15 K	25 T
100 4H	20 NX	25 K	30 T
25 L	8 NX	6 K	10 T
35 L	10 NX	8 K	12 T
50 L	12 NX	10 K	15 T
70 L	18 NX	12 K	25 T
100 L	20 NX	20 K	30 T

Type NX Fuse to Fuse Coordination

Protected Fuse	Protecting T Fuse	Protecting NX Fuse
12 NX	-	6 NX
18 NX	-	6 NX
20 NX	-	8 NX
25 NX	-	8 NX
30 NX	-	10 NX
40 NX	-	12 NX
50 NX	8 T	12 NX
65 NX	10 T	25 NX
80 NX	15 T	30 NX
100 NX	15 T	30 NX

Electronic Recloser to Fuse Coordination OH Circuits 4 shots vs. U.G. Circuits 2 shots

Protected Recloser Overhead Circuits Ph/Gnd.	Protecting Fuse: Current Limiting Fuse (NX)	Expulsion Fuse (K)	Expulsion Fuse (T)	Protected Recloser UG Circuits Ph/Gnd.	Protecting Fuse: Current Limiting Fuse (NX)	Expulsion Fuse (K)	Expulsion Fuse (T)
100A/70A	-	-	15 T	100A/70A	-	-	-
200A/100A	12 NX	20 K	15 T	200A/100A	25 NX	40 K	30 T
280A/120A	18 NX	25 K	30 T	280A/140A	30 NX	50 K	50 T
400A/140A	20 NX	30 K	30 T	400A/170A	50 NX	65 K	65 T
560A/180A	25 NX	40 K	50 T	560A/180A	50 NX	65 K	65 T
630A/180A	30 NX	50 K	50 T	630A/180A	65 NX	80 K	80 T
800A/180A	40 NX	65 K	50 T	800A/180A	80 NX	100 K	100 T

Ungrounded Capacitors

Bank KVAR	Fuse Size
150	6 T
300	12 T
450	20 T
600	25 T
900	40 K
1200	50 K
1800	80 K

Bypassed

Recloser (Amps)	Fuse Size
10	10 T
15	12 T
25	15 T
35	25 T
50	30 T
70	30 T
100	50 T

VFI, Cooper to Fuse Coordination

Protected VFI Setting	Protecting Fuse: Current Limiting Fuse (NX)	Expulsion Fuse (K)	Expulsion Fuse (T)
520 A	80 NX	140 K	80 T
500 A	80 NX	140 K	80 T
400 A	65 NX	100 K	65 T
300 A	50 NX	80 K	50 T
280 A	40 NX	80 K	
200 A	30 NX	65 K	
140 A		40 K	
100 A		30 K	
60 A		15 K	

VFI, S & C Vista to Fuse Coordination

Protected VFI Setting	Protecting Fuse: Current Limiting Fuse (NX)	Expulsion Fuse (K)	Expulsion Fuse (T)
400	65 NX	100 K	65 T
300	50 NX	80 K	50 T
200	30 NX	50 K	30 T

Hydraulic - Hydraulic Coordination

Protected Recloser Amps	Protecting Recloser Amps
100	50
70	35
50	25
35	15
25	10
15	None

Electronic - Hydraulic Coordination

Protected Recloser Amps Ph/Gnd	Protecting Recloser Amps
100A/70A	25
200A/100A	35
280A/120A	50
400A/140A	70
560A/180A	100
630A/180A	100
800A/180A	100

Conventional/CSP Transformers

Transformer KVA 1 Ph	Transformer KVA 3 Ph	Fuse Size	Primary Current (A)	Secondary Current (A) 120/240	Secondary Current (A) 120/208	Secondary Current (A) 277/480	Fuse Type*
1.5	3	0.3	0.14	4	8	4	X
3	9	0.6	0.42	13	25	11	SF
5	15	1	0.69	21	41	18	S&C
7.5	22.5	1.5	1.04	31	62	27	X
10	30	2	1.39	42	83	36	S&C
15	45	3	2.08	62	125	54	S&C
25	75	5	3.47	104	208	90	S&C
37.5	112.5	7	5.21	156	313	135	S&C
50	150	10	6.94	208	416	180	S&C
75	225	15	10.42	313	625	271	S&C
100	300	20	13.89	417	833	361	S&C
167	500	30	23.19	696	1391	603	S&C
250	750	50	34.72	1042	2083	903	S&C
333	1000	65	46.25	1388	2775	1203	S&C
500	1500	80	69.43	2083	4166	1805	S&C
-	2000	100	92.59	2778	5555	2407	S&C

* X — Kearney Type "X"
S&C — S&C Positrol "Standard Speed"
SF — Chance "SloFast"

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Make-up wire

Installation Type	Additional Footage (ft)
Overhead primary (pole to pole)	5 per conductor *
Overhead secondary (transformer to lift pole)	5
Overhead service (lift pole to weather head)	5
Overhead service (transformer to weather head)	7
Underground primary (pole to pad mounted equipment)	pole height plus 5
Underground primary (pad mounted equipment to pad mounted equipment)	17
Underground secondary (pole to pedestal)	pole height plus 5
Underground secondary (pad mounted equipment to pad mounted equipment)	17
Underground service (pole to meter)	pole height plus 5
Underground service (pad mounted equipment to meter)	17
Underground (pole to decorative Light)	pole height plus light pole height plus 7
Underground (pad mounted equipment to decorative Light)	light pole height plus 7
Underground (decorative light to decorative light)	light pole height plus 7 (total doubled)

* AMOUNT MAY BE INCREASED BASED ON WIRE SIZE AND SPAN LENGTH

Transformer Connections

Transformer Type	Max Number of Runs	Max Wire/Cable Size
Single Phase Pad Mount	6	500 MCM
Three Phase Pad Mount	12	750 MCM
Overhead with spades	4	350 - 700 MCM
Overhead with multibar	8	up to 350 MCM

Common Clearance Codes

Description	Clearance Required (ft)	Code Reference
Primary over roads, streets, and other areas subject to truck traffic	18.5	NESC Table 232-1
Primary over spaces and ways subject to pedestrians or restricted traffic	14.5	NESC Table 232-1
Secondary over roads, streets, and other areas subject to truck traffic	16	NESC Table 232-2
Secondary over spaces and ways subject to pedestrians or restricted traffic	12	NESC Table 232-3
Primary over swimming pools	25	NESC Table 234-3
Secondary over swimming pools	22.5	NESC Table 234-3
Underground primary or secondary from swimming pools (horizontal)	5	NESC RULE 351 C 1
Primary from buildings and other structures (horizontal)	7.5	NESC Table 234-1
Primary over buildings and other structures (vertical)	13.5	NESC Table 234-1
Secondary from buildings and other structures (horizontal)	5	NESC Table 234-1
Secondary over buildings and other structures (vertical)	11	NESC Table 234-1
Pad Mounted equipment from fire hydrants	4	NESC Rule 380 D
Pad Mounted equipment (oil filled) from buildings and structures	10	IEEE Std 979

Inventory No	Description
308338	100W CARRIAGE - AMERICAN ELECTRIC LUMINAIRE HPS
474269	3 PH. FIBERGLASS DUMMY PAD,NORDICND552418MBWG
469465	3 PH. FIBERGLASS ENCLOSER ONLY,NORDIC ND2552424TWG101XB3D
469460	3PH. DUMMY CAN 200A/600A - DURHAM 1007396-
309020	400 WATT HPS FLOOD,CFB40SWW76BZ4 LUMINAIRE
308390	ACORN GREEN 100WHPS LUMINAIRE KIT KING
308380	ACORN, BLACK 100W HPS LUMINAIRE KING KIT
474225	Adapter Plate GSA2-75-69-2X-MG-56X14 Adapter Plate for GS-75-69-36RT
212381	ALLEY ARM, STEEL W/ 13/16 HOLES, 4" X 102", SALCO CA-00058
9131	ANCHOR 10 INCH NO-WRENCH SCREW- 1 1/4" X 66" TRIPLEYE
9019	ANCHOR 10 INCH PISA - CHANCE 024476
9357	ANCHOR 12 INCH STRD PISA - CHANCE 024462 POWER INSTALLED
9688	ANCHOR 14 INCH HELIX SINGLE -
8029	ANCHOR 8 INCH PISA - CHANCE 024474
4069	ANCHOR EXPANDING 10-000 LBS -
9855	ANCHOR MULTI-HELIX 8" & 10" - square rod w/multiple anchors
9930	ANCHOR MULTI-HELIX 8" 10" 12" W/TWINEYE NUT,HPS 126542AEJ
309042	ARLINGTON BLACK 100 W.HPS LUMINAIRE
309057	ARLINGTON GREEN 100W HPS LUMINAIRE
309353	ARM BLACK PRAGUE STYLE, KA15-T-1-BK, BISHOP CROOK ARM
309387	ARM BLACK PRAGUE,DOUBLE BISHOP,2BC180R15C-BK LUMINAIRE
309515	ARM DOUBLE BRONZE FOR CORVUS FIXTURE,AMI-1884 BRZ LUMINAIRE
309242	ARM GREEN PRAGUE STYLE BISHOP CROOK LUMINAIRE
309457	ARM PRAGUE GREEN DOUBLE BISHOP CROOK LUMINAIRE
309535	ARM SINGLE BLACK FOR CORVUS FIXTURE LUMINAIRE
309486	ARM SINGLE BRONZE FOR CORVUS FIXTURE,AMI-1883 BRZ LUMINAIRE
309548	ARM,DOUBLE BLACK FOR CORVUS FIXTURE LUMINAIRE
20550	ARRESTER 9KV EQUIPMENT PROTECTION, URT09050A1A1A1A
21170	ARRESTER 9KV -SALTWATER AREA-EQUIP PROTECTION
21165	ARRESTER LIGHTNING 18KV SALT WATER VARIGAP- CPS UHG09050A1A1A1A- ULTRA
21055	ARRESTER LIGHTNING 9/10 KV OH - O.B. & JOSLYN (OBSOLETE)
20670	ARRESTER LIGHTNING 9KV - INTERMEDIATE CLASS (SUBSTATION
20542	ARRESTER LIGHTNING 9KV LINE PROTECTION
462010	ARRESTER PADMONT 9KV MOV ELBOW - T & B 167ESA10
462275	ARRESTER RISER 9KV MOV - POLE MOUNT
520457	ARRESTER, MB K240HSE-HIGH BOYS
520100	ARRESTER, METER BASE 200A OBSOLETE
520260	ARRESTER,MB,W/5TH LUG JAW,SS320A5J
462100	ARRESTOR PARKING STAND- PDMT -
520162	ARRESTOR, MB 320 AMP, SS-320A, SLIM LINE
24000	BALLAST- ROUND GLOBE LIGHT - long cylinder shaped
308897	BLACK CORVUS,150 W,HPS, 120 VOLT LUMINAIRE,
309107	BLACK PRAGUE, K828-HGSA-III-100MOG-HPS-120MT-KPL10-PR-BKTX
422282	BLADE ASSEMBLY FOR SPU3000
64059	BOX- PULL 72" X 72" X 48" - WITH GALVANIZED LID
474493	BOXPAD 750-1500 KVA TRANS. GS-72-62-36RT-2X 58x18
68098	BRACKET 3PH VWE OCR HANGER - FOR POLE MOUNT
67348	BRACKET CT/PT 3 PH -
67421	BRACKET CUTOUT 3 PHASE -
70079	BRACKET FOR COBRA HEAD FIXTURE(1 1/4"X8' AL.ARM
68260	BRACKET- FOR VWE END MOUNT - FOR VERTICAL CONST.POLE MT.

Inventory No	Description
67918	BRACKET INSULATOR BIPIN - "bull horn"
67835	BRACKET INSULATOR STANDOFF - EPOXY- FIBGLASS- RAYCHEM-OTHER
67758	BRACKET POLE MOUNT FOR 400 W. FLOOD LIGHT
70540	BRACKET SWITCH DISCONNECT - 3 PHASE (H.D. EQUIPMENT MOUNT
71043	BRACKET THREE POSITION FOR - TRANSFORMER & OCR'S
72673	BRACKET THREE POSITION FOR H OCR BANDED MODEL FOR 3 H OCR
72833	BRACKET THREE POSITION FOR L - OCR & TRANSFORMERS- BANDED
71205	BRACKET TRANSF. 3 POSITION - FOR 24" HANGERS
71530	BRACKET TWO POSITION FOR TRANSFORMERS & OCR'S
462507	BRACKET UG CABLE TERMINATOR -
70219	BRACKET VWE RECLOSER FOR - SUBSTATION MOUNT
79228	CAPACITOR 100 KVAR - TWO BUSHING- CEP131A6FB
79558	CAPACITOR 300 KVAR -
80016	CAPACITOR 300 KVAR BANK - COMPLETE WITH RACK- CAPACITORS
79061	CAPACITOR 50 KVAR -
80026	CAPACITOR 600 KVAR BANK - COMPLETE WITH RACK- CAPACITORS
80036	CAPACITOR 900 KVAR BANK - COMPLETE WITH RACK- CAPACITORS
80046	CAPACITOR BANK 1200KVAR W/3EA 400KVAR COMP.
206516	CAPACITOR CONTROL 61476 - SANGAMO 61476-200- TYPE TS-
81325	CAPACITOR ISOLATOR, 2.1MH, MODEL 100-050-2M100-15
81624	CAPACITOR ISOLATOR, 4.0MH, MODEL 100-050-4M000-15
79230	CAPACITOR, 200KVAR SINGLE BUSHING, CEP129M61 TYPE EX 7L 7620v
79742	CAPACITOR, 400 KVAR,2 BUSHING,7200V
81026	CAPACITORS 1800 KVAR BANK -
273557	CARETAKER LED CPLI CRTK A A08 E 120 5 B24 A SR LUMINAIRE
308825	CITY OF DFS - COBRA-HEADS LUMINAIRE HPS 250W
305555	COBRA HEAD GREEN LUMINAIRE 100W HPS
305530	COBRA HEAD,GRAY LUMINAIRE 100W,HPS
496655	COMPUTER FOR TURTLE SYSTEM - includes opto wand- software-
166001	CONDUCTOR 1/0 1/0 #2 TPLX UG -
162500	CONDUCTOR 1/0 7-STRAND BARE COPPER
163030	CONDUCTOR 1/0 AAAC - "AZUZA"
163600	CONDUCTOR 1/0 AL 15KV UG - OKONITE 163-23-3072 EPR ONLY
165019	CONDUCTOR 1/0 AL OH QUADRUPLEX - "SHETLAND"
166009	CONDUCTOR 1/0 AL QUAD UG -
164020	CONDUCTOR 1/0 TRIPLEX AL - "LEDA"- XL- 300' COILS
120055	CONDUCTOR 10/2 UF- W/GROUND - 250' COILS
174932	CONDUCTOR 1000 MCM- 15 KV- - AL. PRIMARY COND. FILLEDSTRAND
148528	CONDUCTOR 2 S D COPPER -
166372	CONDUCTOR 2/0 2/0 2/0 TPLX UG - "HUNTER" SURESEAL
173885	Conductor 350 AL UG Triplex WESLEYAN SUPERSEAL
174742	CONDUCTOR 350MCM COPPER THHN - UG SERVICE ENTRANCE CABLE
174730	CONDUCTOR 350MCM COPPER U.S.E. - UNG SERVICE ENTRANCE
173922	CONDUCTOR 394/5 AAAC "CANTON"
149469	CONDUCTOR 4 ACSR
172858	CONDUCTOR 4/0 4/0 2/0 TPLX UG "SWEETBRIAR" SUPERSEAL
173682	CONDUCTOR 4/0 AAAC - "ALLIANCE
172692	CONDUCTOR 4/0 AL 15KV UNDERGRD - OKONITE 162-23-3081 EPR ONLY
173013	CONDUCTOR 4/0 AL QUADPLEX UG - 1000' REELS- "WAKEFOREST"
173849	CONDUCTOR 4/0 AL QUADRUPLEX OH - "WALKING"
173765	CONDUCTOR 4/0 AL TRIPLEX OH - "LEPAS"

Inventory No	Description
171487	CONDUCTOR 4/0 BARE SOFT DRAWN - 7 STRAND
170885	CONDUCTOR 4/0 STRANDED COPPER - TYPE THHN
174763	CONDUCTOR 500MCM BARE CU. S.D. - 37 STRAND- 1000' REEL
174755	CONDUCTOR 500MCM COPPER U.S.E. - UNG SERVICE ENTRANCE
174326	CONDUCTOR 740.8 AAAC "FLINT"(.991 OAD) - 3700 LB N.R. REELS
174912	CONDUCTOR 750 MCM 15KV UG OKONITE 162 23 3096 E.P.R ONLY
174780	CONDUCTOR 750MCM COPPER U.S.E. - UNG SERVICE ENTRANCE
167098	CONDUCTOR ACSR 2/0 X 6/1 -
169078	CONDUCTOR ACSR 3/0 X 6/1
153056	CONDUCTOR NO 2 AAAC - "AMES"
158592	CONDUCTOR NO 2 AL TP UG - "STEPHENS"
159095	CONDUCTOR NO 2 QUAD AL
158006	CONDUCTOR NO 2 TRIPLEX AL "SHRIMP"- XL- 500' COILS
149021	CONDUCTOR NO 4 AAAC -
148031	CONDUCTOR NO 4 S D COPPER -
158025	CONDUCTOR NO 4 TRIPLEX AL -
144568	CONDUCTOR NO 6 DUPLEX AL - VIZSLA
139048	CONDUCTOR NO 6 S D COPPER -
120815	CONDUCTOR, 4 HARD DRAWN COPPER
121575	CONDUCTOR, 6 HARD DRAWN COPPER
122335	CONDUCTOR, 6A COPPERWELD, 3 STRAND
123095	CONDUCTOR, 8A COPPERWELD, 3 STRAND
175114	CONDUIT 1" PVC-SCH 40 -
177475	CONDUIT 1" PVC-SCH 80 -
175882	CONDUIT 2 1/2" P & C FLEX
175948	CONDUIT 2 1/2" SCH 40 - 10' STICK
177508	CONDUIT 2 1/2" SCH 80 -
175425	CONDUIT 2" CONTINUOUS PVC RED W/LUBE & PULL ROPE
175816	CONDUIT 2" P & C FLEX -
175414	CONDUIT 2" PVC-SCH 40 -
177500	CONDUIT 2" PVC SCH 80
175889	CONDUIT 3" P & C FLEX - SCHEDULE 40
176292	CONDUIT 3" PVC CONTINUOUS - SDR-13.5 RED- W/PULL ROPE
176081	CONDUIT 3" PVC-SCH 40 -
177525	CONDUIT 3" PVC-SCH 80 -
177450	CONDUIT 4" CONTINUOUS PVC - SDR13.5- RED- PULL ROPE & LUBE
175896	CONDUIT 4" P & C FLEX - SCHEDULE 40
177238	CONDUIT 4" PVC-SCH 40 - CARLON 59615-010- SCHEDULE 40
177550	CONDUIT 4" PVC-SCH 80 -
177575	CONDUIT 6" GALVANIZED - 10ft sections
206205	CONTROL CAPACITOR, VOLTAGE ONLY W/INTEGRATED METER BASE ADAPTER
206029	CONTROL MANUAL CAPACITOR - ELLIOTT MODEL M-120MB
206050	CONTROL MINICAP CAPACITOR - CPS CSW1A2N2
195185	CONTROL PANEL FOR CPS RECLOSER TYPE:PERFORM6PA KME6
195102	CONTROL PANEL FOR REGULATOR - SIEMENS TYPE MJXL
195061	CONTROL PANEL FOR SIEMENS - STATION BREAKER- SANTA ROSA
195555	CONTROL PANEL FOR VWE RECLOSER Type:4C 3A 3 & FXA electroni
195020	CONTROL PANEL SCHWEITZER - SEL-0351R21X81X1SX1 RECLOSER
196555	CONTROL PANEL- TRIPLE-SINGLE - FOR CPS NOVA RECLOSER-TYPE
308868	CORVUS BRONZE CVM15SCAMT1R3BZ LUMINAIRE 150W HPS 120V
216002	CROSSARM 3 3/4 X 4 3/4 X 10FT -

Inventory No	Description
216598	CROSSARM 3 3/4 X 4 3/4 X 12FT -
213033	CROSSARM 8' FIBERGLASS -
212055	CROSSARM 8' FIBERGLASS DEADEND -
212043	CROSSARM ALUMA-FORM (WOOD) - HEAVY-DUTY DEADEND ASSEMBLY
217091	CROSSARM HEAVY DUTY DEADEND - ASSEMBLY double crossarms
214040	CROSSARM ST.DE,3"X5"X46"SINGLE DE SALCO DEA46B
216075	CROSSARM STEEL 10' -
212049	CROSSARM STEEL 6' -
214075	CROSSARM STEEL 8'
214717	CROSSARM,STEEL 102" OAL,W/DOWN GUY ATT.5"X5" HD,SALCO 200
214023	CROSSARMS 3 3/4 X 4 3/4 X 8FT -
219071	CUTOUT 100 AMP LINE PROTECTION S & C 89022R10CM 89032R10M
219080	CUTOUT 100AMP EQUIPMENT PROTECTION
218081	CUTOUT 200 AMP -
219493	CUTOUT 300 AMP SOLID BLADE - SWITCHES
218404	CUTOUT ELECTRONIC ***** SPU 2000 Removal*****
520043	ECOMETER IN-HOME DISPLAYS
465997	ELBOW 600 AMP 4/0 -
466078	ELBOW 600 AMP BOLT-ON 750 MCM - WITH TEST POINT & 200AMP CAP
466649	ELBOW MODULE 1/0 AL 15 KV - T&B 166LRB5240- CPS LE215B06T
467142	ELBOW MODULE 4/0 AL 15 KV -
466813	ELBOW MODULE,1/0, FUSED,ELASTIMOLD 166FLR1-C2040
467348	ELBOW T BODY- 600 AMP -
467555	ENCLOS BURIED CABLE SUNKEN - water meter type
467894	ENCLOS FUSED DISC 1 WAY 1PH
468132	ENCLOS FUSED DISC 2 WAY 1 PH -
468817	ENCLOSURE 1PH 200AMP RADIAL - FEED W/FUSING FOR 3 1PH TAPS
468397	ENCLOSURE 3PH 200AMP LOOP FEED W/ FUSING FOR ONE(1) 3PH TAP
468702	ENCLOSURE 3PH 200AMP LOOP FEED - W/ FUSING FOR TWO(2) 3PH TAPS
469049	ENCLOSURE 3PH 600 AMP W/ THREE - WAY JUNCTIONS- MALTON
468255	ENCLOSURE 3PH 600AMP LOOP FEED W/FUSNG FOR ONE(1) 200 AMP TAP
469536	ENCLOSURE 3PH-600AMP LOOP FEED - W/ FUSING FOR TWO(2) 3PH TAPS
470211	FAULTED CIRCUIT INDICATOR- UG - P.D.P. FOR 750 & 1000MCM
470195	FAULTED CIRCUIT INDICATOR- UG - POWER DELIVERY PRODUCTS
469811	FAULTED CIRCUIT INDICATORS - CPS STVTA
466151	FEED-THRU 2 WAY/DBL PARK STAND - LOADBREAK PORTABLE FEEDTHRU
308668	FLATHEAD HPS100W FLATHEAD LUMIN CUTOFF
308411	FLATHEAD HPS70W LUMIN CUTOFF
70250	FRAME SUBSTATION MOUNTING-VWE
474220	GR. SLEEVE GS-67-59-36RT-MG-52X14 3ph 75 -500kva Trans.(6000lb limit)
526655	HARDWIRE SURGE PROTECTOR, 1 PH 120/240 LEA & PSG TYPES
308361	HPS 100W HEAD ONLY - DINICO U.G. LIGHT LUMIN
308956	HPS 250 WATT HD FLOODLIGHT ULTRAFLOOD 75 LUMINAIRE
273555	HPS LIGHT COMPLETE SET
290585	INSULATOR 10 INCH SUSPENSION -
290098	INSULATOR 6 INCH SUSPENSION -
289025	INSULATOR EPOXILATOR 25KV HUBBELL 401025 0215 TYPE PDI
287532	INSULATOR HORIZONTAL POST - porcelain-plastic-fiberglass
273556	LIGHT,COBRA, LED CPLI XNV-AB-01-E-U-3-10K-4-AP LUMINAIRE
467605	MALTON ENCLOS. DBL CIRCT 3PH
312033	MARKER- SPHERICAL- LINE -

Inventory No	Description
477232	MODEL 9 600 AMP TWO TAP PADMOUNTED DEADFRONT SWITCH
473763	MULTIPT TERM MOD 200A 2 WAY - JUNCTION LOADBREAK 200 AMP
473819	MULTIPT TERM MOD 200A 3 WAY - JUNCTION LOADBREAK 200 AMP
473991	MULTIPT TERM MOD 200A 4 WAY - JUNCTION LOADBREAK 200 AMP
474001 474037	MULTIPT TERM MOD 600A 2 WAY - MULTIPT TERM MOD 600A 3 WAY DEADBREAK JUNCTIONS
335067	POLE 35/4 -
333796	POLE WOOD 35 CLASS 3 .60 CCA - TREATED- SOUTHERN YELLOW PINE
474484	PAD BURIED GR.SL. GS 75 69 36 SCV MG 58X12 / S&C VISTA 300 & 400
474485	PAD BURIED GROUND SLEEVE - FOR 1500 KVA PADMOUNT TRANSF.
474492	PAD BURIED GROUND SLEEVE - FOR 750 KVA PADMOUNT TRANSF.
474474	PAD BURIED GROUND SLEEVE FOR 75 300 KVA PADMOUNT TRANS
474477	PAD BURIED GROUND SLEEVE - FOR S & C MODEL 300 & 400
474482	PAD BURIED GROUND SLEEVE - FOR S & C MODEL 500 VISTA SWCH
474483	PAD BURIED GROUND SLEEVE - FOR S & C MODEL 550 VISTA SWCH
474479	PAD BURIED GROUND SLEEVE - FOR S & C VISTA SWITCH- NORDIC
474441	PAD BURIED GROUND SLEEVE - NORDIC GS-106-74-36RT-20-Q8457
474396	PAD BURIED GROUND SLEEVE - NORDIC GS-65-44-36:MG49X27
474300	PAD BURIED GROUND SLEEVE - NORDIC GS696636Q2319FOR MALTON
474411	PAD BURIED GROUND SLEEVE - NORDIC GS-75-45-36RT-20-Q7392-
474230	PAD BURIED GROUND SLEEVE - NORDIC GS-75-72-36-B- 75" W. X
474358	PAD BURIED GROUND SLEEVE - NORDIC GS-77-71-36RT20-Q4936
474416	PAD BURIED GROUND SLEEVE - NORDIC GS-86-78-36RT-MG 16X70-
474426 474200	PAD BURIED GROUND SLEEVE - NORDIC GS-88-78-36RT-Q7386-20- PAD BURIED GROUND SLEEVE 1ph for pad mount transformers &
474205	PAD BURIED GROUND SLEEVE 3ph - FOR 3PH 200AMP & 600AMP ENCL.
474210	PAD BURIED GROUND SLEEVE 3ph - FOR 3PH 200AMP & SMALL 600AMP
474215	PAD BURIED GROUND SLEEVE 3ph FOR 3PH 600AMP FUSED SWITCHES
474490	PAD BURIED GROUND SLEEVE / FOR 2000 KVA PAD.TRAN. 80-54-36RT-3X-60x18
474072	PAD COMPOSOLITE FOR 3 PHASE - TRANSFS. & ENCLOSURES
474013	PAD DOUBLE TRANSFORMER,GS724018MG24122428
474048	PAD GROUND SLEEVE COVER NORDIC GSC-75-69-CEC
474099	PAD NORDIC GS-75-69-39RT2O-MG - FOR CPS P00620L06S03A &
474155	PAD TRANSFORMER SINGLE PHASE - FIBERGLASS & COMPOSOLITE
474170	PAD TRANSFORMER SINGLE PHASE - NORDIC CBP374315A- FOR PAD
474117	PAD TRANSFORMER- BP-48-48-20RT - NORDIC- W/40"L X 13"D TOP
474254	PAD, SINGLE PHASE DUMMY,NORDIC ND202418MBWG
474129	PAD,GROUND SLEEVE,GS756936RT2XMG58X18, FOR 3000 PDMT,16,000LB CAP
474319	PAD,GS754836RMG57X18,GR.SL.3PH.UM33.LARGE
475307	PEDESTAL SECONDARY LOOPING -
325555	PLATFORM REGULATOR 16ft. - AlumaForm #3PCAL-16
332904	POLE 25/7 -
333313 333161	POLE 30/1 .60 CCA - SOUTHERN YELLOW PINE-M 20 POLE 30/4
332908	POLE 30/5 -
333088	POLE 30/6 -
333465	POLE 35/1 .60 CCA SOUTHERN YELLOW PINE M 20
338038	POLE 35/5 -
344218	POLE 40/2 -
344051	POLE 40/3
343061	POLE 40/4 -

Inventory No	Description
342071	POLE 40/5 -
342568	POLE 40/6 -
348517	POLE 45/1 .60 CCA - SOUTHERN YELLOW PINE-M 20
348276	POLE 45/2 -
348011	POLE 45/3 -
347021	POLE 45/4
346031	POLE 45/5 -
350277	POLE 50/1 -
350140	POLE 50/2
350066	POLE 50/3 -
349001	POLE 50/4 -
352534	POLE 55/1
352047	POLE 55/2 -
351544	POLE 55/3 -
350553	POLE 55/4 -
351056	POLE 55/5 -
350430	POLE 60/1 -
353037	POLE 60/2 -
353055	POLE 65/1 -
354027	POLE 65/2 -
354500	POLE 70/1 -
354834	POLE 70/2 -
332497	POLE AL. SQ. 14' X 4" .125, 11' MH SSA11B4-E, BRZ REF.2643 DRILL PAT
332769	POLE ALUM 17' SQUARE ,DIRECT BURIED, BRONZE
332900	POLE ALUM,RND TAPERED,GRN & GRAY W/1 ARM(HAPCO RTA20C6BEM1401
331954	POLE CONCRETE 30'- SPUN -
331809	POLE CONCRETE 35'- SPUN -
331609	POLE CONCRETE 40' CLASS 1
331659	POLE CONCRETE 40 CLASS 3
331509	POLE CONCRETE 45 CLASS 3
331409	POLE CONCRETE 45' SPUN
331109	POLE CONCRETE 50 CLASS 2
331209	POLE CONCRETE 50'- SPUN -
331045	POLE CONCRETE 55 CLASS 1
331009	POLE CONCRETE 55'- SPUN -
331000	POLE CONCRETE 60'- SPUN, CLASS 1
331683	POLE CONCRETE 65/1
332444	POLE CONCRETE 70 CLASS H3S
332366	POLE CONCRETE 70/1
332902	POLE- CONCRETE- BLACK-SPUN- - PRESTRESSED- W/ 1.9" x 6" TEN
332901	POLE- CONCRETE DECORATIVE - FOR KING LUMINAIRE
332903	POLE- CONCRETE- GREEN- SPUN - PRESTRESSED- W/3" H X 3" DIA.
355057	POLE CONCRETE, 60 CLASS 1
332825	POLE FIBERGLASS
332850	POLE- FIBERGLASS REINFORCED - EPOXY- TEXTURED-TAPERED-ROUND
332098	POLE LAMINATED WOOD -
332601	POLE METAL 14' ROUND FOR ROUND GLOBE ASSEMBLY WITH
332742	POLE METAL SQUARE 14'
354908	POLE, 75 CLASS 1, WOOD
332496	POLE, ALUM SQ. 4"X4",11'M.H.14' OAL,HAPCO SSA11B4 E,DIRECT BURIED
332875	POLE, ALUM. BLACK,FOR CARRIAGE LIGHT,HAPCO RTA14B5AEBA

Inventory No	Description
445374	SWITCH S & C 934132-L2P4-S115 - 600 AMP LOOP FEED W/1 600 & 2
446987	SWITCH S & C 934222-L2M3P4 - 600 AMP LOOP FEED W2 600 AMP
435700	SWITCH S & C 934222-L2M3P4S - VISTA- 15 KV- 200 AMP LOOP
449495	SWITCH S & C 934222-L2M3P4TO - 600 AMP LOOP FEED- 2/200 AMP
443761	SWITCH S & C 934222-L2P4 VISTA - 600 AMP LOOP FEED W/2 200 AMP
448599	SWITCH S & C MODEL 211 VISTA 600 AMP LOOP FEED W/1 600 TAP
435381	SWITCH S & C MODEL 330 600 AMP - 933302R1-P4L20S- 3 600 AMP
450053	SWITCH S & C MODEL 413- 600 A - W/1 600 AMP SWITCH & 3 600 AMP
447255	SWITCH S & C MODEL 431,600 AMP,934312R1L2M3OP4STO
447793	SWITCH S & C MODEL 514 VISTA - SWITCH 15 KV- 1 600 AMP GANGED
448061	SWITCH S & C MODEL 532, 600A,VISTA SWITCH
450106	SWITCH S & C MODEL 550 600 AMP - 935502-P6L2S0-S(X)-5 600 AMP
435222	SWITCH S & C VISTA MODEL 312 - S.S. 600 AMP LOOP FEED- W/2
447941	SWITCH S&C MDL523 SS 600 AMP,935232R1L2M3OP16STO, VFI
433003	SWITCH SUBSTATION DOUBLE BYPAS - 600AMP TYPE EHTT
432088	SWITCH SUBSTATION SINGLE BYPAS - 600AMP TYPE EH
434088	SWITCH THREE-WAY PHASE OVER - PHASE 15 KV 600 AMP
477405	SWITCH- VACCUM SWITCHGEAR - 3PH 600AMP 15Kv 1-WAY
477400	SWITCH- VACCUM SWITCHGEAR - 3PH 600AMP 15Kv 3-WAY
422505	SWITCH, BYPASS, TANDEM, 13213TAEC300 1200A ROYAL SW.GEAR
431648	SWITCH, DISCONNECT 900A,W/BASE,15 KV,HPS M3D92B
449999	SWITCH, S & C MODEL 413,600 AMP, STAINLESS STEEL
422504	SWITCH, SUBSTATION 60 DEGREE HOOKSTICK, ROYAL 20325TAEC300.A
423002	SWITCH, SUBSTATION V-TYPE, ROYAL 19811TAEC300.B
477195	SWITCH,MDS107B3AL,MALTON,600A,2/200A,FUSED TAPS
447882	SWITCH,S&C,MDL523,600A.935232R1L2M30P6ST0
476977	SWITCH VFI 2 WAY MDL 5 200A VISIBLE BREAK 1 200 A SOURCE
477069	SWITCH-VFI-3 WAY-MDL 6- 200A - VISIBLE BREAK-2 200 A SOURCE
477041	SWITCH-VFI-3 WAY-MDL 7--200A - VISIBLE BREAK-1 200 A SOURCE
477013	SWITCH VFI 4 WAY MDL 12 200A VISIBLE BREAK 1 200 A SOURCE
476941	SWITCH-VFI-4 WAY-MDL 9-200A - VISIBLE BREAK-2 200 A SOURCE
477087	SWITCH-VFI-MDL. 10- 600 AMP - VISIBLE BREAK-2 600 A SOURCE
477539	TERMINATION #2AL 15KV UG -
477612	TERMINATION 1/0 AL 15 KV - 3M 7652-S-4-1/0 25 KV W/PIN
478115	TERMINATION 4/0 AL 15 KV - 3M 7652-S-4-4/0 25 KV
478545	TERMINATION KIT 1000 MCM-25 KV - W/2 HOLE COMPRESSION LUG- 3M
478540	TERMINATION KIT 3M 750 MCM - 7655-S4-40172 25 KV W/2 HOLE
478529	TERMINATOR KIT G & W 750MCM -
310594	WASHINGTON POST BLACK,100W HPS,ACRYLIC LENS LUMINAIRE
310394	WASHINGTON POST GREEN 100W HPS ACRYLIC LUMINAIRE
456582	WIRE GUY 10M ALUMOWELD - O.A.D. .306
457572	WIRE GUY 12.5 M ALUMOWELD - O.A.D. .343
458318	WIRE GUY 18 M ALUMOWELD 500' COIL, .417 DIA
450540	WIRE GUY 3/8"
454017	WIRE GUY 8M ALUMOWELD - O.A.D. .272
458319	WIRE, GUY 1/2", 26900 LBS,
520015	WISHBONE TEE MODULE - INSERT- ROTATABLE FEEDTHRU

Inventory No	Description
332392	POLE, CONCRETE 75 CLASS 1, DODECAGONAL
332079	POLE, SQUARE CONCRETE TAPERED, BLACK FOR CORVUS FIXTURE
332055	POLE,BRONZE SQ.CONCRETE POLE,18',FOR CUTOFF FIXTURE
332187	POLE,CONCRETE 80 CLASS 1
330050	POLE,CONCRETE 90 CLASS 2
332069	POLE,SQUARE CONCRETE TAPERED,BRONZE W/3"TENON,SANDBLASTED/SEALED,35'
309121	PRAGUE GREEN 100W HPS LUMINAIRE
356006	RACK CAPACITOR 3PH SZ 3-6-12 -
496654	RECEIVER AMR TURTLE for subst. for turtle system
356300	RECLOSER- 3PH TYPE: NOVA - 15 KV
356259	RECLOSER- 3PH TYPE: R- RE- WE - all 3 PH except VWE's
356261	RECLOSER- 3PH TYPE: VWE - 15 KV
359999	RECLOSER CPS TRIPLE-SINGLE - 15KV-NOVA-KNTS15-8-400
356800	RECLOSER,3PH.NOVA,800A
273558	ROADWAY LED CPLI-XNV2-AC-02-E-U-3-10K-4-BK LUMINAIRE
372599	ROD GROUND 5/8 X 8' GALVANIZED -
372003	ROD GROUND SECTION COPPERWELD - 5/8" X 10' NON THREADED- 13MIL
373066	SCADA RADIO DOWN LINE UNIT
475145	SECONDARY PEDESTAL - NORDIC PRMC-190WG
374000	SENSORS- LINE POST CURRENT - FISHER PIERCE 1301-17A
376176	SHIELD GLARE FOR KING K118EAR
376192	SHIELD,HOUSE SIDE FOR PRAGUE FIXTURE,180 DEGREE,HOLOPHANE GWSDC180
308721	SHOEBOX LED CPLI RDGCO2LEDEUT3ABZ4 LUMINAIRE LIGHT
308720	SHOEBOX TRUE TRIBUTE STYLE W/ARM, BRONZE,100W,HPS,CPS LUMIN
422172	SUBSTATION PROCESSING UNIT, SPU3000, FASY06320016
477177	SWITCH 200 AMP PADMOUNTED- - 3 WAY PDMT.MODEL 6-2 200 A
477151	SWITCH 200 AMP PADMOUNTED 4 WAY PDMT.MODEL 9 2 200 A
434267	SWITCH 3 PH,TYPE AR,HOR,900A,GANG OPER,LOADBREAK
421905	SWITCH- 400AMP- OIL BREAK - ELECTRONICALLY OPERATED
477337	SWITCH 600 AMP PADMOUNTED DEADFRONT MODEL 6 WITH TWO
477311	SWITCH 600 AMP PADMOUNTED- - DEADFRONT MODEL 9 WITH TWO
434078	SWITCH AIR BREAK,VERTICAL,PHASE OVER PHASE,25KV
434068	SWITCH AIR-BREAK 3 PH.HORZ.25KV
433078	SWITCH B1 REGULATOR BY-PASS -
422004	SWITCH CAPACITOR 15KV- 120V AC - VACUUM w/ 5 PIN "VCS"
422002	SWITCH CAPACITOR OIL FILLED - TYPE "NR"
434625	SWITCH CHANCE MODEL LVS-3- 600 - AMP GANGE OPERATED- PADMOUNTED
424001	SWITCH DISCONNECT 1200 AMP
431428	SWITCH DISCONNECT 900AMP CUTOUT STYLE - S & C LOADBUSTER- 18933
431098	SWITCH DISCONNECT UNDERSLUNG 600AMP - CHANCE #M3D-62B
422006	SWITCH INLINE DISCONNECT - 600AMP #SE127
477395	SWITCH MALTON MOD MDS111B3AL 3-600A SW.1-200A TAP
477390	SWITCH PADMOUNT 600 AMP DEAD FRONT
442148	SWITCH S & C 55252R3 15 KV - 600 AMP MANUAL TYPE MODEL
434983	SWITCH S & C 65252R1-E151 - VISTA- 15 KV- 600 AMP- MODEL
449973	SWITCH S & C 65255R1 E151 PME 13 3 WAY
449734	SWITCH S & C 932102-P2-L2-0-MI - VISTA SWITCH- MODEL 210 2 WAY
437312	SWITCH S & C 933122-L2M3P4S - VISTA- 600 AMP LOOP FEED- W/2
438924	SWITCH S & C 933212-L2M3P4 - VISTA- 15 KV- 600 AMP LOOP
449137	SWITCH S & C 933212-L2M40P4TO - 600 AMP LOOP FEED- 1 200 AMP
440536	SWITCH S & C 933212-L2P4 - VISTA- 600 AMP LOOP FEED W/1

Inventory No	Description
750043	(DO NOT USE - OBSOLETE) METER 3W TURTLE READY - CLASS 200 24OV
800029	0.5 KVA 7200/120V TSF FOR VWE CONTROLS & CAPACITORS
800052	1.0 KVA 7200/120V TSF - FIXED LOAD-FOR CAPACITOR BANKS
800075	1.5 KVA SB CONV. 120/240 VOLT TSF
806067	10 KVA SB CSP 120/240 - TSF
807382	10 KVA DB CONV 120/208 TSF
809038	10 KVA DB CONV 120/240 - TSF
809525	10 KVA DB CONV 240/480 TSF
809200	10 KVA DB CONV SS 120/240 TSF
806830	10 KVA SB CONV 120/240 - TSF
807014	10 KVA SB CONV 120/240 SS TSF
806229	10 KVA SB CSP- SS - 120/240 - TSF
828004	100 DB CONV 240/480 W/TAPS TSF
828010	100 DB CONV 277/480 TSF
827683	100 KVA DB CONV SS 277/480 TSF
827766	100 KVA PDMT 120/240 TSF
827765	100 KVA PDMT SS 120/240 TSF
827923	100 KVA SB CONV 120/240 TSF
827934	100 KVA SB CONV SS 120/240 TSF
827840	100 KVA SB CSP 120/240 TSF
827850	100 KVA SB CSP SS 120/240 TSF
829663	1000 KVA PDMT 3PH 120/208 TSF
829820	1000 KVA PDMT 3PH 277/480 TSF
829825	1000 KVA PDMT 3PH 277/480 RT TSF
827956	100KVA DB CONV 120/240 TSF
828186	112KVA PDMT 3PH 120/208 TSF
828194	112KVA PDMT 3PH 480/277 TSF
810002	15 KVA 120/240 SB CSP TSF
813401	15 KVA DB CONV 120/208 TSF
813071	15 KVA DB CONV 120/240 TSF
812081	15 KVA DB CONV 240/480 TSF
811828	15 KVA DB CONV 277/480 TSF
813621	15 KVA DB CONV SS 120/208 TSF
813181	15 KVA DB CONV SS 120/240 TSF
812411	15 KVA DB CONV SS 240/480 TSF
811400	15 KVA PADMOUNT 120/240 TSF
811500	15 KVA PADMOUNT 240/480 TSF
811609	15 KVA PADMOUNT SS 120/240 TSF
810010	15 KVA S.B.CSP- SS- 120/240 TSF
812631	15 KVA SB CONV 120/240 TSF
812777	15 KVA SB CONV SS 120/240 TSF
811912	15 KVA SS DB CONV 277/480 TSF
810028	15 KVA STPDWN CON 7200/2400 - STEP-DOWN TSF
828742	150 3PH PDMT SS 277/480 TSF
828673	150 PDMT 3 PH 120/208 TSF
828699	150 PDMT 3 PH 277/480 TSF
828508	150 PDMT 3 PH SS 120/208 TSF
829843	1500 KVA PDMT 3PH 120/208 TSF
829840	1500 KVA PDMT 3PH 277/480 TSF
828676	150KVA PDMT 3PH 120/208 RT TSF

