

# **PSEG LI**

**PSEG Long Island LLC**

## **Single Phase Padmounted Transformer Specifications for Customers & Electrical Contractors**

**Revised July 2014**

**Distribution Design  
T&D Engineering**

**SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS**

**TABLE OF CONTENTS**

Section I Introduction.....2

Section II Foundation and Transformer Installation.....3

Section III Primary Wiring.....3

Section IV Transformer and Associated Equipment.....5

Section V Services.....5

**ILLUSTRATIONS AND CONSTRUCTION STANDARDS**

Illustration #1: Padmount Transformer Primary & Secondary Components

Illustration #2: Secondary Spade Connection Detail

CS 3722: Loadbreak Elbow Terminators

CS 3727: Loadbreak Bushing Inserts

CS 3950: General Notes

CS 3960: Single Phase Padmount Transformer

CS 4025: Lightning Protection Single Phase

CS 5369: Protection for Padmount Transformers

CS 5370: Transformer Location Adjacent to Building

# **SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS**

## **Section I: Introduction**

1. This specification covers the material and design requirements of PSEG Long Island (PSEG LI) for “ Dead-Front”, single phase padmount transformers ranging in size from 25 kVA to 167 kVA.
2. Single phase secondary service shall not exceed 800 amperes at 120/240 volts for padmount transformers.
3. The applicant or customer shall consult Distribution Design Department before plans are finalized, equipment or material purchased or construction commenced on facilities to be connected to PSEG Long Island’s (PSEG LI) electric system.
4. All installations shall conform to the requirements of the National Electric Code (NEC), National Electric Safety Code (NESC), and the City of New York Electrical Code (where applicable), latest editions.
5. All installations shall conform to LIPA’s “Specifications and Requirements for Electric Installations” (Red Book). Specific job details will be outlined in a specification letter provided to the customer’s representative/contractor by the Customer Planning Representative.
6. The customer’s electrical contractor or consultant shall furnish all information requested by PSEG LI including but not limited to size of present load and expected future load in kW, equipment specifications, and any unusual requirements.
7. The customer or applicant shall be advised of the available service voltage and applicable fees and rates by the Customer Planning Representative.
8. Summary of General Responsibilities:

In a Single Phase Padmount installation the customer/contractor will provide and install the fiberglass boxpad as specified as in Section II. The customer/contractor is also responsible for both primary, secondary wiring and connections and shall provide all primary and secondary cable.

# SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS

## Section II: Foundation and Transformer Installation

### SINGLE PHASE PADMOUNT TRANSFORMER

1. The customer shall furnish, install, own and maintain the fiberglass boxpad, ground rod, and all wiring.
2. BOXPAD SPECIFICATIONS
  - a) Boxpads shall be manufactured in accordance with specification PT14-07-003, current revision. All boxpad's shall be fiberglass reinforced dark green. The top surface shall be 43 1/2 in. front to back, 37 1/2 in. wide, 32 in. high, with six 3/8 in. x 16 TPI threaded inserts.
3. FIBERGLASS BOXPAD INSTALLATION CLEARANCES:

Reference: CS 3960, CS 5369, CS 5370

- a) A clear working space of 10 feet minimum shall be maintained in front of the padmounted transformer door. The door shall be kept clear of obstructions and shall face away from all building and structures. See above CS's for details.
- b) A minimum of 5 feet shall be maintained between padmounted transformer and adjacent structures. See CS 5370 for details.

## Section III: Primary Wiring

### 1. PRIMARY CABLE SPECIFICATION:

2/C (two conductor) - #2 or #1/0 aluminum or copper concentric or compressed round stranded with copper concentric neutrals. #2 conductor shall have 10-#14 neutral strands and #1/0 conductor shall have 16-#14 neutral strands.

### INSULATION SYSTEM:

Conductor shield: The center conductor shall be covered with a uniform layer of extruded semi-conducting material that is compatible with the conductor and easily removable with conventional stripping tools. The conductor shield minimum thickness shall be 12 mils.

Insulation: 15 kV tree-retardant cross linked polyethylene (TR-XLPE) insulation for aluminum conductor or ethylene propylene rubber (EPR) insulation for copper conductor. Insulation thickness shall be 220 mils.

## **SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS**

Insulation shield: Extruded over the insulation, there shall be a UV stabilized, weather resistant layer of black semi-conducting material compatible with the insulation and copper neutral strand. The insulation shield shall be easily removable with conventional stripping tools. The insulation shield minimum thickness shall be 30 mils.

Jacket: The cable shall have a 50 mil thick black linear low density polyethylene jacket extruded to fill over the concentric neutrals, yet shall be free stripping from the insulation shielding.

**NOTE:** Only semi-conducting jacket material may be direct buried with other facilities (such as communications cables); cable with insulating jacket material must be installed in conduit on public highways and in the presence of direct buried communications facilities.

### **CABLE IDENTIFICATION:**

1. Cable identification shall meet the requirements of AEIC Specification No. CS-5.
2. Jacket shall have identification markings along the entire length as follows:
  - ◆ Three (225 mils wide by 6 mils thick) durable extruded red identification stripes that run longitudinally 120 degrees apart for the entire length of the conductor jacket.
  - ◆ Permanent printed information markings at maximum intervals of 24 inches apart that state the following:
    - ◆ Name of manufacturer.
    - ◆ Year of manufacture.
    - ◆ Conductor size and material.
    - ◆ Type and thickness of insulation.
    - ◆ Type of jacket.
    - ◆ Cable voltage rating.
    - ◆ NESC “Lightning Bolt” before and after the words “ Electric Cable”.
2. PSEG LI’s Customer Planning Representative may request from the customer or contractor a three foot sample of the cable for inspection.
3. Primary cable may be direct buried or installed in schedule 40 PVC conduit below grade. Non-metallic conduit used above grade must be schedule 80 PVC. Cable installed in conduit from the transformer to the riser pole must have a splice box installed at the property line. Direct buried cable must be a minimum of 30 inches below final grade on private property and 42 inches below final grade in the public

## **SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS**

right-of-way. Cable installed in schedule 40 conduit must be a minimum of 24 inches below final grade.

### **Section IV: Transformer and Associated Equipment**

#### **SINGLE PHASE PADMOUNT TRANSFORMER**

Reference: Illustration #1 – pg. 7, CS 3722, CS 3727, CS 3960, CS 4025

- 1) The padmount transformer is delivered and set onto the fiberglass boxpad by PSEG LI and secured via two penta-head bolts. The customer's contractor will be supplied with the appropriate number of bushings, loadbreak elbow terminators and elbow surge arrestors.
- 2) The customer's contractor shall install loadbreak elbow terminators onto the cable according to CS 3722 and in conjunction with the elbow manufacturer's cutback length instructions as explained in step 6 on page 2 of 8 of CS 3722. *For crimping instructions and tool/die requirements, see crimp chart on CS 3722, sheet 8 of 8.*
- 3) The bushings shall be individually bonded with a #14 AWG bare copper conductor that is attached to the "bonding eye" on the bushing and bonded to the transformer ground lug which is installed by the contractor.
- 4) The customer's contractor shall install the elbow surge arrester onto the transformer as shown on CS 4025. PSEG LI will supply one #2 copper lug and one copper hot line clamp. The arrester shall be bonded using a #10 AWG bare copper conductor that is attached to the "bonding eye" on the arrester housing, wrapped around itself and secured to the ground stud.
- 5) Primary and secondary cable shall have a minimum of 6 feet of slack inside the fiberglass boxpad. Maintain as much physical separation between primary and secondary cable as possible inside the boxpad.

### **Section V: Services**

1. All secondary conductor installations governed by the City of New York Electrical Code – latest edition, regardless of voltage characteristics, must obtain approval from PSEG LI prior to the commencement of work.
2. Service conductors shall be of type XHHW - 2, RHW - 2, THW - 2, THWN - 2 when installed in conduit. Service conductors of type USE - 2 may be direct buried or installed in conduit.

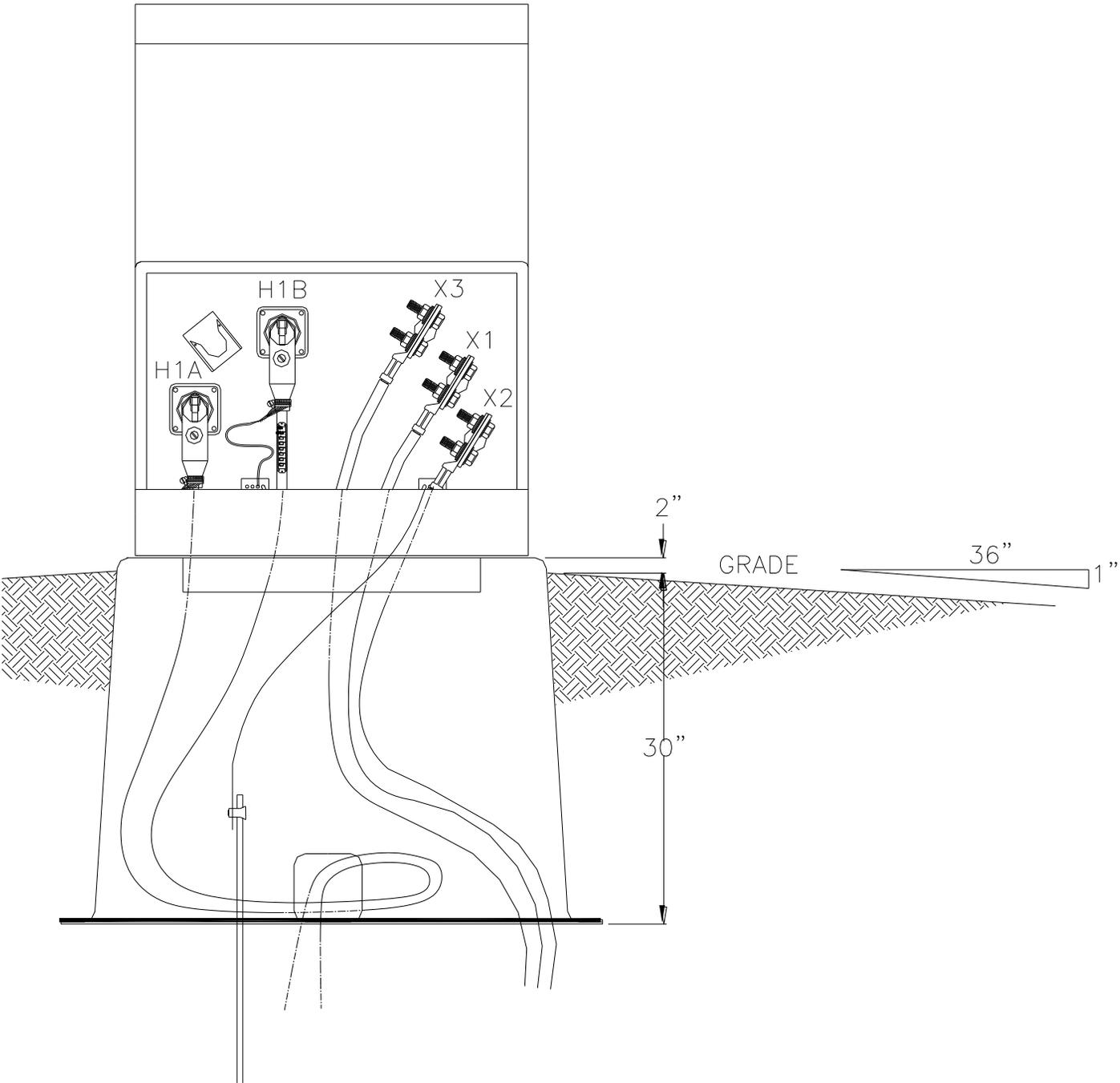
## **SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS**

### **SINGLE PHASE PADMOUNT TRANSFORMER**

Reference: Illustration #1 – pg. 7, Illustration #2 – pg. 8.

- a) A maximum of 4 conductors are permitted, per phase, for the connection to 25 - 167 kVA padmount transformers.
- b) If required for service installation, up to 8 sets may be permitted in the padmount with the use of the appropriate spade extension.
- c) All connections to the transformer secondary terminals shall be made with a 2-hole NEMA terminal lug. See illustration #2 – pg. 8.

**SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS**



**Illustration #1: Padmount Transformer Primary & Secondary Components**

# SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS

## SECONDARY SPADE CONNECTION:

Description: Terminal Lug

1. Terminal Lug – Compression Connector – Tinned Aluminum or Copper. For up to 500 MCM compressed or concentric copper or aluminum secondary cable. NEMA 2-hole pad for ½ inch diameter bolts (stud size). Aluminum lug's bore shall be coated with oxide inhibiting compound and plugged. Connector shall be marked with manufacturer's name, cable size, type of conductor stranding and die index number. Connector barrel shall not have an inspection hole. Connector shall meet or exceed EEI-NEMA Standard TDJ-162, Class A-3.

Follow manufacturer's compression tool and die recommendations for installing terminal connectors. For an aluminum to copper connection, an additional bellville spring washer must be installed on the bolt side of the lug.

