

## 10 Commercial, Industrial, and Large Residential Services, 800 Amps or Lower

This section provides the PGE requirements for commercial, industrial, and large residential services up to 800 amps and lower than 600 volts, including single-phase and three-phase services for self-contained and current transformer (CT) meters. Consult PGE Meter Services for requirements and equipment for services higher than 600 volts.

### 10.1 Basic Requirements

All commercial, industrial, and large residential Customers must coordinate their service requirements with PGE. They must provide factory-produced submittal drawings of switchgear before purchase and installation of equipment.

Single-residential services over 320 amp continuous and all three-phase residential services are considered large residential services. Residential meters must meet the meter clearances and location criteria covered in Section 5.2, *Meter Clearances and Location Criteria*.

Single-phase services over 320 amps continuous, and three-phase services over 200 amps, require CT metering except as referenced in Section 10.3.

### 10.2 Meter Location

Meters must comply with accessibility and location requirements in Section 5, *Clearances*. For commercial and residential meters located outdoors, the ground in front of the meter(s) must be a minimum 4- x 4-foot level area.

Where the permanent final grade (or the final platform landing) cannot be provided in front of the meter(s) or service termination equipment at the time of connection, the Customer must supply and install a temporary minimum 4- x 4-foot platform of sufficient strength to support PGE personnel. Steps to the platform must be provided as needed.

Where meter equipment is installed in a location subject to vehicle traffic, the Customer is required to install and maintain a PGE-approved barrier post. (See **Figure 6-4**, *Barrier Post Dimensions*.) Meter sockets, terminal cabinets, current transformer cabinets, and transformers should be located away from landscape irrigation sprinklers.

Doors to a meter or termination equipment room must open outward and be equipped with a panic bar. A PGE lockbox must be installed near the door. For more information, see Section 5.3, *PGE Electrical Equipment Room*.

Before power is connected, each meter on a structure with multiple service must have a permanently engraved metal or hard plastic label that identifies the Customer service address in letters at least 3/8-inch high (as shown in **Figure 10-1**).



**Figure 10-1: Meter Label With Service Address**

All 480 volt service must be permanently and visibly labeled as such. PGE requires a red label with white lettering that reads: SINGLE-PHASE 480V. Place the label in an easy-to-see location for safety. Consult PGE for further label requirements.

NOTE: It is the Customer's responsibility to ensure that each meter socket is correctly labeled. PGE may check the meter installations to verify that they are correctly labeled, and charge the Customer a fee when a meter socket is incorrectly labeled. See PGE Schedule 300 and Tariff Rule M, Section 1.D.

### **10.3 Direct-Connect Meter**

PGE requires a direct-connect (self-contained), socket-type meter when the ampacity of a single-phase service entrance is 400 amps maximum (320 amps continuous) or lower, or when the ampacity of a three-phase service is 200 amps continuous or lower. See **Table 10-1** for direct-connect meter socket requirements.

**Figure 10-2** shows direct-connect meter sockets for single-phase service. See **Figure 10-3** for direct-connect meter sockets for three-phase service.

NOTE: With prior permission from PGE, an adjustable-speed drive (ASD) controller may be served with single-phase service using a direct-connect, safety-socket meter socket rated 200 amps or lower, 120/240 volt or 240/480 volt. Contact PGE for further information.

NOTE: A three-phase main breaker is required for a 120/208 volt, single-phase service.

Table 10-1: Direct-Connect Meter Socket Requirements

Type of Service	Socket Type
120/240 volt, single-phase, three-wire	4-jaw
120/208 volt, single-phase, three-wire (Contact PGE for information)	5-jaw
208/120 volt, three-phase, 4-wire	7-jaw
480/277 volt, three-phase, 4-wire	
240/120 volt, three-phase, 4-wire <i>or</i> 480/240 volt, three-phase, 4-wire	

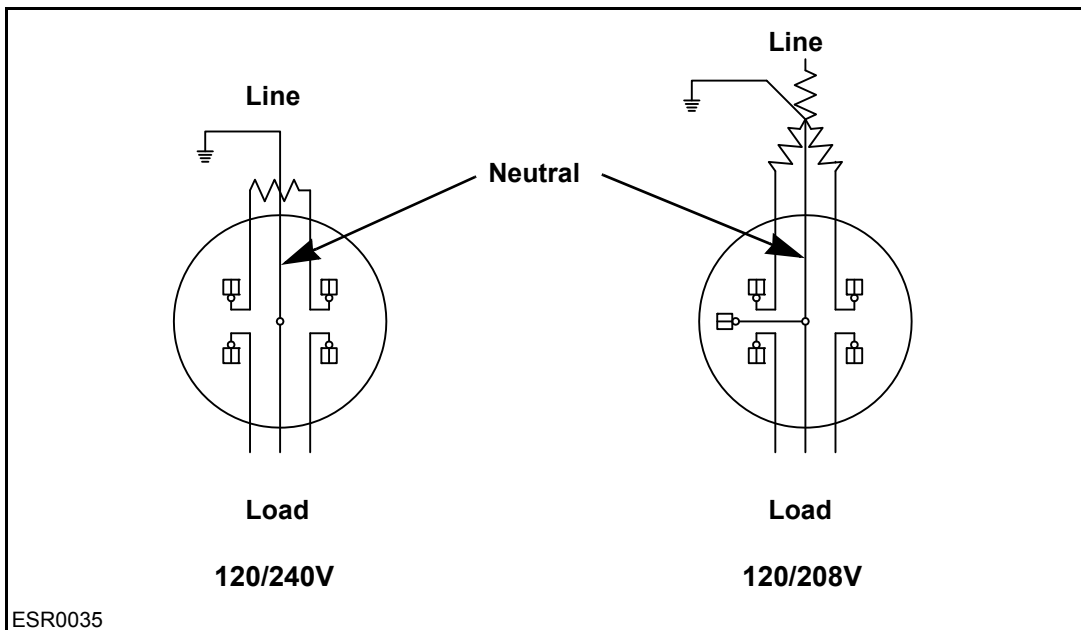
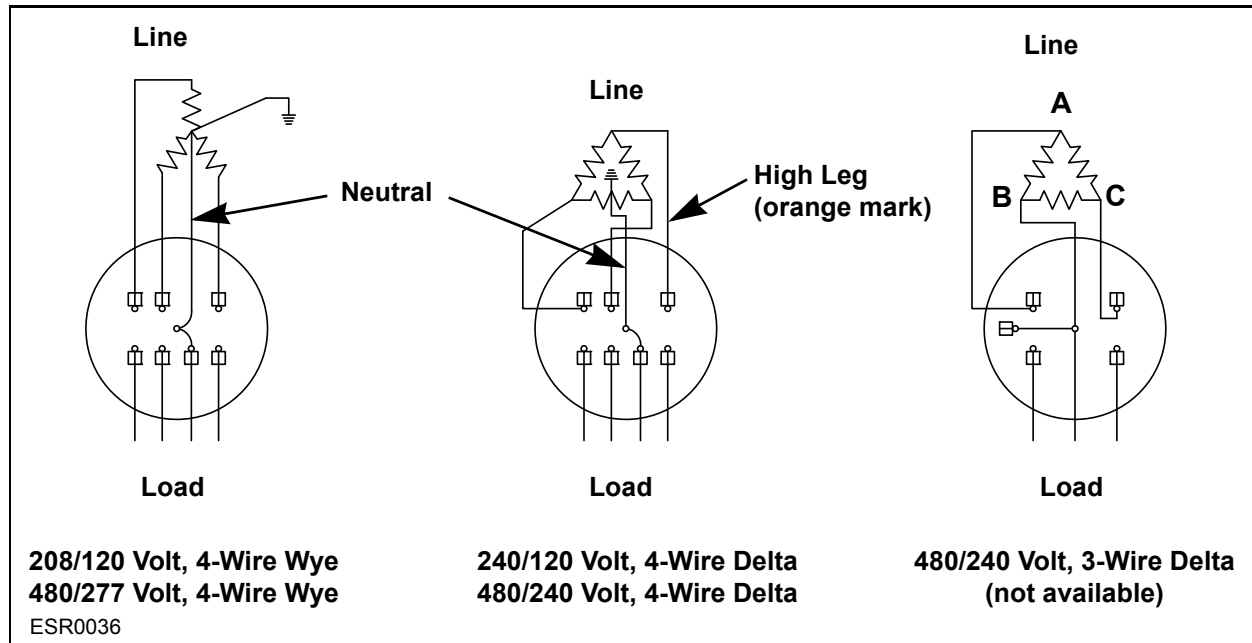