Inventory No	Description
828426	167 KVA DB CONV 120/240 TSF
828343	167 KVA PDMT 1PH 120/240 TSF
806554	167 KVA SB CONV,120/240 - TSF
828301	167 KVA W/TAPS 240/480 TSF
828269	167KV DB CONV 240/480 TSF
828370	167KVA PDMT SS 120/240 TSF
829845	2000 KVA PDMT 3PH 277/480 TSF
828830	225 KVA PDMT 3 PH 120/208 TSF
828913	225 KVA PDMT 3PH 277/480 TSF
815667	25 DB CONV 120/208 TSF
818021	25 DB CONV 120/240 TSF
815928	25 DB CONV SS 120/208 TSF
818516	25 DB CONV SS 120/240 TSF
819508	25 KVA DB CONV 240/480 TSF
819763	25 KVA DB CONV 277/480 TSF
819593	25 KVA DB CONV SS 240/480 TSF
819791	25 KVA DB CONV SS 277/480 TSF
814483	25 KVA PADMOUNT 120/240 TSF
818846	25 KVA S.B.CONV SS 120/240 TSF
814061	25 KVA SB CSP 120/240 TSF
814131	25 KVA SB CSP SS 120/240 VOLT TSF
814490	25 KVA SS PADMT.120/240 TSF
816451	25 SB CONV 120/240 TSF
801019	3 KVA SB CSP TSF
819847	30 KVA 3PH PDMT 120/208 TSF
819854	30 KVA-3PH PDMT 277/480 TSF
829005	300 KVA 3 PHASE PDMT SS 277/480 TSF
828950	300 KVA 3PH PDMT 120/208 TSF
829051	300 KVA PDMT 3PH 277/480 TSF
828983	300 KVA PDMT 3PH 120/208 R WITH R TEMP OIL TSF
829855	3000 KVA PDMT. 3 PH. 277/480 TSF
828925	300KVA 3PH.PDMT SS 120/208 TSF
829093	333 KVA DB CONV 277/480 (overhead Bunge Grain) TSF
822502	37.5 KVA CSP 120/240 TSF
822510	37.5 KVA CSP SS 120/240 TSF
821074	37.5 KVA DB 240/480 TSF
822550	37.5 KVA DB 277/480 TSF
819989	45 KVA 3PH.PDMT SS 277/480 SPACESAVER 3 TSF
820260	45 KVA-3PH PDMT 277/480 SPACE SAVER 3 TSF
803098	5 KVA DB CONV - TSF
802009	5 KVA SB CSP TSF
802034	5 KVA SB CONV. 120/240 TSF
825039	50 KVA DB CONV SS 240/480 TSF
825075	50 KVA DB CONV 120/208 TSF
826024	50 KVA DB CONV 120/240 TSF
825034	50 KVA DB CONV 240/480 TSF
825391	50 KVA DB CONV SS 120/208 TSF
826136	50 KVA DB CONV SS 120/240 TSF
825051	50 KVA PDMT 240/480 TSF
825602	50 KVA SB CONV 120/240 TSF

Inventory No	Description
825742	50 KVA SB CONV SS 120/240 TSF
824045	50 KVA SB CSP 120/240 TSF
824207	50 KVA SB CSP SS 120/240 TSF
824532	50 PAD MOUNT 120/240 TSF
824704	50 PADMT 120/240-SS 409 STAINLESS STEEL TSF
824540	50 PADMT SS 120/240 TSF
829180	500 KVA 3 PHASE PDMT 120/208 - T-BLADE SWITCH TSF
829119	500 KVA PDMT 3PH 120/208 TSF
829125	500 KVA PDMT 3PH 120/208 - WITH GANG OPERATOR SWITCH TSF
829158	500 KVA PDMT 3PH 120/208 - WITH GANG OPERATOR SWITCH TSF
829225	500 KVA PDMT 3PH 277/480 TSF
829250	500 KVA PDMT 3PH 277/480 - WITH 4 POSITION T-BLADE SWITCH TSF
829303	500 KVA PDMT 3PH 277/480 - WITH 5 POSITION TAP SETTING TSF
826362	50KVA DB CONV 277/480 TSF
826445	50KVA DB CONV SS 277/480 TSF
805077	7.5 KVA SB CSP - TSF
827105	75 KVA 3PH PDMT 120/208 TSF
827218	75 KVA 3PH PDMT SS 120/208 TSF
827449	75 KVA 3PH PDMT SS 277/480 TSF
827475	75 KVA DB 240/480 TSF
827501	75 KVA DB CONV 277/480 TSF
827502	75 KVA DB CONV SS 277/480 TSF
827014	75 KVA KVA DB CONV 120/240 TSF
826859	75 KVA PADMOUNT 120/240 TSF
827110	75 KVA PDMT 3PH 120/208 RT TSF
827436	75 KVA PDMT 3PH 277/480 TSF
826611	75 KVA PDMT SS 120/240 TSF
826500	75 KVA SB CONV 120/240 TSF
826537	75 KVA SB CONV SS 120/240 TSF
826933	75 KVA SB CSP 120/240 TSF
826935	75 KVA SB CSP SS 120/240 TSF
829410	750 KVA PDMT 3PH 120/208 TSF
829416	750 KVA PDMT 3PH 277/480 TSF
829498	750 KVA PDMT 3PH 277/480 - 4 POSITION T BLADE SWITCH TSF
829414	750 KVA PDMT 3PH 120/208 RT TSF
826960	75KVA DB CONV 120/208 TSF
796471	CABINET,1 PH,SECTIONALIZING,FIBERGLASS,W/MOUNT PLATE & NO JUNCTIONS,NORDIC
788321	CT METERING 15:5
788000	CT METERING 25:5
786004	CT METERING 5:5
788107	CT METERING 50:5
780937	CT METERING BAR TYPE 200:5
782204	CT METERING BAR TYPE 400:5
782400	CT METERING BAR TYPE 600:5
789560	CT METERING OM 100:150:200:5
791525	CT METERING SPADE 1000:5
792523	CT METERING SPADE 1200:5
792550	CT METERING SPADE 1500:5
791293	CT METERING SPADE 200:5
792565	CT METERING SPADE 2000:5

Inventory No	Description
790469	CT METERING SPADE 400:5
791548	CT METERING SPADE 600:5
792515	CT METERING SPADE 800:5
791038	CT METERING WINDOW 200:5
790204	CT METERING WINDOW 400:5
791459	CT METERING WINDOW 600:5
792028	CT METERING WINDOW 800:5
751804	ENDPOINT TRANSCEIVER,TS2 AX FOCUS MODULE, HUNT 26-1239,240 VOLT
751166	ENDPOINT, TS2 W/ZIGBEE 240V FACTORY INSTALLED
753100	ENDPOINT,TRANSCEIVER,TS2,120 V,FASY-0624-0001
759000	ENDPOINT,TRANSCEIVER,TS2,AMR,FOR FOCUS METER
759050	ENDPOINT,TRANSCEIVER,TS2,S4E, POLYPHASE
750042	METER 1PH 3W50A 120/240V FM2SE WO/DEMAND 4 TERM
750035	METER 2WIRE 1PHASE 120V FM1S - Plant # 33000
750046	METER 3W30A 1PH 120/208V FM12S -
750040	METER CL200 3-WIRE/30AMP - SINGLE PHASE/FM.2S
759366	METER COVER,TINTED FOR S4/S4E , 70751-8
750130	METER ELEC 3PH 120/480V CL20 FM8/9S W/DEMAND TYPE AXS4E AMR READY
750147	METER ELEC 3PH 4W 120/480V CL200 FM15/16S W/DEMAND TYPE AXS4E AMR READY
750117	METER ELEC CL20 4W W/KYZ WYE & - DELTA- 120-480V 3 PH CT RATED
750110	METER ELEC/30AMP/4-WIRE DELTA - 240volt/3-PHASE/SELF CONTAINED
750109	METER ELEC/4W W/KYZ FM6S 120 480V 13 TERMINAL
750107	METER ELEC/4W with DEMAND - FM6-S 120V 13 TERMINAL
750070	METER ELEC/CL10/2-WIRE/240VOLT - SINGLE PHASE/PRIMARY METER
750085	METER ELEC/CL20/3 WIRE W/KYZ 120 480V 3 PH /CT RATED/FM.5S
750080	METER ELEC/CL20/3-WIRE WYE - 120VOLT/3-PHASE/CT RATED/FM.5S
750065	METER ELEC/CL20/3-WIRE/240VOLT - SINGLE PHASE/CT RATED/FM.4S
750120	METER ELEC/CL20/4-WIRE WYE - 120volt/3-PHASE/CT RATED/FM.9S
750030	METER ELEC/CL200/3WIRE/240VOLT - SINGLE PHASE/MS2S
750140	METER ELEC/CL200/4 WIRE WYE 120VOLT/3 PHASE/SELF CONTAINED
750150	METER ELEC/CL400/3-WIRE DELTA - 240VOLT/3-PHASE/SELF CONTAINED
750090	METER ELEC/CL400/4-WIRE WYE - 120VOLT/3-PHASE/SELF CONTAINED
750100	METER ELEC/CL480/4 WIRE DELTA 240VOLT/3 PHASE/SELF CONTAINED
750104	METER ELECTRONIC - FM 15K & 16K
750125	METER ELECTRONIC- 3W-30 AMP- - 120/208 VOLT W/DEMAND FRM 25S
750160	METER ELECTRONIC DEMAND/TOU - RECORDER/LANDIS & GYR RXS4
750048	METER TS2 12SE S4E 1PH NETWORK CL320 WD
750106	METER TS2 16/15K S4E 3PH CL480 WD
750145	METER TS2 16/15S S4E 3PH CL200 WD
750143	METER TS2 16/15SE S4E 3PH CL 320 WD
750038	METER TS2 1S FOCUS 1PH CL100 ND
750190	METER TS2 25S FOCUS 1PH NETWORK CL200 ND
750102	METER TS2 2K FOCUS 1PH CL480 ND
750191	METER TS2 2K FOCUS AXR 1PH CL480 WD
760000	METER TS2 2S FOCUS 1PH CL200 ND
750165	METER TS2 2S FOCUS AX SD 1PH CL200 WD
750192	METER TS2 2SE FOCUS 1PH CL320 ND
750045	METER TS2 2SE FOCUS AXR 1PH CL320 WD
750115	METER TS2 36S S4E 3PH CL20 CT RATED WD
750175	METER TS2 3S FOCUS 1PH CL20 CT RATED ND

Inventory No	Description
750049	METER TS2 3S S4E 1PH CL20 CT RATED WD
750075	METER TS2 45S S4E 3PH CL20 CT RATED WD
750060	METER TS2 4S FOCUS 1PH CL20 CT RATED ND
750055	METER TS2 4S FOCUS AXR 1PH CL20 CT RATED WD
750050	METER TS2 4S S4E 1PH CL20 CT RATED WD
750113	METER TS2 9/8S S4E 3PH CL20 CT RATED WD
750522	METER TS2 9/8S S4E RXR 3PH CL20 CT RATED WD
750026	METER VWE AMP DEMAND -
750047	METER, 3W,3PH,FRM 12SE,120-480 VOLT,W/D,ELECTRONIC
750073	METER,FRM3SW/D,1 PH,240V,ALTIMUS,
750020	METERS OBSOLETE CLOCK & CYCLOMETER REGISTER TYPE
750200	OPTOWAND, SYMBOL MC9000 W/HOLDER & CABLE
797076	PEDESTAL ,SINGLE PH. DUMMY,DURHAM
793273	PT (2.5:1) 277V:120V
793290	PT (2:1) 120V
792937	PT (20:1) 2400V:120V
793059	PT (4:1) 480V:240V
793018	PT (60:1) 7200V:120V
793505	PT 240V:120V
795550	RECLOSER- 1 PHASE POLE MOUNT - ELECTRONIC CONTROLLED TYPE:VXE
795551	RECLOSER CONTROL BOX for - 1 PHASE ELECTRONIC POLE MOUNT
794559	RECLOSER CONTROL CABLE NOVA - 1 PHASE ELECTRONIC POLE MOUNT
796169	RECLOSER CONTROL PANEL - FOR ALL 3 PHASE
794552	RECLOSER CONTROL PANEL NOVA - 1 PHASE ELECTRONIC POLE MOUNT
795583	RECLOSER OIL CIRCUIT TYPE 4H -
795096	RECLOSER OIL CIRCUIT TYPE H -
796086	RECLOSER OIL CIRCUIT TYPE L -
795109	RECLOSER OIL CIRCUIT- 10 H - COOPER POWER SYSTEM KH110B22
795808	RECLOSER OIL CIRCUIT- 100 4 H - COOPER POWER SYSTEM KH4100B22
796020	RECLOSER OIL CIRCUIT- 100 L - COOPER POWER SYSTEMS KL100B22
795598	RECLOSER OIL CIRCUIT- 15 4H - COOPER POWER SYSTEM KH415B22
795122	RECLOSER OIL CIRCUIT- 15 H - COOPER POWER SYSTEM KH115B22
795628	RECLOSER OIL CIRCUIT- 25 4H - COOPER POWER SYSTEM KH425B22
795135	RECLOSER OIL CIRCUIT- 25 H - COOPER POWER SYSTEM KH125B22
795853	RECLOSER OIL CIRCUIT- 25 L - COOPER POWER SYSTEM KL25B22
795673	RECLOSER OIL CIRCUIT- 35 4H - COOPER POWER SYSTEM KH435B22
795148	RECLOSER OIL CIRCUIT- 35 H - COOPER POWER SYSTEM KH135B22
795898	RECLOSER OIL CIRCUIT- 35 L - COOPER POWER SYSTEM KL35B22
795718	RECLOSER OIL CIRCUIT- 50 4H - COOPER POWER SYSTEM KH450B22
795161	RECLOSER OIL CIRCUIT- 50 H - COOPER POWER SYSTEM KH150B22
795943	RECLOSER OIL CIRCUIT- 50 L - COOPER POWER SYSTEM KL50B22
795763	RECLOSER OIL CIRCUIT- 70 4H - COOPER POWER SYSTEM KH470B22
795174	RECLOSER OIL CIRCUIT- 70 H - COOPER POWER SYSTEM
795988	RECLOSER OIL CIRCUIT- 70 L - COOPER POWER SYSTEM KL70B22
794280	RECLOSER SINGLE PHASE- NOVA - CPS KNSP15
794098	RECLOSER, 1PH. VERSATECH 27KV,400 A,W/ BATTERY & 2 RADIOS,POLE MT
799627	REGULATOR 150-500 AMP -
799478	REGULATOR 76.2 KVA- 100 AMP - allis chambers & siemens
799537	REGULATOR 114.3 KVA- 150 AMP -
799679	REGULATOR 167 KVA- 219 AMP -

Inventory No	Description
799774	REGULATOR 250 KVA- 328 AMP - 10-07.6-250
797568	REGULATOR AC 15 AMP- 11.4 KVA -
798553	REGULATOR AC 25 AMP -
799213	REGULATOR AC 50 AMP -
799395	REGULATOR AC 75 AMP - 57.2 KVA
799965	REGULATOR CONTROL PANEL each reg. takes 1 control
778000	REMOTE SERVICE SWITCH
778800	SOCKET 100A 1 PHASE -
779744	SOCKET 13 TERMINAL
779765	SOCKET 14 TERMINAL (all types) - with or w/out ct's & test blks
778910	SOCKET 200A 1 PHASE -
779827	SOCKET 3 GANG -
779090	SOCKET 300A 1 PHASE -
779830	SOCKET 4 GANG - with 200amp main breaker
779840	SOCKET 5 GANGE - with 200amp main breakers
779173	SOCKET 5 TERMINAL
779860	SOCKET 6 GANGE- 200 AMP - W/200 AMP MAIN BREAKERS
779256	SOCKET 6 TERMINAL
779330	SOCKET 7 TERMINAL -
779587	SOCKET 8 TERMINAL
779900	SOCKET CABINET A BASE
780221	SOCKET K4 400'&' 600A
780304	SOCKET K7 400'&' 600A
780064	SOCKET TEST SWITCHES
792689	TRANS.DEFERRAL CABINET,1 PHASE,NORDIC ND-28-MG-103-X-X
789800	TRANSF. CT JKW5 50:100:5 -
790121	TRANSF. CT TYPE MR 400:5 -
849243	TSF 750KVA 3PH PDMT 120/208 T BLADE SWITCH STAINLESS STEEL
750044	TURTLE STD. FOR METERING @ SUB - use for meter 750043
795530	VACCUM INTERRUPTER 3 PH 600AMP - W/1 200AMP TAP- 600A FEED-THRU
795540	VACCUM INTERRUPTER 3 PH 600AMP W/2 200AMP TAPS 600A FEED THRU
795510	VACCUM INTERRUPTER 3 PH 600AMP - W/2 600AMP TAPS-600A FEED-THRU
795200	VACUUM INTERRUPTER 3 PH 600AMP - FEED THRU WITH 600 AMP SOURCE
795520	VACUUM INTERRUPTER 3 PH 600AMP - W/1 600 AMP TAP-600A FEED-THRU
795500	VACUUM INTERRUPTER 3 PH 600AMP - W/2 600 AMP TAPS- NO FEED-THRU
794008	VOLTMETER MIN MAX V4 -

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APPENDIX G

EGLIN AFB
EMCS (DDC) SYSTEM REQUIREMENTS

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Eglin AFB
<u>EMCS (DDC) System Requirements for New Facilities:</u> 12 Feb 2020

1. Provide building level supervisory controllers based on Eglin's existing Niagara 4.0 Framework or later. The building level supervisory controllers shall include point-2-point (P2P), Secure Socket Layer SSL, Web server and embedded WorkBench (WB). The building level supervisory controllers shall contain all building logic, graphics and local controller backups.
2. All graphics and points shall be duplicated in the existing Niagara 4.0 Framework ENS (Enterprise Network Server) using existing workbench software located in building 696, which shall serve as the Web Server for the system. All trended points shall be transferred via P2P to the server for history trending of points.
3. One - laptop computer with a CD ROM writer, the latest operating system to Air Force standard, CPU, and technology as it relates to laptops. Provide software and USB adapters for each type of DDC field controllers, to include factory installed DDC controllers. (This laptop will be used/verified during the training).
4. The system shall allow CE technicians to connect to all controllers with all available software in all modes available from the manufacturer from building 696 via the local area network (LAN) to program, backup, download, configure and perform all functions necessary to maintain the system as if onsite and direct connected to the device.
5. All hardware and software administrator level passwords shall be provided to the government to access all levels of all controllers including the new Niagara Framework controllers as well as copies of the system's topology, hardware/ software inventory, and configuration. The password shall allow complete access to everything the manufacture has access to.
6. All field controllers shall use Building Automation and Control network (BACnet) **IP** protocol.
7. Provide a LAN drop within three feet of each building level supervisory controller and provide a patch cable between the LAN drop and the building level supervisory controller.
8. When the BACnet communication buss leaves and enters a building, use fiber optic cable and provide media converter pairs (i.e. between buildings or out to chillers) and provide DB testing results.
9. The BACnet communication buss shall be daisy chained to the JACE. No additional switches or routers shall be used.

IAW AFGM2019-32-02 CE Control Systems Cybersecurity
Para 3.3.8 requires the vendor(s) to perform an initial security assessment, a scan of vulnerabilities, to provide a copy of the scan results, and to mitigate the identified vulnerabilities **prior to final acceptance by the Air Force**. After acceptance, only government-owned assets (e.g., computer, tablet) may be connected to the network for CS maintenance.

Eglin AFB

<u>EMCS (DDC) System Requirements for Current Facility Remods:</u> 13 Jan 2020

1. Modifications to an existing Building's Control System (CS) **must** be compatible with the current CS in that facility if the new controls are connecting to existing JACE. (Whenever possible, the same brand controls should be used.) If a new JACE is to be installed, the requirements for (New Facilities) will apply.
2. All graphics (including floor plans) must be updated in the existing ENS (Enterprise Network Server) located in building 696 which shall serve as the Web Server for the system, as well as in the JACE.
3. The system shall allow CE technicians to connect to all controllers with all available software in all modes available from the manufacturer from building 696 via the local area network (LAN) to program, backup, download, configure and perform all functions necessary to maintain the system as if onsite and direct connected to the device.
4. Provide all Controls software necessary for project (to be loaded onto an AF provided Laptop with current SDC). Provide latest software and USB adapters for each type of DDC field controllers, to include factory installed DDC controllers. (This laptop will be used/verified during the training).
5. All hardware and software administrator level passwords shall be provided to the government to access all levels of all controllers including the new Niagara Framework controllers as well as copies of the system's topology, hardware/ software inventory, and configuration. The password shall allow complete access to everything the manufacture has access to.
6. All field controllers shall use BACnet **IP** protocol.
7. The BACnet communication buss shall be daisy chained to the JACE. No additional switches or routers shall be used. Ensure not to damage/cut existing Buss Line for the remainder of the Facility.

IAW AFGM2019-32-02 CE Control Systems Cybersecurity
Para 3.3.8 requires the vendor(s) to perform an initial security assessment, a scan of vulnerabilities, to provide a copy of the scan results, and to mitigate the identified vulnerabilities **prior to final acceptance by the Air Force**. After acceptance, only government-owned assets (e.g., computer, tablet) may be connected to the network for CS maintenance.

Graphics *sh*all be in the existing ENS (Enterprise Network Server) located in building 696 which shall serve as the Web Server for the system, as well as in the JACE.

Include date and time on all graphic screens.

Main Map Graphic- This screen will have a list and link to all of the buildings on the entire Eglin complex.

Building Graphic- This screen will have a 3rd graphic of the front of the building and a building number. *The following links are required on this page:* Back to Main Map, floor plans, alarms, reports, schedules, history, and user service.

Floor Plan Graphic

The floor plan will be 3D with color coded zones, room numbers, and as- built sensor and equipment locations.

The following points are required on this page: room temp, room humidity, occupancy status

The following links are required on this page: back to building graphic, all equipment (Click on sensor or equipment shown on the floor plan and the link will go to the corresponding equipment).

Typical VAV Table Graphic

The VAV table should include the following info:

Box #, Zone Temp, Set Points (Heat & Cool), SP Source, Flow SP, Flow, Damper position, Heating %, SAT

Typical Equipment Graphic

Include a header with equipment type and number, room numbers and area served.

Include all points on the equipment graphic.

The following points will be animated: fans, dampers, coils, pumps, boilers.

All set points will have the capability of being changed from the graphic.

The following links are required on this page: back to floor, provide a hidden link over each point to show an hourly 3rd day trend, provide a hidden link over each point to override all outputs. Provide a link to a spreadsheet with manufacture and part numbers and warranty dates for all parts on the equipment graphic.

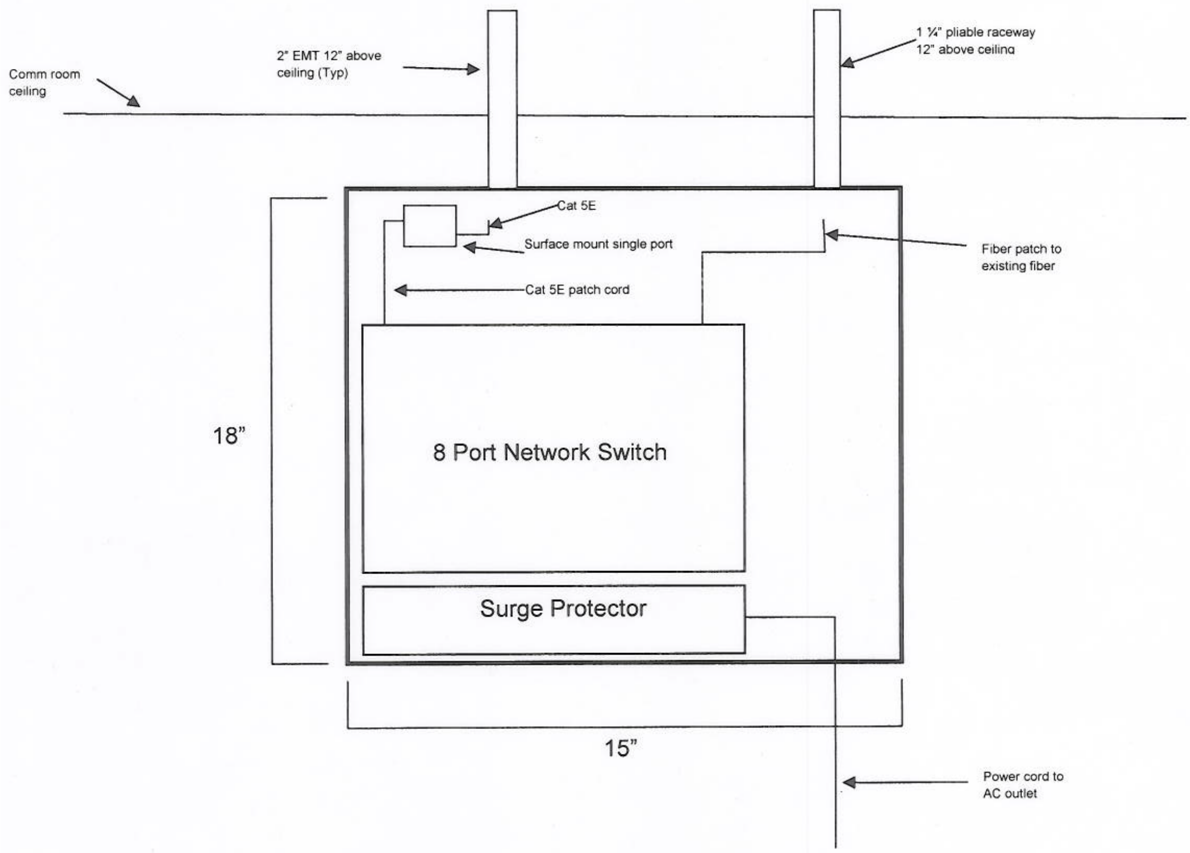
Communication Bus Graphic

Include an as-built wiring diagram of the communication buss between all controllers.

Eglin AFB
Energy Management Control System (EMCS) Network Requirements for New Facilities

1. Comm Squadron shall Install/Identify 2 fiber strands dedicated for DDC connectivity.
2. Contractor installs a wall mounted lockable network enclosure (LNE) with surge protector [for an 8 port switch--**provided by AF** (see attached LNE Detail)] in the **main Communications room.**
3. Contractor installs a 20A/125V duplex receptacle within 3’ of the LNE for connection of the surge protector. This receptacle shall be connected to the emergency power panel if the building is, or will be, equipped with an emergency generator.
4. Contractor installs a single port LAN connection inside the LNE and inside each building level supervisory controller.
5. Contractor installs a 2” EMT conduit from the LNE to each building level supervisory controller in the building.
6. Contractor installs a 1 ¼” pliable raceway, w/pull string, from the LNE to a height approximately 12” above the Communications room rack. [DDC shop personnel shall install a fiber jumper from the LNE to the installed fiber patch panel].
7. Contractor installs purple Cat 5E cable from the LNE to each building level supervisory controller. **Note**: If the distance exceeds 100 meters between the LNE and the building level supervisory controller, the building level supervisory controller shall be moved or fiber w/media converters must be used.

Typical Drawing of Lockable Network Enclosures



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APPENDIX H

TECHNICAL SPECIFICATIONS FOR CONSTRUCTION AND MANAGEMENT OF SENSITIVE COMPARTMENTED INFORMATION FACILITIES (VERSION 1.5.1) IC TECH SPEC-FOR ICD/ICS 705, DATED SEPTEMBER 26, 2021

AND

UFC 4-010-05 (1 FEBRUARY 2013, CHANGE 1, 1 OCTOBER 2013) SENSITIVE COMPARTMENTED INFORMATION FACILITIES PLANNING, DESIGN, AND CONSTRUCTION

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NATIONAL COUNTERINTELLIGENCE AND SECURITY CENTER

Advancing Counterintelligence and Security Excellence

Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities

VERSION 1.5.1

IC Tech Spec – for ICD/ICS 705

An Intelligence Community Technical Specification
Prepared by the
National Counterintelligence and Security Center

July 26, 2021

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OFFICE OF THE DIRECTOR OF NATIONAL INTELLIGENCE
DIRECTOR OF THE NATIONAL COUNTERINTELLIGENCE AND SECURITY CENTER
WASHINGTON, DC

NCSC-2021-00068

MEMORANDUM FOR: Distribution

SUBJECT: Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities, Version 1.5.1, Chapter 13, Second Party Integree and Second Party Liaison Spaces within U.S. Sensitive Compartmented Information Facilities

REFERENCES:
A. Technical Specifications, Version 1.5, 13 Mar 20 (U)
B. ICD 705, Sensitive Compartmented Information Facilities, 26 May 10 (U)
C. ICS 705-01, Physical and Technical Standards for Sensitive Compartmented Information Facilities, 27 Sep 10 (U)
D. ICS 705-02, Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information Facilities, 22 Dec 16 (U)

This memorandum promulgates modifications to Chapter 13 of the Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (SCIF) Version 1.5, dated 13 Mar 2020 (Ref A) to the Intelligence Community (IC), which are effective upon signature of this memorandum.

This Chapter establishes general guidance to our stakeholders for implementing personnel, physical, and technical security standards prior to assigning and placing Second Party officers within United States SCIFs in accordance with authorized agreements.

The Technical Specifications are designed to be a living document that enables periodic updates to keep pace with changes that significantly impact protection of SCIFs from compromising emanations, inadvertent observations, and disclosure by unauthorized persons. To this end, guidance described in this addendum was developed in tandem with physical and technical experts from IC elements and with our industrial partners to arrive at robust security practices that will further supplement and bolster standards identified in ICS 705-01, Physical Security Standards for Sensitive Compartmented Information Facilities and ICS 705-02, Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information Facilities.

SUBJECT: Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities, Version 1.5.1, Chapter 13, Second Party Integree and Second Party Liaison Spaces within U.S. Sensitive Compartmented Information Facilities

Please contact the National Counterintelligence and Security Center's Special Security Directorate at DNI-NCSC-SSD-CSG-PTSP-Mailbox@cia.ic.gov.

Michael J Orlando

JUL 26 2021

Michael J. Orlando
Acting Director

Date

Attachment:
Chapter 13 Modification_Version 1.5.1

Distribution:
Secretary of State, Department of State
Secretary of the Treasury, Department of the Treasury
Secretary of Defense, Department of Defense
Attorney General, Department of Justice
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Secretary of Agriculture, Department of Agriculture
Secretary of Commerce, Department of Commerce
Secretary of Labor, Department of Labor
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Secretary of Housing and Urban Development, Department of Housing and Urban Development
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Administrator, Executive Office of the President
Administrator, Environmental Protection Agency
Director, Office of Management and Budget
United States Trade Representative
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Director, National Drug Control Policy
Director, Central Intelligence Agency
Administrator, Equal Employment Opportunity Commission
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Chairman, Federal Maritime Commission
Chairman, Federal Reserve System
Chairman, Federal Trade Commission
Administrator, General Services Administration

SUBJECT: Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities, Version 1.5.1, Chapter 13, Second Party Integree and Second Party Liaison Spaces within U.S. Sensitive Compartmented Information Facilities

Administrator, National Aeronautics and Space Administration
Archivist, National Archives and Records Administration
Director, National Science Foundation
Chairman, Nuclear Regulatory Commission
Director, Office of Government Ethics
Chairman, Privacy and Civil Liberties Oversight Board
Chairman, Security and Exchange Commission
Director, Selective Service System
Commissioner, Social Security Administration
Administrator, United States Agency for International Development
United States Postal Service
Chairman, United States International Trade Commission
Director, United States Peace Corps
Office of the Chief Administrative Officer

Change History

Rev. #	Date	Page	Changes	Approver
1.2	04/23/12	Cover	Banner Graphic, Version, Date	PTSEWG
1.2	04/23/12	4	Added note to warn users of classification when associating threat information and facility location.	PTSEWG
1.2	04/23/12	5	Re-worded approval of CAs to designate the AO as the primary approval authority of Compartmented Areas within SCIFs.	PTSEWG
1.2	04/23/12	9-10	Changed “Type X Gypsum” to “wallboard” to remove the standard of fire resistant gypsum and permit use of other wallboard types.	PTSEWG
1.2	04/23/12	9-10	Changed references to wall design drawings to “suggested” wall types to enable variety of wall construction techniques to meet the security standards.	PTSEWG
1.2	04/23/12	10	Added explanation to glue and screw plywood to ceiling and floor to clarify standard. Stud placement changed to 16 on center to match drawing and correct error.	PTSEWG
1.2	04/23/12	11	Added statement to finish wall and paint from true floor to true ceiling in Walls B and C to clarify and equal Type A Wall.	PTSEWG
1.2	04/23/12	9-10	Replaced drawings to reflect “suggested” wall construction methods and remove references to “Type X gypsum wallboard”.	PTSEWG
1.2	04/23/12	17-19	Replaced drawings to reflect “suggested” wall construction methods and remove references to “Type X gypsum wallboard”.	PTSEWG
1.2	04/23/12	56	Updated Federal Information Processing Standards (FIPS) encryption standards and certification to remove a standard that could not be met by commercial alarm systems.	PTSEWG
1.2	04/23/12	64	Replaced FIPS 140-2 with Advanced Encryption Standard (AES) to remove	PTSEWG

			a standard that could not be met by commercial alarm systems.	

Rev. #	Date	Page	Changes	Approver
1.2	04/23/12	TEMPEST Checklist	Removed references to “inspectable space” as requested by the TEMPEST Advisory Group (TAG).	PTSEWG
1.2	04/23/12	TEMPEST Checklist	Removed references to “Red-SCI” information.	PTSEWG
1.2	04/23/12	TEMPEST Checklist	Removed parenthetical reference to cell phones and Bluetooth.	PTSEWG
1.2	04/23/12	CA Checklist	Replaced Compartmented Area Checklist to reflect IC standards.	PTSEWG
1.2	04/23/12	SCIF Co-Use Request and MOA Form	Replaced Co-Use and MOA Form to include “joint-use” statements.	PTSEWG
1.3	03/26/15	Cover	Banner change, version, date	PTSEWG
1.3	03/26/15	B-C	Appended “D/NCSC Memorandum”	PTSEWG
1.3	03/26/15	D-G	“Appended Change History”	PTSEWG
1.3	03/26/15	3	Chapter 2.A (2)(a) Added: “NOTE” regarding prefabricated modular SCIFs.	PTSEWG
1.3	03/26/15	9	Chapter 3.C Corrected wording to match wall drawings on p.21.	PTSEWG
1.3	03/26/15	14	Chapter 3.G (7)(c.4) Correction and addition of guidance on vents and ducts perimeter protection.	PTSEWG
1.3	03/26/15	17-19	Reformatted wall types to reflect correct architectural graphics for prescribed materials.	PTSEWG
1.3	03/26/15	53	Chapter 7.A (2)(d) Added requirement for HSS switches.	PTSEWG
1.3	03/26/15	54	Chapter 7.A (2)(k) Changed to reflect restrictions on dissemination of installation plans.	PTSEWG
1.3	03/26/15	54	Chapter 7.A (3)(a.2) Added exception that sensors must be located within SCIF perimeter.	PTSEWG
1.3	03/26/15	55	Chapter 7.A (3)(b.7.e) Replaced “Zones” with “IDE sensor points”.	PTSEWG
1.3	03/26/15	56	Chapter 7.A (3)(c.1) Added language for approval authority.	PTSEWG

1.3	03/26/15	56	Chapter 7.A (3)(c.2) Added language for integrated IDS and Remote Access.	PTSEWG
1.3	03/26/15	56-57	Chapter 7.A (3)(c.2) Added system application software requirements.	PTSEWG
1.3	03/26/15	58-59	Replaced "access/secure" with "arm/disarm" throughout.	PTSEWG
Rev. #	**Date**	**Page**	**Changes**	**Approver**
1.3	03/26/15	58	Chapter 7.B (2) Added "A record shall be maintained that identifies the person responsible for disarming the system".	PTSEWG
1.3	03/26/15	87	Chapter 12.G (2) Changed Section header to read "Inspections/Reviews, added same where the term "inspection" or "review" used. The responsibility to perform as such was changed from "IC element head" to the AO, or designee.	PTSEWG
1.3	03/26/15	SCIF Co-Use Request and MOA Form	Appended Co-Use Request and MOA Form	PTSEWG
1.4	06/27/17	Cover	Banner change, version, date	PTSEWG
1.4	06/27/17	i-iii	Appended "D/NCSC Memorandum"	PTSEWG
1.4	06/27/17	iv-vii	"Appended Change History"	PTSEWG
1.4	06/27/17	1	Chapter 1.B.2 Added SAPF Language	PTSEWG
1.4	06/27/17	12	Chapter 3.E.1.b Added egress device language	PTSEWG
1.4	06/27/17	60	Chapter 7.C.1.c Added, "…IAW UL 2050 requirements (60 minutes)"	PTSEWG
1.4	06/27/17	71-74	Chapter 10 Revised	PTSEWG
1.4	06/27/17	75-76	Chapter 11.B.5 Added sub-bullets to address CNSSI 5002	PTSEWG
1.4	06/27/17	90-91	Chapter 12.L1/2/7 Added clarification language	PTSEWG
1.4	06/27/17	91-92	Chapter 12.M.4 Synchronized bullets	PTSEWG
1.5	11/13/19	3-4	Chapter 2.A.3.a Added clarification language	PTSEWG
1.5	11/13/19	5-6	Chapter 2.C.2	PTSEWG

			Defined CA Types	
1.5	11/13/19	8	Chapter 3. Added Pre-Construction Checklist language	PTSEWG
1.5	11/13/19	13-15	Chapter 3.E Expanded SCIF Door Criteria	PTSEWG
1.5	11/13/19	30	Chapter 4.E.2 Added reference to Inspectable Materials Checklist	PTSEWG
1.5	11/13/19	35	Chapter 5.A Added language in Applicability	PTSEWG
1.5	11/13/19	46	Chapter 6.A.1.a Added exception language	PTSEWG
1.5	11/13/19	74-77	Chapter 10 Changed "CSA" to "AO" where appropriate	PTSEWG
1.5	11/13/19	90	Chapter 12.G.8 Added TSCM language to Inspections/Reviews	PTSEWG
1.5	11/13/19	95-97	Chapter 12.N/O/P Added CUA instructions	PTSEWG
1.5	11/13/19	98	Chapter 13 Updated FFC and added CUA Guide and Cancellation Forms, Inspectable Materials Checklist, Pre-construction Checklist,	PTSEWG
1.5.1	07/26/21	Cover	Version and Date Change	PTSEWG
1.5.1	07/26/21	i-iii	Appended "D/NCSC Memorandum"	PTSEWG
1.5.1	07/26/21	iv-vii	Appended "Change History"	PTSEWG
1.5.1	07/26/21	104/113	Chapter 13, FVEY Chapter inserted. Changing Original Chapter 13, Forms & Plans to Chapter 14, Forms & Plans	PTSEWG

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Table of Contents

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Chapter 1. Introduction

A. Purpose

This Intelligence Community (IC) Technical Specification sets forth the physical and technical security specifications and best practices for meeting standards of Intelligence Community Standard (ICS) 705-01 (Physical and Technical Standards for Sensitive Compartmented Information Facilities). When the technical specifications herein are applied to new construction and renovations of Sensitive Compartmented Information Facilities (SCIFs), they shall satisfy the standards outlined in ICS 705-01 to enable uniform and reciprocal use across all IC elements and to assure information sharing to the greatest extent possible. This document is the implementing specification for Intelligence Community Directive (ICD) 705 (Sensitive Compartmented Information Facilities), ICS 705-01, and ICS 705-02 (Standards for Accreditation and Reciprocal Use of Sensitive Compartmented Information Facilities.

The specifications contained herein will facilitate the protection of Sensitive Compartmented Information (SCI) against compromising emanations, inadvertent observation and disclosure by unauthorized persons, and the detection of unauthorized entry.

B. Applicability

IC Elements shall fully implement this standard within 180 days of its signature.

1. SCIFs that have been de-accredited but controlled at the SECRET level (IAW 32 Code of Federal Regulations (CFR) parts 2001 and 2004) for less than one year may be re-accredited. The IC SCIF repository shall indicate that the accreditation was based upon the previous standards.

2. When the technical specifications herein have been applied to new construction, renovations, and operation of Special Access Program Facilities (SAPFs), those facilities shall satisfy the standards outlined in ICD 705 to enable uniform use across all IC elements for accreditation by IC elements as a Sensitive Compartmented Information Facility.

    a) Accreditation of a SAPF as a SCIF will be based upon a review of all required SCIF construction documentation to ensure all ICD 705 requirements were met in the construction, maintenance, and operation of the SAPF.

    b) The Accrediting Official (AO) will conduct a review of all SAPF accreditation documentation for compliance with the technical specifications herein.

        (1) If all required documentation is available and correct, the AO will issue SCIF accreditation.

        (2) If all required documentation is not available and correct, or waivers have been authorized, the AO is not required to issue SCIF accreditation.

c) If the facility is to be maintained as a SAPF and co-utilized as a SCIF, the security posture of the facility will be to the highest requirement of the two.

(1) The AO may issue a more restrictive accreditation based upon the SCI requirements associated with the new SCIF accreditation. For example, 5 minute response versus 15 minutes, or Closed Storage versus Open Storage.

(2) Program indoctrination will be coordinated as part of the co-utilization agreement. Compartmented Areas may be utilized, but no other sub-division of the facility will be permitted. Facilities requiring additional protections are not suitable for co-utilization.

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Chapter 2. Risk Management

A. Analytical Risk Management Process

1. The Accrediting Official (AO) and the Site Security Manager (SSM) should evaluate each proposed SCIF for threats, vulnerabilities, and assets to determine the most efficient countermeasures required for physical and technical security. In some cases, based upon that risk assessment, it may be determined that it is more practical or efficient to mitigate a standard. In other cases, it may be determined that additional security measures should be employed due to a significant risk factor.