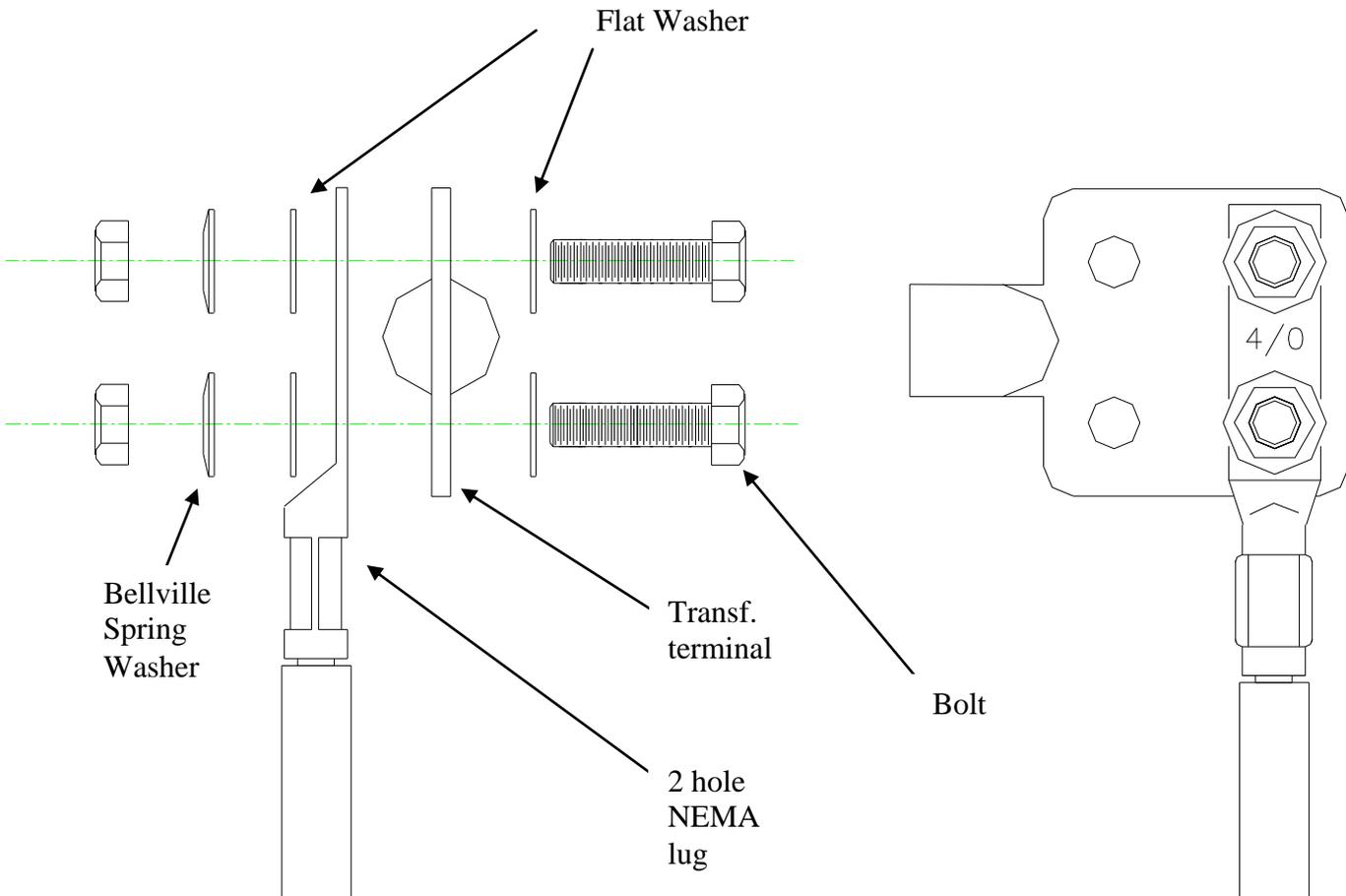


Illustration #2 – Secondary Spade Connection Detail

## **SINGLE PHASE PADMOUNTED TRANSFORMER SPECIFICATIONS**

2. Lug to spade connection shall conform to the following:
  - a) All copper components shall be tin or alloy plated.
  - b) Wire brush aluminum conductor and apply oxide inhibitor compound to aluminum lug pad prior to connection to transformer spade. All excess compound must be removed after lug is secured. (Not required for tinned copper lugs.)
  - c) Connect lug to transformer stud utilizing tinned or cadmium plated silicon bronze or stainless steel hardware. Place concave side of bellville washer toward transformer stud. Recommended torque value for bolts: 480 in-lbs. for silicon bronze and 517 in-lbs. for stainless steel.

# Loadbreak Bushing Insert Installation Instructions

## Precautions

- 1) All apparatus must be de-energized during the installation of the loadbreak bushing insert. Inspect the loadbreak bushing insert and bushing well for damage.
- 2) Read and follow all manufacturers instructions supplied with the loadbreak bushing inserts.

## Replacement Requirements

- 3) For field conditions where a loadbreak elbow experiences a fault or obvious failure, the elbow and bushing must be replaced with new components from the same manufacturer. Bushing inserts and loadbreak elbows are stocked as a set from the same manufacturer.

In existing installations, where routine (non-fault condition / non-Loadbreak elbow failure) jobs are in progress, any loadbreak elbow found to be in good condition may be left in service. The existing elbow may be reinstalled into a new loadbreak bushing with no elbow replacement.

Additional situations where loadbreak elbow connector replacement is recommended:

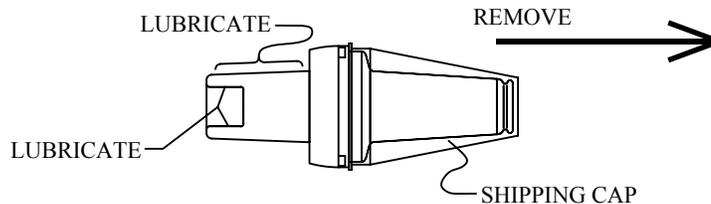
- a. when a faulted elbow is found to have an aluminum compression connector (non-coppertop), replace all three phases.
- b. when an elbow in an enclosure is found to be damaged, deformed or swollen.
- c. when elbow is not imprinted with the 8.3 / 14.4 kV rating and is not accordingly marked with the white and black bands around the cable entrance portion of the elbow.
- d. When the temperature of the elbow terminator is more than 20°C above the ambient temperature of the adjacent cable.

Refer to CS-3722 for the loadbreak elbow installation instructions.

## Installation Instructions

### Clean and Lubricate

- 4) Inspect the apparatus bushing well to be sure it is dry and free from all contaminants. Contamination will cause electrical failure.
- 5) Remove the protective shipping cap from the bushing insert. Lubricate the Bushing well interface area of the bushing insert with the supplied lubricant or using (ITEM ID.101045). Do not use any other greases or silicone products as a substitute.



APPROVED BY: *[Signature]* DATE: 7/22/14

REVISION
6. 06/14: UPDATE NOTES & REVISED TITLE BLOCK

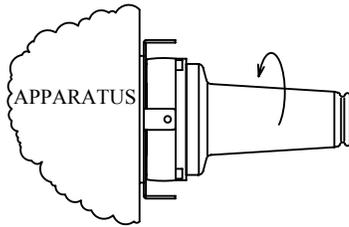
CABLE JOINTS: PRIMARY  
**INSTALLATION INSTRUCTIONS**  
 15 kV, 200 AMP  
**LOADBREAK BUSHING INSERT**

DO NOT REVISE PRINT BY ANY OTHER METHOD THAN AUTO-CAD  
 PREPARED BY: **PSEG LONG ISLAND T&D ENGINEERING**

CONSTRUCTION STANDARD DRAWN BY AH		
NUMBER	SHEET No	REV
3727	1 of 5	6

## Installing Existing Older Loadbreak Bushing Insert Without an Internal Hex Broach

- 6a) Place the threaded end of the bushing insert in the apparatus bushing well.  
Hand tighten the bushing insert in a clockwise direction until it bottoms.  
Do not over tighten. This may cause the bushing well stud to snap off.

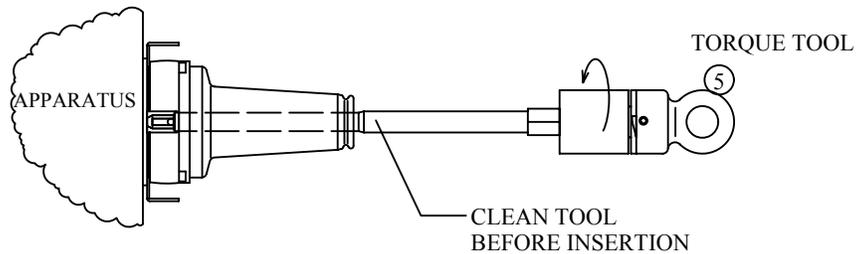


NOTE:

De-energized cleaning and lubricating instructions apply to existing bushings as well as newly installed bushing devices. On existing equipment the reuse of 15 kV bushings implies that the bushings be free of contaminants and properly lubricated with silicone grease.

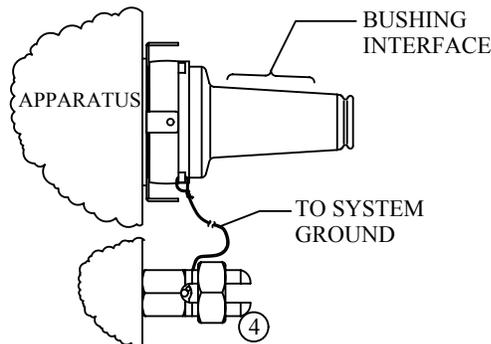
## Alternate Method for Installing Newer Style Loadbreak Bushing Insert with an Internal Hex Broach Compatible with the 200 AMP Insert Torque Tool - ITEM ID. 160105

- 6b) Place the threaded end of the bushing insert into the apparatus bushing well. Insert the torque tool in the bore of the bushing insert. Turn the tool slightly to engage the hex broach. Insert a suitable rod through the eye of the tool and turn in a clockwise direction until the tool begins to ratchet and makes an audible click. Remove the torque tool from the bushing insert. The torque tool tightens the bushing to approximately 10 to 15 FT-LBS.



### ▶ Connect Drain Wire Between Bushing Body and System Ground

- 7) Push a length of neutral strand (or a 14 AWG copper wire) through one of the grounding eyes on the bushing insert. Make a small loop and twist tight taking care not to damage the grounding eye. Connect the free end of the grounding wire to the ground pad lug (ITEM ID. 124138) of the apparatus. The grounding wire should be installed in such a manner so as not to contact the bushing interface or adjacent bushing interfaces or interfere with the placement of accessories on nearby parking stands.



REVISION	6. 06/14: UPDATE NOTES & REVISED BLOCK	CABLE JOINTS: PRIMARY	CONSTRUCTION STANDARD		
			DRAWN BY AH		
		INSTALLATION INSTRUCTIONS 15 kV, 200 AMP LOADBREAK BUSHING INSERT	NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			3727	2 of 5	6

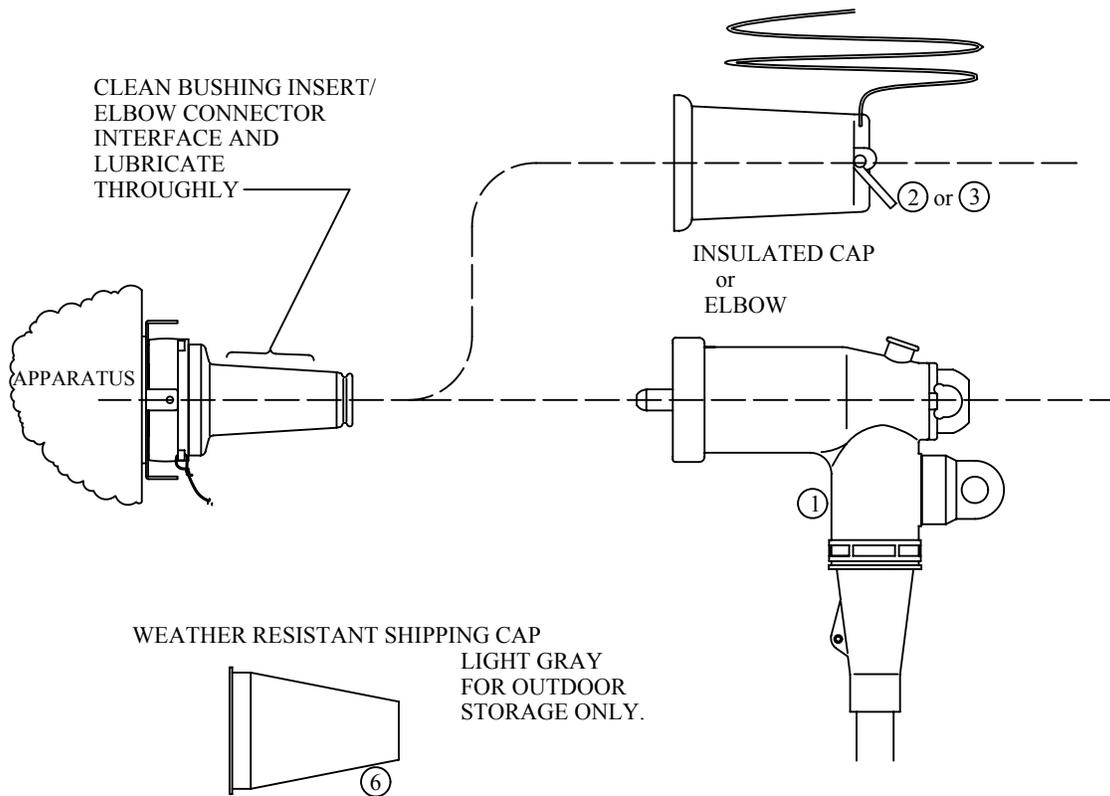
## Cover Loadbreak Bushing Insert

8) Do not leave the bushing interface exposed. Cover with the appropriate mating product as follows:

Using a clean cloth, thoroughly wipe the bushing interface clean of contaminants and lubricate with the supplied lubricant. Do not apply lubricant to the arc quenching material inside the bushing insert. Install load break elbow or insulated cap on all bushing inserts left energized. Refer to CS-3722 for the loadbreak elbow installation instructions, loadmake and loadbreak operating instructions. If the bushing insert is not energized and is to be stored outdoors, install a new light gray weather resistant shipping cap ITEM ID 160024. Do not energize or submerge the apparatus with the shipping cap on the bushing insert. This is a protective cap which is not insulated or water tight and only intended to keep the bushing surfaces clean during storage, handling and installation.

**Attention:** Some newer style load break bushing inserts may be equipped with a latch indicator ring that serves as a visual indicator to verify the mating component is properly seated on the bushing insert. Once the mating component has been properly installed on the bushing insert, the yellow or white ring should be completely covered. If any yellow or white is visible, the load break elbow or protective cap must be completely installed or "latched" before energizing to assure a proper connection.

▶ Also, some new bushing interfaces are red in color. This is to indicate it is a 15KV rated bushing and to distinguish it from bushings rated for higher voltages.