Figure 10-2: Direct-Connect Meter Sockets, Single-Phase, Three-Wire Service



**Figure 10-3: Direct-Connect Meter Sockets, Three-Phase Service**

### 10.3.1 Direct-Connect Meter Safety Socket

Prior to installing a direct-connect meter safety socket, contact PGE. PGE accepts a 320-amp, 120/240-volt manual link bypass meter base for nonresidential use. See **Figure 10-4**.

NOTE: 120 volt service is no longer offered.

Follow these requirements when installing a direct-connect meter safety socket.

- Wires installed in the meter base by the Customer must have clear space for PGE to install conductors.
- The EUSERC safety socket with a test link bypass is required for all 120/240 volt services rated 100 and 200 amps, and for 480 volt services rated up to and including 200 amps.
- A manual link bypass is required for all 120/240 volt, single-phase services with a nominal rating of 400 amps (320 amps continuous).
- No safety socket is required for service equipment rated 200 amps or lower for the following uses:
  - Temporary construction
  - Residential pumps, gates, outdoor lighting, barns, and outbuildings.

Contact PGE for clarification.

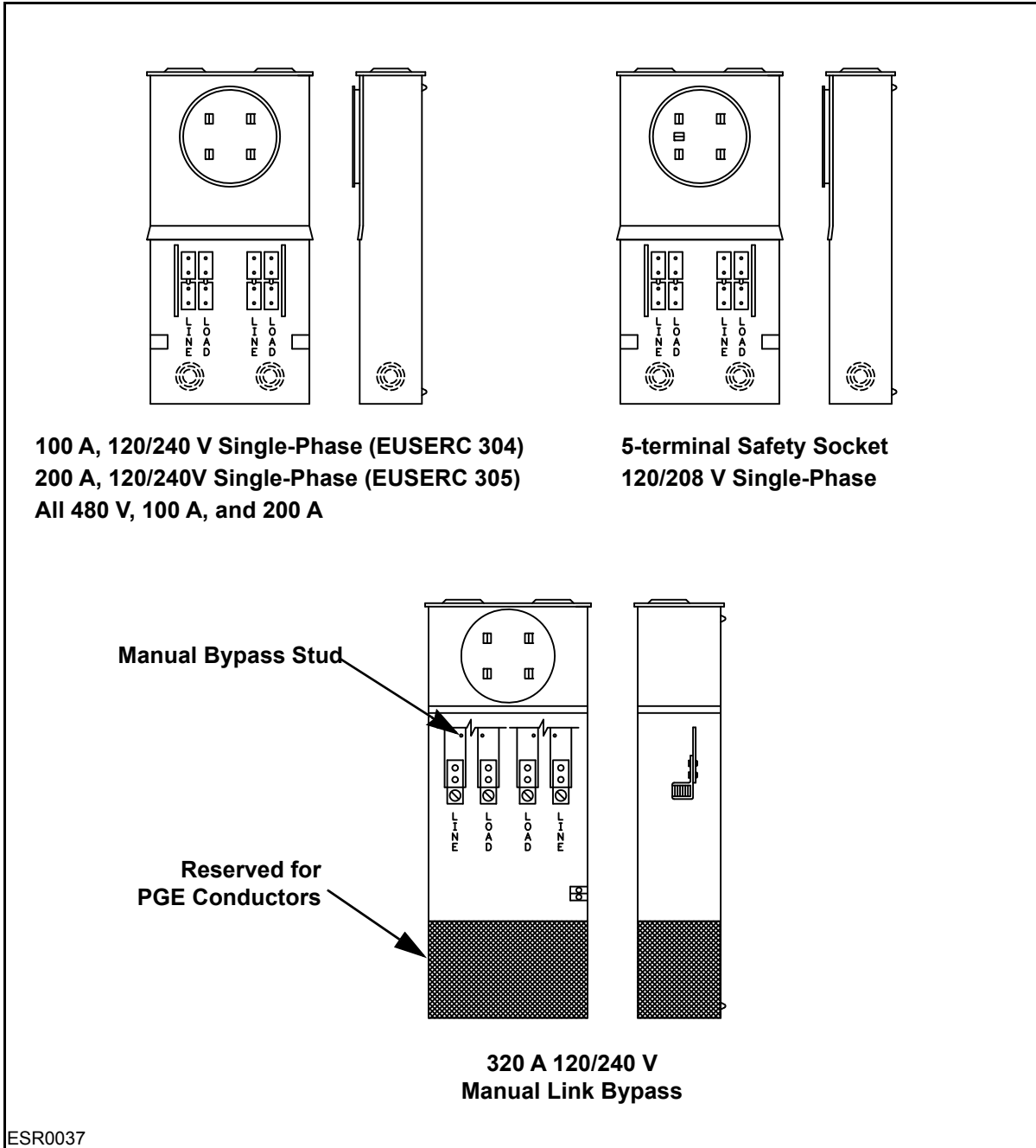


Figure 10-4: Commercial and Large Residential Single-Phase, Direct-Connect Meter Safety Sockets

### 10.4 Termination Compartment Requirements

Locate and make accessible all compartments for termination of PGE service laterals as close as possible to where the conductors enter the building on an entry level or main floor. When connecting two or more sets of service equipment to a single-service lateral, the Customer must provide a sealable terminal box complete with terminating positions.