2. Security begins when the initial requirement for a SCIF is known. To ensure the integrity of the construction and final accreditation, security plans should be coordinated with the AO before construction plans are designed, materials ordered, or contracts let.

    a) Security standards shall apply to all proposed SCI facilities and shall be coordinated with the AO for guidance and approval. Location of facility construction and or fabrication does not exclude a facility from security standards and or review and approval by the AO. SCI facilities include but are not limited to fixed facilities, mobile platforms, prefabricated structures, containers, modular applications or other new or emerging applications and technologies that may meet performance standards for use in SCI facility construction.

    NOTE: Advertised claims by manufactures that their product(s), to include mobile platforms, prefabricated structures, containers and modular structures are built to SCIF standards and can be accredited without modification may not be accurate. AOs are responsible for ensuring security controls spelled out in the ICD/ICS 705 series and this document are implemented to protect the security integrity of the proposed SCIF prior to accreditation.

    b) Mitigations are verifiable, non-standard methods that shall be approved by the AO to effectively meet the physical/technical security protection level(s) of the standard. While most standards may be effectively mitigated via non-standard construction, additional security countermeasures and/or procedures, some standards are based upon tested and verified equipment (e.g., a combination lock meeting Federal Specification FF-L 2740) chosen because of special attributes and could not be mitigated with non-tested equipment. The AO's approval is documented to confirm that the mitigation is at least equal to the physical/technical security level of the standard.

    c) Exceeding a standard, even when based upon risk, requires that a waiver be processed and approved in accordance with ICD 705.

3. The risk management process includes a critical evaluation of threats, vulnerability, and assets to determine the need and value of countermeasures. The process may include the following:

    a) Threat Analysis. Assess the capabilities, intentions, and opportunity of an adversary to exploit or damage assets or information. For SCI Facilities under Chief of Mission (COM) authority or established on a permanent or temporary basis within or on U.S. diplomatic facilities/compounds, use the Overseas Security Policy Board (OSPB), Security Environment Threat List (SETL) to determine technical threat to a location. When evaluating for TEMPEST, the Certified TEMPEST Technical Authorities (CTTA) shall use the National Security Agency Information Assurance (NSA IA) list as an additional resource for specific technical threat information. *NOTE: These threat documents are classified. Associating the threat level or other threat information with the SCIF location (including country, city, etc.) will normally carry the same classification level identified in the threat document. Ensure that SCIF planning documents and discussions that identify threat with the country or SCIF location are protected accordingly.* It is critical to identify other occupants of common and adjacent buildings. (However, do not attempt to collect information against U.S. persons in violation of Executive Order (EO) 12333.) In areas where there is a diplomatic presence of high and critical technical threat countries, additional countermeasures may be necessary.

b) Vulnerability Analysis. Assess the inherent susceptibility to attack of a procedure, facility, information system, equipment, or policy.

c) Probability Analysis. Assess the probability of an adverse action, incident, or attack occurring.

d) Consequence Analysis. Assess the consequences of such an action (expressed as a measure of loss, such as cost in dollars, resources, programmatic effect/mission impact, etc.).

B. Security in Depth (SID)

1. SID describes the factors that enhance the probability of detection before actual penetration to the SCIF occurs. The existence of a layer or layers of security that offer mitigations for risks may be accepted by the AO. An important factor in determining risk is whether layers of security already exist at the facility. If applied, these layers may, with AO approval, alter construction requirements and extend security alarm response time to the maximum of 15 minutes. Complete documentation of any/all SID measures in place will assist in making risk decisions necessary to render a final standards decision.

2. SID is mandatory for SCIFs located outside the U.S. due to increased threat.

3. The primary means to achieve SID are listed below and are acceptable. SID requires that at least one of the following mitigations is applied:

a) Military installations, embassy compounds, U.S. Government (USG) compounds, or contractor compounds with a dedicated response force of U.S. persons.

b) Controlled buildings with separate building access controls, alarms, elevator controls, stairwell controls, etc., required to gain access to the buildings or elevators. These controls shall be fully coordinated with a formal agreement or managed by the entity that owns the SCIF.

c) Controlled office areas adjacent to or surrounding SCIFs that are protected by alarm equipment installed in accordance with manufacturer's instructions. These controls shall be fully coordinated with a formal agreement or managed by the entity that owns the SCIF.

d) Fenced compounds with access controlled vehicle gate and/or pedestrian gate.

e) The AO may develop additional strategies to mitigate risk and increase probability of detection of unauthorized entry.

C. Compartmented Area (CA)

1. Definition

A CA is an area, room, or a set of rooms within a SCIF that provides controlled separation between control systems, compartments, sub-compartments, or Controlled Access Programs.

2. CA Types

a) Type I CAs are intended for workstation environments that are used to view and process compartmented information. These areas may be comprised of open bays, open spaces, or a set of rooms with multiple cubicles in an accredited SCIF. Within these areas, compartmented information may be securely viewed and/or processed via an approved computer workstation by authorized personnel. Workstations in these environments may include computers with single or multiple monitors. When monitor positioning alone will not adequately protect the material from unauthorized viewing, i.e., shoulder surfing, polarized privacy screens shall be used. Compartmented data shall never be openly displayed on a monitor that faces a primary door or common work area. In addition to processing compartmented information on approved computer workstations, Type I CAs may also include the use of printers, copiers, and scanners if appropriate procedures for control of hard copy material have been established and approved by the AO. No storage or discussion is authorized, logical and/or physical.

b) Type II CAs are areas where discussions of compartmented information may take place. If so equipped and approved, compartmented information may also be viewed and processed. This CA comprises a room, e.g., office or conference room, inside an accredited SCIF where compartmented discussions may be held by authorized personnel. All Type II CAs must meet existing sound transmission class (STC) requirements per ICS 705-1 to ensure that the room or office retains sound within its perimeter. In addition to compartmented discussions, Type II CAs may be used for secure video teleconferencing (SVTC) and related communication conferencing and the use of secure telephones for compartmented discussions. The use of printers, scanners, fax, copiers, and the secure transfer of data to approved removable media require prior approval. No storage is authorized, logical and/or physical.

c) Type III: A restricted discussion area used for viewing, processing, printing, copying, storage and control of accountable compartmented information. This CA is intended for storing and retaining compartmented information when accountability and strict control of compartmented program information is required. This includes, but is not limited to: notes, briefs, slides, electronic presentations, analytic papers, removable hard drives, field packs, thumb drives, laptops, personal electronic devices (PEDs) or hand-held devices that store compartmented information. In addition to the storage of compartmented material in a GSA-approved container, Type III CAs may be used for processing compartmented information on approved computer workstations; the use of printers, scanners, and copiers; the secure transfer of data to approved removable media; the use of secure facsimile machines; and the use of secure telephone equipment (STE) for compartmented discussions. All personnel residing within or who have unfettered access to a Type III CA must be formally briefed into all compartments that reside within the Type III CA. Visitors are permitted within Type III areas only when all compartmented information (for which the visitor is not briefed) is stored within containers, out of sight, and while the visitor is under constant observation by a fully briefed person.

3. Requirements

   a) The CA shall be approved by the AO with the concurrence of the CA Program Manager or designee. The CA Checklist (Chapter 13) shall be used to request approval.

   b) Any construction or security requirements above those listed herein require prior approval from the element head as described in ICS 705-2.

4. Access Control

   a) Access control to the CA may be accomplished by visual recognition or mechanical/electronic access control devices.

   b) Spin-dial combination locks shall not be installed on CA doors.

   c) Independent alarm systems shall not be installed in a CA.

5. Visual Protection of CA Workstations

If compartmented information will be displayed on a computer terminal or group of terminals in an area where everyone is not accessed to the program, the following measures may be applied to reduce the ability of “shoulder surfing” or inadvertent viewing of compartmented information:

- Position the computer screen away from doorway/cubicle opening.
- Use a polarizing privacy screen.
- Use partitions and/or signs.
- Existing private offices or rooms may be used but may not be a mandatory requirement.

6. Closed Storage

When the storage, processing, and use of compartmented information, product, or deliverables is required, and all information shall be stored while not in use, then all of the following shall apply:

a) Access and visual controls identified above shall be the standard safeguard.

b) Compartmented information shall be physically stored in a General Services Administration (GSA) approved safe.

7. Open Storage

In rare instances when open storage of information is required, the following apply:

a) If the parent SCIF is accredited for open storage, a private office with access control on the door is adequate physical security protection.

b) If the parent SCIF has been built and accredited for closed storage, then the CA perimeter shall be constructed and accredited to open storage standards.

c) The CA AO may approve open or closed storage within the CA. Storage requirements shall be noted in both the CA Fixed Facility Checklist (FFC) and, if appropriate, in a Memorandum of Understanding (MOU).

8. Acoustic and Technical Security

a) All TEMPEST, administrative telephone, and technical surveillance countermeasure (TSCM) requirements for the parent SCIF shall apply to the CA and shall be reciprocally accepted.

b) When compartmented discussions are required, the following apply:

(1) Use existing rooms that have been accredited for SCI discussions.

(2) Use administrative procedures to restrict access to the room during conversations.

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Chapter 3. Fixed Facility SCIF Construction

Requirements outlined within this chapter apply to all fixed facility SCIFs. The SCIF Pre-Construction Checklist is found in Chapter 13 and may be completed and sent to the Cognizant Security Authority (CSA) and/or AO as part of the concept approval process. All questions about the checklist content and expected information should be directed to the project CSA/AO. Additional information and requirements for facilities located outside the U.S., its possessions or territories, are found in Chapters 4 and 5. Additional information and requirements for temporary SCIFs are described in Chapter 6.

A. Personnel

Roles and responsibilities of key SCIF construction personnel are identified in ICS 705-1 and restated here for reference.

1. AO Responsibilities

    a) Provide security oversight of all aspects of SCIF construction under their security purview.

    b) Review and approve the design concept, Construction Security Plan (CSP), and final design for each construction project prior to the start of SCIF construction.

    c) Depending on the magnitude of the project, determine if the Site Security Manager (SSM) performs duties on a full-time, principal basis, or as an additional duty to on-site personnel.

    d) Accredit SCIFs under their cognizance.

    e) Prepare waiver requests for the IC element head or designee.

    f) Provide the timely input of all required SCIF data to the IC SCIF repository.

    g) Consider SID on USG or USG-sponsored contractor facilities to substitute for standards herein. (SID shall be documented in the CSP and the FFC.)

2. Site Security Managers (SSMs) Responsibilities

    a) Ensure the requirements herein are implemented and advise the AO of compliance or variances.

    b) In consultation with the AO, develop a CSP regarding implementation of the standards herein. (This document shall include actions required to document the project from start to finish.)

    c) Conduct periodic security inspections for the duration of the project to ensure compliance with the CSP.

    d) Document security violations or deviations from the CSP and notify the AO within 3 business days.

    e) Ensure that procedures to control site access are implemented.

3. CTTA Responsibilities

a) Review SCIF construction or renovation plans to determine if TEMPEST countermeasures are required and recommend solutions. To the maximum extent practicable, TEMPEST mitigation requirements shall be incorporated into the SCIF design.

b) Provide the CSA and AO with documented results of review with recommendations.

4. Construction Surveillance Technicians (CSTs) Responsibilities

a) Supplement site access controls, implement screening and inspection procedures, as well as monitor construction and personnel, when required by the AO.

b) In low and medium technical threat countries, begin surveillance of non-cleared workers at the start of SCIF construction or the installation of major utilities, whichever comes first.

c) In high and critical technical threat countries, begin surveillance of non-cleared workers at the start of: construction of public access or administrative areas adjacent to the SCIF; SCIF construction; or the installation of major utilities, whichever comes first.

B. Construction Security

1. Prior to awarding a construction contract, a CSP for each project shall be developed by the SSM and approved by the AO.

2. Construction plans and all related documents shall be handled and protected in accordance with the CSP.

3. For SCIF renovation projects, barriers shall be installed to segregate construction workers from operational activities and provide protection against unauthorized access and visual observation. Specific guidance shall be contained in the CSP.

4. Periodic security inspections shall be conducted by the SSM or designee for the duration of the project to ensure compliance with construction design and security standards.

5. Construction and design of SCIFs should be performed by U.S. companies using U.S. citizens to reduce risk, but may be performed by U.S. companies using U.S. persons (an individual who has been lawfully admitted for permanent residence as defined in 8 U.S.C. § 1101(a)(20) or who is a protected individual as defined by Title 8 U.S.C. § 1324b (a)(3)). The AO shall ensure mitigations are implemented when using non-U.S. citizens. These mitigations shall be documented in the CSP.

6. All site control measures used shall be documented in the CSP. Among the control measures that may be considered are the following:

- Identity verification.
- Random searches at site entry and exit points.

- Signs at all entry points listing prohibited and restricted items (e.g., cameras, firearms, explosives, drugs, etc.).
- Physical security barriers to deny unauthorized access.
- Vehicle inspections.

C. Perimeter Wall Construction Criteria

1. General

a) SCIF perimeters include all walls that outline the SCIF confines, floors, ceilings, doors, windows and penetrations by ductwork, pipes, and conduit. This section describes recommended methods to meet the standards described within ICS 705-1 for SCIF perimeters.

b) Perimeter wall construction specifications vary by the type of SCIF, location, use of SID, and discussion requirements.

c) Closed storage areas that do not require discussion areas do not have any forced entry or acoustic requirements.

d) Open storage facilities without SID require additional protection against forced and surreptitious entry.

e) When an existing wall is constructed with substantial material (e.g., brick, concrete, cinderblock, etc.) equal to meet the perimeter wall construction standards, the existing wall may be utilized to satisfy the specification.

2. Closed Storage, Secure Working Area (SWA), Continuous Operation, or Open Storage with SID - Use Wall A - Suggested Standard Acoustic Wall (see construction drawing for details).

a) Three layers inch-thick gypsum wallboard (GWB), one layer on the uncontrolled side of the SCIF and two on the controlled side of the SCIF, to provide adequate rigidity and acoustic protection (Sound Class 3).

b) allboard shall be attached to 3 inch-wide 16 gauge metal studs or wooden 2 x 4 studs placed no less than 16" on center (o.c.).

c) 16 gauge continuous track (top & bottom) w/ anchors at 32" o.c. maximum) – bed in continuous bead of acoustical sealant.

d) The interior two layers of wallboard shall be mounted so that the seams do not align (i.e., stagger joints).

e) Acoustic fill 3 ½ " (89mm) sound attenuation material, fastened to prevent sliding down and leaving void at the top.

f) The top and bottom of each wall shall be sealed with an acoustic sealant where it meets the slab.

g) Fire safe non-shrink grout, or acoustic sealant in all voids above/below track both sides of partition.

h) Entire wall assembly shall be finished and painted from true floor to true ceiling.

3. Open Storage without SID -- Use Wall B - Suggested Wall for Expanded Metal or Wall C - Suggested Wall for Plywood.

a) hree layers of inch-thick GWB, one layer on the uncontrolled side of the SCIF and two on the controlled side of the SCIF to provide adequate rigidity and acoustic protection (Sound Class 3).

b) allboard shall be attached to 3 inch-wide 16 gauge metal studs or wooden 2 x 4 studs placed no less than 16” o.c.

c) 16 gauge continuous track (top & bottom) w/ anchors at 32” on center (o.c.) maximum) – bed in continuous bead of acoustical sealant.

d) Wall B - Suggested Wall for Expanded Metal (see drawing for Wall B-Suggested Construction for Expanded Metal).

(1) Three-quarter inch mesh, # 9 (10 gauge) expanded metal shall be affixed to the interior side of all SCIF perimeter wall studs.

(2) Expanded metal shall be spot-welded to the studs every six inches along the length of each vertical stud and at the ceiling and floor.

(3) Hardened screws with one inch washers or hardened clips may be used in lieu of welding to fasten metal to the studs. Screws shall be applied every six inches along the length of each vertical stud and at the ceiling and floor.

(4) Fastening method shall be noted in the FFC.

(5) Entire wall assembly shall be finished and painted from true floor to true ceiling.

e) Wall C - Suggested Wall for Plywood (see drawing for Wall C-Suggested Construction for Plywood).

(1) hree layers of inch-thick GWB, two layers on the uncontrolled side and one layer GWB over minimum ½ ” plywood on the controlled side of the SCIF.

NOTE: CTTA recommended countermeasures (foil backed GWB or layer of approved Ultra Radiant R-Foil) shall be installed in accordance with (IAW) best practices for architectural Radio Frequency (RF) shielding. Foil shall be located between the layer of plywood and GWB.

(2) 1/2" Plywood affixed 8’ vertical by 4’ horizontal to 16 gauge studs using glue and #10 steel tapping screws at 12 o.c.

(3) GWB shall be mounted to plywood with screws avoiding contact with studs to mitigate any possible acoustic flanking path.

(4) 16 gauge continuous track (top & bottom) w/ anchors at 32” o.c. maximum) – bed in continuous bead of acoustical sealant.

(5) Fire safe non-shrink grout, or acoustic sealant in all voids above/below track both sides of partition.

(6) Entire wall assembly shall be finished and painted from true floor to true ceiling.

4. Radio Frequency (RF) Protection for Perimeter Walls

a) RF protection shall be installed at the direction of the CTTA when a SCIF utilizes electronic processing and does not provide adequate RF attenuation at the inspectable space boundary. It is recommended for all applications where RF interference from the outside of the SCIF is a concern inside the SCIF.

b) Installation of RF protection should be done using either the drawings or *Best Practices Guidelines for Architectural Radio Frequency Shielding,* prepared by the Technical Requirements Steering Committee under the Center for Security Evaluation. This document is available through the Center for Security Evaluation, Office of the Director of National Intelligence (NCSC/CSE).

5. Vault Construction Criteria

GSA-approved modular vaults meeting Federal Specification AA-V-2737 or one of the following construction methods may be used:

a) Reinforced Concrete Construction

(1) Walls, floor, and ceiling will be a minimum thickness of eight inches of reinforced concrete.

(2) The concrete mixture will have a comprehensive strength rating of at least 2,500 pounds per square inch (psi).

(3) Reinforcing will be accomplished with steel reinforcing rods, a minimum of inches in diameter positioned centralized in the concrete pour and spaced horizontally and vertically six inches on center; rods will be tied or welded at the intersections.

(4) The reinforcing is to be anchored into the ceiling and floor to a minimum depth of one-half the thickness of the adjoining member.

b) Steel-Lined Construction Where Unique Structural Circumstances Do Not Permit Construction of a Concrete Vault

(1) Construction will use ¼ inch-thick steel alloy-type plates having characteristics of high-yield and high-tensile strength.

(2) The steel plates are to be continuously welded to load-bearing steel members of a thickness equal to that of the plates.

(3) If the load-bearing steel members are being placed in a continuous floor and ceiling of reinforced concrete, they must be firmly affixed to a depth of one-half the thickness of the floor and ceiling.

(4) If floor and/or ceiling construction is less than six inches of reinforced concrete, a steel liner is to be constructed the same as the walls to form the floor

and ceiling of the vault. Seams where the steel plates meet horizontally and vertically are to be continuously welded together.

All vaults shall be equipped with a GSA-approved Class 5 vault door.

D. Floor and Ceiling Construction Criteria

1. Floors and ceilings shall be constructed to meet the same standards for force protection and acoustic protection as walls.

2. All floor and ceiling penetrations shall be kept to a minimum.

E. SCIF Door Criteria

1. Door type definitions:

   a) Primary door: A SCIF perimeter door recognized as the main entrance.

   b) Secondary door: A SCIF perimeter door employed as both an entry and egress door that is not the Primary door.

   c) Emergency egress-only door: A SCIF perimeter door employed as an emergency egress door with no entry capability.

2. Primary door criteria:

   a) There shall be only one Primary door to a SCIF.

   b) The Primary door shall be equipped with the following:

      (1) A GSA-approved pedestrian door deadbolt meeting the most current version of Federal Specification FF-L-2890. Previously AO-approved FFL-2740 integrated locking hardware may be used. Additional standalone and flush-mounted dead bolts are prohibited.

      (2) A combination lock meeting the most current version of Federal Specification FFL- 2740. Previously AO-approved combination lock or deadbolt lock type may be used.

      (3) An approved access control device (see Chapter 8). May be equipped with a by-pass keyway for use in the event of an access control system failure.

      (4) Include requirements in E.5 below.

3. **Secondary** door criteria:

   a) Secondary doors may be established with AO approval and as required by building code, safety and accessibility requirements,

      (1) Secondary doors shall:

         (a) Be equipped with a GSA-approved pedestrian door egress device with deadbolt meeting the most current version of Federal Specification FF-L-2890 for secondary door use. An AO-approved alternate device with similar functionality may be authorized. Additional standalone and flush-mounted deadbolts are prohibited.

(b) Have approved access control hardware (see Chapter 8). The access control system must be deactivated when the SCIF is not occupied, or as determined by the AO.

(c) Include requirements in E.5 below.

4. Emergency Egress-only doors shall:
   a) Be installed as required by building code, safety and accessibility requirements.
   b) Be equipped with GSA-approved pedestrian door emergency egress device with deadbolt configuration meeting the most current version of Federal Specification FF-L-2890 for exit only door use. An AO-approved alternate device with similar functionality and no exterior hardware may be authorized. Additional standalone and flush-mounted deadbolts are prohibited.
   c) Be alarmed 24/7 and have a local audible annunciator that must be activated if the door is opened.
   d) Include requirements in E.5 below.

5. Criteria for **all** SCIF perimeter doors:

   a) All SCIF perimeter doors shall comply with applicable building code, safety, and accessibility requirements as determined by the Authority Having Jurisdiction.

   b) Ensure SCIF Standard Operating Procedures (SOP) includes procedures to ensure all doors are secured at end of day.

   c) All SCIF perimeter pedestrian doors shall be equipped with an automatic, non-hold door-closer which shall be installed internal to the SCIF.

   d) Door hinge pins that are accessible from outside of the SCIF shall be modified to prevent removal of the door, e.g., welded, set screws, dog bolts, etc.

   e) SCIF perimeter doors and frame assemblies shall meet acoustic requirements as described in Chapter 9 unless declared a non-discussion area.

   f) All SCIF perimeter doors shall be alarmed in accordance with Chapter 7.

   g) SCIF Perimeter doors shall meet TEMPEST requirements per CTTA guidance.

   h) When practical and permissible, SCIF entry doors should incorporate a vestibule to preclude visual observation and enhance door acoustic protection.

6. SCIF door fabrication and unique criteria:
   a) Wooden SCIF doors shall be 1 ¾ inch-thick solid wood core (i.e. wood stave, structural composite lumber).
   b) Steel doors shall meet following specifications:
      (1) 1 ¾ inch-thick face steel equal to minimum 18-gauge steel.
      (2) Hinges reinforced to 7-gauge steel and preferably a lift hinge.
      (3) Door closure installation reinforced to 12-gauge steel.

(4) Lock area predrilled and/or reinforced to 10-gauge steel.

c) Vault doors shall not be used to control day access to a facility. To mitigate both security and safety concerns, a vestibule with an access control device may be constructed for the purpose of day access to the vault door.

d) Roll-up Doors shall be minimum 18-gauge steel and shall be secured inside the SCIF using dead-bolts on both the right and left side of the door and alarmed in accordance with Chapter 7.

e) SCIF perimeter Double Door Specifications:

(1) The fixed leaf shall be secured at the top and bottom with deadbolts.

(2) An astragal shall be attached to one door.

(3) Each leaf of the door shall have an independent security alarm contact.

f) Adjacent SCIF adjoining doors:

(1) Doors that join adjacent SCIFs, not required for emergency egress, shall:

(a) Be dead bolted on both sides.

(b) Be alarmed on both sides according to chapter 7.

(c) Meet acoustic requirements as required.

(d) Be covered by AO SOP.

g) Other door types shall be addressed on an individual basis as approved by the AO.

F. SCIF Window Criteria

1. Every effort should be made to minimize or eliminate windows in the SCIF, especially on the ground floor.

2. Windows shall be non-opening.

3. Windows shall be protected by security alarms in accordance with Chapter 7 when they are within 18 feet of the ground or an accessible platform.

4. Windows shall provide visual and acoustic protection.

5. Windows shall be treated to provide RF protection when recommended by the CTTA.

6. All windows less than 18 feet above the ground or from the nearest platform affording access to the window (measured from the bottom of the window), shall be protected against forced entry and meet the standard for the perimeter.

G. SCIF Perimeter Penetrations Criteria

1. All penetrations of perimeter walls shall be kept to a minimum.

2. Metallic penetrations may require TEMPEST countermeasures, to include dielectric breaks or grounding, when recommended by the CTTA.

3. Utilities servicing areas other than the SCIF shall not transit the SCIF unless mitigated with AO approval. This restriction does not apply to secure communication

lines required to transit a SCIF to service an adjacent SCIF through a common perimeter surface.

4. Electrical Utilities should enter the SCIF at a single point.

5. All utility (power and signal) distribution on the interior of a perimeter wall treated for acoustics or RF shall be surface mounted, contained in a raceway, or an additional wall shall be constructed using furring strips as stand-off from the existing wall assembly. If the construction of an additional wall is used gypsum board may be inch-thick and need only go to the false ceiling.

6. Installation of additional conduit penetration for future utility expansion is permissible provided the expansion conduit is filled with acoustic fill and capped (end of pipe cover).

7. Vents and Ducts

   a) All vents and ducts shall be protected to meet the acoustic requirements of the SCIF. (See Figure 4, Typical Air (Z) Duct Penetration, for example.)

   b) Walls surrounding duct penetrations shall be finished to eliminate any opening between the duct and the wall.

   c) All vents or duct openings that penetrate the perimeter walls of a SCIF and exceed 96 square inches shall be protected with permanently affixed bars or grills.

      (1) If one dimension of the penetration measures less than six inches, bars or grills are not required.

      (2) When metal sound baffles or wave forms are permanently installed and set no farther apart than six inches in one dimension, then bars or grills are not required.

      (3) If bars are used, they shall be a minimum of ½ inch diameter steel, welded vertically and horizontally six inches on center; a deviation of ½ inch in vertical and/or horizontal spacing is permissible.

      (4) If grilles are used they shall be of:

         (a) ¾ inch-mesh, #9 (10 gauge), case-hardened, expanded metal; or

         (b) expanded metal diamond mesh, 1-1/2” #10 (1-3/8” by 3” openings, 0.093” thickness, with at least 80% open design) tamperproof; or

         (c) welded wire fabric (WWF) 4x4 W2.9xW2.9 (6 gauge smooth steel wire welded vertically and horizontally four inches o.c.).

      (5) If bars, grilles, or metal baffles/wave forms are required, an access port shall be installed inside the secure perimeter of the SCIF to allow visual inspection of the bars, grilles, or metal baffles/wave forms. If the area outside the SCIF is controlled (SECRET or equivalent proprietary space), the inspection port may be

installed outside the perimeter of the SCIF and be secured with an AO-approved high-security lock. This shall be noted in the FFC.

H. Alarm Response Time Criteria for SCIFs within the U.S.

Response times for Intrusion Detection Systems (IDS) shall meet 32 CFR Parts 2001 and 2004.

a) Closed Storage response time of 15 minutes.

b) Open Storage response time within 15 minutes of the alarm annunciation if the area is covered by SID or a five minute alarm response time if it is not.

I. Secure Working Areas (SWA)

SWAs are accredited facilities used for discussing, handling, and/or processing SCI, but where SCI will not be stored.

1. The SWA shall be controlled at all times by SCI-indoctrinated individuals or secured with a GSA-approved combination lock.
2. The SCIF shall be alarmed in accordance with Chapter 7 with an initial alarm response time of 15 minutes.
3. Access control shall be in accordance with Chapter 8.
4. Perimeter construction shall comply with section 3.C. above.
5. All SCI used in an SWA shall be removed and stored in GSA-approved security containers within a SCIF, a vault, or be destroyed when the SWA is unoccupied.

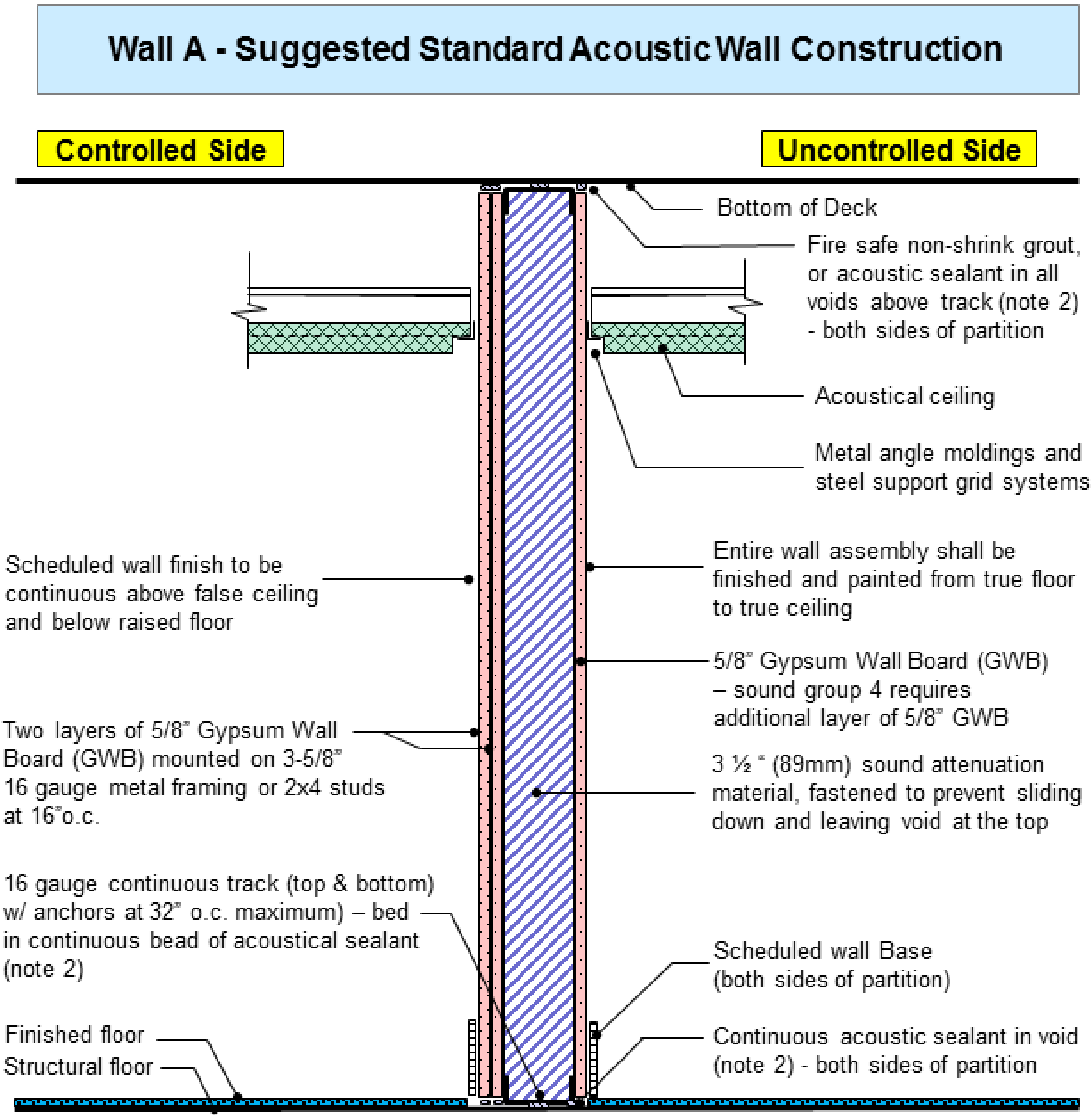
J. Temporary Secure Working Area (TSWA)

TSWAs are accredited facilities where handling, discussing, and/or processing of SCI is limited to less than 40-hours per month and the accreditation is limited to 12 months or less. Extension requests require a plan to accredit as a SCIF or SWA. Storage of SCI is not permitted within a TSWA.

1. When a TSWA is in use at the SCI level, access shall be limited to SCI- indoctrinated persons.
2. The AO may require an alarm system.
3. No special construction is required.
4. When the TSWA is approved for SCI discussions, sound attenuation specifications of Chapter 9 shall be met.
5. The AO may require a TSCM evaluation if the facility has not been continuously controlled at the SECRET level.
6. When the TSWA is not in use at the SCI level, the following shall apply:
    a) The TSWA shall be secured with a high-security, AO-approved key or combination lock.
    b) Access shall be limited to personnel possessing a minimum U.S. SECRET clearance.

Figure 1

Wall A – Suggested Standard Acoustic Wall Construction



Notes:

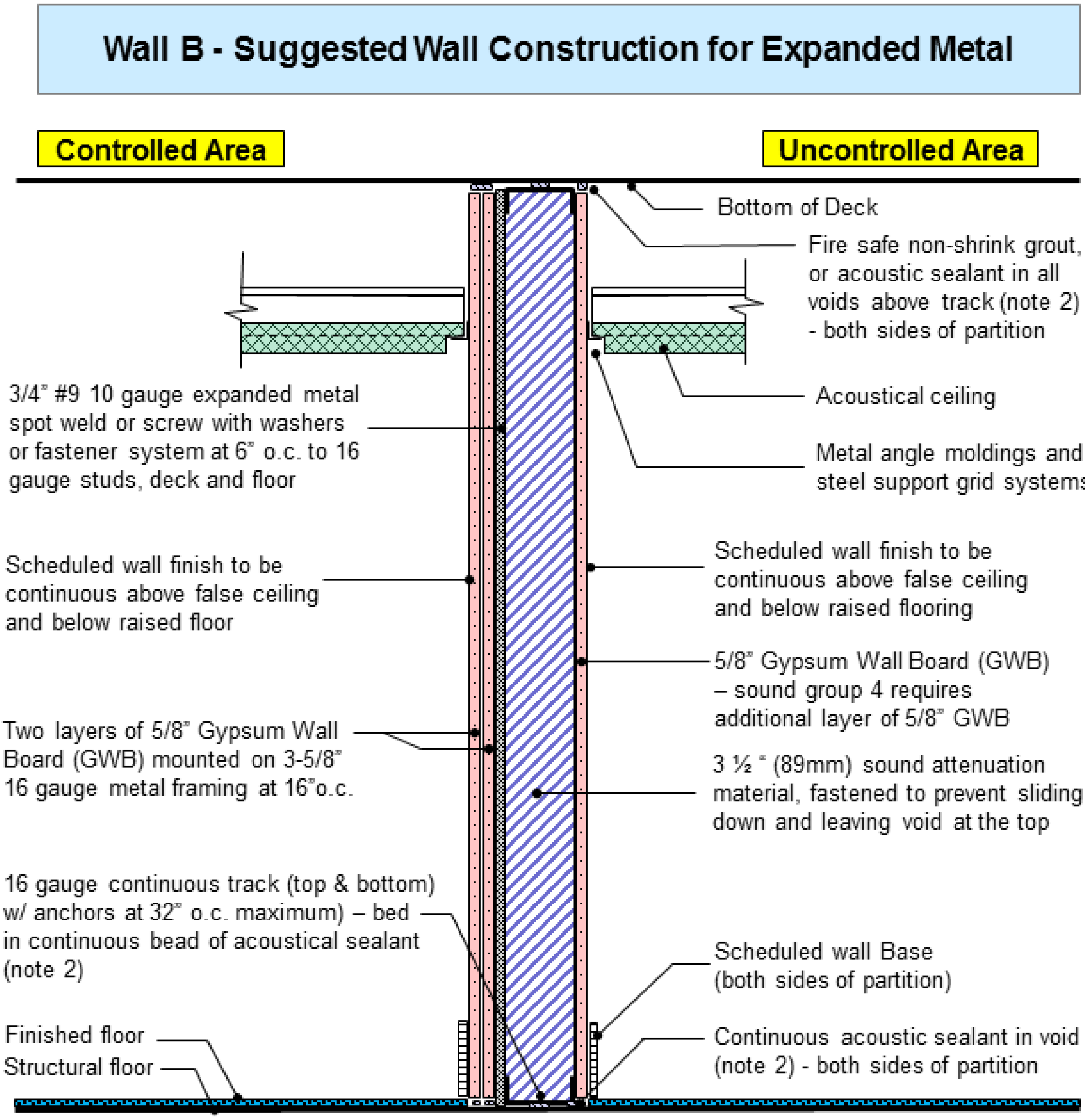
1 CTTA recommended countermeasures (foil backed GWB or layer of approved Ultra Radiant R-Foil) shall be installed IAW best practices for architectural Radio Frequency (RF) shielding. Foil shall be located between the two layers of GWB.

2 Partition shall be sealed continuously with acoustical sealant whenever it abuts another element (e.g., wall, column, mullion, etc.)

3 Any electrical or communications outlets required on the perimeter wall shall be surface mounted.

Figure 2

Wall B - Suggested Construction for Expanded Metal



Notes:

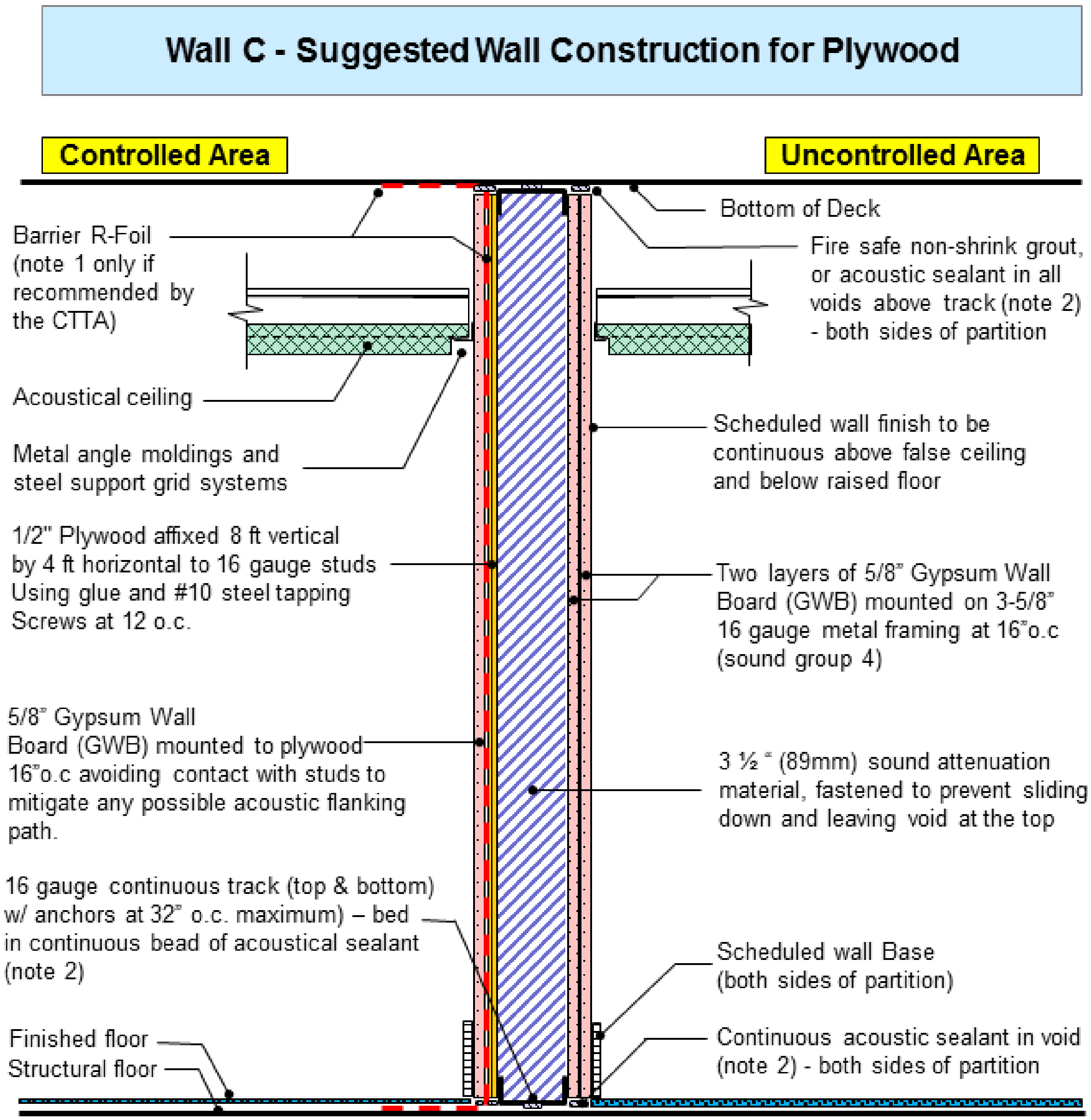
1 CTTA recommended countermeasures (foil backed GWB or layer of approved Ultra Radiant R-Foil) shall be installed IAW best practices for architectural Radio Frequency (RF) shielding. Foil shall be located between the two layers of GWB.

2 Partition shall be sealed continuously with acoustical sealant whenever it abuts another element (e.g., wall, column, mullion, etc.)

3 Any electrical or communications outlets required on the perimeter wall shall be surface mounted.

Figure 3

Wall C – Suggested Construction for Plywood



Notes:

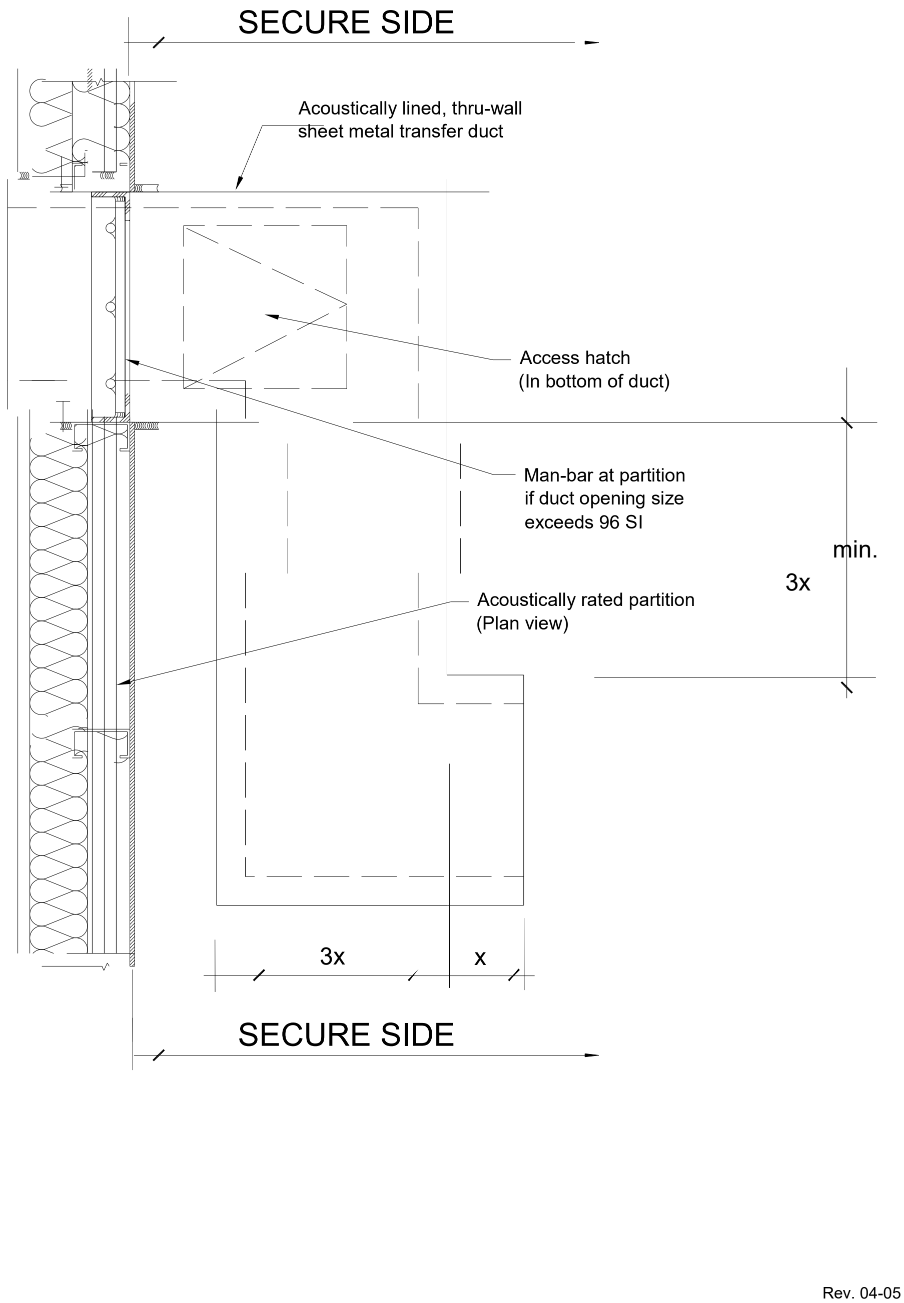
1 CTTA recommended countermeasures (foil backed GWB or layer of approved Ultra Radiant R-Foil) shall be installed IAW best practices for architectural Radio Frequency (RF) shielding. Foil shall be located between the layer of plywood and GWB.