**CAUTION: NEVER ENERGIZE WITH SHIPPING CAP INSTALLED !**

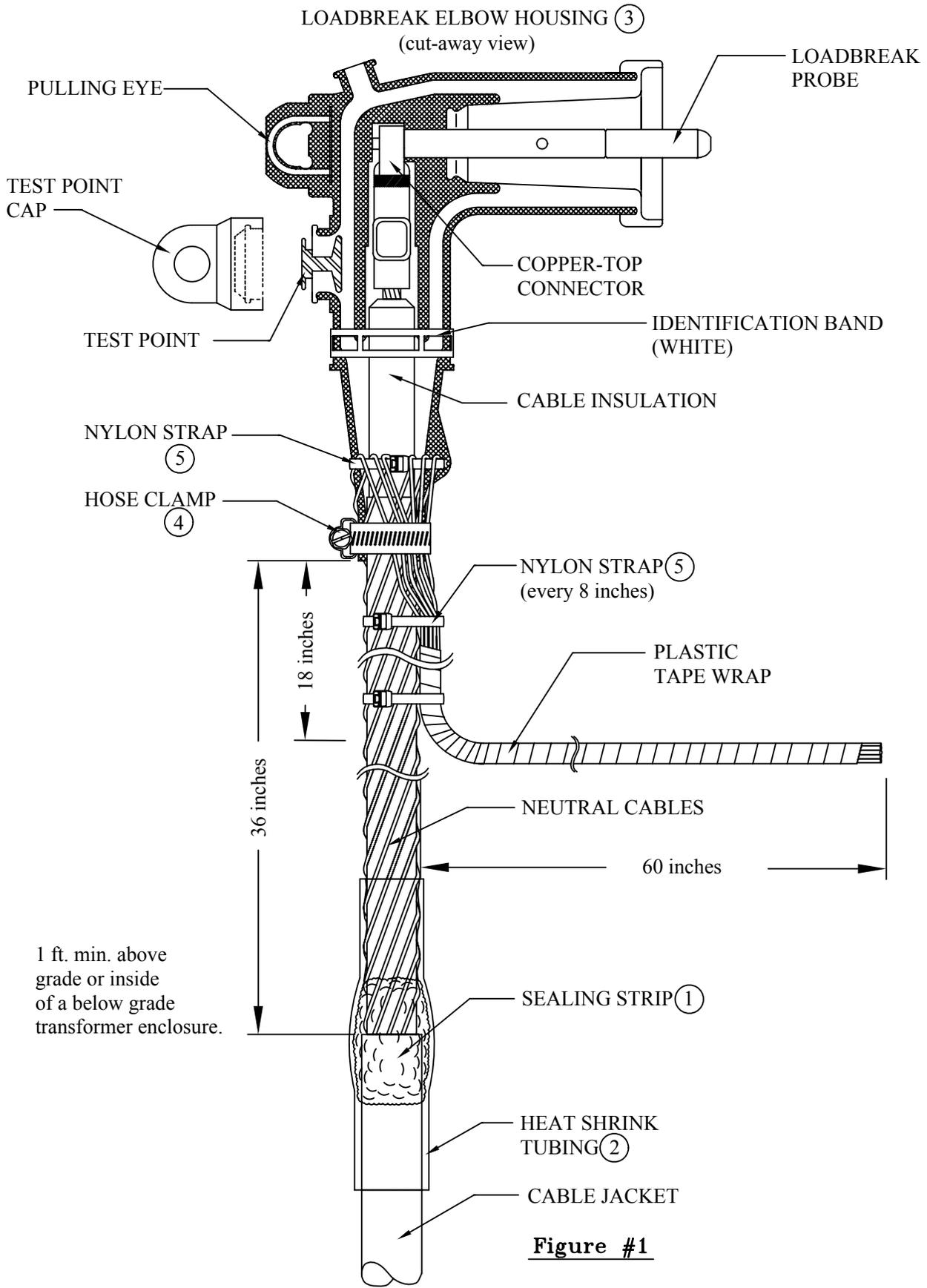
REVISION	▶	CABLE JOINTS: PRIMARY	CONSTRUCTION STANDARD		
	6. 06/14: UPDATE NOTES & REVISED BLOCK		DRAWN BY AH		
		INSTALLATION INSTRUCTIONS	NUMBER	SHEET No	REV
		15 kV, 200 AMP	3727	3 of 5	6
		LOADBREAK BUSHING INSERT			
prepared by PSEG LONG ISLAND T&D ENGINEERING					

## Bushing Insert Removal

- 9) De-energize apparatus, verify apparatus is de-energized and install grounds
- 10) Remove mating product and place in a stand-off device or in a clean, dry location.
- 11) Remove ground wire.
- 12) Use a 5/16" inch hex drive tool, torque tool or a strap wrench to remove.
  - a. If a hex drive tool or torque tool is used, insert the drive into the bushing insert. Turn the tool slightly to engage the hex broach. Turn counter-clockwise to remove.
  - b. If a strap wrench is used, wrap around the collar of the bushing insert. Turn counter-clockwise to remove. Take care not to damage the bushing insert interface during this procedure.

REVISION 	6. 06/14: UPDATE NOTES & REVISED BLOCK	CABLE JOINTS: PRIMARY  INSTALLATION INSTRUCTIONS 15 kV, 200 AMP LOADBREAK BUSHING INSERT	CONSTRUCTION STANDARD DRAWN BY AH		
			NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			<u>3727</u>	<u>4</u> of <u>5</u>	<u>6</u>





**Figure #1**

**PSEG LONG ISLAND**

APPROVED BY: *Richard Zambelli* DATE: 7/22/14

REVISION
17. 06/14: REVISED TITLE BLOCK

TERMINALS CABLE: PRIMARY

INSTALLATION AND OPERATING INSTRUCTION  
15kV 200 AMP LOADBREAK ELBOW TERMINATION  
FOR XLPE or EPR INSULATED Cu. OR AL. CABLE

DO NOT REVISE PRINT BY ANY OTHER METHOD THAN AUTO-CAD  
PREPARED BY: **PSEG LONG ISLAND T&D ENGINEERING**

CONSTRUCTION STANDARD		
DRAWN BY AH		
NUMBER	SHEET No	REV
3722	1 of 8	17

## INSTALLATION INSTRUCTIONS

1. Train the cable to the final assembled position. Six feet of cable should be extended beyond the bushing to provide sufficient system neutral to attach to the system neutral bus. A short length of #2 Cu cable, EPR insulated with a neoprene jacket ( ITEM ID. 199428 ) may be hylinked to the neutral in place of four feet of additional neutral required above. There should also be sufficient cable slack to provide adequate clearance for lifting and placing elbows on operating accessories such as standoffs and feed -thru devices.
2. Slide a 6 inch length of heat shrinkable tubing over the cable.
3. Strip the cable jacket to provide flexibility for elbow operation. In most situations approximately 3 feet of jacket back from the elbow can be removed. The jacket must be retained on all primary cable in contact with soil and for a minimum of 1 foot above finished grade.
4. Install a self locking nylon strap ( ITEM ID. 101003 ) over the neutrals 13 inches below the center of the bushing and fasten securely. Using self locking nylon straps, clamp the neutrals firmly against the insulation shield approximately every 8 inches. Carefully unwind and bend the neutrals back. Do not twist.
5. Cut the cable off 13 inches above the nylon strap.
6. Make the cable cutbacks in accordance with the manufacturers installation instruction sheet included with each kit. See manufacturers instructions for the exact cutback lengths. A brief summary is as follows:
  - a. Remove the insulation shield (semiconductor) by making a circumferential cut part way through the shield. Exercise extreme caution to avoid nicking the insulation beneath. Make several longitudinal cuts part way through the shield from the circumferential cut to the end. Again exercise care not to nick the insulation.

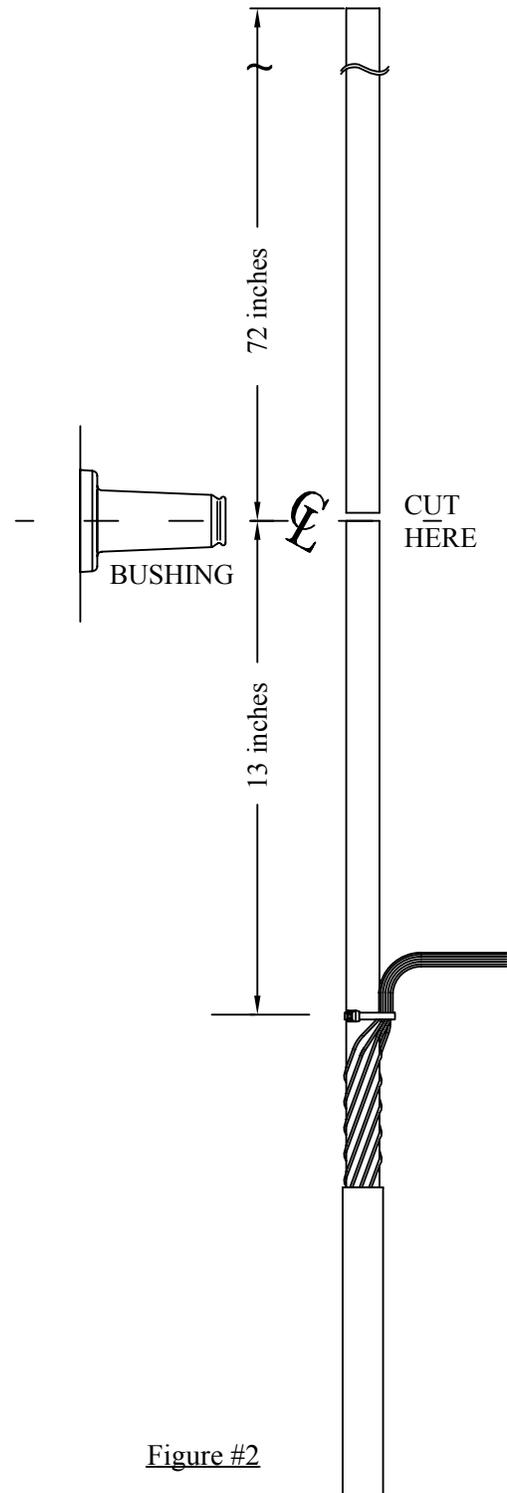


Figure #2

REVISION	17.06/14: REVISED TITLE BLOCK	TERMINALS CABLE: PRIMARY INSTALLATION AND OPERATING INSTRUCTION 15kV 200 AMP LOADBREAK ELBOW TERMINATION FOR XLPE or EPR INSULATED Cu. OR AL. CABLE	CONSTRUCTION STANDARD		
			DRAWN BY AH		
prepared by PSEG LONG ISLAND T&D ENGINEERING			NUMBER	SHEET No	REV
			3722	2 of 8	17

b. Prepare the cable end to accept the coppertop connector. Remove the insulation and conductor shield (semiconductor) from the end of the cable. Cut squarely being careful not to nick the conductor. Do not pencil. Apply a 1/8 inch Bevel to the end of the insulation. Fit the coppertop connector over the conductor. Check to make sure there is a 1/8 inch gap between the connector bottom and the insulation. This space is needed for expansion of the connector when it is crimped. Remove the connector and wipe the inhibitor grease off the conductor.

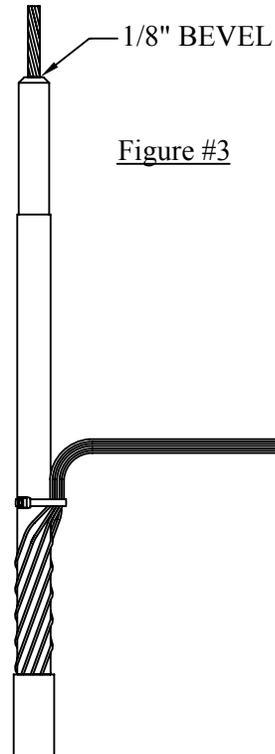


Figure #3

7. Wire brush ( ITEM ID. 519030 ) the bare aluminum conductors. Immediately place the coppertop connector containing inhibitor grease on the conductor. Make sure the threaded hole in the coppertop connector faces the bushing. Crimp the connector in place using a tool and die combination listed in Table 1. Place one crimp centered between the connector knurl and connector bottom.

8. Clean the excess inhibitor grease from the coppertop connector. Wipe toward the threaded eye with a lint free cloth saturated with safety solvent ( ITEM ID. 101374). Inhibitor residue can result in insulation damage and ultimate terminator failure.

Clean the exposed insulation surface with abrasive paper from the cleaning kits. (Item ID 101337) to remove all traces of semiconducting shielding and other foreign matter. Do Not Use Emery Cloth which contains conductive grit. Then wipe all exposed insulation surfaces clean with a lint free cloth saturated with safety solvent. Wipe towards the black semiconductor material without touching it. Be careful not to drag the black semiconductor material onto the clean insulation. In addition, clean the inside of the elbow housing, the cable entrance and the loadbreak bushing. [The solvent must be completely dry before applying any silicon grease.]

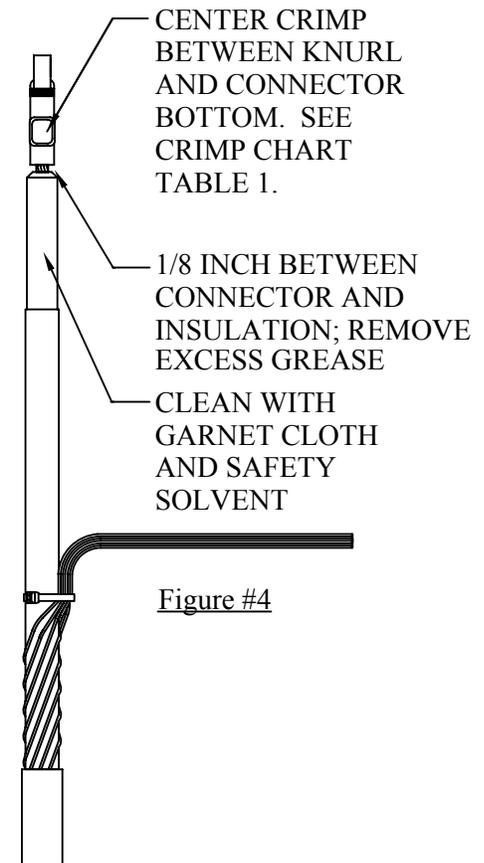


Figure #4

REVISION	17.06/14: REVISED TITLE BLOCK	TERMINALS CABLE: PRIMARY	CONSTRUCTION STANDARD		
		INSTALLATION AND OPERATING INSTRUCTION	NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING		15kV 200 AMP LOADBREAK ELBOW TERMINATION FOR XLPE or EPR INSULATED Cu. OR AL. CABLE	3722	3 of 8	17

9. Apply a thin coat of silicone grease supplied with the elbow kit to the exposed cable insulation, the elbow housing, the elbow cable entrance and the loadbreak bushing. Place the elbow onto the cable. With a twisting motion, push the elbow onto the cable until the threaded eye of the coppertop connector is visible through the elbow housing.