The Customer must also provide an approved method in which to make multiple taps. Do not install Customer-owned devices such as limiters or fuses in terminal boxes.

The Customer must not terminate the principal grounding conductor in the PGE sealed termination compartment.

The termination compartment for PGE conductors must meet EUSERC 342 requirements. Refer to **Table 8-1**, *Dimensions of Terminating Section for Meter Socket Modules*, EUSERC 342 or see EUSERC 343 in **Figure 10-5**.

Follow these requirements when installing a pull box with terminating facilities.

- Refer to **Table 10-2** for the minimum dimensions for pull boxes with terminating facilities (EUSERC 343). This applies only to the PGE portion of the pull box.
- The cable-pulling section must be sized for PGE service termination in EUSERC 342 and 343 and must have bus extension drilled for landing lugs. NEC requires a main disconnect when more than six services are connected. (See Section 1.15, *Six-Disconnect Rule*.) When the sum of distribution section ampacities exceeds the pulling section ampacities, the Customer will be responsible for providing NEC-approved load calculations.
- The termination compartment for a large residential (0 to 800 amps) modular metering section must meet size requirements shown in **Table 8-1**.  
NOTE: PGE will not terminate directly on the customer breaker.
- See **Figure 5-3** for meter clearances for multiple-meter installations.
- If a cross bus is installed below or behind a terminating position, the cross bus must be fully insulated and barricaded.
- Bus stubs shall be anchored to prevent turning.
- Customer service entrance conductors must exit above the lugs.
- Cable entry through the back of the cabinet generally does not meet PGE requirements due to minimum cable bend radius.

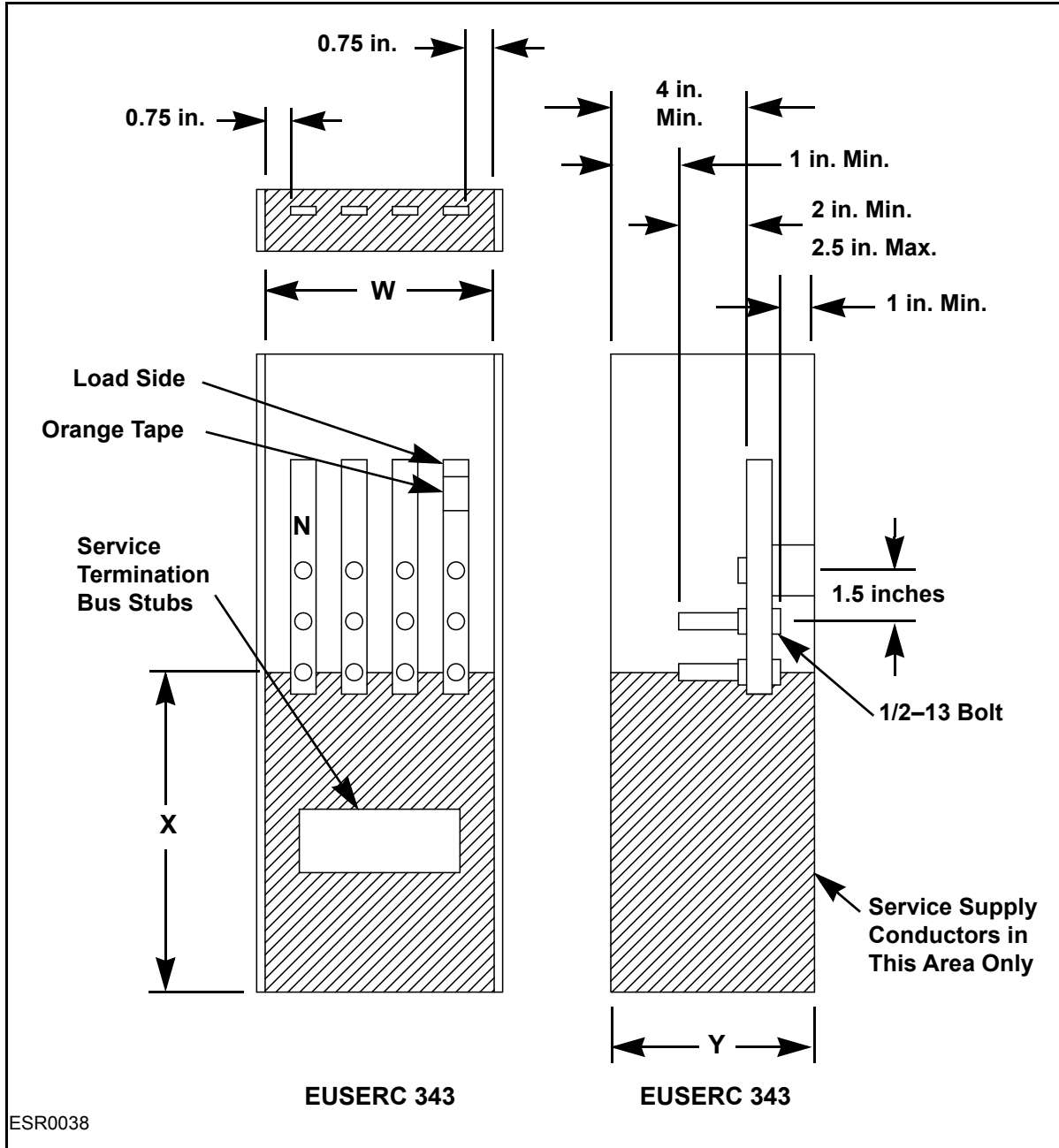


Figure 10-5: Pull Box With Terminating Facilities, 0 to 600 Volts, 0 to 1200 Amps  
(EUSERC 343 and 347)

**Table 10-2: Minimum Dimensions for Pull Boxes With Terminating Facilities (EUSERC 343)**

Total Service (amps)	Dimensions (inches)			
	W		X	Y
	3-Wire	4-Wire	Lug Height	Depth
0 to 200	10.5	14	11	6
201 to 400	10.5	14	22	6
401 to 800	16.5	22	26	11

## 10.5 Customer's Responsibility for Maintaining Switchgear

The Customer is responsible for the proper installation and periodic maintenance of Customer-owned switchgear including overcurrent devices, cable and bus connections and terminations, and all other electrical equipment.

Ensuring that bolted connections have a long service life requires that there be a clean contact surface and proper clamping pressure between the terminal lug and the terminal pad. Use of a torque wrench will result in more consistent clamping forces on bolted connections. PGE recommends that bolted connections be torqued to the values in **Table 10-3**.

**Table 10-3: Maximum Torque Values for Bolted Connections**

Bolt Size	Aluminum (ft·lb)	Everdur (ft·lb)	Stainless Steel (ft·lb)
3/8–16	12	18	20
1/2–13	25	40	45

Note: For set screw connections torque to manufacturer recommendations.



## 10.6 Commercial Service, 0 to 800 Amps

Follow these basic requirements for commercial services of 0 to 800 amps.