2 Partition shall be sealed continuously with acoustical sealant whenever it abuts another element (e.g., wall, column, mullion, etc.).

3 Any electrical or communications outlets required on the perimeter wall shall be surface mounted.

Figure 4

Typical Perimeter Air (Z) Duct Penetration



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Chapter 4. SCIFs Outside the U.S. and NOT Under Chief of Mission (COM) Authority

A. General

1. Requirements outlined here apply only to SCIFs located outside of the U.S., its territories and possessions that are not under COM authority.

2. The application and effective use of SID may allow AOs to deviate from this guidance at Category II and III facilities.

B. Establishing Construction Criteria Using Threat Ratings

1. The Department of State's (DoS) Security Environment Threat List (SETL) shall be used in the selection of appropriate construction criteria based on technical threat rating.

2. If the SETL does not have threat information for the city of construction, the SETL threat rating for the closest city within a given country shall apply. When only the capital is noted, it will represent the threat for all SCIF construction within that country.

3. Based on technical threat ratings, building construction has been divided into the following three categories for construction purposes:

- Category I - Critical or High Technical Threat, High Vulnerability Buildings
- Category II - High Technical Threat, Low Vulnerability Buildings
- Category III - Low and Medium Technical Threat

4. Facilities in Category I Areas

a) Open Storage Facilities

(1) Open storage is to be avoided in Category I areas. The head of the IC element shall certify mission essential need and approve on case-by-case basis. When approved, open storage should only be allowed when the host facility is manned 24-hours-per-day by a cleared U.S. presence or the SCIF is continuously occupied by U.S. SCI-indoctrinated personnel.

(2) SCI shall be contained within approved vaults or Class M or greater modular vaults.

(3) The SCIF shall be alarmed in accordance with Chapter 7.

(4) Access control shall be in accordance with Chapter 8.

(5) An alert system and/or duress alarm is recommended.

(6) Initial alarm response time shall be five minutes.

b) Closed Storage Facilities

(1) The SCIF perimeter shall provide five minutes of forced-entry protection. (Refer to Wall B or Wall C construction methods.)

(2) The SCIF shall be alarmed in accordance with Chapter 7.

(3) Access control system shall be in accordance with Chapter 8.

(4) SCI shall be stored in GSA-approved containers or in an area that meets vault construction standards.

(5) Initial alarm response time shall be within 15 minutes.

c) Continuous Operation Facilities

(1) An alert system and duress alarm is required.

(2) The capability shall exist for storage of all SCI in GSA-approved security containers or vault.

(3) The emergency plan shall be tested semi-annually.

(4) Perimeter walls shall comply with enhanced wall construction methods in accordance Wall B or C standards.

(5) The SCIF shall be alarmed in accordance with Chapter 7.

(6) Access control shall be in accordance with Chapter 8.

(7) Initial response time shall be five minutes.

d) SWAs

Construction and use of SWAs is not authorized for facilities in Category I areas because of the significant risk to SCI.

e) TSWAs

Construction and use of TSWAs is not authorized for facilities in Category I areas because of the significant risk to SCI.

5. Facilities in Category II and III Areas

a) Open Storage Facilities

(1) Open storage is to be avoided in Category II areas. The head of the IC element shall certify mission essential need and approve on case-by-case basis. When approved, open storage should only be allowed when the host facility is manned 24-hours-per-day by a cleared U.S. presence or the SCIF is continuously occupied by U.S. SCI-indoctrinated personnel.

(2) In Category III areas, open storage should only be allowed when the host facility is manned 24-hours-per-day by a cleared U.S. presence or the SCIF is continuously occupied by U.S. SCI-indoctrinated personnel.

(3) The SCIF perimeter shall provide five minutes of forced-entry protection. (Refer to Wall B or Wall C construction methods.)

(4) The SCIF shall be alarmed in accordance with Chapter 7.

(5) Access control shall be in accordance with Chapter 8.

(6) An alert system and/or duress alarm is recommended.

(7) Initial alarm response time shall be five minutes.

b) Closed Storage Facilities

(1) The SCIF perimeter shall provide five minutes of forced-entry protection. (Refer to Wall B or Wall C construction methods.)

(2) The SCIF must be alarmed in accordance with Chapter 7.

(3) Access control system shall be in accordance with Chapter 8.

(4) SCI shall be stored in GSA-approved containers.

(5) Initial alarm response time shall be within 15 minutes.

c) Continuous Operation Facilities

(1) Wall A - Standard wall construction shall be utilized.

(2) The SCIF shall be alarmed in accordance with Chapter 7.

(3) Access control shall be in accordance with Chapter 8.

(4) Initial response time shall be five minutes.

(5) An alert system and/or duress alarm is recommended.

(6) The capability shall exist for storage of all SCI in GSA-approved security containers.

(7) The emergency plan shall be tested semi-annually.

d) SWAs

(1) Perimeter walls shall comply with standard Wall A construction.

(2) The SCIF shall be alarmed in accordance with Chapter 7.

(3) Access control shall be in accordance with Chapter 8.

(4) Initial alarm response time shall be within 15 minutes.

(5) The SWA shall be controlled at all times by SCI-indoctrinated individuals or secured with a GSA-approved combination lock.

(6) An alert system and/or duress alarm is recommended.

(7) All SCI used in an SWA shall be removed and stored in GSA-approved security containers within a SCIF or be destroyed.

(8) The emergency plan shall be tested semi-annually.

e) TSWAs

(1) No special construction is required.

(2) The AO may require an alarm system.

(3) When the TSWA is approved for SCI discussions, sound attenuation specifications of Chapter 9 shall be met.

(4) When a TSWA is in use at the SCI level, access shall be limited to SCI-indoctrinated persons.

(5) The AO may require a TSCM evaluation if the facility has not been continuously controlled at the SECRET level.

(6) When a TSWA is **not** in use at the SCI level, the following shall apply:

(a) The TSWA shall be secured with a high security, AO-approved key or combination lock.

(b) Access shall be limited to personnel possessing a U.S. SECRET clearance.

C. Personnel

1. SSM Responsibilities

a) Ensures the security integrity of the construction site (hereafter referred to as the "site").

b) Develops and implements a CSP.

c) Ensures that the SSM shall have 24-hour unrestricted access to the site (or alternatives shall be stated in CSP).

d) Conducts periodic security inspections for the duration of the project to ensure compliance with the CSP.

e) Documents security violations or deviations from the CSP and notifies the AO.

f) Maintains a list of all workers used on the project; this list shall become part of the facility accreditation files.

g) Implements procedures to deny unauthorized site access.

h) Works with the construction firm(s) to ensure security of the construction site and compliance with the requirements set forth in this document.

i) Notifies the AO if any construction requirements cannot be met.

2. CST Requirements and Responsibilities

a) Possesses U. S. TOP SECRET clearances.

b) Is specially trained in surveillance and the construction trade to deter technical penetrations and thwart implanted technical collection devices.

c) Supplements site access controls, implements screening and inspection procedures, and, when required by the CSP, monitors construction and personnel.

d) Is not required when U.S. TOP SECRET-cleared contractors are used

e) In Category III countries, must do the following:

(1) Shall begin surveillance of non-cleared workers at the start of SCIF construction or the installation of major utilities, whichever comes first.

(2) Upon completion of all work, shall clear and secure the areas for which they are responsible prior to turning control over to the cleared American guards (CAGs).

f) In Category I and II countries, must do the following:

(1) Shall begin surveillance of non-cleared workers at the start of construction of public access or administrative areas adjacent to the SCIF, SCIF construction, or the installation of major utilities, whichever comes first.

(2) Upon completion of all work, shall clear and secure the areas for which the CST is responsible prior to turning over control to the CAGs.

g) On U.S. military installations, when the AO considers the risk acceptable, alternative countermeasures may be substituted for the use of a CST as prescribed in the CSP.

3. CAG Requirements and Responsibilities

a) Possesses a U.S. SECRET clearance (TOP SECRET required under COM authority)

b) Performs access-control functions at all vehicle and pedestrian entrances to the site except as otherwise noted in the CSP.

(1) Screens all non-cleared workers, vehicles, and equipment entering or exiting the site.

(2) Denies introduction of prohibited materials, such as explosives, weapons, electronic devices, or other items as specified by the AO or designee.

(3) Conducts random inspections of site areas to ensure no prohibited materials have been brought on to the site. (All suspicious materials or incidents shall be brought to the attention of the SSM or CST.)

D. Construction Security Requirements

1. Prior to awarding a construction contract, a CSP for each project shall be developed by the SSM and approved by the AO.

2. Construction plans and all related documents shall be handled and protected in accordance with the CSP.

3. For SCIF renovation projects, barriers shall be installed to segregate construction workers from operational activities. These barriers will provide protection against unauthorized access and visual observation. Specific guidance shall be contained in the CSP.

4. When expanding existing SCIF space into areas not controlled at the SECRET level, maximum demolition of the new SCIF area is required.

5. For areas controlled at the SECRET level, or when performing renovations inside existing SCIF space, maximum demolition is not required.

6. All requirements for demolition shall be documented in the CSP.

7. Citizenship and Clearance Requirements for SCIF Construction Personnel

a) Use of workers from countries identified in the SETL as “critical technical threat level” or listed on the DoS Prohibited Countries Matrix is prohibited.

b) General construction of SCIFs shall be performed using U.S. citizens and U.S. firms.

c) SCIF finish work (work that includes closing up wall structures; installing, floating, taping and sealing wallboards; installing trim, chair rail, molding, and floorboards; painting; etc.) in Category III countries shall be accomplished by SECRET-cleared, U.S. personnel.

d) SCIF finish work (work that includes closing up wall structures; installing, floating, taping and sealing wallboards; installing trim, chair rail, molding, and floorboards; painting; etc.) in Category I and II countries shall be accomplished by TOP SECRET-cleared, U.S. personnel.

e) On military facilities, the AO may authorize foreign national citizens or firms to perform general construction of SCIFs. In this situation, the SSM shall prescribe, with AO approval, mitigating strategies to counter security and counterintelligence threats.

f) All non-cleared construction personnel shall provide the SSM with biographical data (full name, current address, Social Security Number (SSN), date and place of birth (DPOB), proof of citizenship, etc.), and fingerprint cards as allowed by local laws prior to the start of construction/renovation.

(1) Two forms of I-9 identification are required to verify U.S. persons.

(2) Whenever host nation agreements or Status of Forces Agreements make this information not available, it shall be addressed in the CSP.

g) When non-U.S. citizens are authorized by the AO:

(1) The SSM shall conduct checks of criminal and subversive files, local, national, and host country agency files, through liaison channels and consistent with host country laws.

(2) Checks shall be conducted of CIA indices through the country’s Director of National Intelligence (DNI) representative and appropriate in-theater U.S. military authorities.

h) Access to sites shall be denied or withdrawn if adverse security, Counterintelligence (CI), or criminal activity is revealed. The SSM shall notify the AO when access to the site is denied or withdrawn.

i) For new facilities, the following apply:

(1) Non-cleared workers, monitored by CSTs, may perform the installation of major utilities and feeder lines.

(2) Installation shall be observed at perimeter entry points and when any trenches are being filled.

(3) The number of CSTs shall be determined by the size of the project (square footage and project scope) as outlined in the CSP.

j) For existing facilities, the following apply:

(1) Non-cleared workers, monitored by CSTs or cleared escorts, may perform maximum demolition and debris removal.

(2) TOP SECRET-cleared workers shall be used to renovate or construct SCIF space.

(3) SECRET-cleared individuals may perform the work when escorted by TOP SECRET-cleared personnel.

(4) SCI-indoctrinated escorts are not required when the existing SCIF has been sanitized or a barrier has been constructed to separate the operational areas from the areas identified for construction.

k) Prior to initial access to the site, all construction personnel shall receive a security briefing by the SSM or designee on the security procedures to be followed.

l) If a construction worker leaves the project under unusual circumstances, the SSM shall document the occurrence and notify the AO. The AO shall review for CI concerns.

m) The SSM may require cleared escorts or CSTs for non-cleared workers performing work exterior to the SCIF that may affect SCIF security.

n) The ratio of escort personnel to construction personnel shall be determined by the SSM on a case-by-case basis and documented in the CSP. Prior to assuming escort duties, all escorts shall receive a briefing regarding their responsibilities.

8. Access Control of Construction Sites

a) Access control to the construction site and the use of badges are required.

b) Guards are required for SCIF construction outside the U.S.

c) All site control measures used shall be documented in the CSP. The following are site control measures that should be considered:

- Identity verification.
- Random searches at site entry and exit points.
- Signs, in English and other appropriate languages, at all entry points listing prohibited and restricted items (e.g., cameras, firearms, explosives, drugs, etc.).
- Physical security barriers to deny unauthorized access.
- Vehicle inspections.

d) Guards

(1) Local guards, supervised by CAGs and using procedures established by the AO and documented in the CSP, may search all non-cleared personnel, bags, toolboxes, packages, etc., each time they enter or exit the site.

(2) In Category I countries, CAGs shall be assigned to protect the site and surrounding area as defined in the CSP.

(3) For existing SCIFs, TOP SECRET/SCI-indoctrinated guards are not required to control access to the site or secure storage area (SSA) provided that TOP SECRET/SCI-indoctrinated personnel are present on a 24-hour basis and prescribed post security resources are in place.

(4) Use of non-cleared U.S. guards or non-U.S. guards to control access to the site or SSA requires the prior approval of the AO. A SECRET-cleared, U.S. citizen must supervise any non-cleared or non-U.S. guards. Non-cleared or non-U.S. guards shall not have unescorted access to the site.

E. Procurement of Construction Materials

1. General Standards. These standards apply to construction materials (hereafter referred to as "materials") used in SCIF construction outside the U.S. These standards do not apply to installations on a roof contiguous to the SCIF provided there is no SCIF penetration.

a) Procurements shall be in accordance with Federal Acquisition Regulations.

b) In exceptional circumstances, SSMs may deviate from procurement standards with a waiver; such deviation shall be noted in the CSP.

c) For building construction projects in Category III countries, cleared U.S. citizens may randomly select up to 35% of building materials from non-specific general construction materials for SCIF construction. Random selection may exceed 35% only if materials can be individually inspected.

d) For building construction projects in Category I and II countries, cleared U.S. citizens may randomly select up to 25% of building materials from non-specific general construction materials for SCIF construction. Random selection may exceed 25% only if materials can be individually inspected.

e) Procurement of materials from host or third party countries identified in the SETL as critical for technical intelligence or listed in the DoS Prohibited Countries Matrix is prohibited.

f) All such materials must be selected immediately upon receipt of the shipment and transported to secure storage.

2. Inspectable (e.g., See Chapter 13 Inspectable Materials Checklist) Materials

a) Inspectable materials may be procured from U.S. suppliers without security restrictions.

b) The purchase of inspectable materials from host or third party countries requires advanced approval from the AO.

c) Procurement of materials from host or third party countries identified in the SETL as critical for technical intelligence or listed in the DoS Prohibited Countries Matrix is prohibited.

d) All inspectable materials procured in host and third party countries, or shipped to site in unsecured manner, shall be inspected using an AO-approved method as outlined in the CSP and then moved to an SSA.

e) Random selection of all inspectable material selected from stock stored outside of the SSA shall be inspected using AO-approved methods outlined in the CSP prior to use in SCIF construction.

3. Non-Inspectable Materials

a) Non-inspectable materials may be procured from U.S. suppliers or other AO-approved channels with subsequent secure transportation to the SSA at the construction site.

b) Non-inspectable materials may be procured in a host or third party country if randomly selected by U.S. citizens with a security clearance level approved by the AO.

c) Materials shall be randomly chosen from available suppliers (typically three or more) without advance notice to, or referral from, the selected supplier and without reference of the intended use of material in a SCIF.

d) Selections shall be made from available shelf stock and transported securely to an SSA.

e) Procurement officials should be circumspect about continually purchasing non-inspectable materials from the same local suppliers, and thereby establishing a pattern that could be reasonably discernible by hostile intelligence services, foreign national staff, and suppliers.

F. Secure Transportation for Construction Material

1. Inspectable Materials

a) Secure transportation of inspectable materials is not required, but materials shall be inspected using procedures approved by the AO prior to use.

b) Once inspected, all inspectable materials shall be stored in a SSA prior to use.

c) If securely procured, securely shipped, and stored in a secure environment, inspectable materials may be utilized within the SCIF without inspection.

2. Non-Inspectable Materials

a) Non-inspectable materials include inspectable materials when the site does not possess the capability to inspect them by AO-approved means.

b) Non-inspectable materials shall be securely procured and shipped to site by secure transportation from the U.S., a secure logistics facility, or low threat third party country using one of the following secure methods:

(1) Securely packaged or containerized and under the 24-hour control of an approved courier or escort office. (Escorted shipments shall be considered compromised if physical custody or direct visual observation is lost by the escort officer during transit. Non-inspectable materials that are confirmed or suspected of compromise shall not be used in a SCIF.)

(2) Securely shipped using approved transit security technical safeguards capable of detecting evidence of tampering or compromise. (An unescorted container protected by technical means ("trapped") is considered compromised if evidence of tampering of the protective technology is discovered, or if an unacceptable deviation from the approved transit security plan occurs. Non-inspectable materials that are confirmed or suspected of compromise shall not be used in a SCIF.).

(3) Non-inspectable materials shall be shipped using the following surface and air carriers in order of preference:

- U.S. Military
- U.S. Flag Carriers
- Foreign Flag Carriers

G. Secure Storage of Construction Material

1. A SSA shall be established and maintained for the secure storage of all SCIF construction material and equipment. An SSA is characterized by true floor to true ceiling, slab-to-slab construction of some substantial material, and a solid wood-core or steel-clad door equipped with an AO-approved security lock.

2. All inspected and securely shipped materials shall be placed in the SSA upon arrival and stored there until required for installation.

3. Alternative SSAs may include the following:

a) A shipping container located within a secure perimeter that is locked, alarmed, and monitored.

b) A room or outside location enclosed by a secure perimeter that is under direct observation by a SECRET-cleared U.S. citizen.

4. The SSA shall be under the control of CAGs or other U.S. personnel holding at least U.S. SECRET clearances.

5. Supplemental security requirements for SSAs shall be set forth in the CSP and may vary depending on the location and/or threat to the construction site.

H. Technical Security

1. TEMPEST countermeasures shall be pre-engineered into the construction of the SCIF.

2. In Category I countries, a TSCM inspection shall be required for new SCIF construction or for significant renovations (50% or more of SCIF replacement cost).

3. In Category II and III countries, a TSCM inspection may be required by the AO for new SCIF construction or significant renovations (50% or more of SCIF replacement cost).

4. A TSCM inspection shall be required if uncontrolled space is converted (maximum demolition) to new SCIF space.

5. When a TSCM inspection is not conducted, a mitigation strategy based on a physical security inspection that identifies preventative and corrective countermeasures shall be developed to address any technical security concerns.

I. Interim Accreditations

1. Upon completion of a successful inspection, the respective agency's AO may issue an Interim Accreditation pending receipt of required documentation.

2. If documentation is complete, AOs may issue an Interim Accreditation pending the final inspection.

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Chapter 5. SCIFs Outside the U.S. and Under Chief of Mission Authority

A. Applicability

1. This portion applies to the construction of SCIFs located overseas and that are on any compound that falls under the DoS COM authority or created to support any Tenant Agency that falls under COM authority.

2. The creation of new SCIF space at facilities that fall under COM authority is governed by both ICDs and Overseas Security Policy Board (OSPB) standards published as 12 Foreign Affairs Handbook-6 (12 FAH-6). If there is a conflict between the standards, the more stringent shall apply.

3. For SCIFs constructed in new facilities (new compound or new office building under COM authority), the proponent activity shall coordinate specific requirements for the proposed SCIF with the DoS/Overseas Buildings Operations (OBO).

4. For SCIFs constructed in existing facilities under COM authority, the project proponent activity must coordinate SCIF requirements with DoS/Bureau of Diplomatic Security (DS), the affected Embassy or Consulate (through the Regional Security Officer (RSO) and General Services Officer (GSO)), and DoS/OBO.

5. Upon an upgrade in the SETL Technical Threat rating for a facility under COM authority, the tenant agency in concert with the RSO, shall conduct a survey for OSPB compliance to the new technical threat requirements, and document any compliance issues accordingly. Upgrade requirements shall be coordinated through the RSO, GSO, and DoS/OBO and DS.

6. Temporary SCIFs may only be authorized by exception for facilities under COM authority. The AO of the tenant agency shall notify both the RSO and the DoS AO of the requirement and the expected duration of these facilities. Prior to accreditation, the tenant agency AO must coordinate with the DoS AO.

B. General Guidelines

1. SCIFs located under COM authority outside the U.S. are located within the CAA.

2. Prior to initiating any SCIF implementation process for upgrade or new construction in an existing office building, the tenant agency CSA shall do the following:

   a) Obtain concurrence from the Post's Counterintelligence Working Group (CIWG).

   b) Obtain written approval from the COM.

   c) Notify the DoS AO of CWIG and COM approvals.

   d) Coordinate OSPB preliminary survey with the post RSO/Engineering Services Office (ESO) if space is not core CAA.

3. A Preliminary Survey shall be developed by the RSO/ESO and submitted to DoS/DS for review and approval prior to awarding a construction contract. A CSP shall then be developed by the tenant and forwarded to DoS/OBO for processing.

4. All SCIF design, construction, or renovation shall be in compliance with OSPB standards for facilities under COM authority.

5. Any waivers that are granted for a SCIF by a waiver authority that would result in non-compliance with OSPB standards shall require an exception to OSPB standards from DoS/DS.

6. Written approval of the request for an exception to OSPB standards must be received prior to the commencement of any construction projects.

7. Upon completion of construction, the tenant agency AO will accredit the SCIF for SCI operations.

C. Threat Categories

1. The DoS SETL shall be used in the selection of appropriate construction criteria. Based on technical threat ratings, building construction has been divided into three categories for construction purposes:

- Category I - Critical or High Technical Threat, High Vulnerability Buildings
- Category II - High Technical Threat, Low Vulnerability Buildings
- Category III - Low and Medium Technical Threat

2. High and Low Vulnerability Buildings will be determined in accordance with the definitions in the OSPB standards.

3. SCIF design and construction shall comply with the building codes utilized by DoS/OBO.

4. SCIF construction projects are subject to the DoS Construction Security Certification requirements stipulated in Section 160 (a), Public Law 100-204, as amended. Construction activities may not commence until the required certification has been obtained from DoS.

5. SCIF construction projects are subject to permit requirements established by DoS/OBO.

6. Open storage in Category I and II areas is to be avoided. The CSA shall certify mission-essential need and approve on a case-by-case basis.

7. Open storage shall only be allowed for Category III posts when the host facility is manned 24-hours per day by a cleared U.S. presence (i.e., Marine Security Guard).

8. Open storage of SCI material is not authorized in lock-and-leave facilities (i.e., no Marine Security Guard).

D. Construction Requirements

1. Perimeter Wall Construction (all facilities regardless of type or location).

a) Perimeter walls shall comply with enhanced wall construction (See drawings for Walls B and C.)

b) Perimeter shall meet acoustic protection standards unless designated as a non-discussion area.

2. All SCIFs must be alarmed in accordance with Chapter 7.

3. Initial alarm response times shall be within 15 minutes for closed storage and five minutes for open storage.

4. Access control systems shall be in accordance with Chapter 8.

5. SCI shall be stored in GSA-approved containers.

6. An alert system and/or duress alarm is recommended.

7. Continuous Operation Facilities

   a) An alert system and/or duress alarm is recommended.

   b) The capability shall exist for storage of all SCI in GSA-approved security containers.

   c) The emergency plan shall be tested semi-annually.

   d) The SCIF shall be alarmed in accordance with Chapter 7.

   e) Access control shall be in accordance with Chapter 8.

   f) Initial response time shall be five minutes.

8. TSWAs

   a) When a TSWA is in use at the SCI level, the following apply:

      (1) Unescorted access shall be limited to SCI-indoctrinated persons.

      (2) The AO may require an alarm system.

      (3) No special construction is required.

      (4) When the TSWA is approved for SCI discussions the following apply:

         (a) Sound attenuation specifications of Chapter 9 shall be met.
         (b) The AO may require a TSCM evaluation if the facility has not been continuously controlled at the SECRET level.

   b) When the TSWA is **not** in use at the SCI level, the following shall apply:

      (1) The TSWA shall be secured with a DoS/DS-approved key or combination lock.

      (2) Unescorted access shall be limited to personnel possessing a U.S. SECRET clearance.

9. SWA

   a) Initial alarm response times shall be within 15 minutes.

b) The SWA shall be controlled at all times by SCI-indoctrinated individuals or secured with a GSA-approved combination lock.

c) The SWA shall be alarmed in accordance with Chapter 7.

d) Access control shall be in accordance with Chapter 8.

e) Perimeter walls shall comply with standard Wall A.

f) An alert system and/or duress alarm is recommended.

g) All SCI used in a SWA shall be removed and stored in GSA-approved security containers within a SCIF or be destroyed.

h) There shall be an emergency plan that is tested semi-annually.

E. Personnel

1. SSM Requirements and Responsibilities

a) Possesses a U.S. TOP SECRET clearance.

b) Ensures the security integrity of the construction site.

c) Develops and implements a CSP.

d) Shall have 24-hour unrestricted access to the site (or alternatives shall be stated in CSP).

e) Conducts periodic security inspections for the duration of the project to ensure compliance with the CSP.

f) Documents security violations or deviations from the CSP and notifies the RSO and the tenant AO.

g) Maintains a list of all workers utilized on the project; this list shall become part of the facility accreditation files.

h) Implements procedures to deny unauthorized site access.

i) Works with the construction firm(s) to ensure security of the construction site and compliance with the requirements set forth in this document.

j) Notifies the RSO and tenant AO if any construction requirement cannot be met.

2. CST Requirements and Responsibilities

a) Possesses a TOP SECRET clearance.

b) Is specially trained in surveillance and the construction trade to deter technical penetrations and to detect implanted technical collection devices.

c) Supplements site access controls, implements screening and inspection procedures, and when required by the CSP, monitors construction and personnel.

d) Is not required when contractors who are U.S. citizens with U.S. TOP SECRET clearances are used.

e) In Category III countries the following shall apply:

(1) The CST shall begin surveillance of non-cleared workers at the start of SCIF construction.

(2) Upon completion of all work, the CST shall clear and secure the areas for which they are responsible prior to turning control over to the CAGs.

f) In Category I and II countries the following shall apply:

(1) The CST shall begin surveillance of non-cleared workers at the start of construction of public access or administrative areas adjacent to the SCIF, or SCIF construction, whichever comes first.

(2) Upon completion of all work, the CST shall clear and secure the areas for which the CST is responsible prior to turning over control to the CAGs.

3. CAG Requirements and Responsibilities

a) Possesses a U.S. TOP SECRET clearance.

b) Performs access control functions at all vehicle and pedestrian entrances to the site except as otherwise noted in the CSP.

(1) Screens all non-cleared workers, vehicles, and equipment entering or exiting the site.

(2) Uses walk-through and/or hand-held metal detectors or other means approved by the RSO or designee to deny introduction of prohibited materials such as explosives, weapons, electronic devices, or other items as specified by the RSO or designee.

(3) Conducts random inspections of site areas to ensure no prohibited materials have been brought on to the site. All suspicious materials or incidents shall be brought to the attention of the SSM.

c) In Category III countries, CAGs shall be assigned to protect the site and surrounding area at the start of construction of the SCIF or commencement of operations of the SSA.

d) In Category I and II countries, CAGs shall be assigned to protect the site and surrounding area at the start of construction of the SCIF, areas adjacent to the SCIF, or commencement of operations of the SSA.

e) For existing SCIFs, TOP SECRET/SCI-indoctrinated U.S. citizen guards are not required to control access to the site or SSA provided the following apply:

(1) TOP SECRET/SCI-indoctrinated U.S. citizens are present on a 24-hour basis in the SCIF or the SCIF can be properly secured and alarmed.

(2) Prescribed post security resources are in place to monitor the SSA.

F. Construction Security Requirements

1. Prior to awarding a construction contract, a CSP for each project shall be developed by the SSM and approved by DoS/DS and DoS/OBO and the tenant AO.

2. Construction plans and all related documents shall be handled and protected in accordance with the CSP.

3. For SCIF renovation projects, barriers shall be installed to segregate construction workers from operational activities. These barriers will provide protection against unauthorized access and visual observation. Specific guidance shall be contained in the CSP.

4. When expanding existing SCIF space into areas not controlled at the SECRET level, maximum demolition of the new SCIF area is required.

5. For areas controlled at the SECRET level that meet OSPB pre-conditions, or when performing renovations inside existing SCIF space, maximum demolition is not required.

6. All requirements for demolition shall be documented in the CSP.

7. Periodic security inspections shall be conducted by the SSM or designee for the duration of the project to ensure compliance with construction design and security standards.

8. Citizenship and Clearance Requirements for SCIF Construction Personnel

   a) Use of workers from countries identified as critical for Technical or Human Intelligence threat, or listed on the DoS Prohibited Countries Matrix, is prohibited.

   b) General construction and finish work is defined by OSPB standards.

   c) General construction of SCIFs shall be performed using U.S. citizens and U.S. firms. Use of foreign national citizens or firms to perform general construction of SCIFs may be authorized in accordance with OSPB standards. In this situation, the CSP shall prescribe mitigating strategies to counter security and counterintelligence threats.

   d) SCIF finish work shall be accomplished by appropriately cleared personnel as directed by OSPB standards for CAA construction.

   e) All non-cleared construction personnel shall provide the SSM with biographical data (full name, current address, SSN, DPOB, proof of citizenship, etc.), and fingerprint cards as allowed by local laws prior to the start of construction/renovation.

   f) Two forms of I-9 identification are required to verify U.S. persons.

   g) Whenever host nation agreements make this information not available, it shall be addressed in the CSP.

   h) When non-U.S. citizens are authorized, the following shall apply:

      (1) The SSM shall conduct, through liaison channels, checks of criminal and subversive files, local and national; and host country agencies, consistent with host country laws.

      (2) Checks shall also be conducted of CIA indices through the country’s DNI representative and appropriate in-theater U.S. military authorities.

(3) Access to sites shall be denied or withdrawn if adverse security, CI, or criminal activity is revealed. The SSM shall notify the AO and RSO when access to the site is denied or withdrawn.

(4) For existing facilities, the following apply:

(a) Non-cleared workers monitored by CSTs may perform maximum demolition for conversion of non-CAA to SCIF. Debris removal by non-cleared workers must be monitored at a minimum by cleared U. S. citizen escorts.

(b) TOP SECRET-cleared U.S. citizens must perform maximum demolition within, or penetrating the perimeter of, an existing SCIF.

(c)TOP SECRET-cleared U.S. citizens shall be used to renovate SCIF space.

(d) SECRET-cleared individuals may perform the work when escorted by TOP SECRET-cleared U.S. citizens.

(e) SCI-indoctrinated escorts are not required when the existing SCIF has been sanitized or a barrier has been constructed to separate the operational areas from the areas identified for construction.

i) Prior to initial access to the site, all construction personnel shall receive a security briefing by the SSM or designee on the security procedures to be followed.

j) If a construction worker leaves the project under unusual circumstances, the SSM shall document the occurrence and notify the RSO and tenant AO. The RSO shall review for CI concerns.

k) The SSM may require cleared escorts or CSTs for non-cleared workers performing work exterior to the SCIF that may affect SCIF security.

l) The ratio of escort personnel to construction personnel shall be determined by the SSM on a case-by-case basis and documented in the CSP. Prior to assuming escort duties, all escorts shall receive a briefing regarding their responsibilities.

9. Access Control of Construction Sites

a) Access control to the construction site and the use of badges are required.

b) Guards are required for SCIF construction outside the U.S.

c) All site control measures used shall be documented in the CSP.

d) The following site control measures should be considered:

(1) Identity verification.

(2) Random searches at site entry and exit points.

(3) Signs, in English and other appropriate languages, at all entry points listing prohibited and restricted items (e.g., cameras, firearms, explosives, drugs, etc.).

(4) Physical security barriers to deny unauthorized access.

(5) Vehicle inspections.

10. Local Guards

a) Local guards, supervised by CAGs and using procedures established by the RSO and documented in the CSP, may search all non-cleared personnel, bags, toolboxes, packages, etc., each time they enter or exit the site.

b) Use of non-cleared U.S. guards or non-U.S. guards to control access to the site or secure storage area (SSA) requires the prior approval of the RSO. A SECRET-cleared U.S. citizen must supervise non-cleared or non-U.S. guards. Non-cleared or non-U.S. guards shall not have unescorted access to the site.

G. Procurement of Construction Materials

1. General Standards

a) These standards apply to construction materials used in SCIF construction under COM authority. These standards do not apply to installations on a roof contiguous to the SCIF provided there is no SCIF penetration.

b) Procurements shall be in accordance with Federal Acquisition Regulations.

c) In exceptional circumstances, SSMs may deviate from procurement standards with a waiver; such deviation shall be noted in the CSP.

d) For building construction projects in Category III countries, cleared U.S. citizens may randomly select up to 35% of building materials from non-specific general construction materials for SCIF construction. Random selection may exceed 35% only if materials can be individually inspected.

e) For building construction projects in Category I and II countries, cleared U.S. citizens may randomly select up to 25% of building materials from non-specific general construction materials for SCIF construction. Random selection may exceed 25% only if materials can be individually inspected.

f) All such materials must be selected immediately upon receipt of the shipment and transported to secure storage.

g) Procurement of materials from host or third party countries identified in the SETL as critical for technical intelligence, or listed on the DoS Prohibited Countries Matrix, is prohibited.

2. Inspectable Materials Specifically Destined for SCIF Construction

a) Inspectable materials specifically destined for SCIF construction may be procured from U.S. third-country or local suppliers without security restrictions.

b) All inspectable materials specifically destined for SCIF construction procured in host and third party countries or shipped to site in an unsecured manner from the U.S. shall be inspected using a DoS/DS-approved method and then moved to an SSA.

c) All inspectable material selected from stock stored outside of the SSA shall be inspected using DoS/DS-approved methods prior to use in SCIF construction.

3. Non-Inspectable Materials Specifically Destined for SCIF Construction

a) Non-inspectable materials specifically destined for SCIF construction shall be procured from U.S. suppliers with subsequent secure transportation to the SSA at the construction site.

b) On an exceptional basis, non-inspectable materials may be procured in a host or third party country if randomly selected by cleared U.S. citizens.

(1) Materials shall be randomly chosen from available suppliers (typically three or more) without advance notice to, or referral from, the selected supplier and with no reference of the intended use of material in a SCIF.

(2) Such selections shall be made from available shelf stock, brought immediately under personal control of a cleared U.S. citizen, and transported securely to an SSA.

(3) Procurement officials should be circumspect about continually purchasing non-inspectable materials from the same local suppliers and establishing a pattern that could be reasonably discernible by hostile intelligence services, foreign national staff, and suppliers.

H. Secure Transportation for Construction Material

1. Inspectable Materials Specifically Destined for SCIF Construction

a) Inspectable materials do not require secure transportation but shall be inspected using procedures approved by the DoS/DS prior to use in the SCIF.

b) Once inspected, all inspectable items shall be stored in an SSA.

c) Materials may be utilized within the SCIF without inspection if securely procured, securely shipped, and stored in a secure environment.

2. Non-inspectable Materials Specifically Destined for SCIF Construction

a) Non-inspectable material includes inspectable materials when the site does not possess the capability to inspect by Do/DS-approved means.

b) Non-inspectable materials shall be securely procured and shipped to site by secure transportation from the U.S., a secure logistics facility, or low threat third party country using one of the following secure methods:

(1) Securely packaged or containerized and under the 24-hour control of an approved courier or escort officer. (Escorted shipments shall be considered compromised if physical custody or direct visual observation is lost by the escort officer during transit. Non-inspectable materials that are confirmed compromised or suspected of compromise shall not be used in a SCIF.)

(2) Securely shipped using approved transit security technical safeguards capable of detecting evidence of tampering or compromise. (An unescorted container protected by technical means ("trapped") is considered compromised if evidence of tampering of the protective technology is discovered, or if an unacceptable deviation from the approved transit security plan occurs. Non-inspectable

materials that are confirmed compromised or suspected of compromise shall not be used in a SCIF.)

(3) Non-inspectable materials shall be shipped using the following surface and air carriers in order of preference:

(a) U.S. Military
(b) U.S. Flag Carriers
(c) Foreign Flag Carriers

I. Secure Storage of Construction Material

1. Upon arrival, all inspected and securely shipped materials shall be placed in the SSA until required for installation.

2. An SSA shall be established and maintained for the secure storage of all SCIF construction material and equipment. It is characterized by true floor to true ceiling, slab-to-slab construction of some substantial material and a solid wood-core or steel-clad door equipped with a DoS/DS-approved security lock.

3. Alternative SSA's may include a shipping container located within a secure perimeter that is locked, alarmed, and monitored, or a room or outside location enclosed by a secure perimeter that is under direct observation by a SECRET-cleared U.S. citizen.

4. The SSA shall be under the control of CAGs or other U.S. citizens holding at least U.S. SECRET clearances.

5. Supplemental security requirements for SSAs shall be set forth in the CSP and may vary depending on the location and/or threat to the construction site.

J. Technical Security

1. TEMPEST countermeasures shall be pre-engineered into the building.

2. A TSCM inspection shall be required in Category I countries for new SCIF construction or significant renovations (50% or more of SCIF replacement cost).

3. A TSCM inspection may be required by the AO in Category II or III countries for new SCIF construction or significant renovations (50% or more of SCIF replacement cost).

4. A TSCM inspection, conducted at the completion of construction, shall be required if uncontrolled space is converted (maximum demolition) to new SCIF space.

5. When a TSCM inspection is not conducted, a mitigation strategy based on a physical security inspection that identifies preventative and corrective countermeasures shall be developed to address any technical security concerns.

K. Interim Accreditations

1. Upon completion of a successful inspection, the respective agency's AO may issue an Interim Accreditation pending receipt of required documentation.

2. If documentation is complete, AOs may issue an Interim Accreditation pending the final inspection.

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Chapter 6. Temporary, Airborne, and Shipboard SCIFs

A. Applicability

1. General Information

a) This chapter covers all SCIFs designed to be temporary or such as those at sites for contingency operations, emergency operations, and tactical military operations. This chapter does not apply to temporary SCIFs established or operated within or on U.S. diplomatic facilities/compounds; see Chapter 5 for applicable guidance.

b) These standards apply to the following:

(1) All ground-based temporary SCIFs (T-SCIFs), including those on mobile platforms (e.g., trucks and trailers).

(2) SCIFs aboard aircraft.

(3) SCIFs aboard surface and sub-surface vessels.

c) When employing T-SCIFs, a risk management approach shall be used that balances the operational mission and the protection of SCI.

2. Accreditation

a) Accreditation for the use of T-SCIFs shall not exceed one year without mission justification and approval by the AO.

b) When the T-SCIF owner determines that a T-SCIF is no longer required, the withdrawal of accreditation shall be initiated by the SSO/Contractor Special Security Officer (CSSO).

(1) Upon notification, the AO will issue appropriate SCI withdrawal correspondence.

(2) The AO or appointed representative will conduct a close-out inspection of the facility to ensure that all SCI material has been removed.

B. Ground-Based T-SCIFs

1. T-SCIF Structures and Activation

a) Ground-based T-SCIFs may be established in hardened structures (e.g., buildings, bunkers) or semi-permanent structures (e.g., truck-mounted or towed military shelters, prefabricated buildings, tents).

b) Permanent-type hardened structures shall be used to the greatest extent possible for T-SCIFs.

c) Prior to T-SCIF activation, the AO may require submission of a standard fixed facility checklist or a T-SCIF checklist produced before or after a deployment.

2. SCI Storage and Destruction

a) Under field or combat conditions, open storage of SCI media and materials requires a continuous presence by SCI-indoctrinated personnel.

b) Under field or combat conditions every effort shall be made to obtain from any available host command necessary support for the storage and protection of SCI (e.g., security containers, generators, guards, weapons, etc.).

c) The quantity of SCI material within a T-SCIF shall be limited, to the extent possible, to an amount consistent with operational needs.

d) All SCI shall be stored in GSA-approved security containers.

e) The AO may approve exceptions to the storage of SCI material in GSA-approved storage containers for a specified period of time.

f) When no longer needed, SCI material shall be destroyed by means approved by the AO.