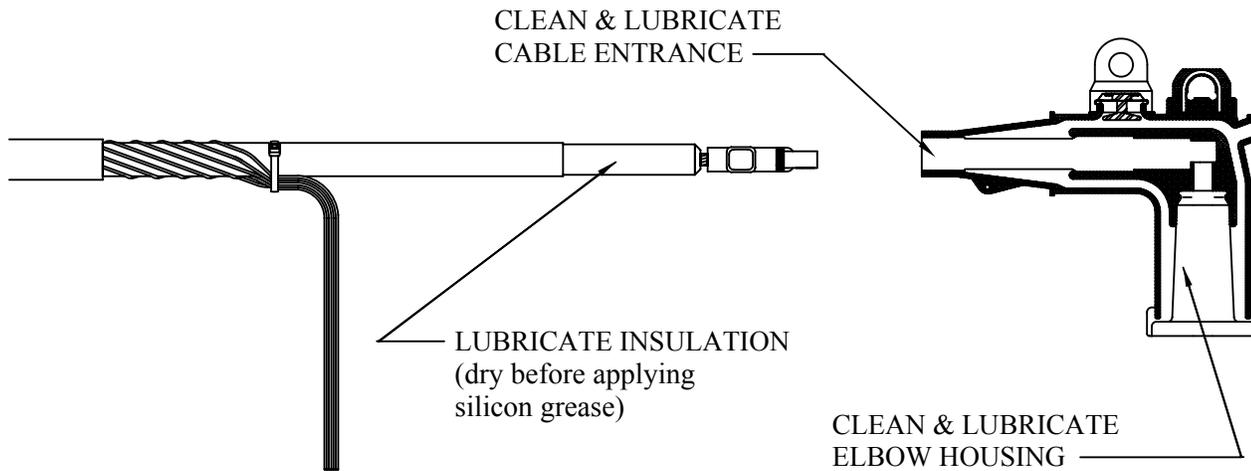


Figure #5

10. Insert the threaded end of the loadbreak probe into the elbow housing being careful not to contaminate the probe with silicone grease. By hand, thread the loadbreak probe into the threaded eye of the coppertop connector. Tighten the loadbreak probe with the torque applicator tool supplied with the elbow kit. Proper torque is applied when the torque applicator bends 180 degrees from its original shape. Discard the torque applicator. Do not reuse. As an alternative, one can use 15/25 kV probe installation tool made by Speed Systems (LPW 1525).

Probe installation tool may also be used to tighten the probe. After threading the probe into the threaded eye by hand, attach the installation tool to the probe and tighten until the tool click once.

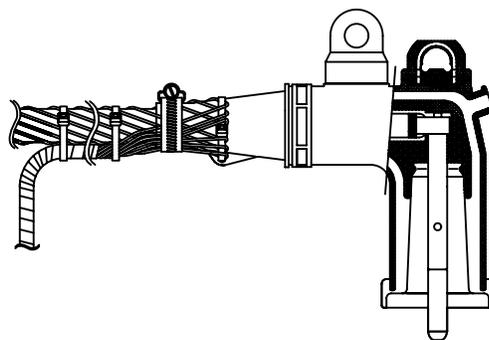
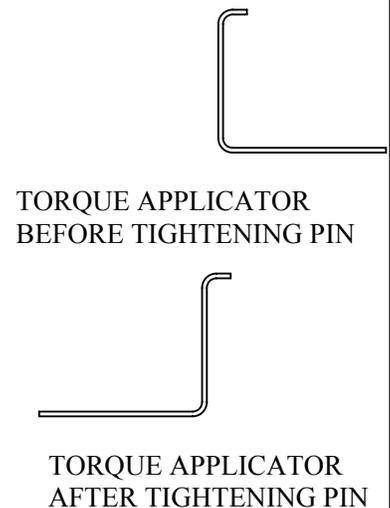


Figure #6



REVISION	17.06/14: REVISED TITLE BLOCK	TERMINALS CABLE: PRIMARY	CONSTRUCTION STANDARD DRAWN BY AH		
		INSTALLATION AND OPERATING INSTRUCTION 15kV 200 AMP LOADBREAK ELBOW TERMINATION FOR XLPE or EPR INSULATED Cu. OR AL. CABLE	NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			3722	4 of 8	17

11. Bring the neutrals onto the elbow cable entrance. SEE FIGURE 1.  
 Install a locking nylon strap over the neutrals and through the round eyelet at the base of the elbow. Bend the neutrals back over the nylon strap and install a hose clamp (ITEM ID. 121189 ) over both layers of neutral and the cable entrance. Tighten the hose clamp slowly until it is snug against the neutrals. Do Not Over Tighten. Gather the loose ends of the individual strands and form them into a parallel bundle of wires. Do Not Twist them tightly together; the individual strands will remain more flexible if not twisted together. Apply one half-lap layer of plastic tape to the last five feet of bundled neutral wire strands. Then, connect them to the neutral bus.
  
12. Apply (2) wraps of the sealing strip ( ITEM ID. 185003 ) over the neutral wires at the point were the neutral wires come out from under the cable jacket.
  
13. Center the heat shrink tube over the sealing strip. Apply heat to the heat shrink tube evenly until it has fully contracted.

**OPERATING INSTRUCTIONS**

Before Loadmake or Loadbreak Operation:

Area must be clear of obstructions or contaminants that would interfere with the operation of the loadbreak elbow. This position should allow the operator to establish firm footing and enable the operator to grasp the shotgun stick securely, maintaining positive control over the movement of the loadbreak elbow before, during and directly after the operating sequence. Do not connect two different phases of a multi-phase system. Before closing any RUD loop, use an approved phasing tool to make sure both ends are the same phase. Do not operate a loadbreak elbow on a bushing insert by hand.

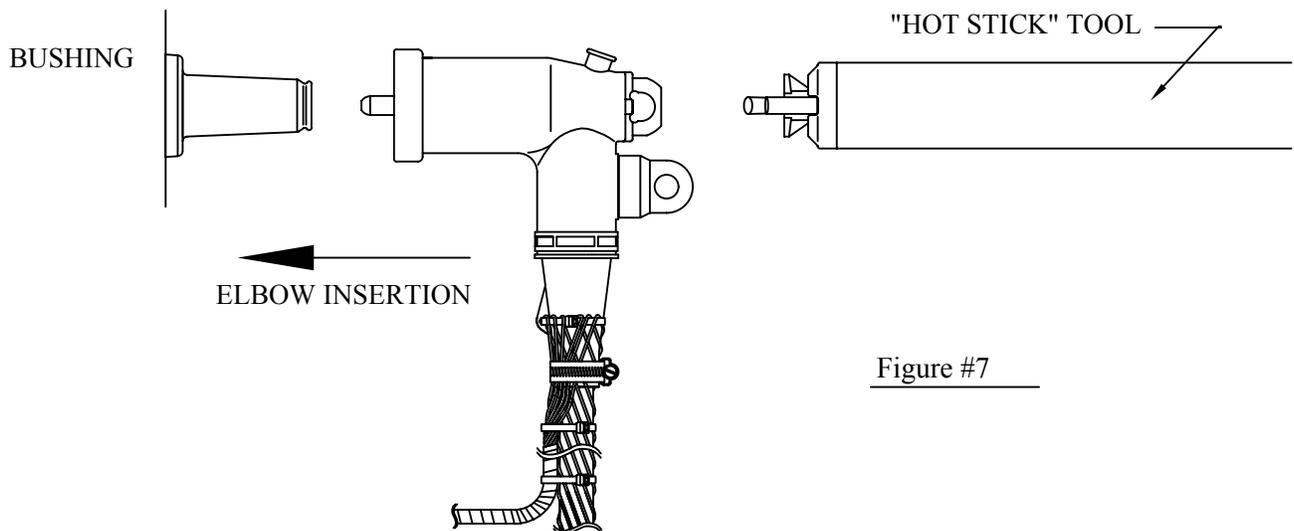


Figure #7

REVISION	17.06/14: REVISED TITLE BLOCK	TERMINALS CABLE: PRIMARY INSTALLATION AND OPERATING INSTRUCTION 15kv 200 AMP LOADBREAK ELBOW TERMINATION FOR XLPE or EPR INSULATED Cu. OR AL. CABLE	CONSTRUCTION STANDARD DRAWN BY AH		
			NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			<u>3722</u>	<u>5</u> of <u>8</u>	<u>17</u>

Loadmake Operation

1. Area must be clear of obstructions or contaminants that would interfere with the operation of the loadbreak elbow.
2. Securely fasten a shotgun stick to the pulling eye.
3. Place the loadbreak elbow over the bushing, inserting the load break probe into the bushing until the first slight resistance is felt. Resistance is felt when the arc follower portion of the loadbreak probe first meets the female contact of the bushing.
4. Immediately thrust the elbow onto the bushing with a fast, firm, straight motion, with sufficient force to latch the elbow to the bushing.

Fault Close

1. Do not operate the elbow on known faults.

Loadbreak Operation

1. Securely fasten a shotgun stick to the pulling eye.
2. To break surface friction between the elbow and the bushing, without exerting any pulling force, slightly rotate the loadbreak elbow clockwise while watching the bushing base. (Caution: If the base moves freely, do not turn the loadbreak elbow counterclockwise. The bushing may not be tightly seated.)
3. Withdraw the loadbreak elbow from the bushing with a fast, firm, straight motion, being careful not to place the elbow near a ground plane.
4. Place the loadbreak elbow on an appropriate accessory device.

REVISION 	17.06/14: REVISED TITLE BLOCK	TERMINALS CABLE: PRIMARY INSTALLATION AND OPERATING INSTRUCTION 15kV 200 AMP LOADBREAK ELBOW TERMINATION FOR XLPE or EPR INSULATED Cu. OR AL. CABLE	CONSTRUCTION STANDARD DRAWN BY AH		
			NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			<u>3722</u>	<u>6</u> of <u>8</u>	<u>17</u>

NOTES:

1. New Construction

The loadbreak elbow and bushing insert must be installed as a matched set from the same manufacturer.

2. Maintenance

In existing installations, where routine ( non-fault condition / non-loadbreak elbow failure ) jobs are in progress, any loadbreak elbow found to be in good condition may be left in service. The existing elbow may be reinstalled into a new loadbreak bushing with no elbow replacement.

For field conditions where a loadbreak elbow experiences a fault or obvious failure, the elbow and bushing must be replaced with new components.

Additional situations where loadbreak elbow connector replacement is recommended:

- a. when a faulted elbow is found to have an aluminum compression lug, replace all three phases.
- b. when an elbow in an enclosure is found to be damaged, deformed or swollen.
- c. when an elbow is not imprinted with the 8.3 / 14.4 kV rating and is not accordingly marked with the white and black bands around the cable entrance portion of the elbow.

2. Refer to CS 3727 for the loadbreak bushing insert installation instructions.

3. DIFFICULT REMOVAL SITUATIONS:

When difficulty may be expected in the removal of a loadbreak elbow, a twisting movement in conjunction with greater than normal pulling force is often required to break the elbow free. It is imperative that in these removal situations an elbow "clam-shell tool" ( ITEM ID. 551308) be used to insure positive leverage on the entire upper elbow body.

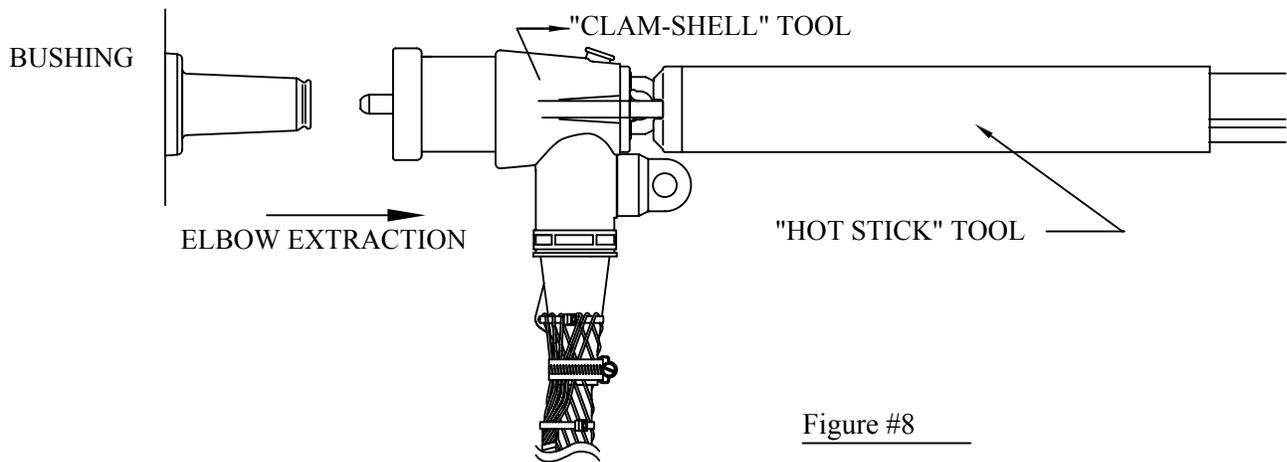


Figure #8

REVISION	17.06/14: REVISED TITLE BLOCK	TERMINALS CABLE: PRIMARY	CONSTRUCTION STANDARD		
		INSTALLATION AND OPERATING INSTRUCTION 15kV 200 AMP LOADBREAK ELBOW TERMINATION FOR XLPE or EPR INSULATED Cu. OR AL. CABLE	DRAWN BY AH		
prepared by PSEG LONG ISLAND T&D ENGINEERING			NUMBER	SHEET No	REV
			3722	7 of 8	17

**BILL OF MATERIAL**

ITEM	DESCRIPTION	QTY.	ITEM ID.
1	SEALANT STRIP	+	185003
2	TUBING, HEAT SHRINKABLE, 1.5 - 0.7" RECOVERED I.D.	+	197304
3	TERMINATOR L/B ELBOW # 2 AWG W/BUSHING INSERT	+	160112
	TERMINATOR L/B ELBOW # 1/0 AWG W/BUSHING INSERT	+	160114
	TERMINATOR L/B ELBOW # 3/0 AWG W/BUSHING INSERT	+	160115
4	HOSE CLAMP, STAINLESS STEEL	+	121189
5	NYLON STRAP, SELF LOCKING	+	101003

**TABLE 1  
CRIMP CHART**

Conductor Size	Insulation Diameter (In.) Min. - Max **	Conn. O.D.	Elbow Term. With Bush. Insert	Tool	Die	No. of Crimps
# 2 Cu. or Alum.	0.755 - 0.815	5/8"	Item I. D. 160112	Y34A Y35 Y46*	A243 U243 U243	1
# 1/0 Cu. or Alum.	0.830 - 0.890	5/8"	Item I. D. 160114	Y34A Y35 Y46*	A243 U243 U243	1
# 3/0 Cu. or Alum.	0.925 - 0.985	5/8"	Item I. D. 160115	Y34A Y35 Y46*	A27AR U27ART U27ART	1

\* Use with P - UADP Adapter

\*\* Compressed Conductor with 220 Mil. Insulation

+ AS REQUIRED

\* MISSING DIGITS BY TYPE OR SIZE

REVISION 

CS # 3722 REV. 17

SHEET # 8 of 8

1. SCOPE

- 1.1 The purpose of this standard is to supplement other construction standards in supplying information pertaining to the Company's requirements for LIPA specified transformer vaults, enclosures, or pads which will be constructed by the customer, to contain transformers connected to the Company's underground electric facilities.
- 1.2 This standard also supplements the National Electric Code, "Article 450 - Transformers and Transformer Vaults" which represents minimum provisions. It is not the intent of this standard to obviate any part of the National Electric Code, or any requirement of such municipal authority or code as may be involved.