- NEC requires a main disconnect when more than six services are connected. (See Section 1.15, *Six-Disconnect Rule* for more information.) When the sum of distribution section ampacity ratings exceeds the pulling section ampacity ratings, the Customer will be responsible for providing NEC-approved load calculations.
- Meters and equipment must be accessible during normal working hours for meter reading and testing. When a lockbox is needed, it must be installed outside the meter room.
- Each multiple-meter service must have a permanently engraved metal or hard plastic label with letters at least 3/8-inch high to identify the customer's service address before power is connected. See **Figure 10-1**.
- If a cross bus is installed below or behind a terminating position, the cross bus must be fully insulated and barricaded (EUSERC 347).

### 10.6.1 Commercial Pedestal, 0 to 200 Amps

See **Figure 10-6** for a commercial pedestal, 0 to 200 amps. For minimum pedestal dimensions, see **Table 10-4**.

Follow these additional requirements when installing a commercial pedestal, 0 to 200 amps.

- Consult PGE for pad requirements.
- The barrier between the meter section and the pull section shall extend to the edge of the test block barrier.
- See EUSERC 308 for additional requirements.

**Table 10-4: Minimum Dimensions for Pedestals**

Service	A (inch)	W (inch)
Single-phase	10	10.5
Three-phase	10	12.5

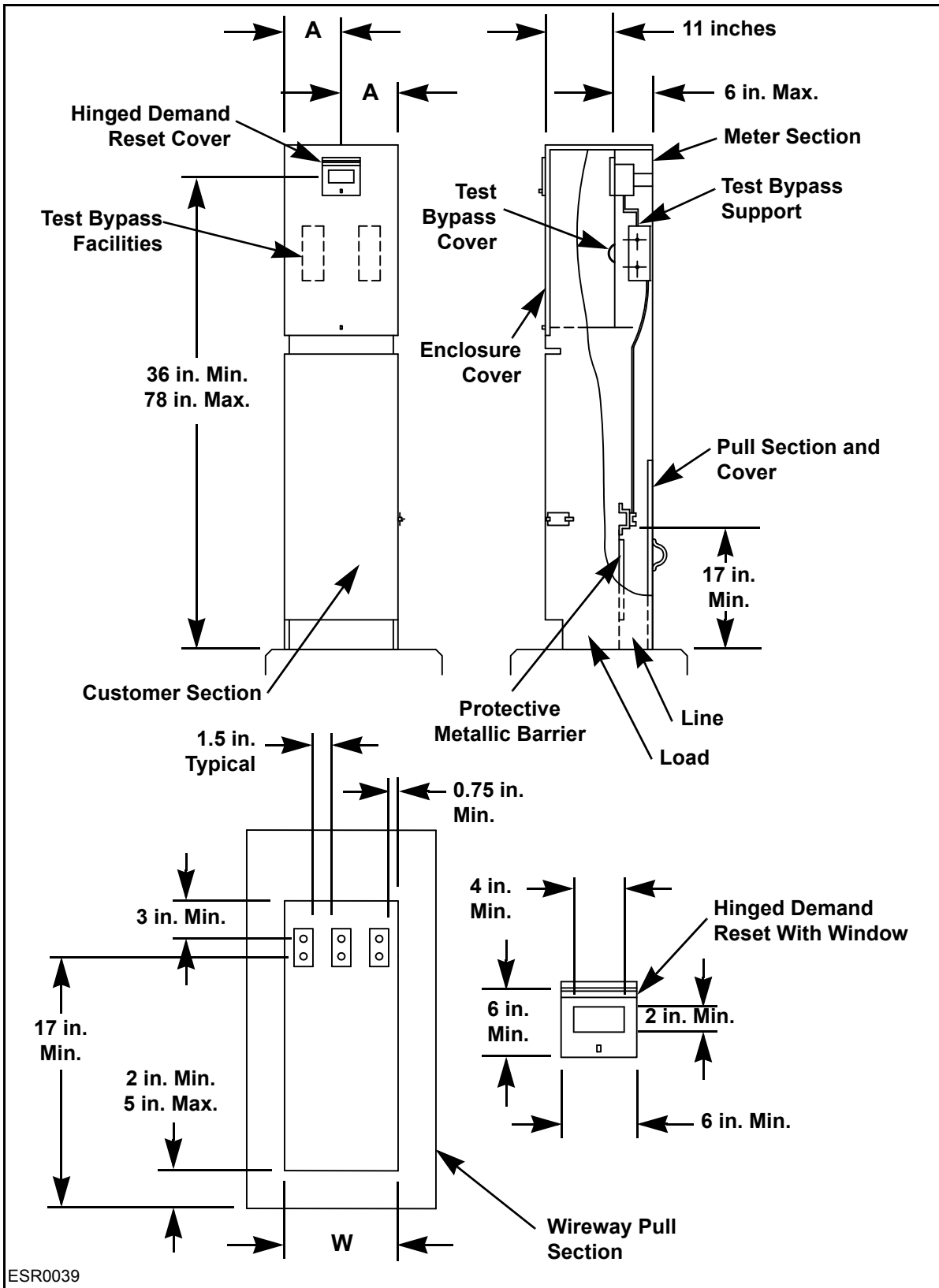


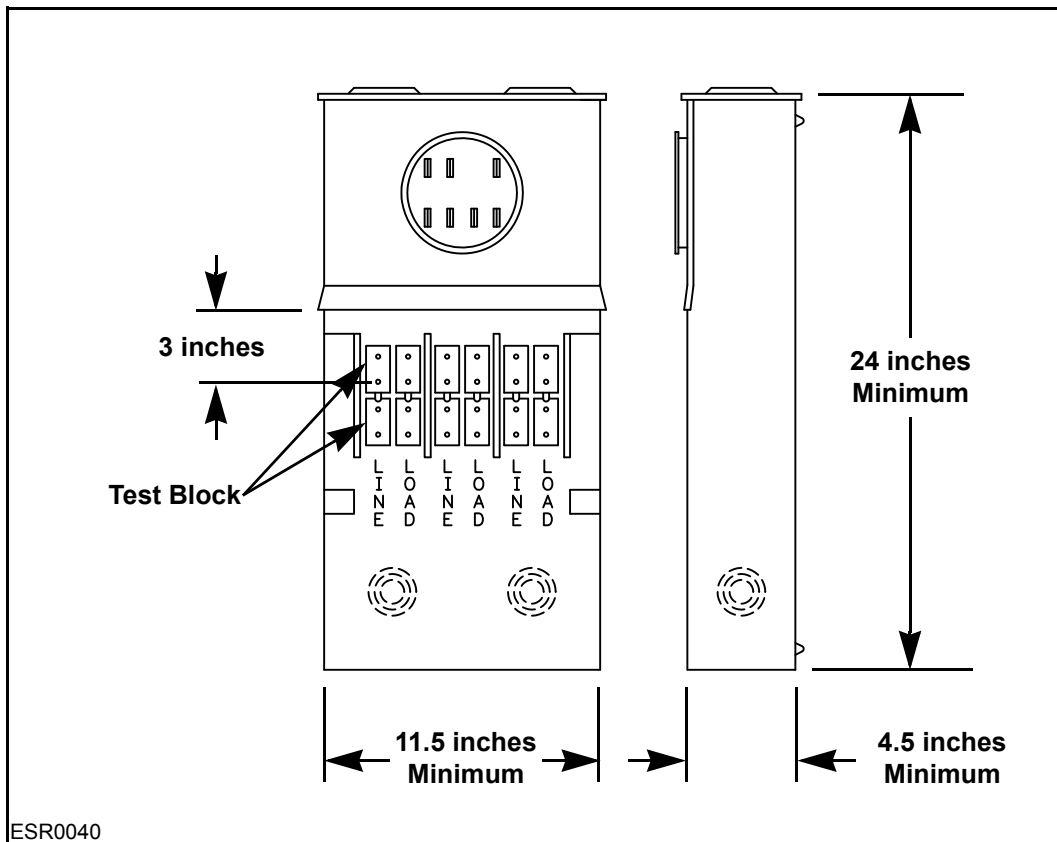
Figure 10-6: Commercial Pedestal, 0 to 200 Amps (EUSERC 308)