3. Security Requirements

a) T-SCIF security features shall provide acoustical, visual, and surreptitious entry protection.

b) A TSCM inspection shall be requested for any structure proposed for T-SCIF use if the space was previously occupied by a non-U.S. element. It is the AO's responsibility to evaluate operating the SCIF prior to TSCM inspection and formally assume all risk associated with early operation.

c) When possible, T-SCIFs shall be established within the perimeters of U.S.-controlled areas or compounds.

d) If a U.S.-controlled area or compound is not available, the T-SCIF shall be located within an area that affords the greatest degree of protection against surreptitious or forced entry.

e) When a T-SCIF is in operation, the perimeter of its immediate area shall be observed and protected by U.S. guards with U.S. SECRET clearances. Guards shall be equipped with emergency communication devices and, if necessary, with weapons.

f) During non-operational hours, the T-SCIF shall be provided security protection in accordance with AO guidelines.

g) The T-SCIF shall have only one entrance which shall be controlled during hours of operation by an SCI-indoctrinated person using an access roster.

h) Unclassified telecommunications equipment shall meet the requirements outlined in Chapter 10 to the greatest extent practical.

i) Telephones obtained in a foreign country shall not be used within a T-SCIF.

j) Cables and wires penetrating the T-SCIF perimeter shall be protected. The AO may require inspections and routing of cables and wiring through protective distribution systems or may require other countermeasures.

k) AO-approved emergency destruction and evacuation plans shall be developed and rehearsed periodically by all personnel assigned to the T-SCIF; the results of the rehearsal drills shall be documented.

l) When in transit, ground-based and mobile (e.g., truck-mounted, towed military shelters) T-SCIFs containing unsecured and non-encrypted SCI shall be accompanied by a U.S. TOP SECRET-cleared individual with SCI access approval(s).

m) During movement, T-SCIF structures shall be secured with GSA-approved locking devices and equipped with tamper-evident seals.

n) When in transit, hardened T-SCIFs having no open storage of SCI may be monitored by a U.S SECRET-cleared individual.

o) Hardened T-SCIFs shall be designed with TEMPEST countermeasures as identified by the CTTA. The AO, in collaboration with the CTTA, shall provide red/black separation and "protected distribution" guidance for field installation in accordance with CNSSAM TEMPEST 1/13 and CNSSI 7003.

p) When a T-SCIF is no longer required, the responsible SCI security official shall conduct a thorough facility inspection to ensure all SCI material has been removed.

C. Permanent and Tactical SCIFs Aboard Aircraft

1. The Aircraft Facility Checklist (see Forms & Plans) will be used for permanent SCIFs aboard aircraft.

2. The AO may determine that an Aircraft Facility Checklist may not be required for tactical SCIFs aboard aircraft if the following information is provided:

a) Name of aircraft (tail number)/airborne T-SCIF.

b) Major command/organization.

c) ID number of parent SCIF, if applicable.

d) Location T-SCIF deployed from and date of deployment.

e) Location T-SCIF deployed to and date of deployment.

f) SCI compartment(s) involved in T-SCIF operations.

g) Time period for T-SCIF operations.

h) Name of exercise or operation.

i) Points of contact (responsible officers).

j) Type of aircraft and area to be accredited as a T-SCIF.

k) Description of security measures for entire period of T-SCIF use (standard operating procedures).

l) Additional comments to add clarification.

3. Security Requirements for Aircraft when Operating in Support of Missions Involving SCI Material

a) SCIF location shall be identified by aircraft tail number.

b) Access to the aircraft interior shall be controlled at all times by SCI-indoctrinated personnel.

c) There are no unique physical security construction standards for SCIFs aboard aircraft.

d) Accreditation, such as that from the Defense Courier Service, is not required for aircraft used solely to transport SCI material between airfields.

e) When all personnel on an aircraft are not briefed on every SCI compartment aboard, procedural methods or physical barriers shall be employed to isolate compartments of the SCI.

f) When an aircraft T-SCIF is no longer required, the responsible SCI security official shall conduct an inspection of the aircraft to ensure all SCI material has been removed.

4. SCI Storage and Destruction

a) SCI materials shall be encrypted or secured in an AO-approved security container.

b) When no longer needed, SCI materials shall be destroyed by means approved by the AO.

c) Following an unscheduled landing in U.S.-controlled or non-hostile territory, the senior SCI-indoctrinated person shall retain control of the SCI material until approved storage arrangements can be effected through a local Special Security Officer or SCI-indoctrinated official.

d) Prior to an unscheduled landing in unfriendly or hostile territory, every reasonable effort shall be made to destroy unencrypted SCI material and communications security equipment in accordance with the emergency destruction plan.

e) If the aircraft is stationary, in the absence of SCI-indoctrinated personnel, all SCI information shall be encrypted or removed and stored in an alternative accredited SCIF or location approved by the AO.

f) Emergency destruction plans for SCI material shall be developed, approved by the AO, and rehearsed periodically by all personnel assigned to the aircraft; rehearsal results shall be documented.

5. Additional Security Requirements for Stationary Aircraft

a) The aircraft shall be parked within a controlled area that affords the greatest protection against surreptitious or forced entry.

b) In the absence of SCI-indoctrinated personnel, all SCI information shall be encrypted or removed and stored in an alternative accredited SCIF or location approved by the AO.

c) If the aircraft cannot be positioned within a U.S.-controlled area, the SCI is not encrypted, and removal of the SCI is not possible, then the following measures must be taken:

(1) SCI-indoctrinated personnel shall remain with the aircraft.

(2) A guard force that can control the perimeter of the aircraft shall be deployed, unless infeasible. The guards shall possess U.S. SECRET clearances and be armed and equipped with emergency communication devices.

d) If the aircraft is located within a U.S.-controlled area, the SCI is not encrypted, and removal of SCI is not possible then, the following measures shall be taken:

(1) The AO may mitigate the requirement for SCI-indoctrinated personnel provided the aircraft is equipped with, or stored within a structure equipped with, an intrusion detection system approved by the AO.

(2) All aircraft hatches and doors shall be secured with AO-approved locks and tamper-evident seals.

(3) A guard force must be available to respond to an alarm within five minutes.

(4) Guards shall possess U.S. SECRET clearances and be armed and equipped with emergency communication devices.

(5) If a cleared U.S. guard force is not available, the AO may approve other mitigation measures.

D. Permanent and Tactical SCIFs on Surface or Subsurface Vessels

1. Permanent shipboard SCIFs shall consist of any area aboard a vessel where SCI is processed, stored, or discussed.

2. The Shipboard Checklist (see Forms & Plans) will be used for permanent SCIFs. The AO may determine that this checklist may not be required providing the below information is available:

a) Name of vessel/hull number.

b) Major command/organization.

c) ID number of parent SCIF, if applicable.

d) Location SCIF deployed from and date of deployment.

e) Location SCIF deployed to and date of deployment.

f) SCI compartment(s) and sub-compartments involved in SCIF operations.

g) Name of exercise or operation.

h) Points of contact (responsible officers).

i) Description of security measures for entire period of SCIF use (standard operating procedures).

j) Additional comments to add clarification.

3. Security Requirements for Permanent SCIFs

a) The perimeter (walls, floors, and ceiling) shall be fabricated of structural bulkheads comprised of standard shipboard/submarine construction materials.

b) Elements of the perimeter shall be fully braced and welded or bonded in place.

c) Doors shall conform to the following requirements:

(1) Perimeter doors and emergency exit(s) shall be constructed of standard shipboard materials and shall be mounted in a frame, braced and welded or bonded in place in a manner commensurate with the structural characteristics of the bulkhead, deck, or overhead.

(2) The primary entry door shall be equipped with a GSA-approved combination lock and an access control device.

(3) If the door is in a bulkhead that is part of an airtight perimeter, the airtight integrity may be maintained by co-locating the door with the metal joiner door, or by adding a vestibule.

(4) Metal joiner doors shall be equipped with a combination lock that meets specification FF-L-2740A and with an access control device approved by the AO.

(5) Doors shall be constructed in a manner that will preclude unauthorized removal of hinge pins and anchor bolts, and obstruct access to lock-in bolts between the door and frame.

(6) Doorways or similar openings that allow visual access to the SCIF shall be screened or curtained.

d) No damage control fittings or cables shall be located within, or pass through, the SCIF. This does not apply to smoke dampers or other life-safety devices that are operated by personnel within the space during working hours.

e) Removable hatches and deck plates less than 10 square feet that are secured by exposed nuts and bolts (external to the SCIF) shall be secured with a high security padlock (unless their weight makes this unreasonable). Padlock keys shall be stored in a security container located within the SCIF.

f) Vents, ducts, and similar openings with a cross-sectional measurement greater than 96 inches shall be protected by a fixed barrier or security grill. (This requirement is not applicable to through-ducts that do not open into the SCIF.)

(1) Grills shall be fabricated of steel or aluminum grating or bars with a thickness equal to the perimeter barrier.

(2) If a grating is used, bridge center-to-center measurements will not exceed 1.5 inches by 4 inches.

(3) Bars shall be mounted in a grid pattern, six-inches on center.

(4) The grating or bars shall be welded into place.

g) Construction of the SCIF perimeter shall afford adequate sound attenuation. Air handling units and ducts may require baffles if SCIF discussions can be overhead in adjacent areas.

h) The SCIF shall be equipped with an AO-approved intrusion detection system (IDS) or other countermeasures if SCI-indoctrinated personnel cannot continuously occupy the area.

i) Passing scuttles and windows should not be installed between the SCIF and any other space on the ship. If installed, they shall be secured on the inside of the SCIF.

j) All SCI cryptographic and processing equipment shall be located within the SCIF.

k) Unclassified telecommunications shall meet the requirements outlined in Chapter 11, to the greatest extent practical.

l) Sound-powered telephones will not be permitted in the SCIF without additional mitigations determined by the AO. If a deviation is granted, sound-powered telephones located within the SCIF and connecting to locations outside the SCIF shall comply with the following:

(1) Telephone cables shall not break out to jack-boxes, switchboards, or telephone sets other than at designated stations. Cables shall not be shared with any circuit other than call or signal systems associated with the SCIF circuit.

(2) Telephone cables shall be equipped with a selector switch located at the controlling station and shall be capable of disconnecting all stations, selecting any one station, and disconnecting the remaining stations.

(3) Sound-powered telephones not equipped with a selector switch shall have a positive disconnect device attached to the telephone circuit.

(4) Within any SCIF, sound-powered telephones not used for passing SCI information shall have a warning sign prominently affixed indicating the restriction.

(5) A call or signal system shall be provided. Call signal station, type ID/D, shall provide an in-line disconnect to prevent a loudspeaker from functioning as a microphone.

m) The approval of the AO is required for unencrypted, internal, communication-announcing systems that pass through the SCIF perimeter.

n) Intercommunications-type announcing systems installed within an SCIF shall meet the following standards:

(1) The system shall operate only in the push-to-talk mode.

(2) Receive elements shall be equipped with a local buffer amplifier to prevent loudspeakers or earphones from functioning as microphones.

(3) Except as specified, radio transmission capability for plain radio-telephone (excluding secure voice) will not be connected.

(4) Cable conductors assigned to the transmission of plain language radio-telephone will be connected to ground at each end of the cable.

(5) A warning sign will be posted that indicates the system may not be used to pass SCI.

(6) Unencrypted internal communication systems that pass through the SCIF perimeter shall be in grounded ferrous conduit.

o) Commercial intercommunication equipment shall not be installed within a SCIF without prior AO approval.

p) Loudspeakers used on general announcing systems shall be equipped with a one-way buffer amplifier to protect against microphonic responses.

q) Pneumatic tube systems shall not be installed within the SCIF. The following safeguards apply to existing systems on older ships:

(1) Covers shall be locked at both ends with an AO-approved lock. Keys shall be stored within an approved security container within the SCIF.

(2) The system shall have the capability to maintain the pressure or vacuum and the capability to lock in the secure position at the initiating end.

(3) There shall be a direct voice communications link between both ends to confirm the transportation and receipt of passing cartridges.

(4) Cartridges passing SCI material shall have a distinctive color.

(5) Pneumatic tubes shall be visually inspectable along their entire length.

(6) The CTTA shall conduct a TEMPEST countermeasures inspection and shall recommend safeguards to limit compromising emanations. TEMPEST safeguards should be pre-engineered into platforms to the greatest extent possible.

4. General Requirements for T-SCIFs

a) SCIFs on sub-surface vessels shall be accredited as T-SCIFs.

b) T-SCIFs aboard a vessel include portable platforms or containers temporarily placed within ship space such as embarked Portable Shipboard Collection Vans.

c) T-SCIFs shall be occupied by an SCI-indoctrinated person at all times unless the facility is protected by a GSA-approved lock, an approved intrusion detection system, and a response capability or other countermeasures approved by the AO.

5. Security Requirements for T-SCIFs

a) Overall T-SCIF construction standards shall be the same as those used for permanent shipboard SCIFs.

b) Vents, ducts, and similar openings shall be constructed to the same standards as those used for a shipboard SCIF.

c) SCI materials shall be destroyed by means approved by the AO when no longer needed.

d) AO-approved emergency destruction plans shall be rehearsed periodically by all personnel assigned to the T-SCIF and the rehearsals documented.

e) Unclassified telecommunications shall meet the requirements for a shipboard SCIF, to the greatest extent practical.

f) When the T-SCIF is no longer required, the responsible SCI security official shall conduct a closing inspection of the T-SCIF to ensure all SCI material has been removed.

g) The CTTA shall conduct a TEMPEST countermeasures inspection and shall recommend safeguards to limit compromising emanations. TEMPEST safeguards should be pre-engineered into platforms to the greatest extent possible.

6. Additional Security Standards for Mobile Platforms or Containers

a) Construction of the perimeter must be of sufficient strength to reveal evidence of physical penetration (except for required antenna cables and power lines).

b) Doors must fit securely and be equipped with a locking device that can be locked from the inside and outside.

7. SCI Storage and Destruction

a) SCI material shall be stored in a GSA-approved security container that is welded or otherwise permanently secured to the structural deck.

b) When no longer needed, SCI materials shall be destroyed by means approved by the AO.

c) AO-approved emergency destruction and evacuation plans shall be developed and rehearsed periodically by all personnel assigned to the SCIF and the rehearsals shall be documented.

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Chapter 7. Intrusion Detection Systems (IDS)

A. Specifications and Implementation Requirements

1. General SCIF IDS Requirements

a) SCIFs shall be protected by IDS when not occupied.

b) Interior areas of a SCIF through which reasonable access could be gained, including walls common to areas not protected at the SCI level, shall be protected by IDS. However, these adjacent areas do not need IDS protection if the AO determines that a facility's security programs consist of layered and complementary controls sufficient to deter and detect unauthorized entry and movement.

c) Doors without access control systems and that are not under constant visual observation shall be continuously monitored by the IDS.

d) If any component of the IDS is disrupted to the extent the system no longer provides essential monitoring service (e.g., loss of line security, inoperable Intrusion Detection Equipment (IDE), or loss of power), SCI-indoctrinated personnel shall physically occupy the SCIF until the system is returned to normal operation. As an alternative, the outside SCIF perimeter may be continuously monitored by a response or guard force.

e) IDS failure shall be addressed in the SCIF emergency plan.

2. System Requirements

a) IDS installation related components and monitoring stations shall comply with Underwriters Laboratories (UL) Standard for National Industrial Security Systems for the Protection of Classified Material, UL 2050.

b) Installation shall comply with an Extent 3 installation as referenced in UL 2050.

c) Systems developed and used exclusively by the USG do not require UL certification, but shall nonetheless comply with an Extent 3 installation as referenced in UL 2050.

d) Areas of a SCIF through which reasonable access could be gained, including walls common to areas not protected at the SCI level, shall be protected by IDS consisting of UL 639 listed motion sensors and UL 634 listed High Security Switches (HSS) that meet UL Level II requirements and/or other AO-approved equivalent sensors. All new SCIF accreditations shall use UL Level II HSS. Existing UL Level I HSS are authorized until major IDS modifications/upgrades are made.

e) IDE cabling that extends beyond the SCIF perimeter shall employ Encrypted Line Security or be installed in a closed and sealed metal conveyance defined as a pipe, tube or the like constructed of ferrous Electrical Metallic Tubing (EMT), ferrous pipe conduit or ferrous rigid sheet metal ducting. All joints and connections shall be permanently sealed completely around all surfaces (e.g. welding, epoxy, fusion, etc.). Set screw shall not be used. The seal shall provide a continuous bond between the components of the conveyance. If a service or pull box must be utilized, it must be secured with a GSA approved combination padlock or AO approved key lock.

f) SCIFs that share common or contiguous perimeter and support the same IC Element, or have an established Co-Use-Agreement (CUA), may have the Premise Control Unit (PCU) programmed into multiple logical units or partitions, of the same PCU, that function as individual control units for the intrusion detection system installed in multiple areas or rooms operated independently of one another. All conditions of compliance that apply to a PCU and IDS apply equally to the partitions of the PCU. The PCU shall be independent of IDS safeguarding non-UL 2050 certified areas.

g) If a monitoring station is responsible for more than one IDS, there shall be an audible and visible annunciation for each IDS.

h) IDS's shall be separate from, and independent of, fire, smoke, radon, water, and other systems.

i) If the IDS incorporates an access control system (ACS), notifications from the ACS shall be subordinate in priority to IDS alarms.

j) System key variables and passwords shall be protected and restricted to U.S. SCI-indoctrinated personnel.

k) IDS technical drawings, installation instructions, specifications, etc., shall be restricted as determined by the AO and documented in the CSP.

l) Systems shall not include audio or video monitoring without the application of appropriate countermeasures and AO approval.

m) Monitoring systems containing auto-reset features shall have this feature disabled.

n) Alarm activations shall remain displayed locally until cleared by an authorized SCI-cleared individual.

o) The AO shall approve all system plans. Final system acceptance testing shall be included as part of the SCIF accreditation package.

p) False alarms shall not exceed one alarm per 30-day period per IDS partition. False alarms are any alarm signal transmitted in the absence of a confirmed intrusion that is caused by changes in the environment, equipment malfunction or electrical disturbances. If false alarms exceed this requirement, a technical evaluation of the system shall be conducted to determine the cause, repaired or resolved, and documented.

3. System Components

a) Sensors

(1) All system sensors shall be located within the SCIF, except as noted in 3.a.(2) below.

(2) With AO approval, sensors external to the SCIF perimeter may be installed in accordance with paragraph A.2.e.

(3) Failed sensors shall cause immediate and continuous alarm activation until the failure is investigated and corrected by procedures as documented in the SCIF SOP or Emergency Action Plan.

(4) Dual technology sensors are authorized when each technology transmits alarm conditions independent of the other technology.

(5) A sufficient number of motion detection sensors shall be installed to meet the requirements of paragraph A.2.d or shall be approved by the AO. However, for facilities outside the U.S. and in Category I and II countries, motion detection sensors above false ceilings or below false floors may be required by the AO.

(6) When the primary entrance door employs a delay to allow for changing the system mode of access, the delay shall not exceed 30 seconds.

(7) SCIF perimeter doors shall be protected by an HSS and a motion detection sensor.

(8) Emergency exit doors shall be alarmed and monitored 24 hours per day.

b) Premise Control Units (PCUs)

(1) PCUs shall be located within a SCIF and only SCIF personnel may initiate changes in access modes.

(2) Operation of the access/secure switch shall be restricted by using a device or procedure that validates authorized use.

(3) Cabling between all sensors and the PCU shall be dedicated to the system, be contained within the SCIF, and shall comply with national and local electric codes and Committee for National Security Systems (CNSS) standards. If the wiring cannot be contained within the SCIF, such cabling shall meet the requirements for External Transmission Line Security 3.b.(10) below.

(4) Alarm status shall be continuously displayed with an alphanumeric display at the PCU and/or monitoring station.

(5) Every effort shall be made to design and install the alarm-monitoring panel in a location that prevents observation by unauthorized persons.

(6) The monitoring station or PCU shall identify and display activated sensors.

(7) Immediate and continuous alarm annunciations shall occur for the following conditions.

(a) Intrusion Detection
(b) Failed Sensor
(c) Tamper Detection
(d) Maintenance Mode (a maintenance message displayed in place of an alarm)
(e) IDE Sensor Points shunted or masked during maintenance mode

(8) A change in power status (AC or backup) shall be indicated locally and at the monitoring station.

(9) All system events shall be reset by authorized SCI-indoctrinated personnel after an inspection of the SCIF and a determination for the cause of the alarm. Any auto-alarm reset feature of the IDS shall be disabled.

(10) IDS transmission lines leaving the SCIF to the monitoring station, must meet National Institute of Standards and Technology, Federal Information Processing Standards (FIPS) for certified encrypted lines. The FIPS standard employed must be noted on the UL 2050/CRZH Certificate or other certificate employed. PCUs certified under UL 1610 must meet FIPS 197 or FIPS 140-2 encryption certification and methods. For PCUs certified under UL1076, only FIPS 140-2 is the acceptable encryption certification and method. Alternative methods shall be approved by the AO and noted on the IDS Certificate

(11) The SCI cleared IDS Administrator(s) shall change maintenance and master profiles, PINs or passcodes from their default settings to a unique PIN or passcode.

c) Integrated IDS and Remote Terminal Access.

(1) US government LAN or WAN requires the AO's Chief Information Officer (CIO) to be consulted before connecting an IDS. The system hosting the IDS shall be issued Authority to Operate (ATO) by the agency CIO, following the FISMA Risk Management Framework as outlined in NIST SP 800-53.

(2) For IDS that have been integrated into a networked system (local area network (LAN) or wide area network (WAN)), the requirements below shall be met.

(a) IDS System software shall be installed on a host computing device that is logically and physically restricted to corporate/government security elements cleared to the SCI level. The host device shall be located in a Physically Protected Space, which is defined as a locked room with walls, floor and ceiling that are fixed in place forming a solid physical boundary to which only SCI-cleared personnel have access. If uncleared personnel or personnel with less than SCI indoctrination require access to this space, they shall be escorted by authorized SCI-cleared personnel. The door(s) shall use Commercial Grade 1 hardware fitted with high security key cylinder(s) in compliance with UL 437. This room will be protected by a UL Extent 3 burglar alarm system and access control unless manned 24 hours.

(b) All system components and equipment shall be isolated in a manner that may include, but are not limited to firewalls, Virtual Private Networks, Virtual Routing Tables, Application Level security mechanisms or similar enhancements, that are configured to allow secure and private data transfers only between the PCU, host computer, remote terminal and monitoring station.

(c) If any component of the IDS is remotely programmable, continuous network monitoring is required. Continuous network monitoring includes auditing and reporting of network intrusion detection and prevention systems used in A.3.c.2.b.

(d) A secondary communication path may be utilized to augment an existing data communication link to reduce investigations of data communication failures of less than five minute duration. The supervision provided by the secondary communication path shall be equivalent to that of the primary communication path. The secondary communications path may only be wireless if approved by the AO in consultation with the CTTA and/or the appropriate technical authority.

(e) A unique user ID and password is required for each individual granted access to the system host computing devices or remote terminal. Passwords shall be a minimum of twelve characters consisting of alpha, numeric, and special characters, and shall be changed every six months or utilize US Government Personal Identity Verification (PIV) Card or Common Access Card (CAC) with two factor certificate authentication.

(f) Individuals with IDS administrative access shall immediately notify the AO or designee of any unauthorized modifications.

(g) All transmissions of system information over the LAN/WAN shall be encrypted using National Institute of Standards and Technology (NIST) FIPS 140-2, VPN, or closed and sealed conveyance (see A.2.e). FIPS-197 (AES) may be used with AO approval.

(h) Remote System terminals shall:

- Utilize role based user permissions (e.g. Super User, SO, Guard) as approved by the AO. USG installations shall be in compliance with paragraph 7.A.3.c.1Prohibit Non SCI Cleared personnel from modifying the IDS or ACS.

- Require an independent user ID and password in addition to the host login requirements. Requirements for IDS Systems Software Passwords shall be: a unique user ID and password for each individual granted access to the remote terminal. Passwords shall be a minimum of twelve characters consisting of alpha, numeric, and special characters and shall be changed every six months or utilize US Government Personal Identity Verification (PIV) Card or Common Access Card (CAC) with two factor certificate authentication if supported by the application.

- Host systems shall log and monitor failed login attempts. All remote sessions shall be documented and accessible to AO upon request.
- All Host systems and PCUs shall be patched and maintained to implement current firmware and security updates. USG systems shall be in compliance with Information Assurance Vulnerability Alert (IAVA) guidance.

B. IDS Modes of Operation

1. General Information

   a) The system shall operate in either armed or disarmed mode.

   b) There shall be no remote capability for changing the mode of operation by non-SCI cleared personnel.

   c) Changing arm/disarm status of the system shall be limited to SCI-indoctrinated personnel.

2. Requirements for Disarmed Mode

   a) When in disarmed mode, normal authorized entry into the SCIF, in accordance with prescribed security procedures, shall not cause an alarm.

   b) A record shall be maintained that identifies the person responsible for disarming the system.

   c) Tamper circuits and emergency exit door circuits shall remain in the armed mode of operation.

   d) The PCU shall have the ability to allow alarm points to remain in armed status while other points are in disarmed status.

3. Requirements for Armed Mode

   a) The system shall be placed into armed mode when the last person departs the SCIF.

   b) A record shall be maintained identifying the person responsible for arming the system.

   c) Each failure to arm or disarm the system shall be reported to the responsible SCIF Security Manager. Records of these events shall be maintained for two years.

   d) When in the armed mode, any unauthorized entry into the SCIF shall cause an alarm to be immediately transmitted to the monitoring station.

4. Requirements for Maintenance and Zone Shunting/Masking Modes

   a) When maintenance is performed on a system, the monitoring station must be notified and logged. The initiation of system maintenance can only be performed by an SCI cleared IDS administrator or SCIF Security Officer (SO).

b) When an IDE point is shunted or masked for reasons other than maintenance, it shall be displayed as such at the monitoring station throughout the period the condition exists.

c) Any sensor that has been shunted shall be reactivated upon the next change in status from armed to disarmed.

d) All maintenance periods shall be archived in the system.

e) A Personal Identification Number (PIN) is required, for maintenance purposes, to be established and controlled by the SCI cleared IDS administrator or SCIF SO. Procedures shall be documented in the SCIF SOP.

f) Portable Electronic Devices (PEDs) are allowed attachment to system equipment either temporarily or permanently for the purposes of system maintenance, repair and reporting (See A.3.c). In addition, when utilizing a stand-alone device, the requirements below shall be met.

(1) Such devices shall be kept under control of SCI-cleared personnel.

(2) When not in use, the PED shall be maintained in a Physically Protected Space (see A.3.c.2.a).

(3) Mass storage devices containing SCIF alarm equipment details, configurations, or event data will be protected at an appropriate level approved by the AO.

g) After the initial installation, the capability for remote diagnostics, maintenance, or programming of IDE shall be accomplished only by SCI-cleared personnel and shall be logged or recorded.

5. Requirements for Electrical Power

a) In the event of primary power failure, the system shall automatically transfer to an emergency electrical power source without causing alarm activation.

b) Twenty-four hours of uninterruptible backup power is required and shall be provided by batteries, an uninterruptible power supply (UPS), generators, or any combination.

c) An audible or visual indicator at the PCU shall provide an indication of the primary or backup electrical power source in use.

d) Equipment at the monitoring station shall visibly and audibly indicate a failure in a power source or a change in power source. The individual system that failed or changed shall be indicated at the PCU or monitoring station as directed by the AO.

6. Monitoring Stations

a) Monitoring stations shall be government-managed or one of the following in accordance with UL 2050:

(1) AO-operated monitoring station.

(2) Government contractor monitoring station (formerly called a proprietary central station).

(3) National industrial monitoring station.

(4) Cleared commercial central station (see NISPOM, Chap. 5).

b) Monitoring station employees shall be eligible to hold a U.S. SECRET clearance.

c) Monitoring station operators shall be trained in system theory and operation to effectively interpret system incidents and take appropriate response action.

d) Records shall be maintained shall be maintained in accordance with Chapter 12 section L.

C. Operations and Maintenance of IDS

1. Alarm Response

a) Alarm activations shall be considered an unauthorized entry until resolved.

b) The response force shall take appropriate steps to safeguard the SCIF, as permitted by a written support agreement, until an SCI-indoctrinated individual arrives to take control of the situation.

c) An SCI indoctrinated individual must arrive in accordance with UL 2050 requirements (60 minutes) or the response time approved by the AO, after receipt of the alarm signal to conduct an internal inspection of the SCIF, attempt to determine the probable cause of the alarm activation, and reset the IDS prior to the departure of the response force.

2. System Maintenance

a) Maintenance and repair personnel shall be escorted if they are not TOP SECRET-cleared and indoctrinated for SCIF access.

b) Repairs shall be initiated by a service technician within 4 hours of the receipt of a trouble signal or a request for service.

c) The SCIF shall be continuously manned by SCI-indoctrinated personnel on a 24-hour basis until repairs are completed or alternate documented procedures approved by the AO are initiated.

d) The following apply to emergency-power battery maintenance:

(1) The battery manufacturer's periodic maintenance schedule and procedures shall be followed and documented in the system's maintenance logs and retained for two years. Batteries should be replaced per manufacture's recommendations or as environmental conditions dictate.

(2) If the communications path is via a network, the local uninterruptible power source for the network shall also be tested.

(3) If a generator is used to provide emergency power, the manufacturers recommended maintenance and testing procedures shall be followed.

e) Network Maintenance

(1) System administrators shall maintain configuration control, ensure the latest operating system security patches have been applied, and configure the operating system to provide a high level of security.

(2) Inside the U.S., network maintenance personnel within a SCIF shall be a U.S. person and be escorted by cleared SCIF individuals.

(3) Outside the U.S., network maintenance personnel shall be U.S. TOP SECRET-cleared or U.S. SECRET-cleared and escorted by SCIF personnel.

D. Installation and Testing of IDS

1. Personnel Requirements

a) Installation and testing within the U.S. shall be performed by U.S. companies using U.S. citizens.

b) Installation and testing outside of the U.S. shall be performed by personnel who are U.S. TOP SECRET-cleared or U.S. SECRET-cleared and escorted by SCIF personnel.

2. Installation Requirements

All system components and elements shall be installed in accordance with requirements of this document, UL 2050, and manufacturer's instructions and standards.

3. Testing

a) Acceptance testing shall be conducted on systems prior to operational use to provide assurance that they meet all requirements of this section prior to SCIF accreditation.

b) Semi-annual IDS testing shall be conducted to ensure continued performance.

c) Records of testing and test performance shall be maintained in accordance with documentation requirements.

d) Motion Detection Sensor Testing

(1) All motion detection sensors shall be tested to ensure activation of the sensor at a minimum of four consecutive steps at a rate of one step per second; that is, 30 inches ± 3 inches or 760 mm ± 80 mm per second. The four-step movement shall constitute a "trial."

(2) The test shall be conducted by taking a four-step trial, stopping for three to five seconds, and taking another four-step trial.

(3) Trials shall be repeated throughout the SCIF and from different directions.

(4) An alarm shall activate at least three out of every four consecutive trials made by moving progressively through the SCIF.

e) HSS Testing

All HSS devices shall be tested to ensure that an alarm signal activates before the non-hinged side of the door opens beyond the thickness of the door from the closed position, e.g., the sensor initiates before the door opens 1¾ inch for a 1¾ inch door.

f) Tamper Testing

(1) Each IDS equipment cover shall be individually removed or opened to ensure there is alarm activation at the PCU or monitoring station in both the secure and access modes.

(2) Tamper detection devices need only be tested when installed.

(3) The AO may require more frequent testing of tamper circuits.

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Chapter 8. Access Control Systems (ACS)

A. SCIF Access Control

1. Guidelines

a) SCIFs shall be controlled by SCI-indoctrinated personnel or by an AO- approved ACS to ensure access is restricted to authorized personnel.

b) Personnel access control shall be utilized at all SCIFs.

c) Visual recognition of persons entering the SCIF by an SCI-indoctrinated person at the entrance to a SCIF is the ideal access control.

d) Entrances where visitor control is conducted shall be under continuous visual observation unless the SCIF is properly secured.

e) When the SCIF is an entire building, access control shall occur at the building perimeter.

2. ACS Requirements if Continuous Visual Observation is Not Possible

a) An automated personnel ACS that verifies an individual's identity before the individual is permitted unescorted access shall be utilized when personal recognition and verification is not used. Automated verification shall employ **two** of the following three technologies:

(1) Identification (ID) badge or card used in conjunction with the access control device that validates the identity of the person to whom the card is issued. Compromised or lost access cards shall be reported immediately and updated in the system to reflect "no access."

(2) A personal identification number (PIN) that is entered into the keypad by each individual. The PIN shall consist of four or more random digits, with no known or logical association to the individual or which can be derived from the person or system generated. Compromised PINs shall be reported immediately to the facility Security Officer (SO) or SCIF SO and updated in the system to reflect "no access."

(3) Biometric personal identity verification using unique personal characteristics such as fingerprint, iris scan, palm print, etc.

b) The automated personnel ACS shall ensure that the probability of an unauthorized individual gaining access is no more than one in ten thousand while the probability of an authorized individual being rejected access is no more than one in one thousand. Manufacturers must certify in writing that their system meets these criteria.

B. ACS Administration

1. ACS administrators shall be SCI-indoctrinated.

2. Remote release buttons that by-pass the ACS shall be inside the SCIF and in a location that provides continuous visual observation of personnel entering the SCIF.

3. ACSs shall not be used to secure an unoccupied SCIF.

4. When not occupied, SCIFs shall be alarmed and in secure mode in accordance with Chapter 7 and secured with an approved GSA FF-L-2740A combination lock.

5. Authorized personnel who permit another individual to enter the SCIF shall verify the individual's authorized access.

6. SCIF access authorization shall be removed when the individual is transferred, terminated, or the access approval is suspended or revoked.

C. ACS Physical Protection

1. Card readers, keypads, communication interface devices, and other access control equipment located outside the SCIF shall be tamper-protected and be securely fastened to a wall or other fixed structure.

2. Electrical components, associated wiring, or mechanical links shall be accessible only from inside the SCIF.

3. System data that is carried on transmission lines (e.g., access authorizations, personal identification, or verification data) to and from equipment located outside the SCIF shall be protected using FIPS AES certified encrypted lines. If this communication technology is not feasible, transmission lines shall be installed as approved by the AO.

4. Equipment containing access-control software programs shall be located in the SCIF or a SECRET controlled area.

5. Electric door strikes installed in conjunction with a personnel ACS shall have a positive engagement and be approved under UL 1034 for burglar resistance.

D. ACS Recordkeeping

1. Records shall reflect the active assignment of ID badge/card, PIN, level of access, entries, and similar system-related information.

2. Records and information concerning encoded ID data, PINs, Authentication data, operating system software, or any other data associated with the personnel ACS shall be secured in an open-storage facility or, when unattended, secured in a GSA-approved container in a closed-storage facility. Access to such data shall be restricted to only SCI-indoctrinated personnel responsible for the access control system.

3. Records of personnel removed from the system shall be retained for two years from the date of removal.

4. Records of security incidents (violations/infractions) regarding ACS shall be retained by the SO for five years from the date of an incident or until investigations of system violations and incidents have been resolved.

E. Using Closed Circuit Television (CCTV) to Supplement ACS

1. CCTV may be used to supplement the monitoring of a SCIF entrance for remote control of the door from within the SCIF. The system shall present no technical security hazard.

2. The remote control device shall be within the interior of the SCIF.

3. The system shall provide a clear view of the SCIF entrance and shall be monitored/operated by SCI-indoctrinated personnel within the SCIF.

4. CCTV communication lines should be located within the SCIF. Communication lines that must run external to the SCIF shall be installed to prevent tampering as approved by the AO.

F. Non-Automated Access Control

1. Non-automated access control devices (mechanical, electric, or electromechanical) may be approved by the AO to control access to SCIFs where the number of personnel that require access is low and there is only one entrance.

2. Combinations shall consist of four (4) or more random digits.

3. The use of pass keys to bypass such devices should be avoided except when local fire/safety codes require them. Any pass keys for such devices must be strictly controlled by SCI-indoctrinated personnel.

4. Mechanical access control devices (e.g., UNICAN, Simplex) shall be installed to prevent manipulation or access to coding mechanisms from outside the door.

5. The following shall apply to electric or electromechanical access control devices:

   a) The control panel or keypad shall be installed in such a manner to preclude unauthorized observation of the combination or the actions of a combination change.

   b) The selection and setting of combinations shall be accomplished by the SO and shall be changed when compromised or deemed necessary by the SO.

   c) The control panel in which the combination and all associated cabling and wiring is set shall be located inside the SCIF and shall have sufficient physical security to deny unauthorized access to its mechanism.

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Chapter 9. Acoustic Protection

A. Overview

1. This establishes DNI guidelines to protect classified conversations from being inadvertently overheard outside a SCIF.

2. This is not intended to protect against deliberate technical interception of audio emanations.

B. Sound Group Ratings

The ability of a SCIF structure to retain sound within the perimeter is rated using a descriptive value, the Sound Transmission Class (STC). To satisfy the normal security standards of SCIFs, the following transmission attenuation groups have been established:

- Sound Group 3 - STC 45 or better. Loud speech from within the SCIF can be faintly heard but not understood outside of the SCIF. Normal speech is unintelligible with the unaided human ear.
- Sound Group 4 - STC 50 or better. Very loud sounds within the SCIF, such as loud singing, brass music, or a radio at full volume, can be heard with the human ear faintly or not at all outside of the SCIF.

C. Acoustic Testing

1. Audio tests shall be conducted to verify standards are met. Tests may be instrumental or non-instrumental as approved by the AO. Test method used shall be detailed in the CSP.

2. Instrumental Acoustic Tests

a) Only those with training on audio testing techniques shall conduct instrumental acoustic tests

b) With all SCIF doors closed, all perimeter walls and openings (e.g., air returns, doors, windows, etc.) shall be tested along multiple points to ensure that either Sound Group 3 or 4 is met.

c) Audio test sources shall have a variable sound level output.

d) The output frequency range shall include normal speech.

e) Test speakers shall be placed six feet from the test wall and 4 feet off the floor.

f) Audio gain of the test source shall produce “loud or very loud speech” as defined by Sound Group 3 and 4 levels respectively.

g) As an alternative, instrumented testing may be performed to Noise Isolation Class (NIC) standards. Results shall comply with NIC 40 for Sound Group 3 and NIC 45 for Sound Group 4.

3. Non-Instrumental Acoustic Tests

All non-instrumental tests shall be approved by the AO.

D. Construction Guidance for Acoustic Protection

1. The SCIF perimeter shall be designed and constructed to meet Sound Group 3 or better standards. (See construction drawings for Wall A, B, or C.)

2. Areas that provide for amplified conversations, such as conference centers, video teleconference (VTC) rooms, or similar areas, shall be designed and constructed to meet Sound Group 4 standards. (See construction drawings for Wall A, B, or C.)

3. Utility (e.g., power, signal, telephone) distribution shall be surface mounted to a sound-treated wall and shall not completely penetrate the sound-engineered structure.

E. Sound Transmission Mitigations

1. Construction of walls as described in Chapter 3 (Wall types A, B and C) or with brick, concrete, or other substantive material and acoustically treating penetrations, walls and doors should provide the necessary acoustic protection for Sound group 3.

2. When Sound Group 3 or 4 cannot be met with normal construction, supplemental mitigations to protect classified discussions from being overheard by unauthorized persons may include but not be limited to the following:

a) Structural enhancements such as the use of high-density building materials (i.e., sound deadening materials) can be used to increase the resistance of the perimeter to vibration at audio frequencies.

b) Facility design can include a perimeter location or stand-off distance which prevents non-SCI-indoctrinated person(s) traversing beyond the point where SCI discussions become susceptible to interception. For example, use of a perimeter fence or protective zone between the SCIF perimeter walls and the closest "listening place" is permitted as an alternative to other sound protection measures.

c) Sound masking devices, in conjunction with an amplifier and speakers or transducers, can be used to generate and distribute vibrations or noise; noise sources may be noise generators, tapes, discs, or digital audio players.

d) Speakers/transducers must produce sound at a higher level than the voice conversations within the SCIF.

e) Speakers/transducers shall be placed close to, or mounted on, any paths that would allow audio to leave the area, including doors, windows, common perimeter walls, vents/ducts, and any other means by which voice can leave the SCIF.

f) Wires and transducers shall, to the greatest extent possible, be located within the perimeter of the SCIF.

g) The sound masking system shall be subject to inspection during TSCM evaluations.

h) If the AO determines risk to be low, a speaker may be installed outside the SCIF door if the following conditions are met:

- The cable exiting the SCIF shall be encased within rigid conduit.
- The sound masking system shall be subject to review during TSCM evaluations.

i) For common walls, the speakers/transducers shall be placed so the sound optimizes the acoustical protection.

j) For doors and windows, the speakers/transducers shall be placed close to the aperture of the window or door and the sound projected in a direction facing away from conversations.

k) Once the speakers or transducers are optimally placed, the system volume shall be set and fixed. The volume level for each speaker shall be determined by listening to conversations outside the SCIF or area to be protected, and the speaker volume adjusted until conversations are unintelligible from outside the SCIF.

l) Sound-source generators shall be permanently installed and not contain an AM/FM receiver and shall be located within the SCIF.

m) Any sound-source generator within the SCIF that is equipped with a capability to record ambient sound shall have that capability disabled.

n) Examples of government-owned or government-sponsored sound-source generators are given below:

- Audio amplifier with a standalone computer (no network connection).
- Audio amplifier with a cassette tape player, compact disc (CD) player, or digital audio player, or with a digital audio tape (DAT) playback unit.
- Integrated amplifier and playback unit incorporating any of the above music sources.
- A noise generator or shift noise source generator using either white or pink noise.

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Chapter 10. Portable Electronic Devices with Recording Capabilities and Embedded Technologies (PEDs/RCET)

A. Approved Use of PEDs/RCET in a SCIF

1. DNI Executive Correspondence, ES 2017-00043, Wireless Technology in the Intelligence Community, should be referred to in all cases dealing with Portable Electronic Devices with Wireless capabilities.

2. Heads of IC elements will institute and maintain mitigation programs (countermeasures) if they allow introduction of PEDs/RCETs with recording capabilities into SCIFs under their cognizance. Such decisions are not reciprocal or applicable to facilities under the cognizance of other heads of IC elements.

3. Medical devices. Approval for medical devices will comply with all applicable laws and oversight policies, including the Rehabilitation Act, and the latest IC medical device approval process. As a minimum, the medical device must be reviewed to determine any technical security issues introduced by the device. Based on the security/technical review, medical devices may be approved by the AO for introduction and use within a SCIF.

4. Recording capabilities and restricted technologies are technologies that introduce vulnerabilities to information and therefore impact SCIF security. These technologies include, but are not limited to, radio frequency transmitters, audio and video recorders, cameras, microphones, data storage devices, computing devices, memory sticks, thumb drives or flash memory and devices with USB connectivity.

5. Any approval for radio frequency transmitters shall require the AO and the Certified TEMPEST Technical Authority (CTTA) collaborate and approve (as required) the introduction and use of PEDs/RCETs into a SCIF where there is a valid mission related requirement.

6. The AO, and when appropriate, the information systems (ISs) authorizing official(s), shall collaborate and approve (as required) the introduction and use of PEDs/RCETs into a SCIF when there is a valid mission related requirement.

7. Outside the U.S., heads of intelligence elements may approve PED/RCET usage by waiver and include the following:

- Defined mission need for PED/RCET usage.
- Defined period of time.
- Statement of residual risk

8. Within the U.S., if the AO determines the risk from PEDs/RCET to SCI under their cognizance is acceptable, taking a PED/RCET into the SCIF may be allowed with the following restrictions:

a) A comprehensive risk assessment addressing each vulnerability, security concern and the component of risk must be completed.

b) Only PEDs/RCET with low risk may be allowed entry to a SCIF.

c) Mitigation shall be applied to PEDs/RCET evaluated to be high and medium risk to reduce the PED/RCET risk to low before the device may be allowed entry.

d) Assessments may result in an AO determination to prohibit specific PEDs/RCET.