2. GENERAL

- 2.1 If deviations from the Company specifications are contemplated they shall be submitted to the Company for approval prior to construction.
- 2.2 The customer's installation shall be subject to a rigid inspection by the Company prior to service being energized. Service will not be energized until all deficiencies are corrected. The installation shall be made in a neat and workman- like manner. Periodic checks shall be made by a Company inspector while pothead or cable work is in progress.

3. SERVICE LOCATION

- 3.1 The location of the service cable terminal pole, transformer pad/vault, or property line manhole will be approved by the Company.
- 3.2 A clear working space of 10 feet shall be maintained in front of a padmount transformer. (CS-5370)  
A minimum of 3 feet shall be maintained between transformer and shrubs or plantings. A clear working space of at least 3 feet shall be maintained around the top of manholes or vaults ("Planting" self-adhesive sign Item ID 181528).
- 3.3 Physical protection shall be provided as directed by the Distribution Design. See (CS-5369)

4. VAULT, ENCLOSURE, OR PAD

**DIMENSIONS.** All dimensions of transformer vault, enclosure, or pad and location of equipment shall be in accordance with the specifications furnished by the Company for a particular project. When services are to be metered at secondary voltage, LIPA will deliver transformers to the customer transformer location. These vaults, enclosures or pads shall be readily accessible to Company trucks.

5. PRIMARY CONDUIT (where required)

- 5.1 Conduit size shall be a minimum of 4" or larger if required. Both ends of any metallic conduits shall be bonded to neutral conductor and manhole grounding system.
- 5.2 All conduit bends and off-sets shall have a minimum radius of 36". Both ends of the conduit entering manhole shall be sealed.

		REVISION 	TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION VAULT OR PAD AND ENCLOSURE HOUSED	CONSTRUCTION STANDARD		
		10.11/10:GENERAL UPDATE		DRAWN BY AH		
APPROVED BY	DATE	APPROVED BY	DATE	NUMBER	SHEET No	REV
	12/20/10		1/07/11	3950	1 of 3	10
DO NOT REVISE PRINT BY ANY OTHER METHOD THAN AUTO-CAD PREPARED BY: National Grid Engineering & Survey, Inc.						

## 6. PRIMARY CABLE

6.1 TYPE. Unless otherwise specified, primary cable shall consist of three two-conductor concentric cables, (for 3 phase) or one two -conductor concentric cable (for 1 phase) of Tree-Retardant cross-linked polyethylene or EPR insulation. Cables shall be shielded and jacketed. All primary cables purchased by the customer or his contractor shall be in accordance with the latest AEIC and ICEA specifications. The two conductor (2/C) concentric cables shall be purchased in accordance with LIPA PT 61-45-021, latest Revision.

6.1.1 Shielding - Shielding on Tree Retardant Cross linked polyethylene insulated concentric cable shall consist of an extruded layer of semi-conducting cross-linked polyethylene.

6.1.2 Jacket - A free stripping semi-conducting jacket shall consist of linear low density polyethylene. It must be identified with three (3) Red Stripe and NESC Markings, and identified as described in the NEC.

If the cable will not be installed in a common trench installation with other facilities, an insulated jacket may be used.

6.1.3 Size - Minimum of #2 AWG aluminum or copper.

6.2 INSTALLATION: Where the customer will own the service cable, the cable pull between the customer's last pull-box and Company's pole or manhole shall be done jointly by Company's crews and contractor. The contractor shall give the Company a 48-hour minimum advance notice of cable pulling schedule.

6.2.1 Care in Handling - The 15kV cable shall be handled with extra care to avoid insulation or jacket damage. The minimum bending radius of primary cable is twelve times the overall diameter. De-energized cables temporarily terminated in vaults or manholes, shall be sealed with heat shrink end caps.

## 7. PRIMARY TERMINATIONS

7.1 Primary cable terminations shall be made utilizing LIPA supplied load break elbow terminators (LBT). LIPA will furnish specifications for all primary cable terminations.

## 8. GROUNDING AND BONDING

8.1 GROUND RODS - 1/2" X 8' copper clad ground rod(s) shall be installed as required by transformer vault, enclosure, or pad specifications.

8.2 EQUIPMENT AND HOUSING: All metallic non-current carrying parts shall be bonded together and connected to the system neutral and driven ground rods, using #6 AWG or larger bare tinned copper conductor mechanically connected or braced to metal parts. The copper conductor shall be bolted to the transformer casing.

8.3 BONDING:

Concentric wires on polyethylene insulated cable shall be served just below the termination and shall be interconnected to the system neutral and driven grounds.

REVISION 		TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION VAULT OR PAD AND ENCLOSURE HOUSED	CONSTRUCTION STANDARD DRAWN BY AH		
	10.11/10:GENERAL UPDATE	GENERAL NOTES	NUMBER	SHEET No	REV
LONG ISLAND POWER AUTHORITY			3950	2 of 3	10
<small>prepared by National Grid Engineering &amp; Survey, Inc.</small>					

8.4 PRIMARY AND SECONDARY NEUTRALS - Primary and secondary neutrals shall be interconnected using #2 AWG minimum bare tinned solid copper conductor; then shall be connected to a grounding electrode (rod) system with a minimum of #6 bare solid copper conductor.

If a Wye -Delta connection is used, the primary bank neutral must be isolated from the system neutral.

9. SECONDARY CONNECTORS:

9.1 COMPRESSION CONNECTOR - Cable connection to transformers equipped with secondary spade terminals shall only be made with 2 hole compression connectors. Radial and loop feed transformers shall necessitate the use of connectors having 9/16" holes spaced 1-3/4" on center. Network transformers shall necessitate the use of connectors having 7/16" holes spaced 1 to 1-1/4" on center, ( one hole, one slot).

9.2 SECONDARY CONNECTIONS - Aluminum to aluminum or copper to aluminum connector to bus (or spade) connections must conform to the following.

9.2.1 All copper components will be tin or alloy plated.

9.2.2 Oxide inhibitor compound shall be applied to brushed surfaces of the lug pad prior to affixing connector to bus. All excess compound must be removed after lug is installed

9.2.3 Affix connector to bus utilizing tinned cadmium, silicon bronze, or stainless steel hardware. Place concave side of Belleville washer (4,200 lb) toward bus. A flat washer must be placed between the Belleville washer and the bus. Recommended torque values for these bolts are as follows.

Size	Silicon Bronze	Stainless Steel
5/16"	123 in-lbs.	132 in-lbs.
3/8"	219 in-lbs.	236 in-lbs.
1/2"	480 in-lbs.	517 in-lbs.

▶ Maximum bolt length shall be 3 inches

9.2.4 Particular care should be taken to insure that each surface at a joint has been carefully and thoroughly cleaned before completing the joint.

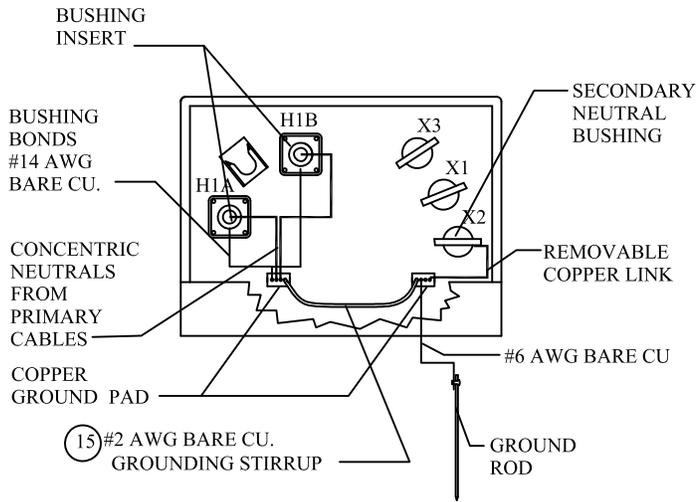
9.2.5 Approved lugs shall be crimped in accordance with CS-2090.

REFERENCES

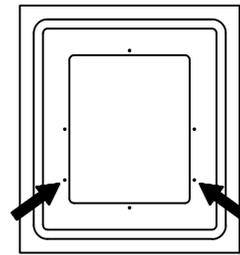
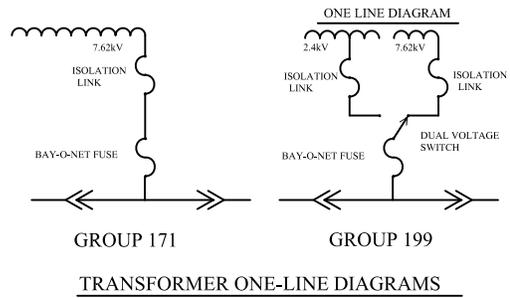
Rules and Regulations for Electric Installation (Red Book)

- [CS-2090](#) Compression Connectors.
- [CS-3722](#) Installation instructions - loadbreak Elbow Terminator
- [CS-5362](#) 3 Phase "Dead Front" Metal Clad Transformers
- [CS-5369](#) Protection for Padmounted Transformer
- [CS-5370](#) Transformer Pad Locations adjacent to buildings
- [CS-5506](#) General Specifications Underground Distribution System
- [CS-6707](#) 150-1500kVA 3 phase Subway Loop feed Transformer
- [PT 61-45-021](#) Cable, 15 kV, Single or Three Phase, TRXLPE #2, 1/0, 3/0 AWG.

REVISION 	10.11/10:GENERAL UPDATE	TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION VAULT OR PAD AND ENCLOSURE HOUSED	CONSTRUCTION STANDARD DRAWN BY AH		
			NUMBER	SHEET No	REV
LONG ISLAND POWER AUTHORITY <small>prepared by: National Grid Engineering &amp; Survey, Inc.</small>		GENERAL NOTES	<u>3950</u>	<u>3</u> of <u>3</u>	<u>10</u>

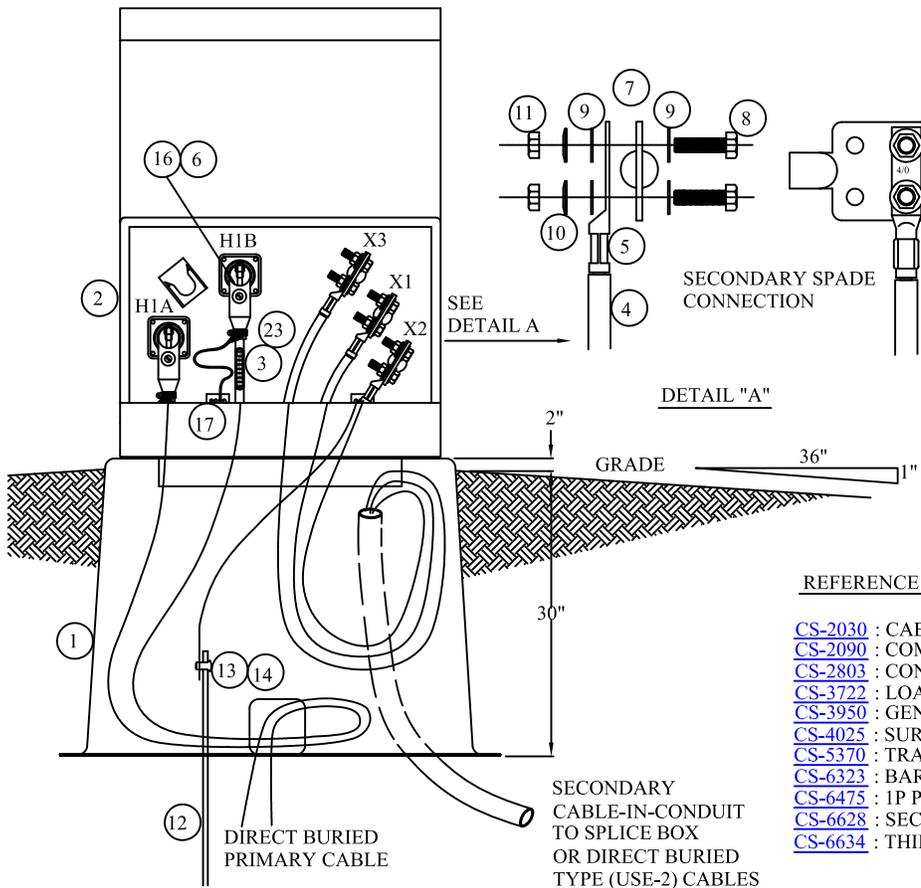


### GROUNDING DIAGRAM

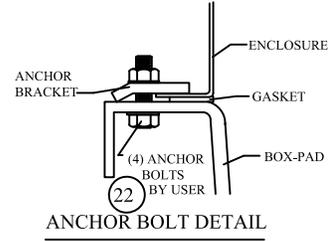


"FRONT"  
(DOOR SIDE)  
SEE NOTE 2

### ORIENTATION OF BOXPAD



### DETAIL "A"



### ANCHOR BOLT DETAIL

### REFERENCE DRAWINGS:

- [CS-2030](#) : CABLE TERM. I.D. TAG SYSTEM
- [CS-2090](#) : COMPRESSION CONNECTOR INDEX
- [CS-2803](#) : CONTAMINATED AREA SUBSTITUTIONS.....
- [CS-3722](#) : LOAD BREAK ELBOW
- [CS-3950](#) : GENERAL NOTES
- [CS-4025](#) : SURGE PROTECTION FOR RUD
- [CS-5370](#) : TRANSFORMER LOCATIONS
- [CS-6323](#) : BARRIER INSULATING COVER FOR SEC'DY. BUS
- [CS-6475](#) : 1P PM TRANS W/C-I-C SEC'DY.
- [CS-6628](#) : SECONDARY SPLICE BOX
- [CS-6634](#) : THIRD PARTY ATTACHMENTS