### 10.6.2 Commercial Three-Phase, Direct-Connect Meter Safety Socket

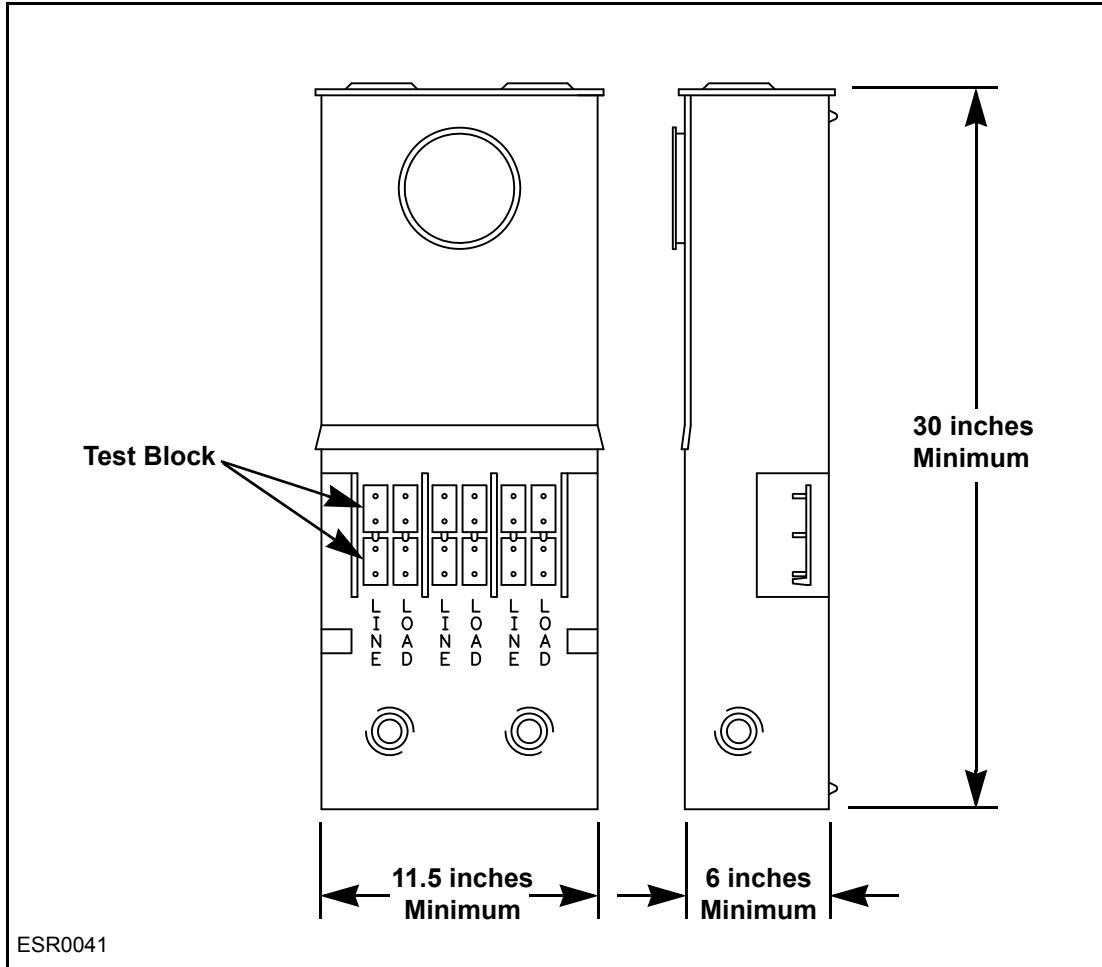
**Figure 10-7** shows a 100-amp commercial, three-phase pedestal (EUSERC 304). See **Figure 10-8** for a 200-amp commercial, three-phase pedestal (EUSERC 305).

Follow these additional requirements when installing a commercial three-phase, direct-connect meter safety socket.

- The socket must be a EUSERC-approved safety socket with test blocks that maintain service to the customer while the meter is removed for testing or inspection.
- A three-phase, 320-amp, direct-connect meter socket is not approved for commercial use.
- For a four-wire delta service, the high-leg (wild) terminal must be located on the right side of the test blocks, and identified by an orange mark. The test block must be factory marked and readily identified.



**Figure 10-7: 100-Amp Commercial, Three-Phase, Direct-Connect Meter Safety Socket (EUSERC 304)**



**Figure 10-8: 200-Amp Commercial, Three-Phase, Direct-Connect Meter Safety Socket (EUSERC 305)**

### 10.6.3 Commercial Ganged Meter Sockets

Follow this additional requirement when installing commercial ganged meter sockets, such as the one shown in **Figure 10-9**.

- PGE terminates service conductors in the cable pulling section on bus extensions only, not on the Customer's disconnect. Cable entry through the back of the pulling section is not allowed. The cable pulling section must be sized for PGE service termination (EUSERC 343) and must have bus extension drilled for landing lugs.