B. Prohibitions

1. Personally-owned PEDs/RCETs are prohibited from processing SCI. Connecting personally-owned PEDs/RCETs to an unclassified IS inside SCIFs may only be done when wireless capability is physically disconnected and has the approval of the AO for the IS.

2. Personally-owned PEDs/RCETs are prohibited in SCIFs outside the U.S. If the AO determines that mission requirements dictate a need, government- or contractor-owned PEDs/RCETs may be permitted in a SCIF by specific exception or if the AO determines the risk is low.

3. If a PED/RCET is transported outside the U.S. and left unattended or physical control is lost, that device shall not be reintroduced into a SCIF.

C. PED/RCET Risk Levels

1. General Information

a) Levels of risk are based on the functionality of PEDs/RCET.

b) The AO and appropriate authorizing official for the IS (when a portable IS is involved) will determine risk level and mitigation requirements for devices not addressed.

2. Low-, Medium-, and High-risk PEDs/RCET.

a) Low-risk PEDs/RCET are devices without recording or transmission capabilities and may be allowed into a SCIF by AO without mitigation. Low-risk PEDs/RCET include, but are not limited to, the following:

- Electronic calculators, spell checkers, language translators, etc.
- Receive-only pagers.
- Audio and video playback devices with no storage capability.
- Radios (receive-only).
- Infrared (IR) devices that convey no intelligence data (e.g., text, audio, video, etc.), such as an IR mouse or remote control.

b) Medium-risk PEDs/RCET are devices with built-in features that enable recording or transmitting digital text, digital images/video, or audio data; however, these features can be physically disabled. Medium-risk PEDs/RCET may be allowed in a

SCIF by the AO with appropriate mitigations. Examples of medium-risk PEDs/RCET include, but are not limited to, the following:

- Voice-only cellular telephones.
- Portable ISs, such as personal digital assistants (PDAs), tablet personal computers, etc.
- Devices that may contain or be connected to communications modems
- Devices that have microphones or recording capabilities

c) High-risk PEDs/RCET are those devices with recording and/or transmitting capabilities that require more extensive or technically complex mitigation measures to reduce the inherent risk or those that cannot be sufficiently mitigated with current technology. The AO may approve entry and use of government- and contractor-owned PEDs/RCET for official business provided mitigation measures are in place that reduces the risk to low. Examples include, but are not limited to, the following:

- Electronic devices with RF transmitting (IEEE 802.11, Bluetooth, etc.).
- Photographic, video, and audio recording devices.
- Multi-function cellular telephones.

D. Risk Mitigation

1. Heads of IC elements shall establish risk mitigation programs if high- or medium-risk PEDs/RCET are allowed into SCIFs.

2. Risk mitigation programs shall contain the following elements:

a) Formal approval process for PEDs/RCET.

b) Initial and annual refresher training for those individuals with approval to bring PEDs/RCET into a SCIF.

c) Device mitigation compliance documents listing the specific PEDs/RCET, their permitted use, required mitigations, and residual risk after mitigation.

d) A user agreement that specifies the following:

(1) The USG or a designated representative may seize the PED/RCET for physical and forensic examination at the government's discretion.

(2) The USG and the designated representative are not responsible for any damage or loss to a device or information stored on personally-owned PEDs/RCET resulting from physical or forensic examination.

3. Risk mitigation programs may include the following elements:

a) Registration of PED/RCET serial numbers.

b) PED/RCET security training program.

c) Reporting procedures for loss or suspected tampering.

d) Labeling approved PEDs/RCET for easy identification.

e) Electronic detection equipment to detect transmitters/cell phones.

Chapter 11. Telecommunications Systems

A. Applicability

1. This guidance is compatible with, but may not satisfy, security requirements of other disciplines such as Information Systems Security, Communications Security (COMSEC), Operational Security (OPSEC), or TEMPEST.

2. This section outlines the security requirements that shall be met to ensure the following:

- Protection of information.
- Configuration of unclassified telecommunications systems, devices, features, and software.
- Access control.
- Control of the cable infrastructure.

B. Unclassified Telephone Systems

1. A baseline configuration of all unclassified telephone systems, devices, features, and software shall be established, documented, and included in the SCIF FFC.

2. The AO shall review the telephone system baseline configuration and supporting information to determine if the risk of information loss or exploitation has been suitably mitigated.

3. When security requirements cannot be met, unclassified telephone equipment shall be installed and maintained in non-discussion areas only.

4. When not in use, unclassified telephone systems shall not transmit audio and shall be configured to prevent external control or activation, technical exploitation, or penetration.

5. Unclassified telephone systems shall incorporate physical and software access controls to prevent disclosure or manipulation of system programming and data. The following specific requirements shall be met:

a) On-hook and off-hook audio protection shall be provided by equipment identified by the National Telephone Security Working Group within TSG-6/CNSSI 5006, National Instruction for Approved Telephone Equipment, or an equivalent TSG 2/ CNSSI 5002:

(1) The purpose of a TSG-2 or CNSS 5002 Computerized Telephone Switch (CTS) installation is to prevent manipulation of telephone instruments to obtain audio from within the SCIF while the instrument is in an "on-hook" condition.

(2) When isolation is provided by a CTS installed IAW TSG-2 or CNSS 5002, the AO accepts the risk on-hook audio from the SCIF may be present on all instrument wiring until it reaches the CTS due to instrument configuration, design, or breakdown. *(TSG-2/CNSS 5002 does not address procedures to determine security of the station itself.)*

(3) To provide the necessary level of security, the Physically Protected Space (PPS) where the CTS is installed must meet equivalent security and access control standards as the SCIF it supports to provide positive physical protection for the CTS and all of its parts. *(CNSSI 5002 para 7.A.(1))*. This includes all instruments, cables, lines, intermediate wiring frames, and distributed CTS modules necessary for the functioning of the instruments.

(4) The AO may require all instrument wiring exiting between the SCIF and PPS which is not at the SCIF level be contained in a closed and sealed metal conveyance as defined in Chapter 7.A.2 to ensure physical security of the instrument wiring.

(5) Telephones or instruments not type-accepted will be presumed to have on-hook audio available at the mounting cord until determined otherwise. Determining telephone stations do not have on-hook audio hazards requires a technical investigation and specific equipment. These investigations and determinations may only be conducted by a TSCM team or National Telephone Security Working Group (NTSWG) authorized telephone laboratory.

b) If a Computerized Telephone System (CTS) is selected for isolation, it shall be installed and configured as detailed in TSG 2 with software and hardware configuration control and audit reporting (such as station message detail reporting, call detail reporting, etc.).

c) System programming shall not include the ability to place, or keep, a handset off-hook.

d) Configuration of the system shall ensure that all on-hook and off-hook vulnerabilities are mitigated.

e) When local or remote CTS administration terminals are not contained within a controlled area and safeguarded against unauthorized manipulation, the use of CNSSI 5006 approved telephone instruments shall be required, regardless of the CTS configuration.

f) Speakerphones and audio conferencing systems shall not be used on unclassified telephone systems in SCIFs. Exceptions to this requirement may be approved by the AO when these systems have sufficient audio isolation from other classified discussion areas in the SCIF and procedures are established to prevent inadvertent transmission outside the SCIF.

g) Features used for voice mail or unified messaging services shall be configured to prevent access to remote diagnostic ports, internal dial tone, and dial plans.

h) Telephone answering devices and facsimile machines shall not contain features that introduce security vulnerabilities, e.g., remote room monitoring, remote programming, or other similar features that may permit off-premise access to room audio.

i) All unclassified telephone systems and associated infrastructure shall be physically isolated from classified information and telecommunications systems in accordance with DNI and CNSS TEMPEST guidance.

j) TSG6/CNSSI 5006 approved instruments or compliance with CNSSI 5000 is required for installation in SCIFs for Voice over Internet Protocol (VoIP) systems installed in a SCIF. TSG6/CNSSI 5006 approved instruments must be installed following the manufacturer's requirements. For non-TSG6/CNSSI 5006 approved instruments, the security requirements and installation guidelines contained in the National Telecommunications Security Working Group (NTSWG) publication CNSSI 5000 shall be followed for Voice over Internet Protocol (VoIP) systems installed in a SCIF.

C. Unclassified Information Systems

1. Unclassified information systems shall be safeguarded to prevent hardware or software manipulation that could result in the compromise of data.

2. Information systems equipment with telephonic or audio features shall be protected against remote activation and/or removal of audio (analog or digitized) information.

3. Video cameras used for unclassified video teleconferencing and video recording equipment shall be deactivated and disconnected when not in use.

4. Video devices shall feature a clearly visible indicator to alert SCIF personnel when recording or transmitting.

D. Using Closed Circuit Television (CCTV) to Monitor the SCIF Entry Point(s)

1. CCTV may be used to supplement the monitoring of a SCIF entrance and to record events for investigation.

2. The system shall present no technical security hazard to the SCIF.

3. The system and all components, including communications and control lines, shall be exterior to the SCIF perimeter.

4. The system may provide a clear view of the SCIF entrance but not enable the viewer to observe classified information when the door is open nor external control pads or access control components that would enable them to identify PINs.

E. Unclassified Wireless Network Technology

1. The use of devices or systems utilizing wireless technologies pose a high risk and require approval from the AO, CTTA, and IT systems approving authority prior to introduction into the SCIF.

2. Wireless systems shall meet all TEMPEST and TSCM requirements and shall be weighed against the facilities overall security posture (i.e., facility location, threat, as well as any compensatory countermeasures that create SID) when evaluating these systems.

3. All separation and isolation standards provided in TEMPEST standards are applicable to unclassified wireless systems installed or used in SCIFs.

F. Environmental Infrastructure Systems

1. The FFC shall include information on whether or not environmental infrastructure systems (also referred to as building maintenance systems) are located in the SCIF. Examples include the following:

- Premise management systems
- Environmental control systems
- Lighting and power control units
- Uninterrupted power sources

2. The FFC shall identify all external connections for infrastructure systems that service the SCIF. Examples of the purpose of external connections include the following:

- Remote monitoring
- Access and external control of features and services
- Protection measures taken to prevent malicious activity, intrusion, and exploitation.

G. Emergency Notification Systems

1. The introduction of electronic systems that have components outside the SCIF perimeter is prohibited, with the following exceptions:

a) The system is approved by the AO.

b) The system is required for security purposes.

c) The system is required under life safety regulations.

2. If required, and speakers or other transducers are part of a system that is not wholly contained in the SCIF but are installed in the SCIF for life safety or fire regulations, the system must be protected as follows:

a) All incoming wiring shall breach the SCIF perimeter at one point. TEMPEST or TSCM concerns may require electronic isolation and shall require review and approval by the CTTA.

b) One-way (audio into the SCIF) communication systems shall have a high gain amplifier.

c) Two-way communication systems shall only be approved when absolutely necessary to meet safety/security requirements. They shall be protected so that audio cannot leave the SCIF without the SCIF occupants being alerted when the system is activated.

d) All electronic isolation components shall be installed within the SCIF and as close to the point of SCIF penetration as possible.

H. Systems Access

1. Installation and maintenance of unclassified systems and devices supporting SCIF operations may require physical or remote access. The requirements outlined in this section shall apply to telecommunications devices located within the SCIF or in a controlled area outside the SCIF.

2. Installation and maintenance personnel requiring physical access shall possess the appropriate clearance and access, or will be escorted and monitored at all times within the SCIF by technically knowledgeable, U.S. SCI-indoctrinated personnel.

3. Remote maintenance shall be protected against manipulation or activation.

4. All capabilities for remote maintenance and diagnostic services shall be specified in the FFC.

5. The FFC shall identify all procedures and countermeasures to prevent unauthorized system access, unauthorized system modification, or introduction of unauthorized software.

6. Remote maintenance and diagnosis may be performed from a SCIF or an adjacent controlled area over a protected link in accordance with FIPS AES standards.

7. Telephone systems only may be accessed over an unclassified telephone line as specified in TSG 2 Standard, Section 4.c.

I. Unclassified Cable Control

1. To the extent possible, all telecommunications cabling shall enter the SCIF through a single opening and allow for visual inspection.

2. Cable, either fiber or metallic, shall be accounted for from the point of entry into the SCIF.

   a) The accountability shall identify the precise use of every cable through labeling.

   b) Log entries may also be used.

   c) Designated spare conductors shall be identified, labeled, and bundled together.

3. Unused conductors shall be removed. If removal is not feasible, the metallic conductors shall be stripped, bound together, and grounded at the point of ingress/egress.

4. Unused fiber shall be uncoupled from the interface within the SCIF, capped, and labeled as unused fiber.

J. Protected Distribution Systems

1. Unencrypted communication cables transmitting SCI between accredited SCIFs shall be installed in a Protective Distribution System that complies with standards established in CNSSI 7003, Protected Distribution System.

2. PDS used to protect SCI shall be approved by the CSA AO.

K. References

1. Overview

   a) The NTSWG publishes guidance for the protection of sensitive information and unclassified telecommunications information processing systems and equipment.

   b) NTSWG documents are currently in transition from TSG/NTSWG documents to Committee on National Security Systems (CNSS) publications.

   c) The List of References is provided for use by personnel concerned with telecommunications security.

2. List of References

   a) TSG Standard 1 (Introduction to Telephone Security). Provides telephone security background and approved options for telephone installations in USG sensitive discussion areas.

   b) TSG Standard 2 (TSG Guidelines for Computerized Telephone Systems) and Annexes. Establishes requirements for planning, installing, maintaining, and managing CTS, and provides guidance for personnel involved in writing contracts, inspecting, and providing system administration of CTS.

   c) TSG Standards 3, 4, 5, and CNSSI 5001. Contains design specifications for telecommunication manufacturers and are not necessarily applicable to facility security personnel.

   d) CNSSI 5000. Establishes requirements for planning, installing, maintaining, and managing VoIP systems.

   e) CNSSI 5006. Lists approved equipment which inherently provide on-hook security.

   f) NTSWG Information Series (Computerized Telephone Systems). A Review of Deficiencies, Threats, and Risks, December 1994). Describes deficiencies, threats, and risks associated with using computerized telephone systems.

   g) NTSWG Information Series (Executive Overview, October 1996). Provides the salient points of the TSG standards and presents them in a non-technical format.

   h) NTSWG Information Series (Central Office (CO) Interfaces, November 1997). Provides an understanding of the types of services delivered by the local central office and describes how they are connected to administrative telecommunications systems and devices.

i) NTSWG/NRO Information Series (Everything You Always Wanted to Know about Telephone Security…but were afraid to ask, 2nd Edition, December 1998). Distills the essence of the TSG standards (which contain sound telecommunications practices) and presents them in a readable, non-technical manner.

j) NTSWG/NRO Information Series (Infrastructure Surety Program…securing the last mile, April 1999). Provides an understanding of office automation and infrastructure system protection that contributes to SCIF operation.

k) NTSWG Information Series (Computerized Telephone Systems Security Plan Manual, May 1999). Assists to implement and maintain the "secure" operation of CTSs as used to support SCIF operations. (The term "secure" relates to the safe and risk-free operation, not the use of encryption or a transmission security device.)

l) Director of National Intelligence, Intelligence Community Directive 702, Technical Surveillance Countermeasures.

m) Director of National Intelligence, Intelligence Community Directive 503, Intelligence Community Information Technology Systems Security Risk Management, Certification and Accreditation.

n) SPB Issuance 00-2 (18 January 2000). Infrastructure Surety Program and the Management Assessment Tool.

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Chapter 12. Management and Operations

A. Purpose

To establish safeguards and procedures necessary to prevent the unauthorized disclosure of SCI and other classified national security information in SCIFs. To define administrative processes that shall provide a secure operating environment and enable adequate security oversight, management, and operations of SCIFs.

B. SCIF Repository

1. As required by ICD 705, the DNI shall manage an inventory of information on all SCIFs which shall be reported to the DNI via the SCIF repository not later than 180 days after the effective date of ICD 705 and updated no later than 30 days after changes occur thereafter.

2. Reportable SCIF Administrative Information:

- SCIF ID
- AO ID
- Location of SCIF
  - In U.S.
  - Outside U.S.
  - Under COM
- SCIF Type
  - Closed Storage
  - Open Storage
  - SWA
  - TSWA
  - T-SCIF
- SID
- Initial Accredited Date
- Re-Accreditation Date
- Review date
- Waivers
- Date waiver approved
- Waiver approval authority/ID
- Exceeded standards
- Does not meet standards
- Date waiver expires

C. SCIF Management

1. SO Responsibilities:

   a) The SCIF SO shall be responsible for all aspects of SCIF management and operations to include security policy implementation and oversight.

   b) The SO shall prepare a comprehensive Standard Operating Procedure (SOP) that documents management and operations of the SCIF.

   c) The SO shall review the SOP at least annually and revise it when any aspect of SCIF security changes.

   d) The SO shall issue and control all SCIF keys. Locks shall be changed when a key is lost or is believed to be compromised.

   e) The SO shall conduct annual self-inspections to ensure the continued security of SCIF operations, identify deficiencies, and document corrective actions taken. Inspection results shall be forwarded to the AO and copies retained by the SO until the next inspection.

   f) The SO shall create an emergency plan to be approved by the AO. Plans shall be reviewed and updated annually and all SCIF occupants shall be familiar with the plans. Drills shall be conducted as circumstances warrant, but at least annually. The emergency plan may be an extension of an overall department, agency, or installation plan.

      (1) For SCIFs within the U.S., emergency plans shall address the following:

      - Fire
      - Natural disaster
      - Civil unrest
      - Intrusion detection system failures
      - Admittance of emergency personnel
      - The protection of SCIF occupants and classified information
      - Evacuation requirements and emergency destruction

      (2) For SCIFs outside the U.S., emergency plans shall address all of the above and shall include instructions for the emergency destruction or removal of SCI where political instability, terrorism, host country attitudes, or criminal activity suggest the possibility that a SCIF may be overrun.

   g) The SO shall control passwords to access the maintenance mode of copiers and other office equipment.

   h) The SO shall develop an SOP that addresses actions to be taken when IDS maintenance access is required.

2. Required SCIF Documentation

   a) Copies of all documents relating to SCIF accreditation shall be maintained by the SCIF SO and include, but not limited to, the following:

- SCIF accreditation
- Fixed facility checklist
- Construction security plan
- CTTA evaluation
- IS accreditation
- SOPs
- The results of the final acceptance test of the original system installation and any tests to system modifications made thereafter
- Emergency plan

b) As applicable, the following documents shall be maintained by the SCIF SO:

- TSCM reports
- Co-utilization agreements
- Memoranda of agreement
- Self-inspection reports
- Compartmented area checklist
- Shipboard SCIF checklist
- Aircraft/UAV checklist
- A copy of the CRZH certificate (UL 2050)
- Pre-Construction Checklist Form

D. SOPs

1. A comprehensive SOP that documents management and operations of the SCIF shall be prepared by the SO.

2. The SOP shall be included in the accreditation package and approved by the AO.

3. All individuals assigned to, or having unescorted access to, the SCIF shall be familiar with and adhere to the SOP.

4. All SOP revisions shall be provided to the AO for approval.

5. SOPs shall be tailored to a specific SCIF.

6. SOPs shall include specific areas of security concern as defined by program or mission requirements.

7. The following are examples of subjects that should be addressed in an SOP:

- Self-inspections
- Security incidents and violations
- Alarm systems and response requirements
- Opening and closing procedures
- Access controls
- Visitor access
- Escort procedures
- Equipment maintenance procedures

- Handling, processing, and destruction of classified material
- Badge procedures
- End-of-day security procedures
- Personnel and package inspection procedures
- Secure communications device instructions

E. Changes in Security and Accreditation

1. Changes affecting the security posture of the SCIF shall be immediately reported by the SO to the AO to include any corrective or mitigating actions taken.

2. If an AO determines that SCIF security conditions are unsatisfactory, SCIF accreditation may be suspended or revoked.

   a) All appropriate authorities and SCIF occupants shall be immediately notified and the SCIF closed until deficient conditions are corrected.

   b) All SCI material shall be relocated to another SCIF.

F. General

1. Except for law enforcement officials or other personnel required to be armed in the performance of their duties, firearms and other weapons are prohibited in SCIFs.

2. Photography, video, and audio recording equipment are restricted but may be authorized for official purposes as documented in the SOP.

3. Procedures shall be established to control IT storage media upon entering or exiting a SCIF in accordance with ICD 503 (Intelligence Community Information Technology Systems Security Risk Management, Certification and Accreditation).

4. SCIF perimeter doors shall remain closed and controlled at all times. When a door needs to be open, it shall be continually monitored by an SCI-indoctrinated individual.

5. All SCIF occupants shall be familiar with emergency plans and drills shall be conducted as circumstances warrant, but at least annually.

6. Where the risk of hostile action is significant, SCI materials shall be maintained at an absolute minimum.

G. Inspections/Reviews

1. SCIF inspections shall be performed by the AO, or designee, prior to accreditation.

2. The AO, or designee, shall conduct periodic security inspections/reviews to ensure the efficiency of SCIF operations, identify deficiencies, and document corrective actions taken. All relevant documentation associated with SCIF accreditation, inspections, and security administration may be subject to review.

3. Periodic inspections/reviews shall be conducted based on threat, facility modifications, sensitivity of programs, past security performance, or at least every five years.

4. SOs shall conduct annual self-inspections to ensure the continued security of SCIF operations, identification of deficiencies, and to document corrective actions taken. Inspection results shall be forwarded to the AO and copies retained by the SO until the next inspection.

5. Authorized inspectors shall be admitted to a SCIF without delay or hindrance when inspection personnel are properly certified to have the appropriate level of security clearance and SCI indoctrination for the security level of the SCIF.

6. Short-notice or emergency conditions may warrant entry without regard to the normal SCIF duty hours.

7. Government-owned equipment needed to conduct SCIF inspections will be admitted into the SCIF without delay. Specifically, equipment for TEMPEST or Technical Surveillance Countermeasures (TSCM) testing shall be admitted to a SCIF as long as the personnel operating the equipment are certified to have the appropriate level of security clearance and SCI indoctrination.

8. Technical Surveillance Countermeasures (TSCM) activities in SCIFs will only be conducted by USG TSCM teams established or sponsored by a USG element. USG TSCM teams consist of USG military or civilian personnel or USG contractors who have successfully completed approved TSCM training.

H. Control of Combinations

1. Combinations to locks installed on security containers/safes, perimeter doors, windows, and any other opening should be changed in the following circumstances:

   a) When a combination lock is first installed or used.

   b) When a combination has been subjected, or believed to have been subjected, to compromise.

   c) Whenever a person knowing the combination no longer requires access to it unless other sufficient controls exist to prevent access to the lock.

   d) At other times when considered necessary by the SO.

2. When the lock is taken out of service, it will be reset to 50-25-50.

3. All combinations to the SCIF entrance doors should be stored in a different SCIF. When this is not feasible, alternative arrangements shall be made in coordination with the AO.

I. De-Accreditation Guidelines

SCIF closeouts and de-accreditations shall comply with the following procedures:

1. Inspect all areas, storage containers, and furniture for the presence of classified, sensitive, or proprietary information, and remove any found.

2. Reset safe combinations to 50-25-50 and lock the containers.

3. Affix written certification to all storage containers that the container does not contain classified, sensitive, or proprietary information. The certification shall include the date of inspection and the name and signature of the inspector.

4. Ensure that reproduction and printing equipment is decertified or disposed of in accordance with AO guidance.

5. Dispose of, or relocate, SCI computer equipment, media, hard drives, and portable storage media as approved by the AO.

6. Request revocation of Automated Information Systems (AIS) accreditation.

7. Request revocation of SCIF accreditation.

8. If the SCIF will be used for another mission or project that requires alarms, transfer alarm service to the new activity.

9. If the SCIF will not be used for another mission or project and all classified, sensitive, or proprietary information has been removed, the following shall occur:

   a) Alarm service shall be discontinued.

   b) Combinations on the entrance door and any GSA containers shall be changed to 50-25-50.

   c) All keys shall be accounted for.

J. Visitor Access

1. General Requirements

   a) Visitor logs shall be used to record all SCIF visitors and include the following information:

   - Visitor's full name
   - Organization
   - Citizenship
   - Purpose of the visit

- Point of contact
- Date/time of the visit

b) Government-issued identification shall be required as a means of positive identification.

c) Visitor logs shall be retained for two years after the date of the last entry.

d) Visitor clearance verification shall be accomplished using the DNI Scattered Castles database to the greatest extent possible.

e) Visitors whose clearances have not been verified may be permitted, under escort, entry into the SCIF; however, access to and/or discussion of classified information shall be denied pending clearance verification.

f) Visitors, SCIF occupants, and their possessions may be subject to screening and inspections to deter the unauthorized removal of classified material or the introduction of prohibited items or contraband.

g) Screening and inspection procedures shall be documented and approved by the AO.

2. SCIF Access by Uncleared and Emergency Personnel

a) Uncleared personnel shall be escorted at all times by cleared personnel.

b) The ratio of cleared escorts to uncleared personnel shall be determined on a case-by-case basis by the SO.

c) Prior to assuming escort duties, all escorts shall receive a briefing by the SO or designee outlining their responsibilities.

d) Uncleared personnel shall be kept under observation at all times while in the SCIF. Escorts shall ensure precautions are taken to preclude inadvertent access to classified information.

e) Lights, signs, or other alerting mechanisms or procedures shall be used to alert SCIF occupants of the presence of uncleared personnel.

f) Emergency personnel and equipment shall be allowed access to SCIFs and be escorted to the degree practical. If exposed to classified information, they shall sign an inadvertent disclosure statement when feasible.

K. Maintenance

1. SCI-indoctrinated maintenance personnel shall be used to the extent possible.
2. Procedures for performing maintenance on office equipment, including the use of diagnostic equipment, shall be documented in the SCIF SOP.
3. Computerized diagnostic equipment, to include associated hardware and software, shall be kept under control within a SCIF and shall be managed to prohibit the migration of classified data when connected to classified systems. Procedures shall be documented in the SOP.
4. Passwords to access the maintenance mode of copiers and other office equipment shall be controlled by the SO.
5. Office equipment that is no longer serviceable, such as copiers and classified fax machines, shall be sanitized by having volatile memory erased and non-volatile memory and disk storage removed for terminal destruction.

L. IDS and ACS Documentation Requirements

The following documents and records shall be maintained by the SCIF SO:

1. System Plans such as system design, equipment, and installation documentation.
2. If applicable, agreements established for external monitoring, response, or both, and which shall include the following information:
   - Response time for response forces and SCI indoctrinated personnel.
   - Responsibilities of the response force upon arrival.
   - Maintenance of SCIF points of contact.
   - Length of time response personnel are required to remain on-site.
3. Monitoring Station SOP and/or a copy of the monitoring station UL certificate.
4. Maintenance access SOP.
5. Records, logs, and archives.
6. Records of system testing (for two years) shall include the following information:
   - Testing dates
   - Names of individuals performing the test
   - Specific equipment tested
   - Malfunctions detected
   - Corrective actions taken

7. Records of guard or response force personnel testing as required by the AO.

8. The PCU shall contain a secured, non-volatile event (alarm) log capable of storing at least six months of events, or a printer shall be installed that provides real-time recording of openings, closings, alarms, trouble alarms, and loss of communications.

   a) If the system has no provision for automatic entry into archive, the AO may authorize a manual logging system.

   b) Monitoring personnel shall record the time, source, type of alarm, and action taken.

   c) The SCIF SO shall routinely review the historical records.

   d) Results of investigations and observations by the response force shall also be maintained at the monitoring station.

   e) Records of alarm annunciations shall be retained for two years.

   f) Shunting or masking of any zone or sensor shall be logged in the system archives.

   g) All maintenance periods shall be archived into the system.

   h) An archive shall be maintained for all remote service mode activities.

9. Access Control Systems Records which include:

   a) The active assignment of ID badge/card, PIN, level of access, entries, and similar system-related information

   b) Records of personnel removed from the system which shall be retained for two years from the date of removal.

10. Records of security incidents (violations/infractions) regarding automated systems shall be retained by the SO for five years from the date of an incident or until investigations of system violations and incidents have been resolved.

M. Emergency Plan

1. The SO shall create an emergency plan.

2. The emergency plan shall be approved by the AO and maintained on-site for each accredited SCIF.

3. The emergency plan may be an extension of an overall department, agency, or installation plan.

4. The emergency plan shall address the following:

   - Fire
   - Natural disaster
   - Civil unrest
   - Intrusion detection system failures
   - Admittance of emergency personnel into a SCIF
   - The protection of SCIF occupants and classified information

- Evacuation requirements and emergency destruction

5. Plans shall be reviewed at least annually and updated as necessary.

6. All SCIF occupants shall be familiar with the plans and drills shall be conducted as circumstances warrant, but at least annually.

7. Where political instability, terrorism, host country attitudes, or criminal activity suggests the possibility that a SCIF may be overrun, emergency plans shall include instructions for the secure destruction or removal of SCI under adverse circumstances and include contingencies for loss of electrical power and non-availability of open spaces for burning or chemical decomposition of material.

8. Where the risk of hostile actions are significant, SCI holdings and reference materials shall be maintained at an absolute minimum required for current working purposes. If reference or other material is needed, it shall be obtained from other activities and returned or destroyed when no longer needed.

N. SCIF Co-Use and Joint Use

1. Any SCIF that has been accredited by an AO or designee shall be reciprocally accepted for use as accredited by all IC Elements when there are no waivers to the requirements established in ICS 705-1, ICS 705-2 and the IC Tech Specs.

2. Reciprocity is a condition that occurs when there is a requirement to share an accredited SCIF or a portion thereof with a compartment, program or special activity that is sponsored by an IC Element or organization other than the current SCIF CSA.

3. Reciprocal use requires a Co-Use (or Joint Use) agreement (CUA) which:

   -Identifies responsibilities of the tenant and host

   -Identifies the proposed use/activity

4. All CUA require completion of the SCIF Co-Use Request form.

5. CUA are considered Joint Use when the tenant desires to use the host information system.

6. CUA are routed through and approved by designated Co-Use Coordinators. These are the only individuals another Co-Use Coordinator will accept a CUA form from for processing.

7. The burden to initiate a CUA falls to the tenant. Information accuracy in the request is the responsibility of the tenant/host to facilitate; not the CUA coordinator.

8. CUA are NOT required when sharing a SCIF by two or more components under the cognizance of the same IC Element.

9. CUA are coordinated with the Information System security representatives if the tenant intends to bring an IT system into the host SCIF. Joint Use requires Information System security representative coordination as well.

O. CUA Form and Instructions

1. The following provides a guide on required information to ensure a CUA form is completed sufficiently and can be approved by both the tenant and host Co-Use Coordinators. Information accuracy on the form is the responsibility of the tenant and host mission areas to validate prior to the form being routed to the requesting (tenant) Co-Use Coordinator to initiate the approval process.

2. Overall classification of the CUA will usually be to the host security classification guide, unless the tenant mission is a higher classification.

3. All processing of a CUA should use the current form and be conducted on a classified system. Obtain the current CUA form from your agency Co-Use Coordinator. Legacy forms will not be accepted by the Co-Use Coordinator. Information necessary for a complete form includes:

-Block 1: Host Agency/Department

-Block 2: Tenant Agency/Department POC's (POC's are NOT the CUA Coordinator)

-Block 3: Provide complete and accurate information, to include the complete address and SCIF ID; this is how a coordinator validates information. Ensure the room numbers are accurate. This is important for IS installation. Site POC could be someone from host mission area or SO.

-Block 4: Ensure accuracy; one box must be checked.

-Block 5: Ensure accuracy; this is how a coordinator validates information.

-Block 6: This is the Host Information Security POC. Ensure the Co-Use or Joint Use categories and use criteria is accurate and clarified with Tenant/Host before the form is filled out.

-Block 7: Ensure all required information is filled out for an Industry site. Most Government locations are "Indefinite", however IC Elements AO or Designee may have designated time limits.

-Block 8: Most instances are "Intel Related". If you check "Other" ensure that a full and thorough description is provided in Block 9.

-Block 9: Ensure any information is clarified and input here; don't use for "filler". Classify as needed and portion mark properly.

-Tenant/Host Concur Blocks: Do NOT digitally sign; these are for CUA Coordinator use.

-Classification Block: Ensure the document is classified properly and this block is filled out properly; most likely to the Host classification guides.

P. CUA Cancellation

1. When a CUA is no longer desired or necessary a CUA cancellation form is required.

2. The burden to initiate the CUA cancellation form falls to the tenant.

3. The following provides a guide on required information to ensure a CUA cancellation form is completed sufficiently.

-Block 1: Host Agency/Department

-Block 2: Tenant Agency/Department POC's (POC's are NOT the CUA Coordinator)

-Block 3: Provide complete and accurate information, to include the complete address of the facility hosting the CUA/JUA

-Block 4: Ensure the SCIF ID is accurate.

-Block 5: Ensure the room numbers are accurate. This is important for IS removal (if applicable).

-Block 6: Ensure any pertinent information is clarified and input here.

-Tenant CUA Coordinator will digitally sign and date

-Classification Block: Ensure the document is classified properly and this block is filled out properly.

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Chapter 13. Second Party Integree and Second Party Liaison Spaces within U.S. Sensitive Compartmented Information Facilities (SCIF)

A. Applicability:

1. This chapter applies only to U.S. SCIFs where Sensitive Compartmented Information (SCI) -indoctrinated Second Party Integree (2PI) officers or SCI-indoctrinated Second Party Liaison (2PL) officers are permitted access or are assigned workspaces in accordance with authorized U.S. and Second Party agreements.

2. This chapter does not apply to foreign officers other than Second Parties, defined below.

3. The mitigations listed in this chapter shall be coordinated with the other SCIF tenants, as applicable.

B. Definitions:

1. Second Party (also known as Five Eyes): Australia, Canada, New Zealand, and the United Kingdom.

2. Second Party Integree (2PI): A Second Party citizen who is employed by a Second Party government who works in support of a United States Government (USG) objective at a USG organization, under the supervision and direction of USG personnel within a USG facility with a co-utilization agreement, or

- A Second Party citizen who works under a USG contract, in support of a USG objective at a USG organization, under the supervision and direction of USG personnel within a USG facility or Second Party facility with a co-utilization agreement.

3. Second Party Liaison (2PL): A Second Party citizen who is employed by, works in support of a mission of, represents the equities of, and works under the supervision of their government or other foreign entity rather than the USG. These individuals act as immediate points of contact for

official interaction between their government or foreign entity and the USG organization to which they are assigned.

4. Unescorted: An individual unaccompanied or unattended in a space, or otherwise without line of sight observation by a SCI-indoctrinated U.S. person.

5. Non-releasable Information: Includes, but not limited to, all No Foreign National (NOFORN), For Official Use Only (FOUO), or any other program information that is not releasable to foreign nationals.

C. General Guidelines:

1. This chapter establishes procedures for implementing mitigations for the assignment of 2PI and 2PL officers within, or granting of access by 2PI and 2PL officer to IC accredited SCIFs.

2. 2PI and 2PL officers may be given unescorted access, with AO approval, to U.S. SCIFs that contain only information and information systems (IS) that is releasable to them without any additional mitigations.

3. IC elements must adhere to all policy standards and guidance noted below before permitting 2PI and 2PL access or assignment to U.S. SCIFs:

- Intelligence Community Directive (ICD) 704, *Personnel Security Standards and Procedures for Access to SCI*
- Intelligence Community Standard (ICS) 704-02, *Waiver Requests for Access to SCI*
- ICS 503-04, *Managing Non-U.S. Personnel Access to Information Systems*
- ICD 705, *Sensitive Compartmented Information Facilities*
- ICS 705-01, *Physical and Technical Security Standards for Sensitive Compartmented Information Facilities*
- ICS 705-02, *Standards for Accreditation and Reciprocal Use of SCIFs*

- ICD/ICS 705, *Technical Specifications for Construction and Management of SCIFs*

- ES-2016-00816, *Second Party Integree Access to the Intelligence Community (IC) Information Environment*. This chapter establishes procedures for implementing mitigations for the assignment of 2PI and 2PL officers within IC-accredited SCIFs.

At a minimum, and prior to placement, the U.S. host organization will ensure:

a. All 2PI and 2PL officers assigned to U.S. SCIFs have the appropriate security clearance equivalent to Top Secret (TS)/SI/TK
b. Agreements, through which the officer has been authorized, have been executed
c. All necessary approvals, as specified in paragraph D.1, have been received, and mitigations as specified in paragraph D.2 have been implemented

4. All requirements established in ICS 503-04, *Managing Non-U.S. Personnel Access to Information Systems* will be implemented and adhered to. This applies to all U.S. or partnership IS that store, process, or transmit U.S. intelligence information, as defined in ICS 503-04.

5. Every effort will be made to place 2PI officers outside of U.S. SCIF space where non-releasable information or IS is processed, stored, or located.

6. 2PL officers shall not be placed in or given unescorted access to U.S. SCIF space where non-releasable information or IS is processed, stored, or located.

7. 2PI or 2PL officers shall not be placed in or given unescorted access to a U.S. SCIF that also contains open storage of Special Access Program information.

8. 2PI officers shall not be given unescorted access to U.S. SCIFs or SCIF areas in which they do not have assigned workspaces unless that SCIF or SCIF area is the most direct walk-path to their assigned workspace. If the most direct walk-path must transverse these areas, all standards, mitigations, and outlined requirements within this chapter also are extended to any hallways or open SCIF cubicle/work areas that the 2PI must traverse to reach their assigned work location.

9. Intent to permit access, or assign approved 2PI or 2PL officers within an existing accredited U.S. SCIF shall be immediately reported by the Security Officer or Mission Owner to the Accrediting Official (AO), to include any mitigating actions for AO and Authorizing Official, for approval. Chief Information Security Officer (CISO) consultation is recommended. The host agency AO shall notify all co-use tenants in writing at least 30 days prior to the assignment of 2PI or 2PL personnel to the SCIF and provide a list of mitigations that will be implemented to prevent access to non-releasable information for the duration of the 2PI or 2PL's assignment. Co-use tenants are responsible for any additional mitigations above and beyond those mitigations in place or recommended that are particular to the protection of their information. The additional mitigations will be adhered to by any other tenants and by the host if they require access to the tenant's information. 2PI or 2PL officer assignment to the specific SCIF will be annotated in the IC SCIF Repository.

10. If an AO determines that required SCIF security mitigations, as specified in paragraph D.1 and D.2 have not been met or if 2PI or 2PL officers are placed or provided access without the necessary approvals, immediate corrective action is required and may include: exclusion of 2PI or 2PL officers from general or unescorted access to the space; suspension or revocation of SCIF accreditation; removal of all non-releasable information and IS, or; other action as determined by the AO.

11. IC Elements must implement the AO-approved mitigations listed herein within 45 days of issuance of this chapter. SCIF AOs may provide an extension for SCIFs already accredited to allow elements additional time to

implement the listed mitigations. The additional timeline will be determined by the AO.

D. Approvals, Mitigations, and Procedures

This section provides guidance on procedures and mitigations to support placement of TS/SI/TK or equivalent cleared 2PI officers within U.S. SCIFs where non-releasable information or IS are processed, stored, or located.

1. Approvals:

   a. AO approval is required when some or all the mitigations outlined in section D.2.a. are implemented. If mitigations other than those listed in section D.2.a. are implemented or changed, approval by the host IC element head or their designee, and notification to any affected tenants or agencies with co-use agreements is required. Any alternate mitigations must meet the requirement of ICD 705 that SCI be protected from unauthorized disclosure, which includes the unauthorized disclosure of non-releasable information to 2PI officers.

   b. All applicable authorizing officials (e.g., AO and CISO) for non-releasable IS must determine their risk tolerance based on the implemented mitigations. If the SCIF is co-use by other tenants, the authorizing officials from those other agencies also must review the mitigations and determine risk tolerance.

Note: In accordance with ICD 705, waivers must be approved by the IC element head. When approving assignment of 2PI officers within SCIFs the IC element head may only approve waivers and accept risk as it relates to the SCI information processed and IS for which their IC element is responsible. In accredited SCIFs where 2PI have been granted physical access to the space, and where SCI information is processed or IS that belong to more than one IC element are present, all affected elements **must be informed of any waivers**, and decide to accept the risk, remove their systems, or implement additional mitigations as necessary.

In addition, each 2PI or 2PL shall be assigned a Control Officer (CO)/Mission Sponsor (MS) who is responsible for ensuring the 2PI or 2PL does not receive access to any information not authorized as outlined in the Designated Disclosure Letter by the IC element's International Program Office or equivalent. AOs are responsible for documenting 2PI and 2PL and CO/MS assignments and ensuring that the documentation is accessible to all tenants within the SCIF.

2. Mitigations:

a. The AO shall minimize access to non-releasable information by implementing the following mitigations (if applicable):

- Segregating 2PI-releasable and non-releasable areas of the SCIF to the greatest extent practical
- Using access control systems to restrict 2PI access to only those SCIF areas to which they are assigned and/or must traverse on the most direct walk-path to their assigned workspace consistent with their agreements
- Using partitions and/or signs to designate SCIF locations where 2PI officers are assigned or traverse
- Using partitions and signs, or colored tape on the floor to designate U.S.-only areas
- Locking computer screen(s) (throughout the day) or logging out of system(s) (at end of day) and conducting security check of area before departing
- Implementing security education and awareness program(s) with annual refresher training for SCIF occupants

b. Minimize the likelihood of accidental visibility by implementing the following:

- Using polarizing privacy screens
- Positioning computer screens aimed away from doorway, cubicle openings, walk paths, and common spaces

- Positioning non-releasable information or IS away from doorways, cubicle openings, walk-paths, and common spaces, and co-locating non-releasable information or IS with other like compartmented non-releasable or IS
- Using cover sheets for classified information at all times
- Ensuring that all classified information printing/reproduction equipment that processes non-releasable information uses identity verification (e.g., pin to print)
- Implementing clean desk policies and securing non-releasable information when not in use
- Ensuring that discussion of non-releasable information does not takes place in areas where 2PI are assigned or traverse, and placing "no-discussion" signs in prominent places on the walls
- Ensuring equipment with Top Secret video/teleconference capability is located in an authorized space which meets STC 50 (in accordance with ICD/ICS 705, *Technical Specifications for Construction and Management of SCIFs)*, and uses a mitigation to preclude unauthorized use by 2PI personnel (e.g., PIN-enabled)

c. All attempts should be made to separate 2PI office space from U.S. office spaces. To prevent inadvertent disclosure, sound masking devices or sound batting shall be installed between the offices and above false ceilings (in accordance with Chapter 9E). Additionally, office doors shall be closed when discussing non-releasable information if FVEY personnel are present or have access to the area, and speaker phones located in non-enclosed areas shall be disabled.

3. <u>Procedures</u>**:**

a. If appropriate mitigations are implemented and approvals obtained as described in this chapter, the AO may approve:

1) Assigned SCI-indoctrinated 2PI officers to move unescorted to/from their assigned space(s) via designated walk-paths when properly cleared U.S. personnel are present within the workspace.

2) Assigned SCI-indoctrinated 2PI officers to escort SCI-indoctrinated visitors to/from the 2PI assigned work areas only when U.S. SCI-indoctrinated personnel are present in the workspace.