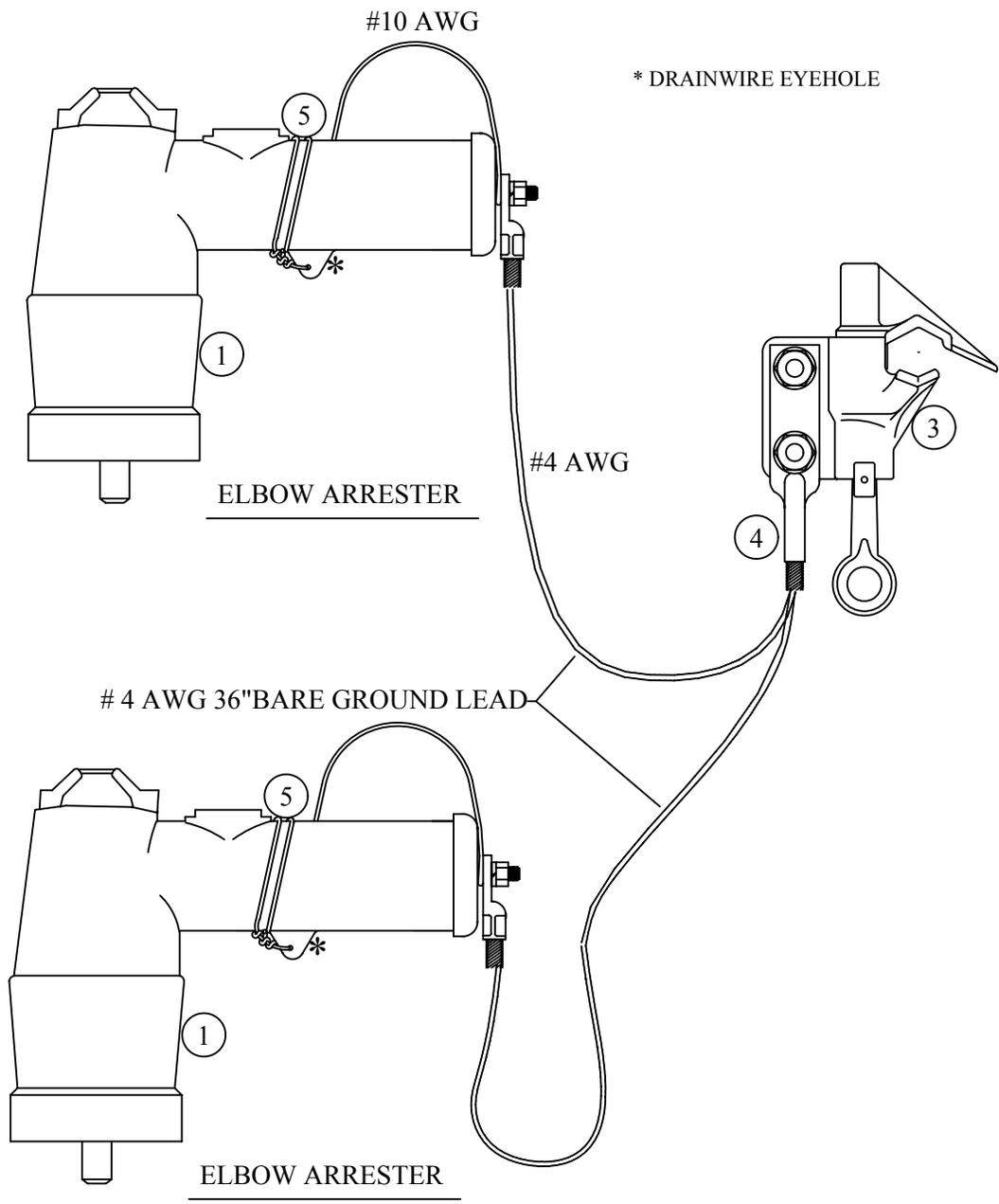
		REVISION	TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION: PAD AND ENCLOSURE HOUSED	CONSTRUCTION STANDARD		
		4.02/12: CHANGE SEC'DY. WIRE SIZES	PADMOUNT TRANSFORMER SINGLE PHASE 25 - 167 KVA	DRAWN BY AH		
APPROVED BY 	DATE 03/01/12	APPROVED BY 	DATE 03/27/12	NUMBER 3960	SHEET No 1 of 3	REV 4
DO NOT REVISE PRINT BY ANY OTHER METHOD THAN AUTO-CAD PREPARED BY: National Grid Engineering & Survey, Inc.						

BILL OF MATERIAL			
ITEM	DESCRIPTION	QTY.	ITEM ID.
1	Fiberglass Boxpad	1	131119
2	Transformer Group 171	+	9171***
	Group 199	+	9199***
3	Cable, 15kV Primary	+	199***
4	Cable, Cu, 600V 25-50KVA; 4/0 AWG	+	199262
	75-100KVA; 500 MCM 	+	199267 
	167KVA, 500 MCM (x2) 	+	199267 
5	Terminal Lug; 2 hole, Al or Cu.		
	4/0 AWG	+	143087
	500 MCM 	+	143098 
6	Fault Indicator, Elbow Mntd, Volt Reset (Loop Feed Only)	+	101400
7	Oxide Inhibitor	+	126012
8	Bolt, Stainless Steel 1/2" x 2"	+	110150
9	Washer, Stainless Steel, Flat 1/2"	+	198018
10	Washer, Stainless Steel, Belleville 1/2"	+	198020
11	Nut, Stainless Steel, Hexagon, 1/2"	+	110153
12	Ground Rod, 1/2" x 8'	+	173007
13	Wire, Copper, bare #6 AWG solid	6'	199444
14	Connector, Ground Rod	1	121065
15	Wire, Copper tinned, #2 AWG solid	10'	199265
16	Loadbreak Elbow w/Bushing Insert		
	#2	+	160112
	1/0	+	160114
17	Connector, Ground, Threaded Stub	3	124138
18	Label, Do Not Plant Shrubs	1	181528
19	Sign, "Electric Current On"	1	181512
20	Sign, "Attention Unauthorized Personnel"	1	181513
21	Tape, Plastic 3/4" All Weather	+	189008
22	Mounting Bolts; 1" x 3/8"	2	110216
23	Tag, Cable Identification <a href="#">CS-2030</a>	+	155***
	 Secondary Bus Extension (Where Required)	+	197118 
	 Barrier, Insulating Cover, For Secondary Spades	3	160506 
24	15kV RADIALLY FED TRANSFORMERS ONLY: Elbow Surge Arrester with L/B Bushing	1	105214
25	15kV LOOP FEED OPEN POINT TRANSFORMERS ONLY Two way portable feedthru device	1	160091
26	Elbow Surge Arrester (no bushing)	2	105213
+ AS REQUIRED * MISSING DIGITS BY TYPE OR SIZE		REVISION 	CS # <u>3960</u> REV. <u>4</u> SHEET # <u>2</u> of <u>3</u>

NOTES:

1. Padmount transformer shall be placed a minimum of 10 ft. back from the curb, and a minimum of 5 ft. away from all buildings, (see [CS-5370](#)). Consideration should be given to future fences along property lines when determining the transformers location and orientation. A clear work space of 10 ft. minimum shall be maintained in front of the terminal compartment and 5' minimum between transformers and adjacent above grade structures or shrubbery. Always face the transformer away from the nearest building.
2. It is important that the face of the transformer be in the same direction as the front of the box pad foundation so that the mounting provisions on the transformer and box pad align properly.
3. Install a transformer ground connector in each of the two threaded pads located approximately 10" away from one another on the lower half of transformer wall. Form a grounding stirrup of #2 copper wire between the two connectors. The third ground pad shall be used to ground the X2 bushing via the removable link (provided by manufacturer).
4. Assemble loadbreak elbows on primary cable. Maintain a minimum of 6 ft. of primary slack in the box pad enclosure. Allow enough slack in the concentric neutrals of the primary cable to permit the elbow to be switched from the bushing to a feedthru or isolating bushing.
5. Bond the load break bushing insert to the outside of the bushing well using a piece of #14 AWG bare copper.
6. Install plastic identification tag in accordance with [CS-2030](#) for all cables. The tag should indicate where the cable goes (i.e. Riser Pole Number, Pad Mount Number).
- ▶ 7. Secondary cable terminations shall be made as shown in detail "A". First, wire brush cable hylugs and aluminum spades. Immediately apply oxide inhibitor to both surfaces and complete bolted termination. To connect more than 4 secondary cables, use secondary bus extension, item ID. 197118.
8. Install insulating covers on all three secondary terminations (see [CS-6323](#)). Secure with three laps of tape around the lower part of each cover.
9. Secondary cable from transformer to adjacent splicebox shall always be either #4/0 AWG or 500 MCM copper, (Item #4 B.O.M) depending on the size of the transformer. #3/0 AWG aluminum cable-in-conduit shall be used for the secondary grid, including all splicebox to splicebox and splicebox to meter connections. (See 6400 Series)
10. An "Electric Current On" sign shall be affixed on the outside of the fliptop cover. An "Attention Unauthorized Personnel" sign shall be affixed to the interior face of the transformer in a manner that will make it clearly visible when the door is open.
11. Stencil the PM number on the upper left corner of the transformer front cover.
12. Install a Fault Indicator on the test point of the outgoing cable loadbreak elbow terminator on loop feed installations.
13. Surge arresters ([CS-4025](#)) are to be used at open-points on loops and dead-end points on radial installation. Surge arrestors shall not be installed on 4kV transformers.
- ▶ 14. Group 199 transformers are manufactured with stainless steel and should be used in all salt fog locations either 13 or 4kV. See [CS-2803](#) for contaminated areas.

REVISION ▶		TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION: PAD AND ENCLOSURE HOUSED  <b>PADMOUNT TRANSFORMER</b> <b>SINGLE PHASE 25 - 167 KVA</b>	CONSTRUCTION STANDARD		
	4.02/12: CHANGE SEC'DY. WIRE SIZES		DRAWN BY AH		
LONG ISLAND POWER AUTHORITY			NUMBER	SHEET No	REV
prepared by: National Grid Engineering & Survey, Inc.			<u>3960</u>	<u>3</u> of <u>3</u>	<u>4</u>



DUAL SURGE ARRESTER ELBOWS ARE FOR THE OPEN POINT IN PRIMARY LOOP

(SINGLE ELBOW ARRESTER IS ONLY FOR END POINT OF RADIAL)



REVISION	▶
6. 4/14: REVISED TITLE BLOCK	

TRANSFORMER AND EQUIPMENT: GENERAL  
**SURGE PROTECTION**  
**1Ø R.U.D.**

CONSTRUCTION STANDARD  
 DRAWN BY AH

APPROVED BY DATE  
*Richard Zambelli* 5/15/14

NUMBER	SHEET No	REV
4025	1 of 6	6

DO NOT REVISE PRINT BY ANY OTHER METHOD THAN AUTO-CAD  
 PREPARED BY: PSEG LONG ISLAND T&D ENGINEERING

BILL OF MATERIAL

ITEM	DESCRIPTION	QTY.	ITEM ID.
1	ELBOW ARRESTER WITH GROUND LEAD FOR EXISTING TRANSFORMERS (without bushing*)	+	105213
2	FEED THROUGH DEVICE ( Loop Feed Transformers Only )	1	160091
3	HOT LINE CLAMP, COPPER	1	121096
4	LUG, #2 COPPER (2 HOLE) (one lug for each ground lead)	+	143070
5	WIRE, # 10 BARE SOLID COPPER	36"	199010
6	ELBOW ARRESTER W/GROUND LEAD W/BUSHING INSERT ( For New Transformers )	+	105214
<p>* USE OF ELBOW ARRESTER WITHOUT BUSHING (ITEM ID. 105213) IMPLIES THAT ARRESTER WILL BE INSERTED INTO AN ELBOW BUSHING ON THE TRANSFORMER OR INTO A FEED-THROUGH DEVICE BUSHING.</p>			

+ AS REQUIRED  
 \* MISSING DIGITS BY TYPE OR SIZE

REVISION 

CS # 4025 REV. 6  
 SHEET # 2 of 6

PREPARATION OF DEVICES

A. DUAL SURGE ARRESTER ELBOWS, PREPARATION FOR OPEN POINT LOOP FEED APPLICATION (SEE SHEET 1).

1. REMOVE ELBOW ARRESTERS FROM PACKAGES.  
EACH ITEM IS PACKED WITH 36" LENGTH OF BARE #4 EXTRA-FINE STRANDED COPPER GROUND LEAD. ( EQUIVALENT TO A #2 19 STRAND COPPER WIRE )
2. USING THE 36" LENGTH #10 BARE SOLID COPPER WIRE SECURE IT TO THE DRAIN WIRE EYEHOLE THEN MAKE TWO TIGHT WRAPS AROUND THE UPPER BODY AND SECURE, LEAVE SLACK SECTION, AND TOGETHER WITH THE LUG END OF THE GROUND LEAD ATTACH THEM TO THE ELBOW ARRESTER GROUND STUD. TIGHTEN GROUND STUD 4 TO 8 FT. LB. TORQUE ( SEE SHEET 1 ). NOTE: ELBOW ARRESTORS MANUFACTURED BY ELASTIMOLD ALREADY HAVE THIS WIRE INSTALLED.
3. REPEAT STEP 2 FOR THE SECOND ELBOW ARRESTER DEVICE IF REQUIRED.
4. HYPRESS THE FREE ENDS OF THE 36" LENGTH(S) OF BARE #4 EXTRA-FINE STRANDED GROUND LEAD TO EACH OF THE #2 TWO HOLE LUG(S).
5. LUBRICATE BUSHING INTERFACE OF ARRESTER WITH LUBRICANT SUPPLIED.
6. INSTALL ARRESTERS AS SHOWN ON SHEETS 4 RADIAL INSTALLATION OR 5 LOOP FEED INSTALLATION.