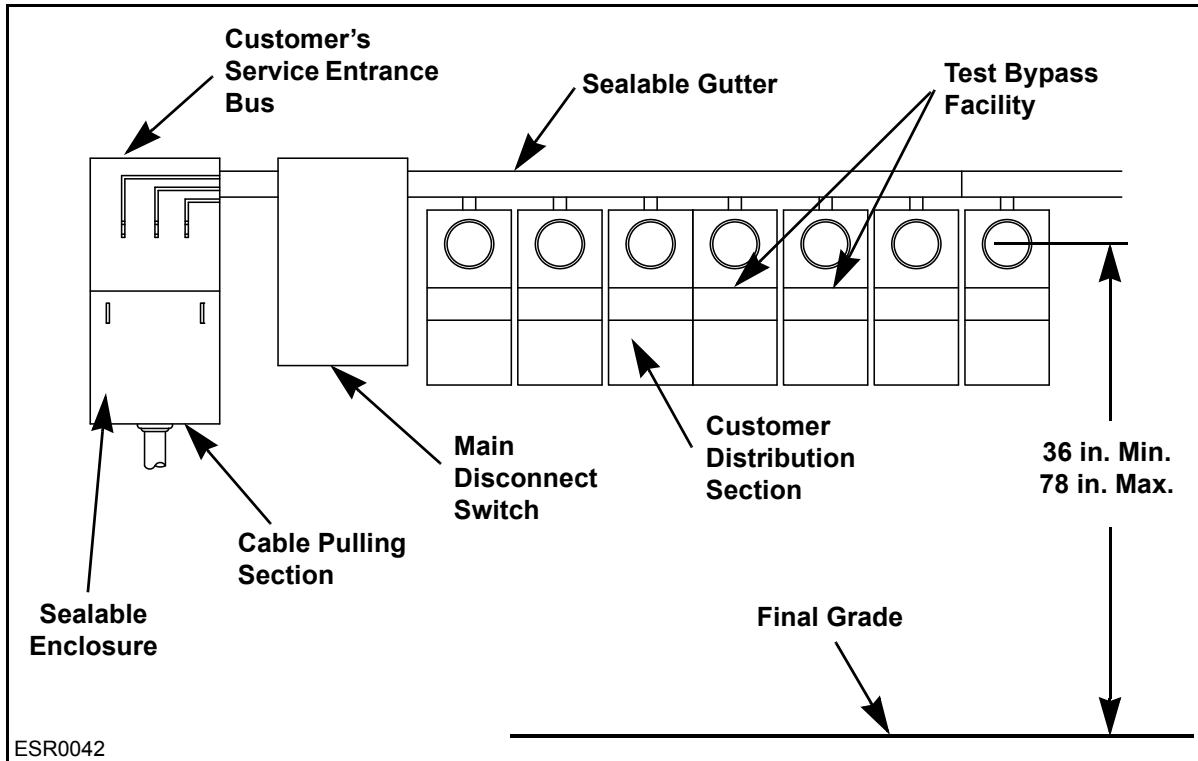


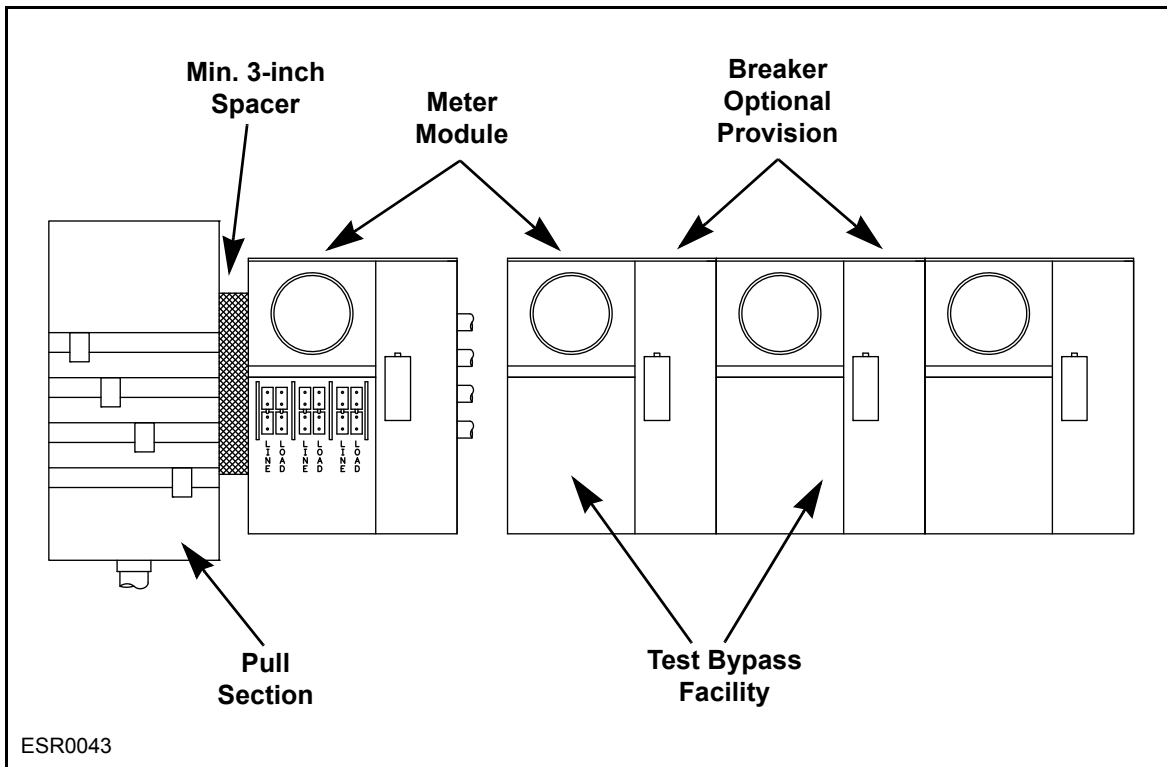
Figure 10-9: Commercial Ganged Meter Sockets

### 10.6.4 Commercial Module Meter Sockets

**Figure 10-10** shows a commercial module meter socket installation (EUSERC 304, 305, and 347). See **Figure 10-11** for a typical double-stacked module meter socket installation.

Follow this additional requirement when installing commercial ganged meter sockets.

- A minimum 3-inch spacer is required between the pull section and the meter socket panel.