3) Assigned SCI-indoctrinated 2PI officers to escort 2P visitors, who are either uncleared or whose 2P clearance has not been verified, to/from the 2PI officer's assigned work areas only if all of the following are met:

- U.S. SCI-indoctrinated personnel are present in the workspace
- All inhabitants are made aware of visitor presence via auditory or visual means
- The visit duration is limited to one day, unless approved for longer period, at which time the visit shall be revalidated

b. The AO may authorize an SCI-indoctrinated assigned 2PI person to have lock combinations and/or intrusion detection system (IDS) arming/disarming codes of a U.S. SCIF perimeter door only when:

1) There is a validated mission requirement

2) All information and IS processed, stored, or located within the SCIF space are FVEY-releasable, or non-releasable information is stored in a GSA-approved security container when there are not SCI-indoctrinated U.S. personnel present in the workspace

3) All SCIF organizational tenants and agencies with co-utilization agreements with this or any adjacent SCIF have been notified in writing of the 2PI integration and been provided an opportunity to raise concerns.

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UFC 4-010-05
1 February 2013
Change 1, 1 October 2013

UNIFIED FACILITIES CRITERIA (UFC)

SENSITIVE COMPARTMENTED INFORMATION FACILITIES PLANNING, DESIGN, AND CONSTRUCTION

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APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

UFC 4-010-05
1 February 2013
Change 1, 1 October 2013

UNIFIED FACILITIES CRITERIA (UFC)

SENSITIVE COMPARTMENTED INFORMATION FACILITIES PLANNING, DESIGN, AND CONSTRUCTION

U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEER CENTER

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	**Date**	**Location**
1	1 Oct 2013	Added paragraphs 3-5.6.4, 3-5.6.1 and 3-5.14 Added Figure 3-3 Modified paragraphs 1-4, 1-12, 1-13, 3-5.4.5, 3-5.6, 3-5.6.4, 3-5.6.5.1, 3-5.6.10, 3-5.7, 3-5.7.1, 3-5.8.1, 3-5.8.2, 3-5.8.3, 3-5.9, 3-5.9.1, 3-5.10, 3-5.12.1, 3-5.12.3, 3-5.12.3.2 3-5.12.3.3, and 3-5.13 Modified Figure 3-10 Modified References

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD (AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the most stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request. The form is also accessible from the Internet sites listed below.

UFC are effective upon issuance and are distributed only in electronic media from the following source:

- Whole Building Design Guide web site http://dod.wbdg.org/.

Refer to UFC 1-200-01, *General Building Requirements*, for implementation of new issuances on projects.

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UNIFIED FACILITIES CRITERIA (UFC) REVISION DOCUMENT SUMMARY SHEET

Document: UFC 4-010-05, *Sensitive Compartmented Information Facilities Planning, Design, and Construction, with Change 1*

Superseding: UFC 4-010-05, *Sensitive Compartmented Information Facilities Planning, Design, and Construction*

Description: This change includes updates due to DoDM 5105.21, IC Tech Spec-for ICD/ICS 705 and added clarification on TEMPEST mitigation.

Reasons for Document:

Director of National intelligence issued policy for the planning, design, and construction of SCIF. There was no UFC document that prescribed facility criteria for SCIF. This UFC provides unified criteria for the planning, design, and construction of Sensitive Compartmented Information Facilities (SCIF).

- This document is one of a series of security engineering criteria documents covering physical countermeasures for the current threat environment.
- The design of physical security measures is a specialized technical area that does not fall in the normal skill record and resume of commanders, architects, engineers, and project managers. This document provides guidance to those parties tasked with implementing existing and emerging physical protection system requirements for SCIF.
- This document provides a unified approach for physical security measures for SCIF.

Impact:

- Implementation of Director of National Intelligence (DNI) policy for SCIF may have significant cost impacts for SCIF constructed overseas. This is primarily due to the security requirements for personnel and companies designing and constructing SCIF outside the United States and the access control measures that may have to be implemented during construction.

Unification Issues

There are no unification issues

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FIGURES

TABLES

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CHAPTER 1 INTRODUCTION

1-1 BACKGROUND.

Sensitive Compartmented Information (SCI) is classified Confidential, Secret or Top Secret information that is derived from intelligence sources, methods or analytical processes which is required to be handled within formal control systems established by the Director of National Intelligence. Sensitive Compartmented Information (SCI) can only be handled, processed, discussed, or stored in an accredited Sensitive Compartmented Information Facilities (SCIF).

Sensitive Compartmented Information Facilities (SCIF) are accredited areas, room(s) or building(s) where Sensitive Compartmented Information (SCI), is stored, used, processed or discussed. SCIF are only required for SCI and not necessarily required for Secret or Top Secret information. When required, SCIF provide an operational capability that is critical to the supported command's mission.

1-2 PURPOSE.

Intelligence Community Directive (ICD) 705 established that all Intelligence Community (IC) SCIF comply with uniform IC physical and technical security requirements. Intelligence Community Standard (ICS) 705-1 and the IC Tech Spec-for ICD/ICS 705 provide the physical and technical security standards for all SCIF including existing and new construction, and renovation projects. This UFC is intended to make planning, design and construction communities aware of the published policy and ensure timely and appropriate implementation.

1-3 APPLICABILITY.

This document provides planning and design criteria for DoD components and participating organizations. This document applies to all construction, renovation, and repair projects for SCIF.

1-4 REFERENCES.

Appendix A contains a list of references used in this document. The publication date of the code or standard is not included in this document. \1\ The most recent edition of referenced publications applies, unless otherwise specified. /1/

1-5 GLOSSARY.

Appendix B contains acronyms, abbreviations, and terms.

1-6 POLICY.

Director of Central Intelligence Directive (DCID) No. 6/9 was rescinded by the issuance of ICD 705 by the Director of National Intelligence. ICD 705 replaces DCID No. 6/9 and all its annexes as the policy for SCIF. ICS 705-1 was issued by the Director of National

Intelligence (DNI) on 17 September 2010. ICS 705-1 and the IC Tech Spec-for ICD/ICS 705 provide the standards for the physical and technical security standards that apply to a SCIF, including existing, new construction, and renovation of SCIF. Refer to ICD 705, ICS 705-1, and IC Tech Spec-for ICD/ICS 705 for more information.

DoDM 5200.01 is the primary document associated with SCIF administration. The manual is composed of several volumes, each having its own purpose. It assigns responsibilities and prescribes procedures for the implementation of Director of Central Intelligence and Director of National Intelligence (DNI) policies for SCI.

1-7 IMPLEMENTATION.

Intelligence Community (IC) elements shall fully implement ICS 705-1 and IC Tech Spec-for ICD/ICS 705 within 180 days of signing. ICS 705-1 was signed on 17 Sep 2010 and IC Tech Spec-for ICD/ICS 705 was signed on 5 May 2011. Facilities under construction or renovation as of the effective date of ICS 705-1 shall be required to meet these standards or request a waiver to the standards. The Accrediting Official (AO) is responsible to request waiver approval.

Each SCIF must be planned, programmed, designed, and constructed on a project by project basis. Work closely with the supported command, designated Site Security Manager (SSM), and the Certified TEMPEST Technical Authority (CTTA) to determine the requirements for each SCIF.

1-8 GENERAL BUILDING REQUIREMENTS.

UFC 1-200-01, "General Building Requirements", provides applicability of model building codes and government-unique criteria for typical design disciplines and building systems, as well as for accessibility, antiterrorism, security, sustainability, and safety. Use this UFC in addition to UFC 1-200-01 and the UFCs and government criteria referenced therein.

1-9 RISK MANAGEMENT.

Per ICS 705-1, the AO must ensure the application of analytical risk management in the SCIF planning, design and construction. Analytical risk management is the process of assessing threats against vulnerabilities and implementing security enhancements to protect assets at an acceptable level of risk, and within acceptable cost.

The CTTA will use a risk based approach outlined in CNSSI No. 7000 to determine applicable countermeasures for each SCIF. Supported command will provide the CTTA with a completed DNI TEMPEST Checklist for review. The TEMPEST Checklist is included in the IC Tech Spec-for ICD/ICS 705. Project Managers may need to provide site plans and building floor plans to assist CTTA in the determination of TEMPEST countermeasures.

1-9.1 Department of State (DoS) Security Environment Threat List (SETL).

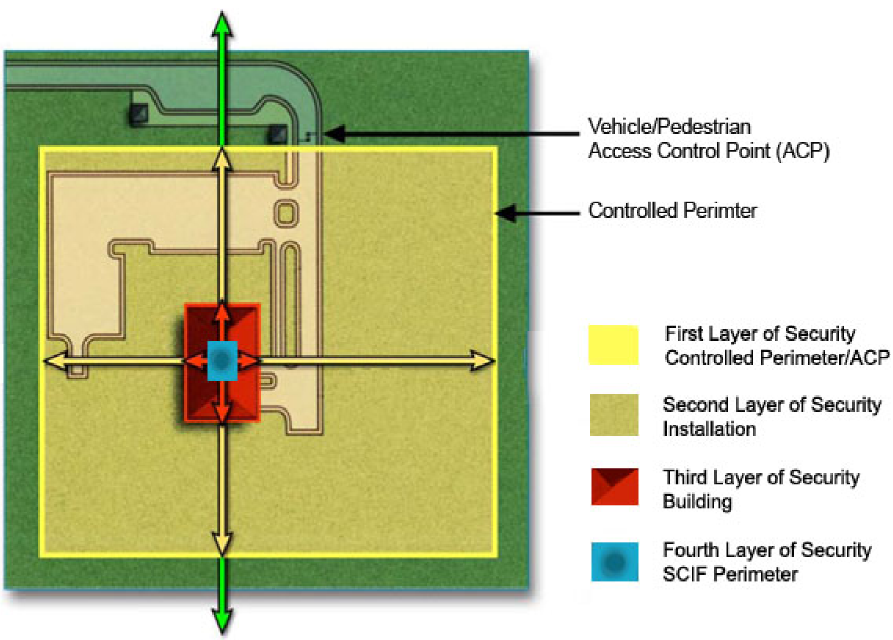
The SETL and its contents are classified information. The SETL reflects four categories of security threats for overseas locations. The AO will utilize the SETL category to determine security requirements for locations outside the United States.

1-9.2 Security in Depth (SID).

SID is desired for all SCIF and required for all SCIF located outside the United States. SID is a multilayered approach, which effectively employs human and other physical security measures throughout the installation or facility to create a layered defense against potential threats. The intent of SID is to increase the possibility of detection of potential aggressors prior to compromising the SCI. The AO will assess the layers of security measures in place to determine if any security enhancements are required. The primary means to achieve SID include:

- Located on a Military installation or compound with a dedicated response force of U.S. citizens or U.S. persons.
- Located within a building or fenced compound that employs access control.
- Office areas adjacent to or surrounding the SCIF are controlled and are protected by alarm.

Figure 1-1 Security-in-Depth



1-10 SCIF CLASSIFICATIONS.

SCIF are classified based on operational requirements. Per ICS 705-1, there are six SCIF classifications.

1-10.1 Secure Working Area (SWA).

Area where SCI is handled, discussed, and/or processed but not stored.

1-10.2 Temporary Secure Working Area (TSWA).

Secure working area is SCIF that is used less than 40 hours per month.

1-10.3 Temporary SCIF.

SCIF established for a limited time to meet tactical, emergency, or immediate operational requirements.

1-10.4 Closed Storage.

SCIF where SCI material is stored in GSA approved storage containers when not in use. This includes documents, computer hard drives, and storage media.

1-10.5 Open Storage.

SCIF in which SCI may be openly stored or processed.

1-10.6 Continuous Operation.

SCIF which is staffed and operated 24/7

1-11 SCIF SECURITY REQUIREMENTS.

ICS 705-1 and IC Tech Spec-for ICD/ICS 705 provide the minimum and enhanced security requirements. The minimum security requirements for a SCIF are based on classification and location. To implement security enhancements above the minimum, the AO must evaluate the threat, SID and balance the enhancements with risk at acceptable cost.

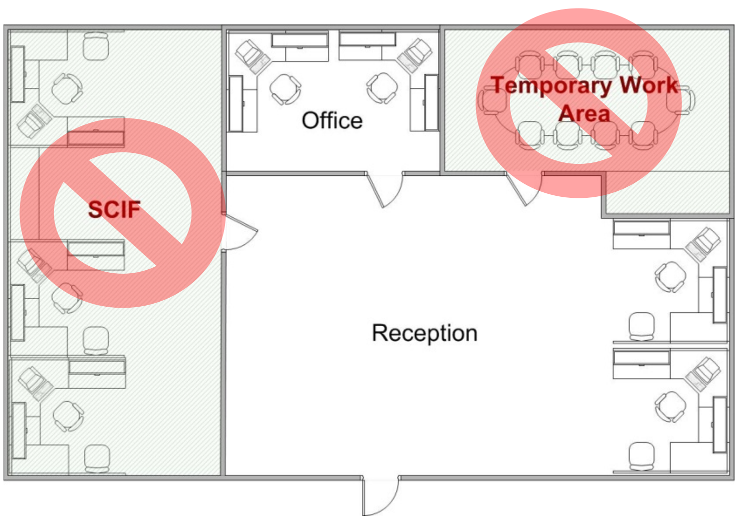
1-12 CONSTRUCTION SECURITY PLAN (CSP).

Per ICS 705-1, a Construction Security Plan (CSP) shall be developed by the SSM and approved by the AO to address the application of security to the SCIF planning, design, and construction. \1\ /1/

1-13 INFORMATION SECURITY.

Per ICS 705-1, construction plans and all related documents shall be handled and protected in accordance with the CSP. If classification guides dictate, plans and related documents may require classification. DoDM 5105.21 Vol 2 states the facility's location (complete address) and identity as a SCIF shall be protected at a minimum of FOR OFFICIAL USE ONLY (FOUO). Drawings or diagrams identified as a SCIF may not be posted on an UNCLASSIFIED website or transmitted over the Internet without some type of encryption. Therefore, do not identify SCIF locations on planning or construction documents; see Figure 1-2. With SSM's approval, areas may be identified as "Secure Area" or "Controlled Area". Under no circumstances shall plans or diagrams that are identified for SCI be sent or posted on unprotected information technology systems or Internet venue without encryption. Refer to DoDM 5200.01 \1\ /1/ and the Service's related policy documents for guidance on the handling of classified information.

Figure 1-2 SCIF Drawings



1-14 SCIF DESIGN SECURITY.

Per ICS 705-1, design of SCIF shall be performed by U.S. companies using U.S. citizens or U.S. persons. AO shall ensure mitigations are implemented when using non-U.S. citizens and these mitigations shall be documented in the CSP.

U.S. Person is defined as an individual who has been lawfully admitted for permanent residence as defined in 8 U.S.C. 1101(a)(20) or who is a protected individual as defined by Title 8 U.S.C. 1324b (a)(3), and able to provide two forms of identification listed on Department of Homeland Security Form I-9, Employment Eligibility Verification.

1-15 SCIF CONSTRUCTION SECURITY.

Per ICS 705-1, construction security requirements are documented in the CSP. Depending on the location of the SCIF, the AO may impose procedures for the procurement, shipping, and storing of construction materials at the site. These procedures must be documented in the CSP.

1-15.1 SCIF Within the United States.

General construction of SCIF shall be performed by U.S. companies using U.S. citizens or U.S. persons. The AO shall ensure mitigations are implemented when using non-U.S. citizens. These mitigations shall be documented in the CSP.

Intrusion Detection System (IDS) installation and testing shall be performed by U.S. companies using U.S. citizens.

1-15.2 SCIF Outside the United States.

General SCIF construction shall be performed using U.S. companies using U.S. citizens.

- On military facilities, the AO may authorize foreign national citizens or companies to perform general construction of SCIF. In this situation, the SSM shall prescribe, with AO approval, mitigating strategies. These mitigations shall be documented in the CSP.
- U.S. Top Secret-cleared personnel shall perform finish work in Category I and II countries. U.S. Secret-cleared personnel shall perform finish work in Category III countries. Finish work includes closing up wall structures; installing, floating, taping and sealing wallboards; installing trim, chair rail, molding, and floorboards; painting, etc.
- Intrusion Detection System (IDS) installation and testing shall be performed by personnel who are U.S. TOP SECRET-cleared or U.S. SECRET-cleared and escorted by SCIF personnel.

1-16 SCIF ACCREDITATION.

A letter of accreditation is a formal statement on behalf of the IC element head that a facility has been designed, constructed, inspected, and certified for the protection of all Sensitive Compartmented Information (SCI) compartments, programs or special activities in accordance with the provisions of ICD 705. Refer to ISC 705-2 for the policy on SCIF accreditation.

1-16.1 Accreditation Process.

SCIF inspections and evaluations shall be performed by the AO, or designee, prior to initial accreditation. The accreditation process shall include a review of documents relating to SCIF design, construction, and operations. The SSM shall be responsible for assembling and submitting documents for AO approval. Documents shall include, but not be limited to:

- Fixed Facility Checklist
- Standard Operating Procedures
- Emergency Plans
- Construction Security Plan
- TEMPEST countermeasures evaluation from CTTA
- Waiver request packages and supporting documentation, if applicable.

1-16.2 Fixed Facility Checklist (FFC).

The FFC is a standardized document used in the process of accrediting a SCIF. It documents physical, technical, and procedural security information for obtaining an initial or subsequent accreditation.

To support the accreditation process, Designers of Record, Project Managers, and Construction mangers shall provide the AO/SSM site plans, building floorplans, IDS plans, and information related to perimeter and compartment area wall construction, doors, locks, deadbolts, IDS, telecommunication systems, acoustical protection, and TEMPEST countermeasure. See chapter 4 for additional information.

1-16.3 TEMPEST Review.

A TEMPEST review and evaluation shall be included in the accreditation documentation. TEMPEST review and verification of countermeasures by the appropriate Certified Technical TEMPEST Authority (CTTA) is a part of the accreditation process.

1-17 HISTORIC PRESERVATION COMPLIANCE.

1-17.1 Security and Stewardship.

The Department of Defense remains the lead federal agency in balancing security threats with the protection of historic properties. The Department of Defense abides by federal legislation on protecting cultural resources, and issues its own complementary policies for stewardship.

1-17.2 Compliance with Laws.

Implementation of ICD 705 will not supersede DoD’s obligation to comply with federal laws regarding cultural resources to include the National Historic Preservation Act and the Archaeological Resources Protection Act. Installation personnel need to determine possible adverse effects upon an historic structure and/or archaeological resource during project development and consult accordingly. Personnel at installations outside the United States should coordinate with the applicable host nation regarding possible adverse effects to cultural resources.

1-17.3 Compliance with DoD Standards.

Conversely, historic preservation compliance does not negate the requirement to implement Department of Defense policy. Federal agencies are always the decision-maker in the Section 106 process of the National Historic Preservation Act. An agency should not allow for prolonged consultations that conflict with the eminent need to implement security requirements. Preservation issues need to be quickly and effectively resolved.

1-18 SECURITY ENGINEERING UFC SERIES.

This UFC is one of a series of security engineering unified facilities criteria documents that cover minimum standards, planning, preliminary design, and detailed design for security and antiterrorism. The manuals in this series are designed to be used sequentially by a diverse audience to facilitate development of projects throughout the design cycle. The manuals in this series include the following:

1-18.1 DoD Minimum Antiterrorism Standards for Buildings.

This UFC 4-010-01 and 4-010-02 establish standards that provide minimum levels of protection against terrorist attacks for the occupants of all DoD inhabited buildings. These UFCs are intended to be used by security and antiterrorism personnel and design teams to identify the minimum requirements that must be incorporated into the design of all new construction and major renovations of inhabited DoD buildings. They also include recommendations that should be, but are not required to be incorporated into all such buildings.

1-18.2 DoD Security Engineering Facilities Planning Manual.

UFC 4-020-01 presents processes for developing the design criteria necessary to incorporate security and antiterrorism into DoD facilities and for identifying the cost implications of applying those design criteria. Those design criteria may be limited to the requirements of the minimum standards, or they may include protection of assets other than those addressed in the minimum standards (people), aggressor tactics that are not addressed in the minimum standards or levels of protection beyond those required by the minimum standards. The cost implications for security and antiterrorism are addressed as cost increases over conventional construction for common construction types. The changes in construction represented by those cost increases are tabulated for reference, but they represent only representative construction that will meet the requirements of the design criteria. The manual also addresses the tradeoffs between cost and risk. The Security Engineering Facilities Planning Manual is intended to be used by planners as well as security and antiterrorism personnel with support from planning team members.

1-18.3 DoD Security Engineering Facilities Design Manual.

UFC 4-020-02 provides interdisciplinary design guidance for developing preliminary systems of protective measures to implement the design criteria established using UFC 4-020-01. Those protective measures include building and site elements, equipment, and the supporting manpower and procedures necessary to make them all work as a system. The information in UFC 4-020-02 is in sufficient detail to support concept level project development, and as such can provide a good basis for a more detailed design. The manual also provides a process for assessing the impact of protective measures on risk. The primary audience for the Security Engineering Design Manual is the design team, but it can also be used by security and antiterrorism personnel.

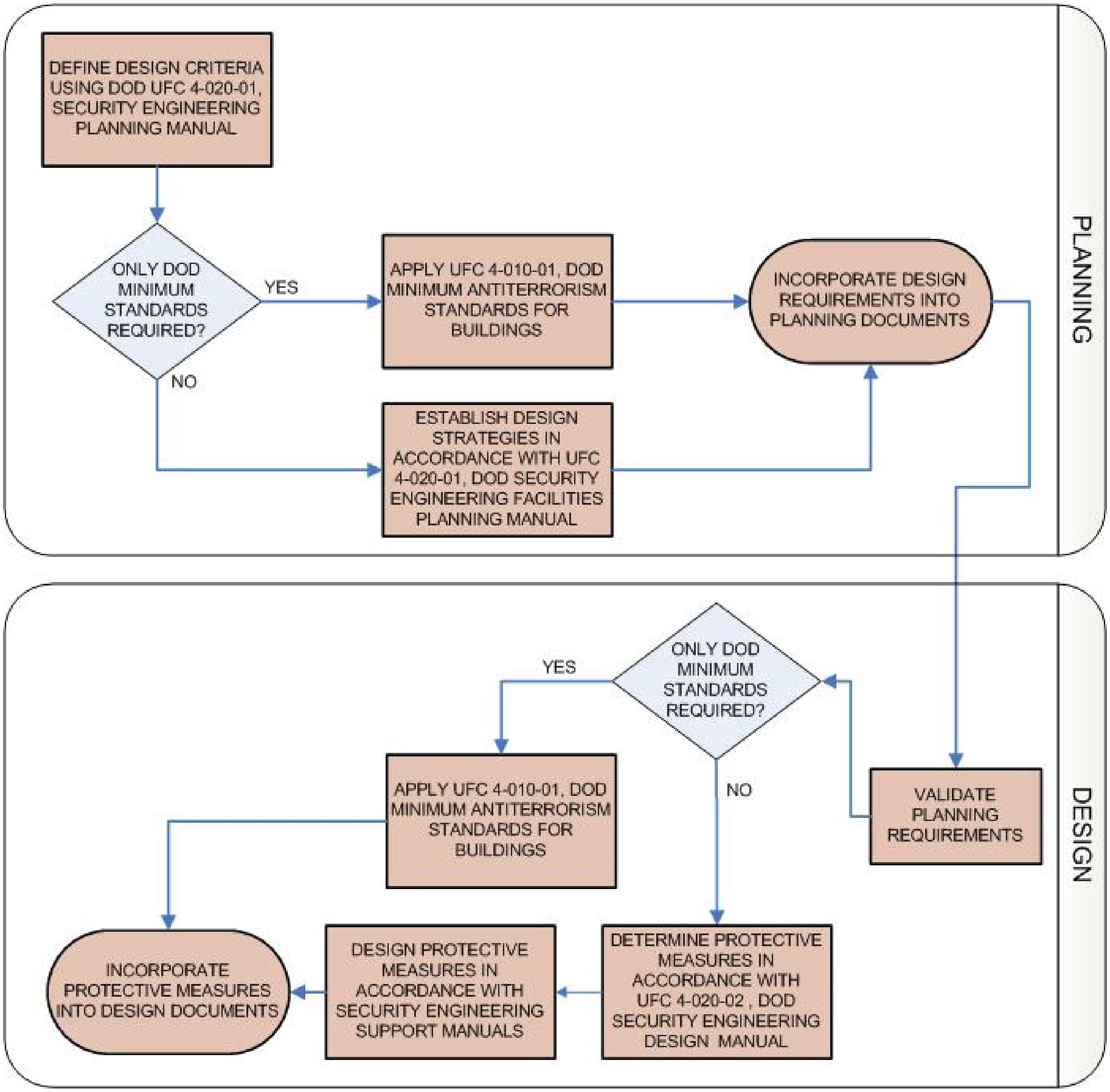
1-18.4 Security Engineering Support Manuals.

In addition to the standards, planning, and design UFCs mentioned above, there is a series of additional UFCs that provide detailed design guidance for developing final designs based on the preliminary designs developed using UFC 4-020-02. These support manuals provide specialized, discipline specific design guidance. Some address specific tactics such as direct fire weapons, forced entry, or airborne contamination. Others address limited aspects of design such as resistance to progressive collapse or design of portions of buildings such as mail rooms. Still others address details of designs for specific protective measures such as vehicle barriers or fences. The Security Engineering Support Manuals are intended to be used by the design team during the development of final design packages.

1-18.5 Security Engineering UFC Application.

The application of the security engineering series of UFCs is illustrated in Figure 1-1. UFC 4-020-01 is intended to be the starting point for any project that is likely to have security or antiterrorism requirements. By beginning with UFC 4-020-01, the design criteria will be developed that establishes which of the other UFCs in the series will need to be applied. The design criteria may indicate that only the minimum standards need to be incorporated, or it may include additional requirements, resulting in the need for application of additional UFCs. Even if only the minimum standards are required other UFCs may need to be applied if sufficient standoff distances are unavailable. Applying this series of UFCs in the manner illustrated in Figure 1-3 will result in the most efficient use of resources for protecting assets against security and antiterrorism related threats.

Figure 1-3 Security Engineering UFC Application



CHAPTER 2 PLANNING

2-1 ESTABLISH PLANNING REQUIREMENTS.

This chapter is intended to make planners aware of SCIF requirements that may affect the facility scope and budget. It is not intended to document the standard planning processes related to project development.

SCIF are established only when there are clear operational requirements which are critical to the supported command's mission. All SCIF projects begin with an Accrediting Official's Sponsorship. If a supported command requests a SCIF be included in a project, that SCIF has an Accrediting Official and a Site Security Manager (SSM).

2-1.1 Minimum and Enhanced Security.

ICS 705-1 and IC Tech Spec-for ICD/ICS 705 provide the minimum and enhanced security requirements for SCIF including construction details. The minimum security requirements are based on classification and location. Table C-1 in Appendix C provides an overview of the minimum SCIF construction requirements. To implement security enhancements above the minimum, the AO and CTTA will evaluate the threat, TEMPEST, SID and balance the security enhancements with cost at acceptable risk.

2-1.2 Planning Team.

Establish an interdisciplinary planning team with local considerations. The interdisciplinary planning team must work together to determine classification of SCIF and establish the minimum/enhanced security requirements. The planning team may consider user constraints such as operations, manpower requirements or limitations, and sustainment costs when determining the requirements for the overall security solution. The planning team should include the following:

- Planning
- Supported Command
- Site Security Manager (SSM)
- Certified TEMPEST Technical Authority (CTTA)
- Communications
- Security
- Engineering
- Cultural resources (if historical building)

2-2 PLANNING DOCUMENTATION.

The SCIF classification, operation, TEMPEST countermeasures, and resulting facility related requirements must be determined, documented, and budgeted during the planning process.

2-2.1 Configuration of SCIF Spaces.

When a facility has more than one SCIF, serious consideration should be given to consolidate SCIF with Compartmented Areas within. Any consolidation of spaces will reduce initial and sustainment costs for infrastructure and electronic security systems and the associated accrediting requirements. This must be coordinated with the supported commands to insure the configuration will meet their operational (compartmented) requirements.

2-2.2 SCIF and Historic Preservation.

Preservation of Cultural Resources must be considered when converting a historical building into a SCIF or locating a SCIF within a historic building. In a SCIF, every effort should be made to minimize or eliminate windows, especially on the ground floor. Windows less than 18 feet above the ground or from the nearest platform affording access to the window (measured from the bottom of the window) and doors shall be protected against forced entry and meet the standard for the SCIF perimeter which may include acoustic and TEMPEST mitigation. State Historic Preservation Officers (SHPO) may consider window and door modifications to have an adverse effect but may allow the modification if the impact is minimized and the effect mitigated. Planners will need to explore options and consult with the State Historic Preservation Office (SHPO) to determine options that meet security requirements and are compatible with the Secretary of the Interior's Standards for Rehabilitation.

2-2.3 Construction Security.

For locations outside the United States, the AO may impose procedures for the procurement, shipping, and storing of construction materials at the site. In addition, the AO may require access control to the construction materials and the SCIF construction area. Since these additional security measures may have significant cost impacts on project, they must be determined during project development.

2-2.4 Project Documentation.

Work with the Supported Command, SSM, and the CTTA to determine and document the classification, operation, and resulting facility requirements for the SCIF. SCIF located in higher threat areas (outside the United States) may have additional security requirements. Determine and document the following during project development:

- Is the SCIF the entire facility or an area within the facility?
- Will there be more than one SCIF, if so how many?

- What is the classification of the SCIF?
- Will the SCIF perimeter wall be standard, enhanced, or vault construction?
- What is the required Sound Transmission Class (STC) rating for the SCIF perimeter?
- Will the SCIF have Compartmented Areas? If so, how many and what is the required STC rating for the Compartmented Areas?
- Will an Electronic Security System (ESS) be required?
- Is there equipment that will be processing National Security Information (NSI)?
- Has the supported command provided the CTTA with a completed TEMPEST Checklist for review? The TEMPEST Checklist is included in the IC Tech Spec-for ICD/ICS 705.
- Will there be a TEMPEST requirement? If so, what will be required TEMPEST countermeasures?
- Are there special procurement, shipping, and storing of SCIF construction materials at the site required? If so, what will be required?
- Are there access control requirements for the construction materials and the SCIF construction area?
- Will U.S. companies using U.S. citizens be required for construction and oversight?
- Will U.S. Secret or U.S. Top Secret cleared personnel be required to perform finish work?
- Will installation and testing of the ESS be performed by U.S. TOP SECRET-cleared personnel or U.S. SECRET-cleared personnel escorted by SCIF personnel.

Some of these requirements are documented in the approved CSP. Therefore, it is very important to obtain the approved CSP during project development to ensure appropriate security requirements are included in the project budget and scope.

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CHAPTER 3 DESIGN

3-1 VALIDATE PLANNING REQUIREMENTS.

Work with the Supported Command, SSM, and the CTTA to validate planning requirements. Operation, classification, and threat classification of the SCIF may have changed since the project was planned. Validate and document the classification, operation, and resulting facility requirements for the SCIF. Include requirements in the Design Build RFP, design documents, and construction contracts to insure the SCIF can be accredited to meet the supported command's operational capabilities.

3-2 MINIMUM AND ENHANCED SECURITY.

ICS 705-1 and IC Tech Spec-for ICD/ICS 705 provide the minimum and enhanced security requirements for SCIF. The minimum security requirements are based on classification and location. Table C-1 in Appendix C provides an overview of the minimum SCIF construction requirements. To implement security enhancements above the minimum, the SSM and CTTA will evaluate the threat, SID and balance the security enhancements with cost at an acceptable risk.

3-3 DESIGN APPROVAL.

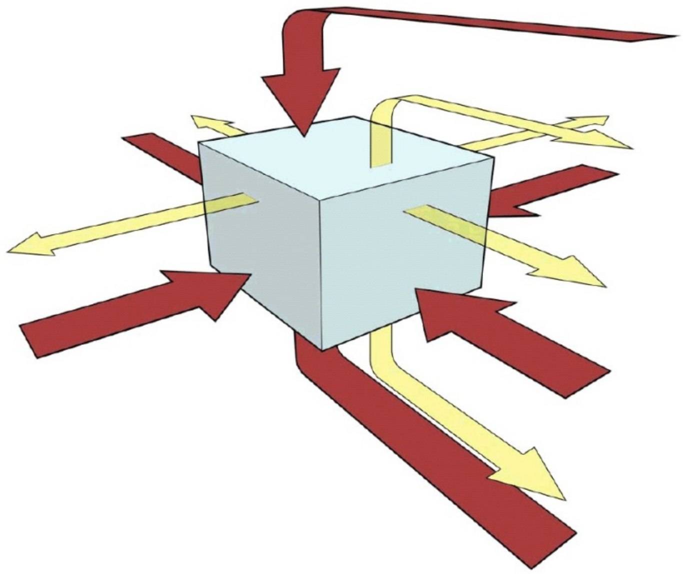
Per ICS 705-1, Concept and final design for each construction project must be reviewed and approved by the Accrediting Official prior to start of construction.

3-4 GENERAL DESIGN STRATEGY.

The general design strategy for any tactic is the basic approach to developing a protective system to mitigate the effects of that tactic. It governs the general application of construction, building support systems, equipment, manpower, and procedures.

SCIF design will vary depending on type of SCIF, location, SID, SCI discussion, and NSI processing requirements. Mitigation against forced entry, covert entry, visual surveillance, acoustic eavesdropping, and electronic emanations will dictate security requirements. Designers must take a six-sided approach when implementing SCIF requirements, see Figure 3-1. The floor, ceiling, walls and any penetrations must be designed to meet the performance requirements for the SCIF perimeter.

Figure 3-1 Six Sided Approach



3-4.1 Configuration of SCIF Spaces.

If a facility has more than one SCIF, serious consideration should be given to the consolidation SCIF spaces with Compartmented Areas within. Any consolidation of spaces will reduce accrediting requirements and the initial/sustainment costs for infrastructure and electronic security systems. This must be coordinated to insure configuration will meet operational (compartmented) requirements.

3-4.2 SCIF Perimeter.

The perimeter of the SCIF includes perimeter walls, windows, doors, ceiling, floor, and all penetrations. At a minimum, SCIF Perimeter shall provide:

- Resistance to forced entry
- Resistance to covert entry
- Visual evidence of surreptitious penetration
- Sound Attenuation
- Countermeasures for Electronic Emanations -TEMPEST (when required)

This includes above the false ceilings and below raised floors.

3-4.3 Intrusion Detection System.

All Interior areas of a SCIF through which reasonable access could be gained, including walls common to areas not protected at the SCI level, shall be protected by IDS, unless continuously occupied.

3-4.4 Sound Attenuation.

The ability of a SCIF structure to retain sound within the perimeter is rated using a descriptive value, the Sound Transmission Class (STC). Architectural Graphics Standards (AGS) established Sound Groups I through 4, of which Groups 3 and 4 are considered adequate for specific acoustical security requirements for SCIF construction. Per AGS:

- Sound Group 3 – (STC of 45) or better. Loud speech can be faintly heard but not understood. Normal speech is unintelligible.
- Sound Group 4 – (STC of 50) or better. Very loud sounds, such as loud singing, brass musical instruments or a radio at full volume, can be heard only faintly or not at all.

SCIF and compartmented area perimeters shall meet Sound Group 3, unless additional protection is required for amplified sound. This applies to the entire perimeter of the space to include walls, ceilings and floors and perimeter penetrations such as conduit, pipe, ducts, doors, and windows. Conference rooms or other areas where amplified audio is used such as video teleconference (VTC) equipment, audio visual systems, and speakerphones shall meet Sound Group 4 performance criteria.

3-4.5 Electronic Emanations - TEMPEST.

National Security Telecommunications and Information System Security Instruction (NSTISSI) No. 7000, “TEMPEST Countermeasures for Facilities,” establish guidelines and procedures that shall be used by departments and agencies to determine the applicable TEMPEST countermeasures for national security systems. In general, TEMPEST countermeasures apply when the SCIF contains equipment that will be processing national security information (NSI). However, having equipment that will be processing NSI does not necessarily imply the need to implement TEMPEST countermeasures.

The Certified TEMPEST Technical Authority (CTTA) has responsibility for conducting or validating TEMPEST reviews and recommending TEMPEST countermeasures. Failure to consult the CTTA could result in installation of unnecessary and/or expensive countermeasures or the omission of needed countermeasures. If required TEMPEST countermeasures are omitted, the facility will not be accredited and the Supported Command will not be mission capable.

3-5 SPECIFIC DESIGN STRATEGY.

The specific design strategy for any tactic governs how the general design strategy varies for different levels of protection or threat severity. They may vary by the sophistication of the protective measures and the degree of protection provided. The specific design strategies reflect the degree to which assets will be left vulnerable after the protective system has been employed.

3-5.1 Adjacent Space.

To increase SID, locate other areas that require access control adjacent to or surrounding the SCIF.

3-5.2 Vestibule.

When practical, the entrance into a SCIF should incorporate a vestibule to preclude visual observation and enhance acoustic protection.

3-5.3 Perimeter Construction.

The SCIF and compartmented area perimeters and the penetrations in those perimeters are the primary focus of SCIF design. IC Tech Spec-for ICD/ICS 705 provides the minimum and enhanced construction requirements for SCIF perimeter and compartmented area with regard to forced entry, covert entry, visual evidence of surreptitious penetration, and sound attenuation. In addition, radio frequency (RF) shielding and other TEMPEST mitigation shall be provided as determined by the CTTA.

IC Tech Spec-for ICD/ICS 705 includes recommended construction details for acoustic wall construction and duct penetrations. Designers must ensure that details used from IC Tech Spec-for ICD/ICS 705 comply with UFC 1-200-01. For example, IC Tech Spec-for ICD/ICS 705 has a wall detail for Wall C - enhanced construction utilizing plywood. To meet UFC 1-200-01, the plywood must be Fire Retardant Treated (FRT) plywood.

3-5.4 Perimeter/Compartmented Areas Walls.

Walls must go from floor slab (true floor) to underside of floor or roof deck (true ceiling). Perimeter walls, floor and ceiling shall be permanently and solidly constructed and attached to each other. Seal partition continuously with acoustical foam or sealant (both sides) and finished to match wall wherever it abuts another element such as the floor, ceiling, wall, column, or mullion.

3-5.4.1 Wall Finish.

Walls must be uniformly finished on both sides from floor slab (true floor) to underside of floor or roof deck (true ceiling). See Figure 3-2.

Figure 3-2 Wall Finish

UNACCEPTABLE

- Wall not uniformly finished above false ceiling.
- Wall not sealed where wall abuts floor pan.
- Wall penetrations unsealed.

ACCEPTABLE

- Wall is uniformly finished above false ceiling
- Wall is sealed where wall abuts floor pan.
- Wall penetrations are sealed.

3-5.4.2 Sound Attenuation.

Provide acoustical protection to protect SCI against being inadvertently overheard by the casual passerby, not to protect against deliberate interception of audio.

3-5.4.3 Minimum Sound Attenuation.

The amount of sound energy reduction may vary according to individual facility requirements. However, Sound Group ratings shall be used to describe the effectiveness of SCIF acoustical security measures afforded by various wall materials and other building components.

- SCIF Perimeter shall meet Sound Group 3, unless additional protection is required for amplified sound. This applies to the entire perimeter of the space to include walls, ceilings and floors and perimeter penetrations such as conduit, pipe, ducts, doors, and windows.
- Compartmented Area: If compartmented areas are required within the SCIF, the dividing office walls must meet Sound Group 3, unless additional protection is required for amplified sound.
- Conference rooms or other areas where amplified audio is used such as video teleconference (VTC) equipment, audio visual systems, and speakerphones shall meet Sound Group 4 performance criteria.

3-5.4.4 Sound Masking.

When normal construction and baffling measures have been determined to be inadequate to meet the sound attenuation requirement, sound masking shall be employed. A sound masking system may utilize a noise generator as a noise source with speakers or transducers located on the perimeter of the SCIF. When required, provide sound masking devices at penetrations to the SCIF perimeter such as doors and duct penetrations.

3-5.4.5 Utilities on Perimeter Wall.

Utilities such as power,\1\ telecommunications, /1/ signal, and plumbing on the interior of a perimeter/compartmented wall treated for acoustic or RF shall be surface mounted, contained in a raceway, or a furred out wall shall be constructed for routing of utilities. Utilities shall not be mounted in a manner that affects the acoustic or RF shielding performance. If a furred out wall is used, gypsum board may be 3/8 inch (10 mm) and shall terminate above the false ceiling. \1\ See Figure 3-3 for an example. /1/

3-5.4.6 Recessed Fire Extinguisher Cabinets.

Recessed fire extinguisher cabinets are prohibited on perimeter walls.

3-5.5 Ceiling and Floors.

Ceilings and floors shall meet the same requirements as walls with regard to forced entry, covert entry, visual evidence of surreptitious penetration, and sound attenuation. In addition, ceilings, floors and all penetrations shall meet TEMPEST requirements when required by CTTA.

3-5.6 Perimeter Doors.

SCIF perimeter doors and frame assembles shall meet acoustic requirements (vestibule of two doors may be used) unless declared a non-discussion area. \1\ /1/ Provide dead bolts for perimeter doors with day access controls for SCIF residents. In addition, perimeter doors shall meet TEMPEST requirements when required by CTTA.

\1\

Figure 3-3 Furred Out Wall for Utilities

/1/

3-5.6.1 Acoustic Rated Doors.

Specify an acoustical assembly to include door, seals, hinges, frame, and threshold tested to ASTM-E336 to obtain a STC 45 or 50 rated door. Fill voids between frame and adjacent wall with sound deadening material. For STC 46 or higher rated door assemblies, fill voids between frame and adjacent wall with lightweight gypsum plaster, foam, or sealant. Seal both sides of the entire perimeter of the door assembly with acoustical caulk where it interfaces with wall.

3-5.6.2 Wood doors.

At a minimum, wood doors shall be 1 ¾ inch (45 mm) thick solid wood core (wood stave).

\1\

3-5.6.3 Steel Doors.

At a minimum, steel doors shall meet following specifications:

- 1 ¾ inch (45 mm) thick face steel equal to 18 gauge.
- Hinges reinforced to 7 gauge.
- Door closure reinforced to 12 gauge.
- Lock area predrilled and/or reinforced to 10 gauge.

3-5.6.4 Door Closers.

All perimeter SCIF doors shall be equipped with a heavy duty automatic non-hold door-closer installed internal to the SCIF.