IMPORTANT NOTE FOR RADIAL APPLICATION:

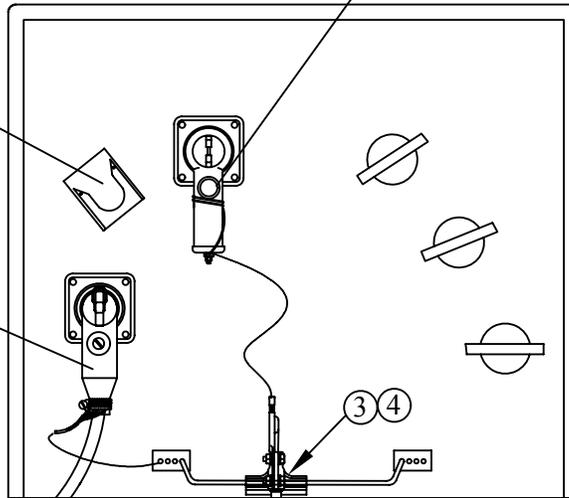
NOTE: 1. WHEN INSTALLING SURGE ARRESTER ON RADIAL FEED TRANSFORMER DISREGARD ANY REFERENCE TO THE SECOND ELBOW ARRESTER.

REVISION 	6. 4/14: REVISED TITLE BLOCK	TRANSFORMER AND EQUIPMENT: GENERAL <b>SURGE PROTECTION</b> 1Ø R.U.D.	CONSTRUCTION STANDARD DRAWN BY AH		
			NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			4025	3 of 6	6

ELBOW ARRESTER IN TRANSFORMER BUSHING (ITEM ID. 105213) ①  
 FOR NEW TRANSFORMER USE  
 (ITEM ID. 105214) ⑥

PARKING STAND

ENERGIZED ELBOW  
 INCOMING FEED



PAD MOUNT TRANSFORMER  
 SHOWN WITH FRONT  
 COVER OFF AND NO  
 SECONDARY FOR CLARITY.

RADIAL FEED TRANSFORMER (END POINT)

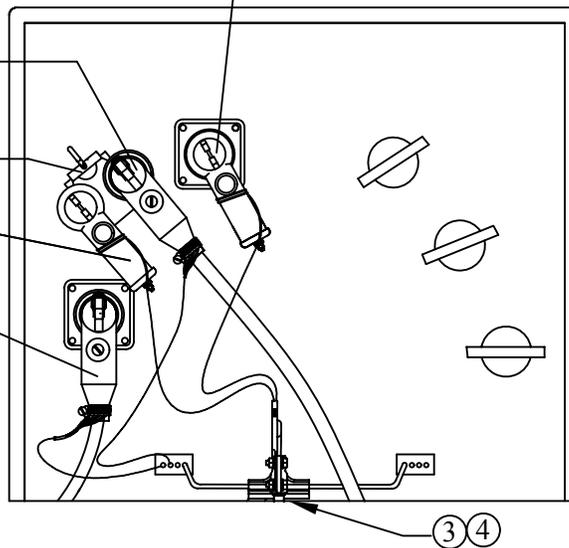
ENERGIZED OUTGOING  
 OPEN POINT ELBOW

② FEEDTHRU DEVICE  
 ITEM ID. 160091

① ELBOW ARRESTER  
 ITEM ID. 105213

ENERGIZED ELBOW  
 INCOMING FEED

ELBOW ARRESTER IN TRANSFORMER BUSHING ITEM ID. 105213 ①  
 FOR NEW TRANSFORMER USE  
 (ITEM ID. 105214) ⑥



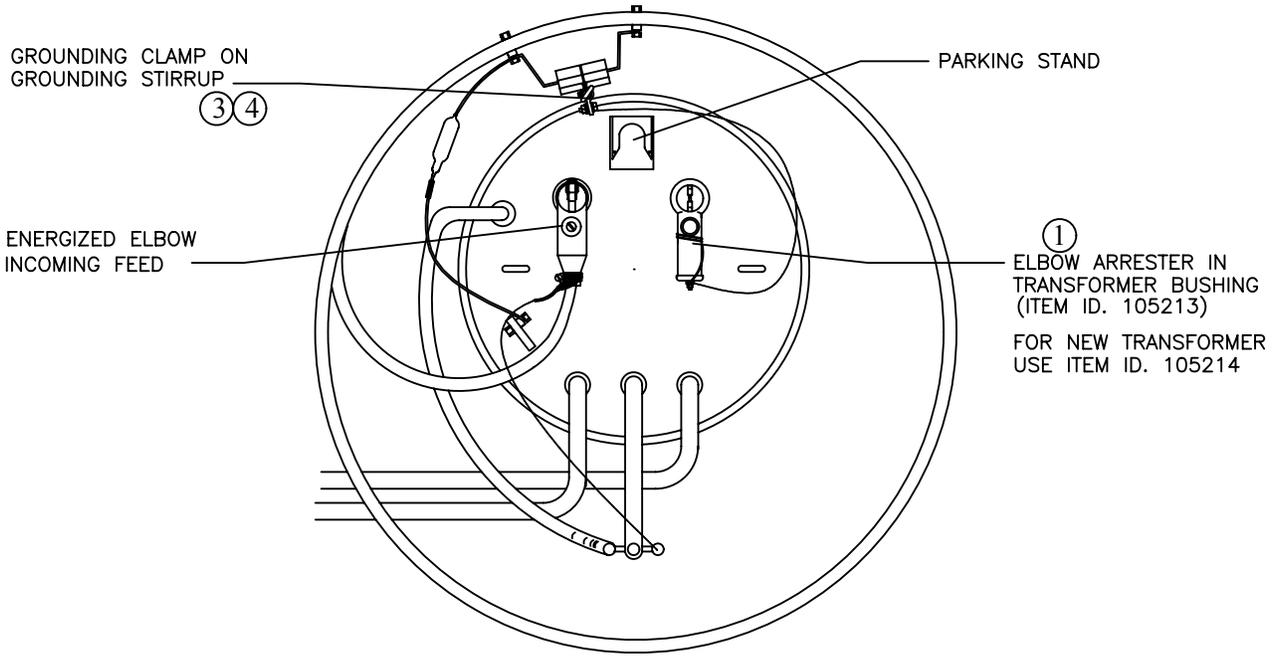
PAD MOUNT TRANSFORMER  
 SHOWN WITH FRONT  
 COVER OFF AND NO  
 SECONDARY FOR CLARITY.

LOOP FEED TRANSFORMER (OPEN POINT)

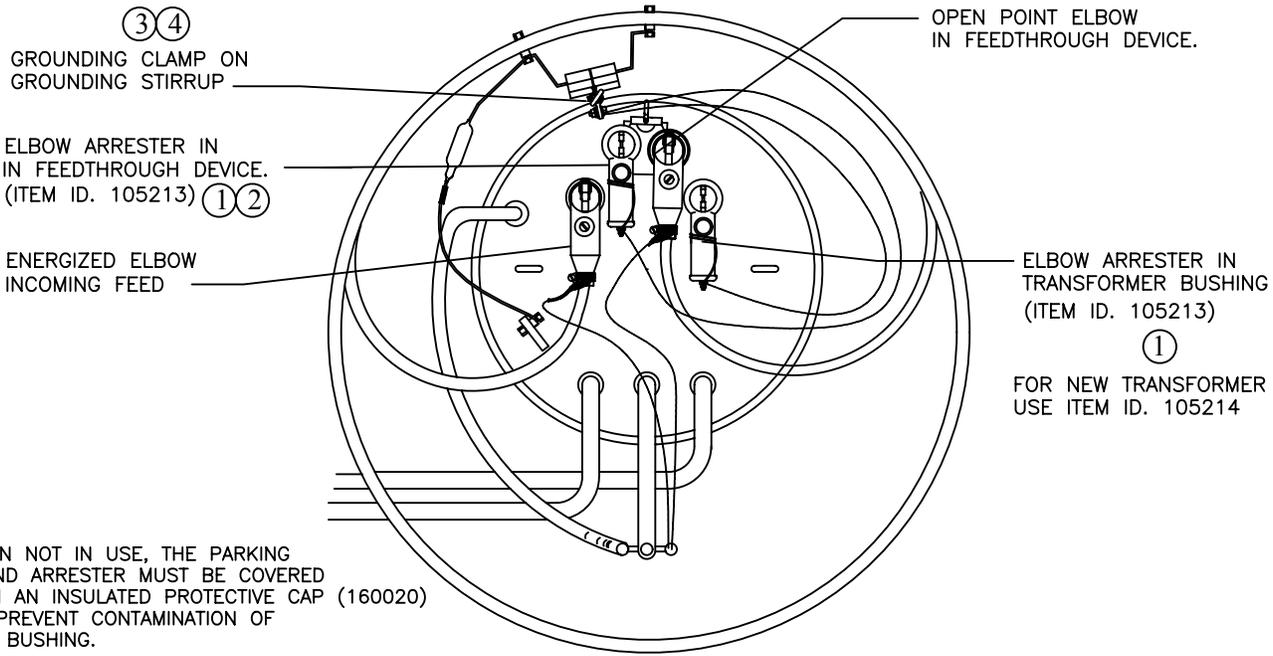
NOTE: WHEN NOT IN USE, PARKING STAND ARRESTER MUST  
 BE COVERED WITH AN INSULATED PROTECTIVE CAP  
 TO PREVENT CONTAMINATION OF THE BUSHING. (160020)

PADMOUNT TRANSFORMERS GROUP 171 & 199 ( DUAL VOLTAGE)

REVISION	6. 4/14: REVISED TITLE BLOCK	TRANSFORMER AND EQUIPMENT: GENERAL	CONSTRUCTION STANDARD		
			DRAWN BY AH		
			NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING		<b>SURGE PROTECTION</b> <b>1Ø R.U.D.</b>	4025	4 of 6	6



RADIAL FEED TRANSFORMER (END POINT)



NOTE:  
WHEN NOT IN USE, THE PARKING STAND ARRESTER MUST BE COVERED WITH AN INSULATED PROTECTIVE CAP (160020) TO PREVENT CONTAMINATION OF THE BUSHING.

LOOP FEED TRANSFORMER (OPEN POINT)

BELOW GRADE TRANSFORMERS GROUP 234 & 170 (DUAL VOLTAGE)

REVISION	6. 4/14: REVISED TITLE BLOCK	TRANSFORMER AND EQUIPMENT: GENERAL	CONSTRUCTION STANDARD DRAWN BY AH		
		<b>SURGE PROTECTION 1Ø R.U.D.</b>	NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			4025	5 of 6	6

INSTALLATION OF DEVICES ON EXISTING TRANSFORMERS

**A. ELBOW ARRESTER INSTALLATION ON RADIAL FEED TRANSFORMER (ENDPOINT).**

1. OPEN THE TRANSFORMER ENCLOSURE AND IDENTIFY VISUALLY THE LOCATION OF THE TRANSFORMER ENCLOSURE GROUNDING POINT.

NOTE: UTILIZE APPROPRIATE ENERGIZED/HOT STICK PROCEDURES FOR ALL INSTALLATION AND REMOVAL OPERATIONS.

2. USING HOT STICK TOOL, INSTALL THE ELBOW ARRESTER'S HOTLINE CLAMP AT THE GROUNDING POINT.
3. REMOVE THE INSULATED PROTECTIVE CAP FROM THE TRANSFORMER BUSHING. THE DEAD END CAP IS NO LONGER REQUIRED.
4. INSTALL THE ELBOW ARRESTER DEVICE ONTO THE OPEN BUSHING.
5. CLOSE AND LOCK THE TRANSFORMER ENCLOSURE.

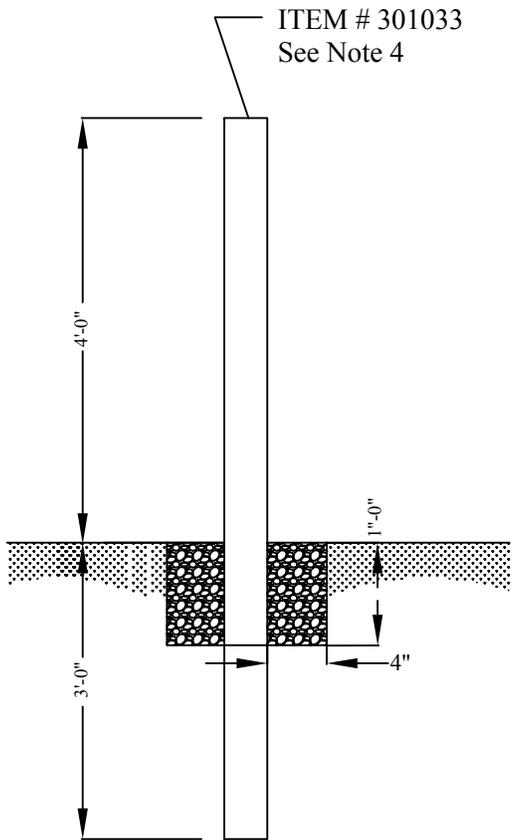
**B. DUAL SURGE ARRESTER ELBOW INSTALLATION ON LOOP FEED TRANSFORMER (AT THE OPEN POINT).**

1. OPEN THE TRANSFORMER ENCLOSURE AND IDENTIFY VISUALLY THE LOCATION OF THE TRANSFORMER ENCLOSURE GROUNDING POINT.

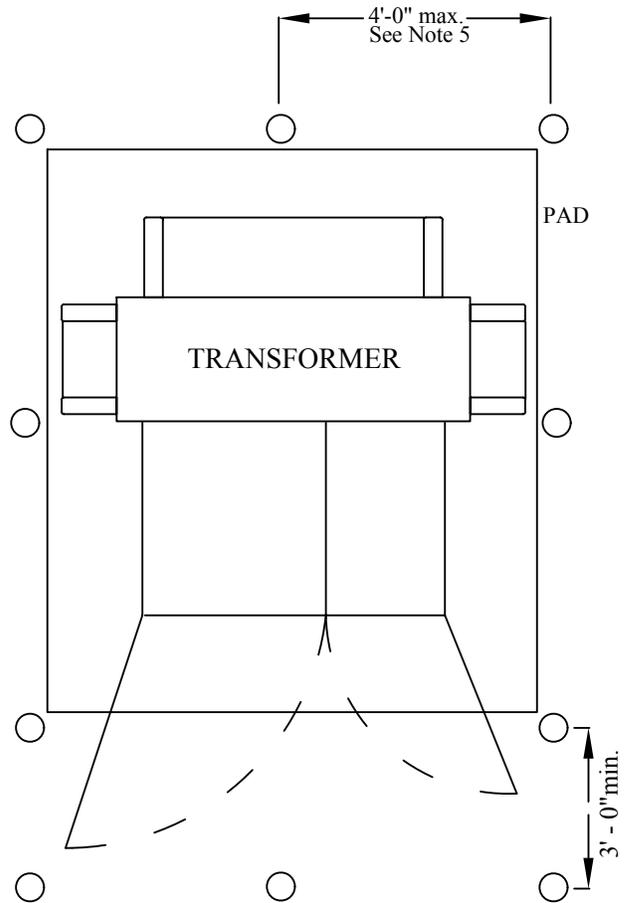
NOTE: UTILIZE APPROPRIATE ENERGIZED/HOT STICK PROCEDURES FOR ALL INSTALLATION AND REMOVAL OPERATIONS.