**Figure 10-10: Commercial Module Meter Sockets (EUSERC 304, 305, and 347)**



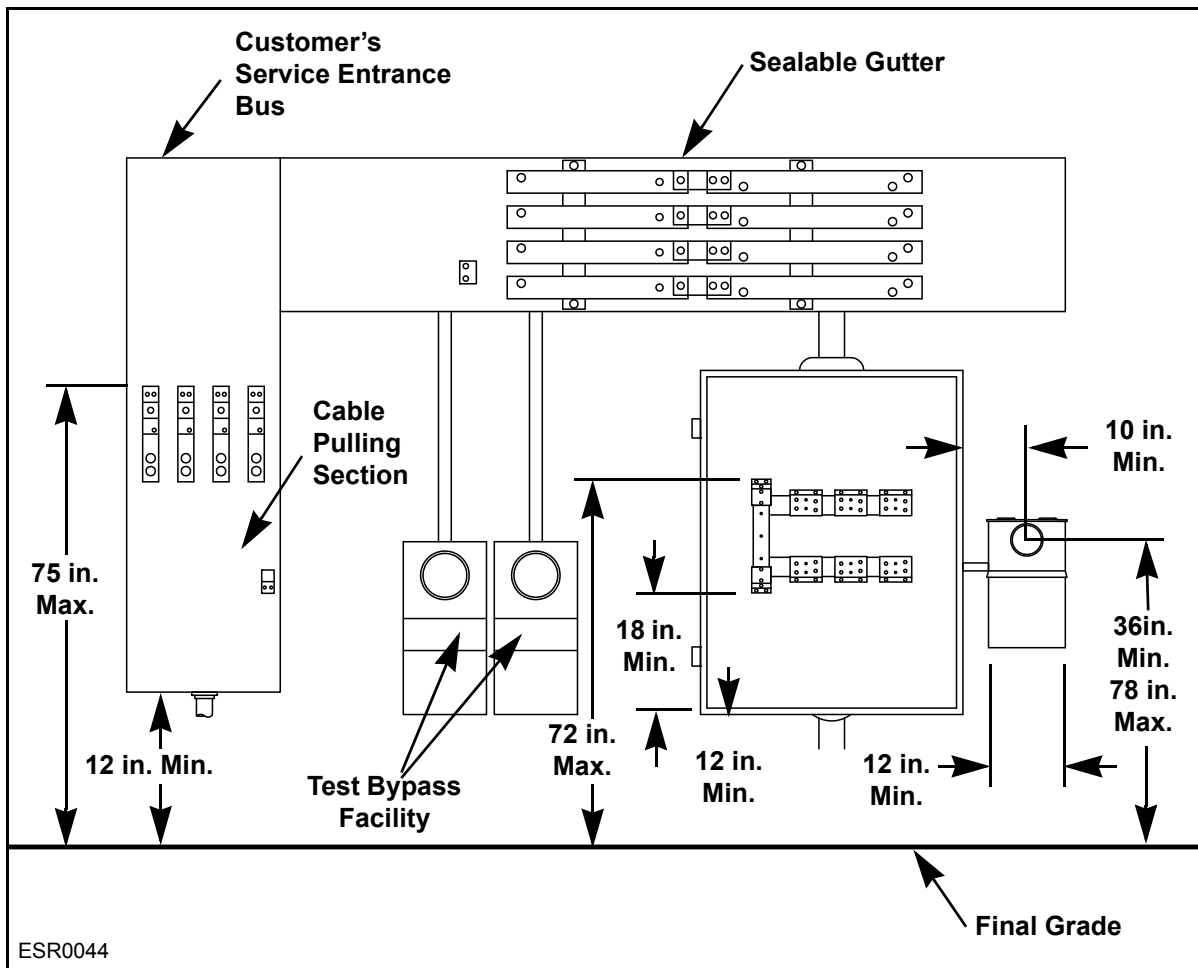
Figure 10-11: Typical Double-Stacked Module Meter Sockets

**10.6.5 Combination Current Transformer/Direct-Connect, Wall-Mount Metering**

**Figure 10-12** shows a combination current transformer (CT)/direct-connect, wall-mount metering, 0 to 800 amps. See **Figure 10-13** for the EUSERC identification for this equipment.

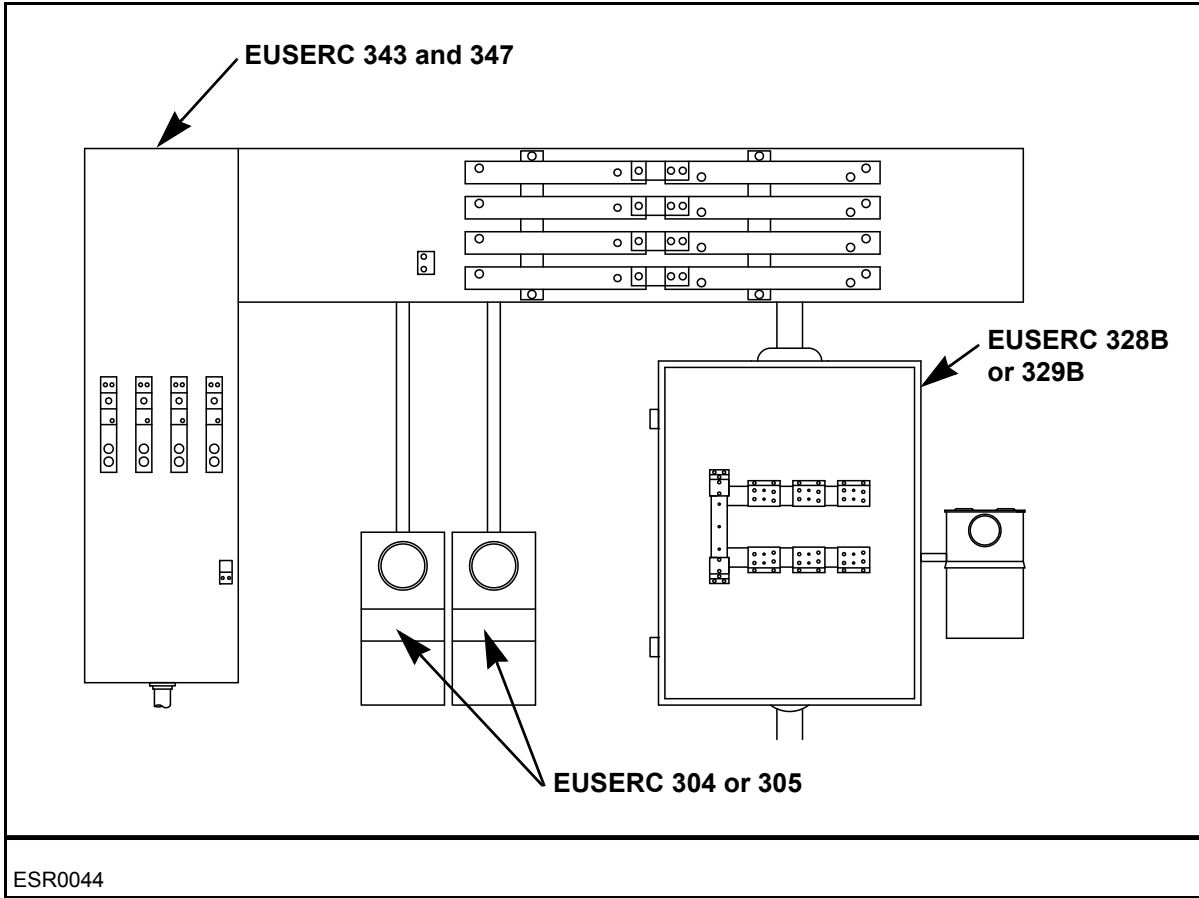
Follow these requirements when installing a combination CT/direct-connect, wall-mount metering.

- Bonding jumpers must be used around knockouts.
- The pull section must be rated at the sum of the service maximum ampacity.
- For services larger than 800 amps, see Section 11, *Commercial, Industrial, and Large Residential Services, 801 Amps or Higher*.