/1/

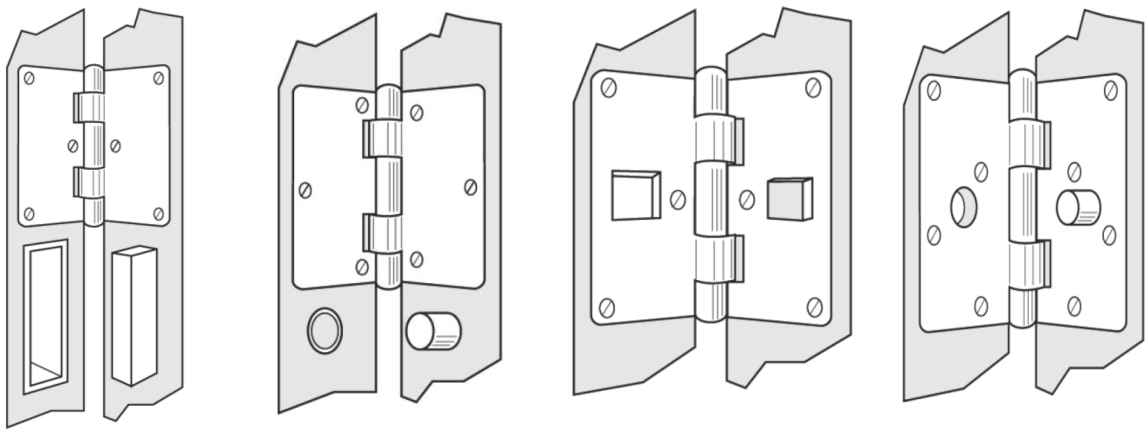
3-5.6.5 Hinges.

Hinges shall be full mortise, half mortise, full surface, or half surface design as recommended by the manufacturer for acoustical door assembly.

3-5.6.5.1 Hinge Pins.

Hinge pins on SCIF perimeter doors shall be tamper resistant unless mounted on the protected side of the door. Tamper resistant hinges shall have non-removable pins, security pins,\1\ set screws, welded, /1/ or equipped with a safety stud. \1\ See Figure 3-4. /1/

Figure 3-4 Tamper Resistant Hinges



3-5.6.6 Primary Entrance.

Unless approved by the AO, each SCIF shall have one primary SCIF entrance where visitor control is conducted. The primary entrance should incorporate a vestibule to preclude visual observation and enhance the acoustic protection. Primary entrance shall be:

- Equipped with an approved automated access control device.
- Equipped with a GSA-approved pedestrian door deadbolt meeting Federal Specification FF-L- 2890.
- Equipped with combination lock meeting Federal Specification FF-L 2740.

Federal Specification FF-L-2890 requires a combination lock that meets Federal Specification FF-L-2740. Therefore, only one locking device is provided on the door, that locking device shall meet Federal Specification FF-L- 2890.

3-5.6.7 Emergency Exit Doors.

Emergency exit doors shall meet perimeter door requirements and:

- Have no exterior hardware; see \1\ Figure 3-5. /1/
- Secured with deadlocking panic hardware.
- Alarmed 24/7 and equipped with a local annunciation.
- Delayed-egress is recommended with NFPA 101 compliance.

Figure 3-5 Emergency Exit Doors

3-5.6.8 Vault Doors.

All vaults shall be GSA-approved Class 5 vault door.

3-5.6.9 Roll-up Doors.

Roll-up doors shall only be located in an area of the SCIF that is a non- discussion area due to the inability to treat for acoustics. Roll-up doors shall be 18 gauge or greater and secured with dead bolts on each side of the door.

3-5.6.10 Double Doors.

Double doors should not be used on SCIF perimeter. If double doors are used:

- One side shall be secured top and bottom with deadbolts.
- Have an astragal strip attached to \1\ either /1/ door to prevent observation of the SCIF through the opening between the doors.
- Each door shall be alarmed (have a balanced magnetic switch).
- A GSA approved lock shall be installed on the moving door.

3-5.7 Windows.

SCIF perimeters should have no windows. Therefore, every effort should be made to minimize or eliminate windows, especially on the ground floor. If provided, \1\ windows shall be non-operable. /1/ Provide mitigation for visual surveillance, acoustic protection and meet TEMPEST requirements when required by CTTA. Large windows may require noise generator transducers to achieve acoustic protection. For visual surveillance protection, windows shall be made opaque or with SSM approval equipped with blinds, drapes or other coverings.

Windows less than 18 feet (5.5 meters) (measured from the bottom of the window) above the ground or from the nearest platform; such as lower roof, canopy or mechanical equipment, which affords access to the window shall:

- Be fixed non-opening.
- Meet the standards of the SCIF perimeter.
- Be protected against forced entry.
- Be alarmed.

3-5.7.1 Windows greater than 18 feet (5.5 meters).

Windows located above 18 feet (5.5 meters) shall be fixed non-opening \1\ /1/

3-5.8 Perimeter Penetrations.

Penetrations of the perimeter shall be kept to a minimum. Ducts, conduits, pipes, or anything that penetrates the SCIF perimeter present a vulnerability that must be addressed. Ducts, conduits or pipes servicing areas other than SCIF shall not penetrate the SCIF Perimeter unless mitigation is provided. \1\ In addition, perimeter penetrations shall meet TEMPEST requirements when required by CTTA. /1/

3-5.8.1 Utility Penetrations.

Utilities (power and signal) should enter the SCIF at a single point. Seal all utility penetrations to mitigate acoustic emanations and covert entry. Spare conduits are allowed for future expansion \1\ provided the expansion conduit is filled with acoustic fill and capped. /1/

3-5.8.2 Metallic Penetrations.

All metallic penetrations through SCIF walls shall be considered carriers of compromising emanations (CE) and pose TEMPEST hazards that shall be addressed. Unless directed otherwise by the CTTA:

- Metal conduit or pipe: provide a dielectric union inside the SCIF perimeter adjacent to the penetration, or ground the conduit within 6 inch (150 mm) of the perimeter penetration using a no. 4 wire (0.2043-diameter copper wire) to the building ground.
- Metallic sprinkler (fire suppression) pipe: provide a UL Listed dielectric union inside the SCIF perimeter adjacent to the penetration, or ground the conduit within 6 inch (150 mm) of the perimeter penetration using a no. 4 wire (0.2043-diameter copper wire) to the building ground.
- Mechanical system refrigerant lines: ground the line within 6 inch (150 mm) of the perimeter penetration using a no. 4 wire (0.2043-diameter copper wire) to the building ground. Maintain integrity of refrigerant line insulation.

- HVAC ducts: provide a nonconductive break (flex connection) using material appropriate for the climate, for a 2- to 6-inch (50 to 150 mm) section of the duct inside the SCIF perimeter adjacent to the penetration; see \1\ Figure 3-6. When a waveguide-below-cutoff RF filter is required by CTTA, provide between the SCIF perimeter and the nonconductive break. /1/

In addition, the CTTA may require additional TEMPEST countermeasures.

Figure 3-6 Duct Penetrations

3-5.8.3 Penetration Seals.

Seal both sides of perimeter penetrations with an acoustical foam or sealant finished to match adjacent wall, floor, or ceiling. Fire Stop System may be required for fire rated assemblies, see \1\ Figure 3-7. In addition, penetration seals shall meet TEMPEST requirements when required by CTTA. /1/

3-5.9 Vents, Ducts, and Pipes.

All vents or duct openings exceeding 96 square inches (619 cm^2) that penetrate the perimeter shall be protected with permanently affixed bars, grills, metal sound baffles or wave forms. If one dimension of the penetration measures less than 6 inch (150 mm), protection is not required. One of the following can be used to secure them.

- Bars shall be a minimum of ½ inch (13 mm) diameter steel, welded vertically and horizontally 6 inch (150 mm) on center. A deviation of ½ inch (13 mm) in vertical and/or horizontal spacing is permissible, see Figure 3-8.
- Grills shall be shall be of ¾ inch (20 mm) #9 (10 gauge) case hardened expanded metal. When used, metal sound baffles or wave forms shall be

permanently installed and set no farther apart than 6 inch (150 mm) in one dimension.

- Metal sound baffles or \1\ waveguide-below-cutoff RF filters /1/ permanently installed and set no farther apart than 6 inch (150 mm) in one dimension.

\1\

3-5.10 Access Port.

For vents or ducts that require bars or grill, provide an accessible access panel in the bottom within the perimeter of the SCIF to allow visual inspection of the bars ,grill, or waveguide-below-cutoff RF filter see Figure 3-9.

If the area outside the SCIF is controlled (SECRET or equivalent proprietary space), the inspection port may be installed outside the perimeter of the SCIF, and be secured with an AO approved high-security lock such as a GSA combination padlock meeting Federal Specification FF-P-110.

3-5.11 Flashing or Rotating Light.

Per DoDM 5105.21 Vol 2, SCIF personnel must be informed when non-SCI-indoctrinated personnel have entered and departed the SCIF. This may be accomplished either verbally or through visual notification methods. A flashing or rotating light is an excellent measure to indicate the presence of non-SCI-indoctrinated personnel in the SCIF. When used, lights shall be placed to ensure visual observation by SCIF personnel. Controls shall be provided within the SCIF at each door including emergency exit doors.

3-5.12 Duress Alarm.

When a duress alarm is required, duress alarm shall initiate an alarm condition at the central monitoring station and shall not result in an audible or visual signal in the protected area.

/1/

Figure 3-7 Sealing Penetrations

UNACCEPTABLE

- Wall penetration is not sealed around duct.
- Wall not uniformly finished around duct penetration.

Figure 3-8 Bars on Penetration

Figure 3-9 Access Port

3-5.13 Electronic Security System (ESS).

ESS is the integrated electronic system that encompasses one or more of the following subsystems; access control system (ACS), intrusion detection system (IDS), and closed circuit television (CCTV) systems for assessment of alarm conditions. For notional ESS layout, see \1\ Figure 3-10. /1/

ESS shall meet the requirements of ICS 705-1 and IC Tech Spec-for ICD/ICS 705 and designed in accordance with UFC 4-021-02NF.

3-5.13.1 Access Control System (ACS).

ACS function is to ensure only authorized personnel are permitted ingress and egress into the SCIF. At a minimum, provide card reader with keypad at the primary entrance. Unless otherwise directed, the default ACS identifier credential shall be the \1\ Common Access Card (CAC)[1]. /1/

- Equipment containing access-control software programs shall be located in the SCIF or a SECRET controlled area.
- System data that is carried on transmission lines (e.g., access authorizations, personal identification, or verification data) to and from equipment located outside the SCIF shall be protected using FIPS 140-2 certified encrypted lines. If this communication technology is not feasible, transmission lines shall be installed as approved by the AO.
- Electric door strikes installed in conjunction with an ACS shall have a positive engagement and be UL 1034 Listed for burglar resistance.

3-5.13.2 Closed Circuit television (CCTV).

Cameras are not allowed within the SCIF perimeter. A camera may be provided on the exterior of the SCIF to supplement the monitoring of a SCIF entrance for remote control of the door from within the SCIF. The system shall provide a clear view of the SCIF entrance and shall be monitored/operated by SCI-indoctrinated personnel within the SCIF.

3-5.13.3 Intrusion Detection System (IDS).

The IDS shall be independent of systems safeguarding other facilities and compatible with Installation’s central monitoring system. All Interior areas of a SCIF through which reasonable access could be gained, including walls common to areas not protected at the SCI level, shall be protected by IDS, unless continuously occupied. If the occupants of a continuously occupied SCIF cannot observe all potential entrances to the SCIF, the SCIF shall be equipped with a system to alert occupants of intrusions into the SCIF. Emergency exit doors shall be monitored 24 hours a day to provide quick identification and response to the appropriate door when there is an alarm indication.

\1\ [1] Per DoD 5200.08-R /1/

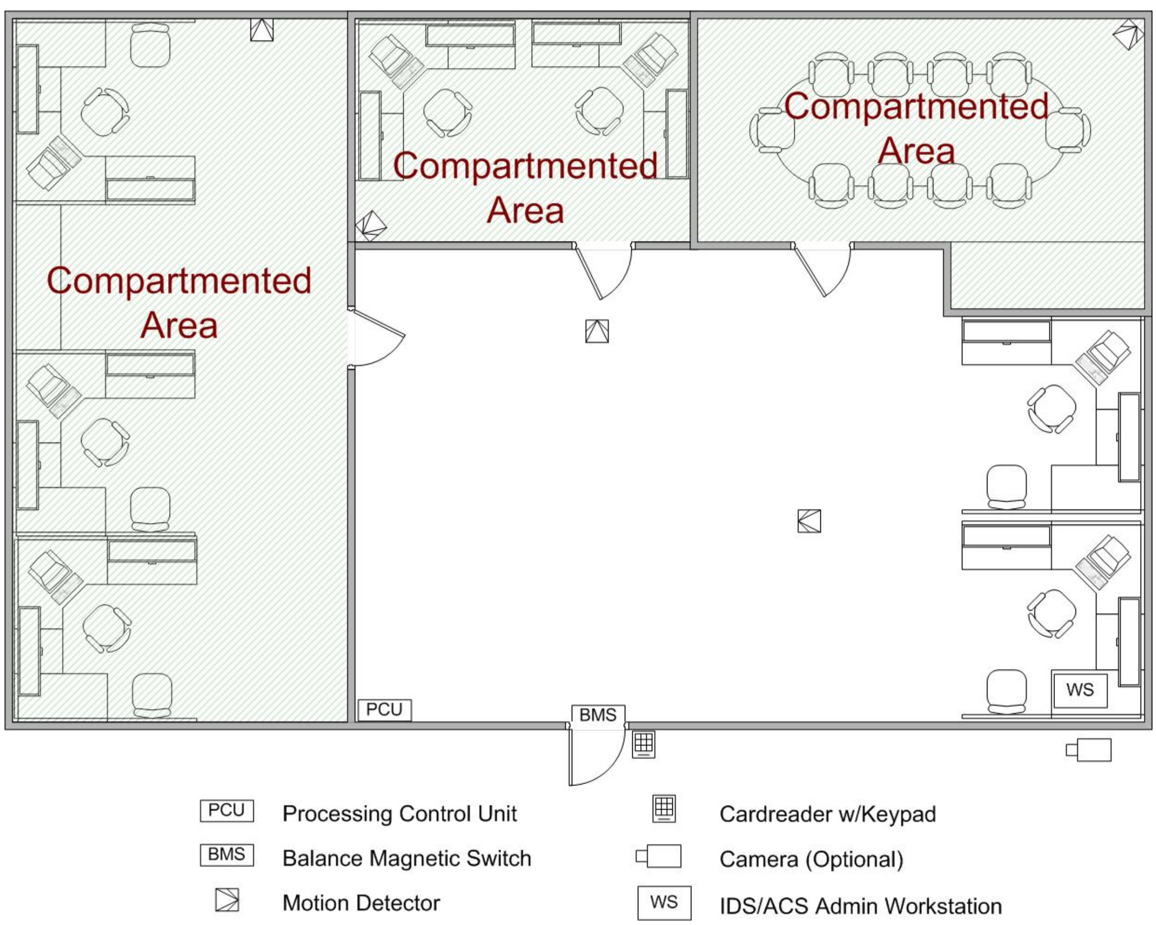
Provide point sensors on all \1\ /1/ doors, and man-passable openings. Provide motion sensors within SCIF to protect all windows, doors, and man-passable openings and detect movement within the SCIF to include compartmented areas. Motion detection sensors are not required above false ceilings or below false floors; however, these detectors may be required for critical and high threat facilities outside the U.S.

3-5.13.3.1 Intrusion Detection Installation and Components.

IDS installation, related components, and monitoring stations shall comply with Underwriters Laboratories (UL) 2050 Extent 3 standards. Systems developed and used exclusively by the U.S. Government do not require UL certification but shall comply with UL 2050 Extent 3 standards for installation. UL 2050 materials are restricted and only distributed to those demonstrating relevant national industrial security involvement. However, UL 2050 implements UL 681, Installation and Classification of Burglar and Holdup Alarm Systems for alarm system installation. See \1\ Figure 3-10 /1/ for a notional IDS layout.

\1\

Figure 3-10 Notional IDS Layout



/1/

Notes:

- Point sensor protect door
- Motion sensor monitoring door and space with access to SCI
- Camera (optional) monitors primary entrance - No cameras within SCIF
- Card reader with keypad located at primary entrance
- PCU and administrative workstation located within SCIF

3-5.13.3.2 Motion Detection Sensors.

\1\ Shall be UL 639 Listed. Dual-technology sensors may be used when authorized and when each technology transmits alarm conditions independent of the other technology ("or" configuration). /1/

3-5.13.3.3 Point Sensors.

Shall be UL 634 high security switches (HSS) level 1 or 2. HSS Level 2 is preferred. \1\ Level 2 rated switches only include Balanced Magnetic Switches that pass additional performance testing. /1/

3-5.13.3.4 Sensor Cabling

Cabling between all sensors and the PCU shall be dedicated to the system, contained within the SCIF, and comply with Committee for National Security Systems (CNSS) standards. If the wiring cannot be contained within the SCIF, such cabling shall meet the requirements for External Transmission Line Security.

3-5.13.3.5 Premise Control Unit (PCU).

PCU shall be located within the SCIF. System shall be configured to only allow cleared personnel located within the secure/protected area to initiate changes in access modes or alarm conditions.

3-5.13.3.6 External Transmission Line Security

IDS transmission lines leaving the SCIF to the central monitoring station, must meet National Institute of Standards and Technology, Federal Information Processing Standards (FIPS) certified encrypted lines.

3-5.13.3.7 Backup power.

Provide Twenty four hours of uninterruptible backup power. This may be provided by batteries, uninterruptible power supply (UPS), or generators, or any combination. Emergency backup power for IDS should not generate the requirement for a UPS or generator. If a generator or UPS is not available for backup, provide backup with batteries.

In the event of primary power failure, the IDS shall:

- Automatically transfer to an emergency electrical power source without causing alarm activation.
- Initiate an audible or visual indicator at the PCU to provide an indication of the primary or backup electrical power source in use.
- Initiate an audible or visual indicator at the monitoring station indicating a failure in a power source or a change in power source.

3-5.13.3.8 IDS Approval.

The AO shall approve IDS proposals and plans prior to installation within a SCIF as part of the initial SCIF construction approval process.

\1\

3-5.14 Telecommunication Cabling System.

Cabling, patch panels, connector blocks, work area outlets, and cable connectors must be color coded[2] to distinguish their classification level. If color coding is not possible, cabling must be clearly marked to indicate their classification level. Cabling must enter a SCIF from a single location and must be identified and labeled with its purpose and destination at the point of entry. Backbone and horizontal cabling may differ depending on network classification, service provider, and TEMPEST requirement. Coordinate requirements with SSO, service provider, and CTTA. See TEMPEST Countermeasures.

/1/

3-5.14.1 Protected Distribution Systems (PDS).

A signal distribution system containing unencrypted NSI which enters an area of lesser classification, unclassified area, or uncontrolled (public) area must be protected according to the requirements of the current PDS standard. For a SCIF, that means a signal distribution system containing unencrypted NSI that leaves the SCIF must be protected according to the requirements of the NSTISSI No 7003. NSTISSI No. 7003 provides the minimum standards for PDS, refer to Service specific implementation policy or standards.

3-5.15 TEMPEST Countermeasures.

TEMPEST countermeasures and RF mitigation shall be provided at the direction of the CTTA. RF mitigation is recommended for all applications where RF interference from the outside of the SCIF is a concern inside the SCIF. \1\ /1/

3-5.15.1 Inspectable Space.

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[2] Per DoDM 5105.21 Vol 1.

Inspectable space is the three-dimensional space surrounding equipment that processes classified and/or sensitive information within which TEMPEST exploitation is not considered practical or where legal authority to identify and/or remove a potential TEMPEST exploitation exists. The CTTA shall determine the Inspectable Space for each facility.

Upon determination of the CTTA, the Inspectable space boundary may extend beyond the SCIF perimeter.

3-5.15.2 Radio Frequency (RF) Mitigation.

When directed by the CTTA, the SCIF shall be protected from compromising emanations. SCIF perimeter wall may have foil backed gypsum wall board or R-foil. Foil layer shall be placed inside the SCIF between the first and second layer of gypsum board. When directed, RF mitigation shall be provided for walls, ceilings, floors, and all penetrations including doors and windows. Doors shall be steel with RF gasket, and door frame shall be bonded to RF shield. Shielding shall be electrically bonded continuously at interfaces between, walls, floors, ceilings, doors, and windows. RF mitigation may include waveguides, power line and telecommunication line filters.

- Mounting apparatus shall not be connected to the RF shielding material in a manner that affects RF shielding performance.

3-5.15.3 RED/BLACK Telecommunication Systems.

All equipment, wirelines, components, and systems that process National Security Information (NSI) are considered RED. All equipment, wirelines, components, and systems that process encrypted NSI and non-NSI are considered BLACK. BLACK lines and other electrically conductive materials that egress the inspectable space are potential carriers of Compromising Emanations (CE) that can inadvertently couple to the Red lines. Various signal line isolation techniques such as separation and filtering can be used to protect the signal line, the distribution system or other fortuitous conductors from conducting compromising signals beyond secure areas. The RED/BLACK concept is utilized to establish guidance for physical separation to decrease the probability that electromagnetic emissions from RED devices might couple to BLACK systems. Consult CTTA to determine TEMPEST countermeasures. Possible countermeasures may include:

- Red/Black separation.
- Distribution equipment must be designed with separate RED and BLACK connector blocks to prevent improper connection of RED and BLACK lines.
- Signal Line Isolators and Filters.

3-5.15.4 Paging, Intercom, and Public Address Systems.

- Systems should be totally contained within the SCIF. If not, for eavesdropping (using the speakers as microphones), a buffer amplifier is the standard mitigation. For most systems, this is a simple amplifier in SCIF that takes the incoming audio signal and amplifies/distributes the signal to the speakers within the SCIF.

- In systems that require two-way communication, the system shall have electronic isolation. SCIF occupants must be alerted when the system is activated.
- Provide voice frequency, lowpass filters if they are not totally contained within the Inspectable space. This protects against TEMPEST signals on the cables but does not protect against voice modulation of the speakers.
- When required, all electronic isolation components shall be installed within the SCIF as near to the point of SCIF penetration as possible.
- Equipment and signal lines should meet the separation recommendations

3-5.15.5 Fire Alarm and Mass Notification System (MNS).

The introduction of electronic systems that have components outside the SCIF should be avoided. TEMPEST concerns may require electronic isolation, validate requirements with CTTA. Speakers or other transducers, which are part of a system that is not wholly contained in the SCIF, may be required in the SCIF. Consult CTTA to determine TEMPEST countermeasures. Possible countermeasures may include:

- Separation of signal lines from RED telecommunication lines and processors.
- For eavesdropping (using the speakers as microphones), a simple buffer amplifier is the standard mitigation. For most systems, this is a simple amplifier in SCIF that takes the incoming audio signal and amplifies/distributes the signal to the speakers within the SCIF. However, equipment such as pre-amplifiers, amplifiers and products translating or converting live voice signals for use in mass notification systems must comply with the applicable requirements in UL 1711, the Standard for Amplifiers for Fire-Protective Signaling Systems. Therefore, any amplifier used in a MNS must meet UL 1711.
- Provide a MNS/Fire alarm subpanel within the SCIF with optical fiber backbone to the building system. Optical fiber shall have no metallic shielding, cladding, or strength members.
- In systems that require two-way communication, the system shall have electronic isolation. SCIF occupants should be alerted when the system is activated.
- When required, all electronic isolation components shall be installed within the SCIF as near to the point of SCIF penetration as possible.

3-5.15.6 Power Systems.

The power requirements are divided into two groups -- power for the mission equipment (technical) and power for the supporting services (nontechnical). Supporting services include lighting, heating, ventilating, air conditioning, etc. Provide a separate service feeder dedicated to the sensitive equipment and control its distribution reducing the opportunity for unauthorized detection of compromising signals on those lines. Power line conduction occurs when plain text information is transferred onto the power line by RED equipment, or radiated through free space and coupled onto the power lines. If a facility is processing NSI, power is sometimes divided into RED and BLACK power. RED power provides isolation for those non-TEMPEST approved equipment processing NSI. BLACK power is provided for equipment processing non-NSI because power isolation is not required. This separation prevents conducted emissions from RED equipment being coupled through BLACK equipment to BLACK lines that might egress the inspectable space. Consult CTTA to determine TEMPEST countermeasures. Possible countermeasures may include:

\1\

- Separation of Black power lines from RED telecommunication lines and processors.
- Power line Filters.

/1/

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CHAPTER 4 CONSTRUCTION

4-1 DESIGN APPROVAL.

Per ICS 705-1, Final design for each construction project must be reviewed and approved by the Accrediting Official prior to start of construction.

4-2 CONSTRUCTION SECURITY.

Per ICS 705-1, construction plans and all related documents shall be handled and protected in accordance with the CSP. If classification guides dictate, plans and related documents may require classification. Under no circumstances should plans, diagrams, etc. that are identified for a SCIF be sent or posted on unprotected information technology systems or Internet venue without encryption.

A Site Security Manager (SSM) shall be the single point of contact regarding SCIF security and the individual responsible for all security aspects of the SCIF construction. SSM shall conduct periodic security inspections for the duration of the project to ensure compliance with the CSP.

4-3 ACCREDITATION PROCESS.

In support of the accreditation process, Project/Construction mangers shall provide the AO/SSM site plans, building floorplans, IDS plans, and information related to perimeter and compartment area wall construction, doors, locks, deadbolts, IDS, telecommunication systems, acoustical protection, and TEMPEST countermeasure.

4-4 INSPECTIONS.

Coordinate preliminary walkthrough with the SSM prior to substantial completion of SCIF space. Conduct periodic inspections of SCIF area to document and validate:

- Perimeter and Compartmented Area construction
  - Wall goes from floor slab (true floor) to underside of floor or roof deck (true ceiling)
  - Top and bottom sealed (both sides) with acoustical foam or sealant
  - Wall finished and uniform from true floor to true ceiling
  - Acoustic batting installation
  - Gypsum Wallboard installation
  - Floor and Ceiling construction
- Perimeter Penetrations
  - Sealed (both sides) with acoustical foam or sealant
  - Finished to match wall.
  - Metallic penetrations at perimeter (non-conductive break (e.g., canvas, rubber) installed at the interior perimeter.

- Perimeter Doors
    - Acoustical rating
    - Door assemblies sealed with acoustical foam or sealant (both sides) and finished to match wall
    - Door hardware (locks, closers, and hinges)
- Man-bar installation.
- Inspection ports.
- Tempest Countermeasures (as applicable)
    - RF shielding including penetrations
    - Waveguides
    - Doors including RF gaskets
    - Power Line Filters
    - Signal Line Isolators and Filters

Prior to walk through; assemble required documents for accreditation process and equipment providers. Requirements vary depending on project but in general assemble the following documents:

- Drawings:
    - Civil Site Plan
    - Architectural
        - Floor and Reflective Ceiling Plans
        - Wall sections (floor to ceiling)
        - Floor and Ceiling section
        - Door Schedule
        - Door head, jamb, and threshold details
        - Window schedule and details
    - Fire Protection
        - Sprinkler piping including penetration details
        - Fire Alarm system
        - Mass Notification System
    - Mechanical
        - HVAC plans, sections and details of SCIF penetrations, ductwork details sheets
        - Plumbing floor plans, detail for SCIF penetrations
    - Electrical
        - Site plan

        - Lighting, Power, Telecommunications, ESS plans. Plans must indicate device and panel location and include strobe lights and controls.
        - One-line diagrams for Power, Telecommunications, and ESS including RED/Black separation when required.
        - ESS Door wiring details
        - SCIF penetration details

- Submittals
    - Doors
    - Door Hardware (locks, closers, and hinges)
    - Acoustical ratings
    - Electronic Security Systems
    - Sound masking equipment
    - Tempest Countermeasures (as applicable)
        - RF shielding
        - RF sealant
        - Waveguides
        - Doors including RF gasketing
        - Power Line Filters
        - Signal Line Isolators and Filters

- As-Built drawings

4-5 PHOTOGRAPHIC CONSTRUCTION SURVEILLANCE RECORD.

Photographic Construction Surveillance Record may be accomplished by the SSM or approved personnel to expedite the accreditation process. It is important to capture areas which will be covered up during construction. Pictures shall include the SCIF and CA perimeters and should capture:

- Wall construction
    - Stud walls
    - Acoustic installation
    - Enhanced wall construction (9 gauge expanded metal)
    - R-foil or aluminum foil backed gypsum installation
    - Wall finishes (true floor to true ceiling)
    - Wall penetrations
- Duct construction including inspection ports and acoustic baffles
- Man-bar construction
- Sound masking devices

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APPENDIX A REFERENCES

THE AMERICAN INSTITUTE OF ARCHITECTS

Architectural Graphics Standards

DEPARTMENT OF DEFENSE

Manuals:
http://www.dtic.mil/whs/directives/corres/pub1.html

\1\ DoDM 5105.21-Volume 1, *Sensitive Compartmented Information (SCI) Administrative Security Manual: Administration of Information and Information Systems Security* /1/

DoDM 5105.21-Volume 2, *Sensitive Compartmented Information (SCI) Administrative Security Manual: Administration of Physical Security, Visitor Control, and Technical Security*

DoDM 5200.01 Volume 3, *DoD Information Security Program: Protection of Classified Information*

\1\

Directives

http://www.dtic.mil/whs/directives/

DoD 5200.8-R (DTM) 08-004, *Physical Security Program*, Department of Defense, Washington Headquarters Service, Executive Services and Communication Directorate, Directives and Records Division

/1/

Federal Specifications:
http://dodssp.daps.dla.mil/

FF-L-2740, *Locks, Combination*

FF-L-2890, *Lock Extension (Pedestrian Door, Deadbolt)*

\1\ FF-P-110, Padlock, Changeable Combination (Resistant to Opening by Manipulation and Surreptitious Attack) /1/

DIRECTOR OF NATIONAL INTELLIGENCE

Director of Central Intelligence Directive (DCID) No. 6/9, *Physical Security Standards for Sensitive Compartmented Information Facilities (superseded)*

Intelligence Community Directive (ICD) 705, *Sensitive Compartment Information Facilities*. http://www.ncix.gov/publications/policy/docs/ICD_705-Sensitive_Compartmented_Information_Facilities.pdf

Intelligence Community Standard Number 705-1 (ICS 705-1), *Physical and Technical Security Standards for Sensitive Compartmented Information Facilities* http://www.ncix.gov/publications/policy/docs/ICS_705-01_Physical_and_Technical_Security_Standards_for_Sensitive_Compartmented_Information_Facilities.pdf

Intelligence Community Standard Number 705-2 (ICS 705-2), *Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information* http://www.ncix.gov/publications/policy/docs/ICS_705-02_Standards_for_the_Accreditation_and_Reciprocal_Use_of_Sensitive_Compartmented_Information_Facilities.pdf

IC Tech Spec-for ICD/ICS 705, *Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities* http://www.ncix.gov/publications/policy/docs/Technical_Specifications_for_SCIF_Construction-V1.2.pdf

COMMITTEE ON NATIONAL SECURITY SYSTEMS INSTRUCTION (CNSSI)

CNSSI No. 7000, *TEMPEST Countermeasures for Facilities (Confidential)*

NATIONAL SECURITY TELECOMMUNICATION AND INFORMATION SYSTEMS SECURITY (NSTISS)

NSTISSI No.7003, *Protective Distribution Systems (PDS)*

http://www.cnss.gov/instructions.html

NATIONAL FIRE PROTECTION ASSOCIATION
http://www.nfpa.org

NFPA 101, *Life Safety Code*

UNDERWRITER'S LABORATORIES, Inc.
http://www.ul.com

UL 634, *Standard for Connectors and Switches for Use with Burglar-Alarm Systems*

UL 639, *Standard for Intrusion-Detection Units*

UL 681, *Installation and Classification of Burglar and Holdup Alarm Systems for Alarm System Installation*

UL 1711, *Amplifiers for Fire Protective Signaling Systems*

UL 2050, *National Industrial Security Systems;* UL 2050 materials are restricted and only distributed to those demonstrating relevant national industrial security involvement

UNIFIED FACILITIES CRITERIA
http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4

UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings*

UFC 4-010-02, *DoD Minimum Antiterrorism Standoff Distances for Buildings (FOUO)*

UFC 4-020-01, *DoD Security Engineering: Facilities Planning Manual*

UFC 4-020-02, *DoD Security Engineering: Facilities Design Manual*, currently in Draft and unavailable

UFC 4-021-02NF, *Security Engineering: Electronic Security Systems*

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APPENDIX B GLOSSARY

ACRONYMS

ACS	Access Control System
AO	Accrediting Official
BIA	Bilateral Infrastructure Agreements
CA	Compartmented Area
CSP	Construction Security Plan
CTTA	Certified TEMPEST Technical Authority
DNI	Director of National Intelligence
FFC	Fixed Facility Checklist
HNFA	Host Nation Funded Construction Agreements
HSS	High Security Switch
IC	Intelligence Community
IDS	Intrusion Detection System
MNS	Mass Notification System
NSI	National Security Information
PCU	Premise Control Unit
RF	Radio frequency
SETL	Security Environment Threat List
SCI	Sensitive Compartmented Information
SCIF	Sensitive Compartmented Information Facilities
SID	Security-in-depth
SOFA	Status of Forces Agreements
SSM	Site Security Manager

STC Sound Transmission Class

SWA Secure Working Area

TSWA Temporary Secure Working Areas

VTC Video teleconference

DEFINITION OF TERMS

Accrediting Official (AO): Person designated by the Cognizant Security Authority (CSA) that is responsible for all aspects of SCIF management and operations to include security policy implementation and oversight.

Black Equipment: A term applied to equipment that processes only unclassified and/or encrypted information.

Black LAN: A term applied to equipment, cables, or fiber that processes or carries only unclassified and/or encrypted information.

Certified TEMPEST Technical Authority (CTTA): U.S. Government employee who has met established certification requirements in accordance with NSTISSC-approved criteria and has been appointed by a U.S. Government department or agency.

Closed Storage: The storage of SCI material in properly secured GSA approved security containers within an accredited SCIF.

Cognizant Security Authority (CSA): The single Principal designated by a SOIC (see definition of SOIC) to serve as the responsible official for all aspects of security program management with respect to the protection of intelligence sources and methods, under SOIC responsibility.

Compartmented Area (CA): The a room, a set of rooms, or an area that provides controlled separation between compartments within a SCIF.

Construction Security Plan (CSP): A plan developed by the Site Security Manager (SSM) and approved by the AO, which outlines security measures to be followed to ensure security of the construction site and compliance with the SCIF construction requirements.

Continuous Operation: This condition exists when a SCIF is staffed 24 hours every day.

Inspectable Space. The three-dimensional space surrounding equipment that processes classified or sensitive information within which TEMPEST exploitation is not considered practical or where legal authority to identify and remove a potential TEMPEST exploitation exists. Inspectable space may include parking areas around the facility which are owned or randomly inspected daily by the organization, public roads along which parking is not allowed, heavily wooded or other undeveloped areas with restricted vehicular access, and any areas where U.S. security personnel have unannounced 24-hour access.

Open Storage: The storage of SCI material within a SCIF in any configuration other than within GSA approved security containers.

Red Equipment: A term applied to equipment that processes unencrypted NSI that requires protection during electrical/electronic processing.

Red LAN: A term applied to equipment, cables, or fiber that processes or carries unencrypted National Security Information (NSI) that requires protection during electrical/electronic processing.

Secure Working Area: An accredited SCIF used for handling, discussing and/or processing of SCI, but where SCI will not be stored.

Security Environment Threat List (SETL): Classified List managed by the Office of Intelligence and Threat Analysis (ITA). The SETL reflects four categories of security threat, including political violence and crime for U.S. missions overseas.

Site Security Manager (SSM): Person designated by the Accrediting Official (AO) that is responsible for all aspects of SCIF management and operations to include security policy implementation and oversight.

Sensitive Compartmented Information (SCI): Classified information concerning or derived from intelligence sources, methods, or analytical processes, which is required to be handled within formal access control systems established by the Director of Central Intelligence.

Sensitive Compartmented Information Facility (SCIF): Accredited area, room, group of rooms, buildings, or installation where SCI may be stored, used, discussed, and/or processed.

Sound Transmission Class (STC): The ability of a SCIF structure to retain sound within the perimeter is rated using a descriptive value.

STC Rating: STC is a single number rating used to determine the sound barrier performance of walls, ceilings, floors, windows, and doors.

TEMPEST: TEMPEST refers to the investigation, study, and control of Compromising Emanations of National Security Information (NSI) from telecommunications and information processing systems.

Telecommunications System. Any system that transmits an analog or digital signal over a physical (cable or wire) or non-physical (wireless) connection. This includes systems such as information technology, control, cable television, electronic security, fire alarm, paging, intercom, public address, and mass notification.

Temporary Secure Working Areas (TSWAs): An accredited facilities where handling, discussing, and/or processing of SCI is limited to less than 40-hours per month and the accreditation is limited to 12 months or less.

U.S. Person: An individual who has been lawfully admitted for permanent residence as defined in 8 U.S.C. 1101(a)(20) or who is a protected individual as defined by Title 8 U.S.C. 1324b (a)(3), and able to provide two forms of identification listed on Department of Homeland Security Form I-9, Employment Eligibility Verification.

Vault: A room(s) used for the storing, handling, discussing, and/or processing of SCI and constructed to afford maximum protection against unauthorized entry.

APPENDIX C MINIMUM CONSTRUCTION

Table C-1 Minimum SCIF Wall Construction and Alarm

	CLASSIFICATION	WALL CONSTRUCTION[1]	IDS[3]	ACS[4]	DURESS
INSIDE UNITED STATES	Open Storage without SID[5]	Wall B - Enhanced Wall (Expanded Metal)[2] Wall C - Enhanced Wall (Fire Retardant Plywood)[2]	YES	YES	NO
INSIDE UNITED STATES	Open Storage with SID[5]	Wall A - Standard Wall[2]	YES	YES	NO
INSIDE UNITED STATES	Closed Storage	Wall A - Standard Wall[2]	YES	YES	NO
INSIDE UNITED STATES	Continuous Operations	Wall A - Standard Wall[2]	YES	YES	NO
INSIDE UNITED STATES	Secure Working Area (SWA)	Wall A - Standard Wall[2]	YES	YES	NO
OUTSIDE UNITED STATES	SETL Cat I				
OUTSIDE UNITED STATES	Open Storage	Vault [2]	YES	YES	RECOMMENDED
OUTSIDE UNITED STATES	Closed Storage	Wall B - Enhanced Wall (Expanded Metal)[2] Wall C - Enhanced Wall (Fire Retardant Plywood)[2]	YES	YES	NO
OUTSIDE UNITED STATES	Continuous Operation	Wall B - Enhanced Wall (expanded Metal)[2] Wall C - Enhanced Wall (Fire Retardant Plywood)[2]	YES	YES	YES
OUTSIDE UNITED STATES	SETL Cat II & III				
OUTSIDE UNITED STATES	Open Storage	Wall B - Enhanced Wall (expanded Metal)[2] Wall C - Enhanced Wall (Fire Retardant Plywood)[2]	YES	YES	RECOMMENDED
OUTSIDE UNITED STATES	Closed Storage	Wall B - Enhanced Wall (Expanded Metal)[2] Wall C - Enhanced Wall (Fire Retardant Plywood)[2]	YES	YES	NO
OUTSIDE UNITED STATES	Continuous Operation	Wall A - Standard Wall[2]	YES	YES	RECOMMENDED
OUTSIDE UNITED STATES	Secure Working Area (SWA)	Wall A - Standard Wall[2]	YES	YES	RECOMMENDED

Notes:

1. Table indicates the minimum wall construction, Accrediting Official shall determine construction requirements based on Risk Assessment.
2. Refer to IC Tech Spec-for ICD/ICS 705 for wall construction definitions and details. Include Radio Frequency (shielding) protection and sound attenuation as required.
3. IDS - Intrusion Detection System
4. ACS - Access Control System: Automated ACS is not required.
5. SID - Security In Depth

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APPENDIX I

AF FORM 103, BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST

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BASE CIVIL ENGINEER WORK CLEARANCE REQUEST

Permit Number:

1. Clearance is requested to proceed with work at ______________________ on Work Order No. ____________

Contract No. ____________ involving excavation or utility disturbance per attached sketch.

2. **Description of Work: Particularly describe in detail all ground penetrations.**

3.

INSTRUCTIONS: This BCE Work Clearance Request is required for any work that may disrupt aircraft or vehicular traffic flow, base utility services, fire protection, intrusion alarm systems, air quality, water quality, stormwater flow, biovents/monitoring wells, recreations trails/activities, wetlands, vegetation or routing activities of the installation. Work must be coordinated in order to minimize customer inconvenience and ensure the safety of contract workers and base personnel. This request must be processed prior to start of work. If work is not started within 30 days of the approval date or it is suspected that job site conditions have changed, this request must be reprocessed by all shops and validated by the approving officer. Further guidance concerning utilities can be found in

BCE shops are only at buliding 5327 from 0800-1000 Tues and Thurs from 1 Apr-30 Sept. Coordination of work requests from 1 Oct-31 Mar must be made at each individual shop from 0800-1100 or 1300-1600 Mon-Fri (Excluding Federal holidays).

4. Requester's Name:	5. Phone No.	6. Organization:

	ORGANIZATION	Utilities in Area		Locate Date	Printed Name and Signature	Remarks Use Block 16 for additional
		Yes	No			
7. BASE CIVIL ENGINEERS	A. Environmental Bldg 5312 552-7305/3865					
	B. Steam/Heat Distr Lines-HVAC Bldg 5327 552-3831/8131					
	C. Water and Sewer Lines Bldg 5327 552-3024					
	D. Alarm Shop Bldg 5337 552-4046/4037 244-0517					
	E. Electrical Distribution Bldg 5329 552-4280/4084					
	F. POL Distribution Bldg 8306 552-3334					
	G. Cathodic Protection Bldg 8306 552-3334					
	H. Drainage, Pavmts, Grounds, RIDS Bldg 9361 552-2994/2995					
	I. Fire Department Station #2 Bldg 5126 552-2620/8108					
	J. Power Pro Bldg 10306 552-2715					
	K Drafting Bldg 6326 Rm 166 552-0050					
	L. Constr Management (JBER-R) Bldg 730 384-3081					

ORGANIZATION		Utilities in Area Yes	No	Locate Date	Printed Name and Signatures	Remarks Use Block 16 for additional
8.	Security Forces - SFO (JBER-R) Bldg 656 384-0812					
9.	Base Communications Cable Maintenance Bldg 6230 Rm 15 552-8541					
10.	Airfield Management Bldg 11369 552-2107					
11.	Cable TV (GCI), Natural Gas (ENSTAR), Commerical Telephone (ACS), ALASCOM Communications Alaska Dig Line 278-3121					Locate Number:
12.	RF Transmission Systems Bldg 6230 Rm 21 552-5141					
13.	673 ABW Ground Safety Bldg 10471 2nd Floor 552-6850					
14.	3 WG Weapons Safety Bldg 10427 3rd Floor 552-6856					
15.	Privatized Housing 753-1023/1024 Bldg 6350 Arctic Warrior Drive					

16. Additional Remarks:

17. Clearance request ☐ Approved ☐ Disapproved

18. Work Must Start Prior To:

19. Signature of Approving Officer: *(Chief, Operations Chief, Engineering)*

20. Approval Date:

Work Clearance is not valid until a permit number is assigned. Permit numbers are assigned in the 3 CES office (Bldg 6326, after the approving officer has signed. Approved work is limited to the description in Block 2 and attached drawings.