2. INSTALL THE HOT LINE CLAMP THAT JOINS THE TWO ELBOW ARRESTERS GROUND WIRES ON TO THE ENCLOSURE GROUNDING POINT.
3. REMOVE THE INSULATED PROTECTIVE CAP FROM THE TRANSFORMER BUSHING. THIS DEAD END CAP IS NO LONGER REQUIRED.
4. CLOSE THE PRIMARY LOOP THROUGH THE TRANSFORMER, BY REMOVING THE ENERGIZED ELBOW FROM THE STANDOFF ISOLATING BUSHING AND PLACING IT INTO THE TRANSFORMER POSITION.
5. REMOVE THE STANDOFF ISOLATING BUSHING FROM THE TRANSFORMER PARKING STAND BRACKET. THIS STANDOFF ISOLATING BUSHING IS NO LONGER REQUIRED.
6. INSTALL THE FEEDTHROUGH DEVICE (ITEM ID. 1600910) IN TO THE TRANSFORMER PARKING STAND BRACKET.
7. RE-OPEN THE PRIMARY LOOP BY TRANSFERRING THE ELBOW (step 4) FROM THE TRANSFORMER BUSHING BACK TO THE FEEDTHROUGH DEVICE.
8. PLACE ONE ELBOW ARRESTER DEVICE INTO THE OPEN TRANSFORMER BUSHING.
9. PLACE THE OTHER ELBOW ARRESTER DEVICE INTO THE FEEDTHROUGH BUSHING.
10. CLOSE AND LOCK THE TRANSFORMER ENCLOSURE.

REVISION 	6. 4/14: REVISED TITLE BLOCK	TRANSFORMER AND EQUIPMENT: GENERAL <b>SURGE PROTECTION</b> 1Ø R.U.D.	CONSTRUCTION STANDARD		
			DRAWN BY AH		
			NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			<u>4025</u>	<u>6</u> of <u>6</u>	<u>6</u>



DETAIL "A"



Reference Drawings

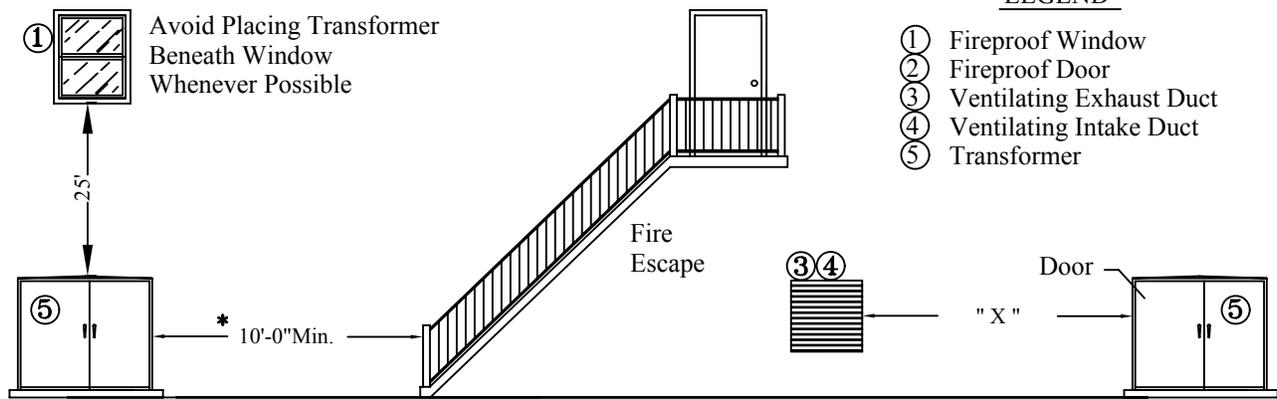
CS-5362 Dead Front Transformers

NOTES:

1. This standard provides recommended barrier protection for pad mounted equipment subject to vehicular traffic.
2. Posts may be omitted on side (s) not subject to vehicular traffic.
- ▶ 3. Barriers must not interfere with the operation of pad mount equipment by PSEG Long Island personnel.
4. A 3-1/2" heavy wall steel, concrete filled lally column purchased from local lumber yards is acceptable. Bearing plates must be removed. Set posts in concrete ( see detail "A" ).
5. Install additional posts on sides or back as required to maintain maximum 48" spacing.

	REVISION ▶	TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION PAD AND ENCLOSURE HOUSED <b>PROTECTION FOR PAD MOUNT          TRANSFORMER SUBJECT TO          VEHICULAR TRAFFIC</b>	CONSTRUCTION STANDARD		
	7.04/14: CHANGED LIPA TO PSEG Long Island		DRAWN BY AH		
APPROVED BY	DATE		NUMBER	SHEET No	REV
<i>Richard Zumbath</i>	5/15/14		5369	1 of 1	7
<small>DO NOT REVISE PRINT BY ANY OTHER METHOD THAN AUTO-CAD</small> PREPARED BY: <b>PSEG LONG ISLAND T&amp;D ENGINEERING</b>					

**FIG 1**



**LEGEND**

- ① Fireproof Window
- ② Fireproof Door
- ③ Ventilating Exhaust Duct
- ④ Ventilating Intake Duct
- ⑤ Transformer

**FIG 2**

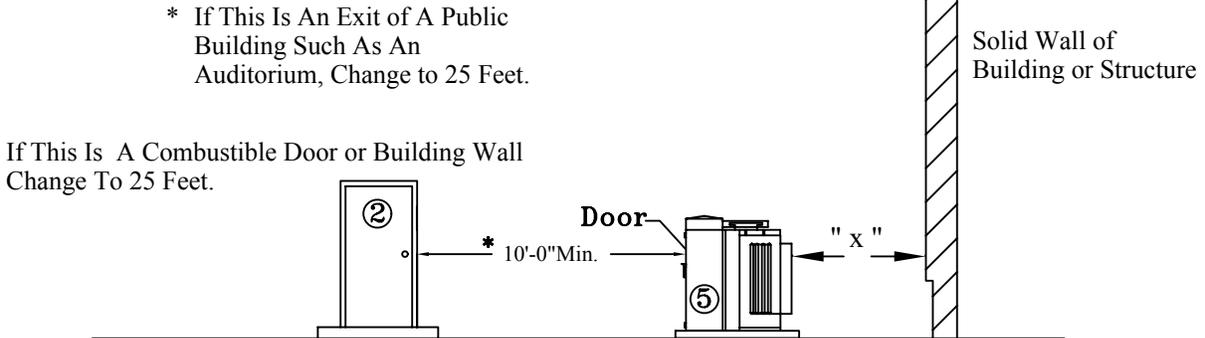


FIG 1 AND 2 SHOW MINIMUM CLEARANCES BETWEEN THE TRANSFORMER PAD AND WINDOWS, DOORS, FIRE ESCAPES, ENTRANCES AND VENTILATING DUCTS.

**TABLE 1**

Separation Distance	Horizontal Distance		Vertical Distance
	Fire Resistant or Non-Combustible Construction	Combustible Construction	
X	5'	25'	25'

If the separation distances shown in table 1 cannot be maintained, a fire barrier must be provided to protect the building from exposure to any fire in the transformer. Fabricated barriers must be installed between the transformer and the building a minimum of 1 foot from the transformer pad. Barriers should be constructed of concrete block or reinforced concrete construction with a 2 hr fire rating ( as specified by the building architect ).

The barriers must extend at least one foot above the height of the transformer. The barrier should break the line of sight from the highest point on the transformer to any point on the adjacent building (Fig. 3) closer than the distance in table 1.

Likewise, barriers must extend a minimum of 2 feet horizontally beyond the transformer, but be far enough to break the line of sight from the edge of the transformer to any point on the adjacent building (Fig. 4) closer than the distance in table 1.



REVISION ▶

11.02/14: UPDATE TITLE BLOCK & CHANGE REF. CS NUMBER

TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION: PAD AND ENCLOSURE HOUSED

CONSTRUCTION STANDARD  
DRAWN BY AH

APPROVED BY DATE

*Richard Zambelli* 3/19/14

TRANSFORMER PAD LOCATION  
ADJACENT TO BUILDINGS

NUMBER SHEET No REV

5370 1 of 2 11

DO NOT REVISE PRINT BY ANY OTHER METHOD THAN AUTO-CAD  
PREPARED BY: PSEG LONG ISLAND T&D ENGINEERING

Building

FIG 3

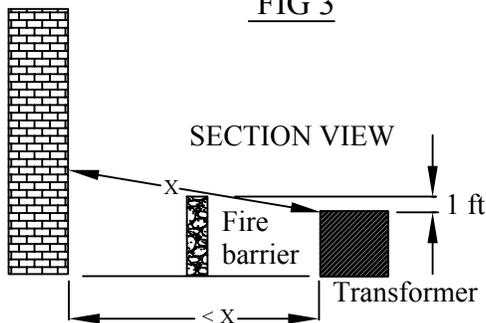
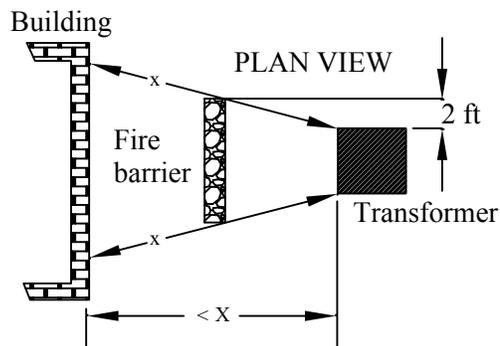


FIG 4



x = Minimum separation distance

NOTES:

1. PLACE TRANSFORMER SO THAT DOORS FACE AWAY FROM WALLS, FENCES OR OTHER FIXED STRUCTURES. 10' CLEARANCE REQUIRED IN FRONT OF THE DOORS
2. NO BUSHES, TREES, OR OTHER OBSTRUCTIONS SHALL BE PLANTED OR INSTALLED IN FRONT OF TRANSFORMER DOORS.
3. THE TRANSFORMER PAD LOCATION MUST BE ACCESSIBLE BY TRUCK AT ALL TIMES. NO PART OF THE BUILDING STRUCTURE SHALL EXTEND DIRECTLY ABOVE THE TRANSFORMER.
4. NO OPENINGS IN BUILDINGS OR STRUCTURE WILL BE PERMITTED WITHIN 10 FEET OF TRANSFORMER. BUILDING MATERIAL, INCLUDING DOOR AND WINDOWS LESS THAN 25 FEET FROM TRANSFORMER SHALL BE FIRE RESISTANT OR NON-COMBUSTIBLE MATERIAL.
5. CLASS 1, DIVISION 1 and 2 LOCATIONS SHALL REQUIRE A MINIMUM OF 25 FEET CLEARANCE ( e.g. PROPANE TANKS, GAS PUMPS, ETC. OR ANY PLACE WHERE VOLATILE LIQUID / GAS TRANSFER FILLING OCCURS )  
[ SEE NEC ARTICLES 500-5(a) (3) and 450-27]
6. MAINTAIN AT LEAST 1 FOOT SEPARATION BETWEEN PADMOUNT TRANSFORMERS AND A GAS METER HEADER.
7. SUBMERSIBLE TRANSFORMERS IN BELOW GRADE VAULTS ARE NOT REQUIRED TO MEET THE ABOVE CLEARANCES FROM BUILDING WALLS. VAULTS MUST BE INSTALLED A MINIMUM OF 10' FROM ANY BUILDING WALLS TO ALLOW ADEQUATE WORKING SPACE FOR REMOVAL OF GRATES.

REFERENCE DRAWINGS

- [CS-3960](#) 1Ø PADMOUNT TRANSFORMER 25-167kVA
- [CS-5315](#) 3Ø 13kVA-4kV 1500kVA STEP- DOWN TRANSFORMER
- ▶ [CS-5320](#) 3Ø PADMOUNT TRANSFORMERS 13kVA DEAD FRONT
- [CS-5322](#) 500 and 1000kVA NETWORK TRANSFORMERS
- [CS-5325](#) 1500 and 2000kVA NETWORK TRANSFORMERS
- [CS-5362](#) 3Ø 4kVA or 13kVA 75 - 1500kVA " DEAD FRONT" TRANSFORMER

REVISION ▶	11.02/14: UPDATE TITLE BLOCK & CHANGE CS NUMBER	TRANSFORMER INSTALLATION AND HOUSING CONSTRUCTION: PAD AND ENCLOSURE HOUSED	CONSTRUCTION STANDARD		
			DRAWN BY AH		
		TRANSFORMER PAD LOCATION ADJACENT TO BUILDINGS	NUMBER	SHEET No	REV
prepared by PSEG LONG ISLAND T&D ENGINEERING			5370	2 of 2	11