**Figure 10-12: Combination Current Transformer/Direct-Connect, Wall-Mount Metering, 0 to 800 Amps**





**Figure 10-13: EUSERC Identifications for Combination Current Transformer/Direct-Connect, Wall-Mount Metering, 0 to 800 Amps**

### 10.7 Current Transformer Metering, 800 Amps Maximum

Current transformer (CT) metering is required when a three-phase service exceeds 200 amps, or when a single-phase 120/240 volt service exceeds 400 amps (320 amps continuous). For services over 800 amps, see Section 11, *Commercial, Industrial, and Large Residential Services, 801 Amps or Higher*. PGE prefers switchgear metering, but it is not required for services of 800 amps or lower.

The CT cabinet and meter must be mounted outside the building as described in Section 5.2, *Meter Clearances and Location Criteria*.

The Customer will provide and install:

- The weathertight NEMA 3R-rated metallic CT cabinet securely mounted on a rigid surface. The doors are to be hinged and capable of being sealed. (See Section 10.7.4.) For installations where both the line and load sides are coming in and going out underground or overhead, the cabinet shall be a minimum 48-inches wide x 48-inches high x 11-inches deep.
- EUSERC-approved CT mounting bases rated 50,000 amperes fault duty. Fault currents over 50,000 amperes must have switchgear metering. Contact PGE for maximum available fault current.
- The conduit between the socket enclosure and the CT mounting base.
- The remote socket enclosure, drilled and tapped for a PGE test switch.
- A 6-inch diameter barrier post, which is required where metering equipment is installed in vehicle traffic area. For more information, see **Figure 6-5**, **Figure 6-6**, and **Table 6-3** in Section 6.4.6, *Barrier Post*.
- The CT cabinet and meter socket, which must be mounted plumb in both directions.

PGE will own, provide, and install:

- The meter and test switch, with their associated wiring.
- Line-side service conductors on the CT mounting base and connectors for PGE-owned conductors (for underground services only).

Consult PGE for current transformer installation specifications.

NOTE: To prevent water drainage into the customer's equipment, PGE equipment, transformers, and vaults must not be located higher than the CT cabinet.

### 10.7.1 Current Transformer Metering, Post-Mounted

**Figure 10-14** shows current transformer metering, post-mounted, 600 volts, 800 amps maximum.

Follow these requirements when installing post-mounted current transformer metering.

- The Customer must consult PGE before construction and follow the guidelines in Section 10.7.
- The current transformer cabinet must have two factory-installed, 24- x 48-inch hinged doors with handles in the center.
- The cabinet must be a minimum 12 inches above the final grade.
- The meter must be mounted so that it does not interfere with the opening of the cabinet doors.
- For a four-wire delta service, the high-leg (wild) terminal must be located on the right side and identified by an orange mark.
- The configuration shown in **Figure 10-14** can be used as a wall mount if clearance allows.
- The Customer must provide 3-inch galvanized, rigid steel pipe supports with caps or 6- x 6-inch pressure-treated wood posts.
- The Customer must provide the conduit and the sweep with a 36-inch minimum radius.
- Mount the meter socket on the side of the compartment.
- Provide a 1- to 3-inch space between the cabinet and the meter enclosure.
- The Customer must provide 24 inches of concrete backfill.

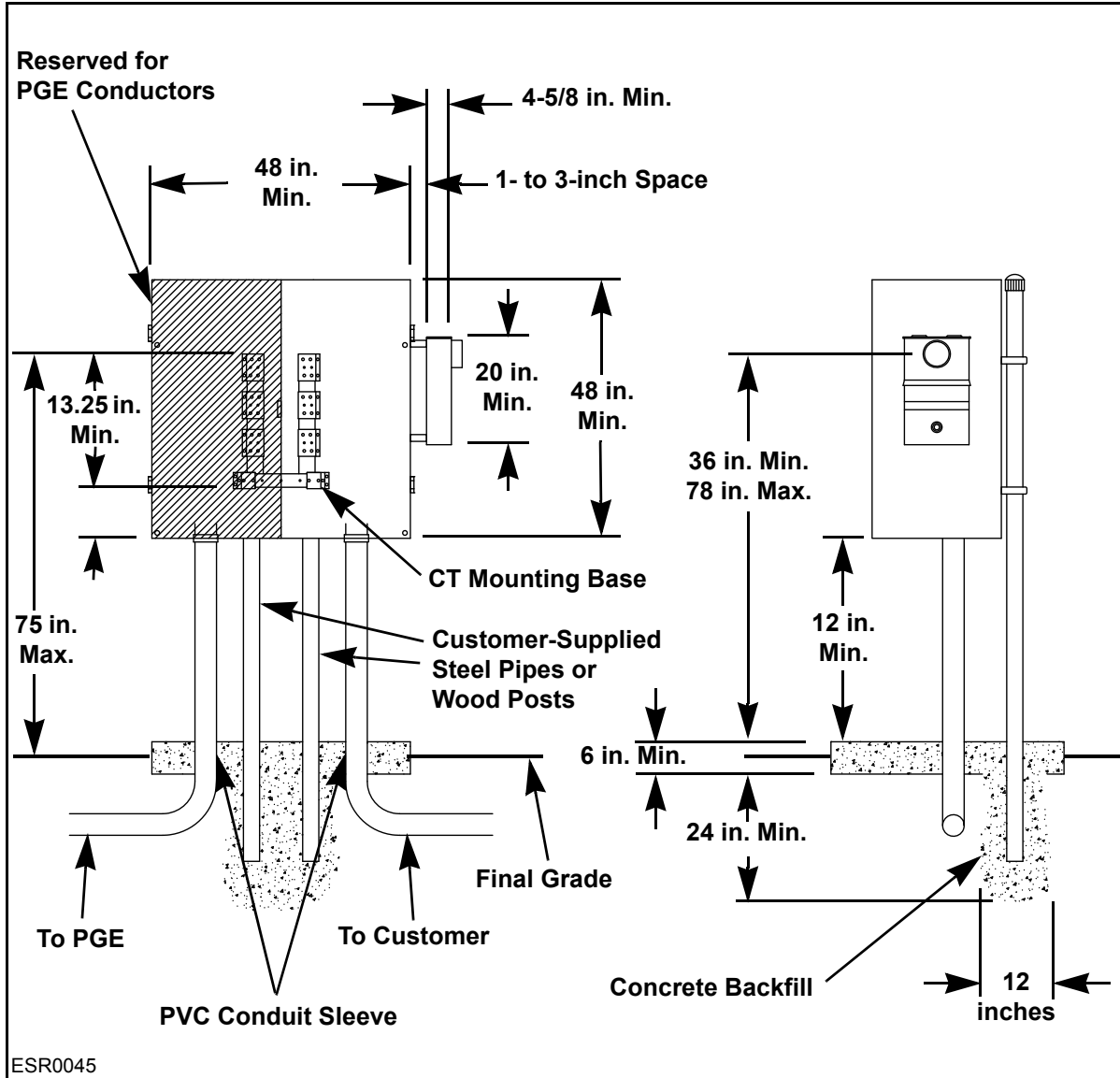


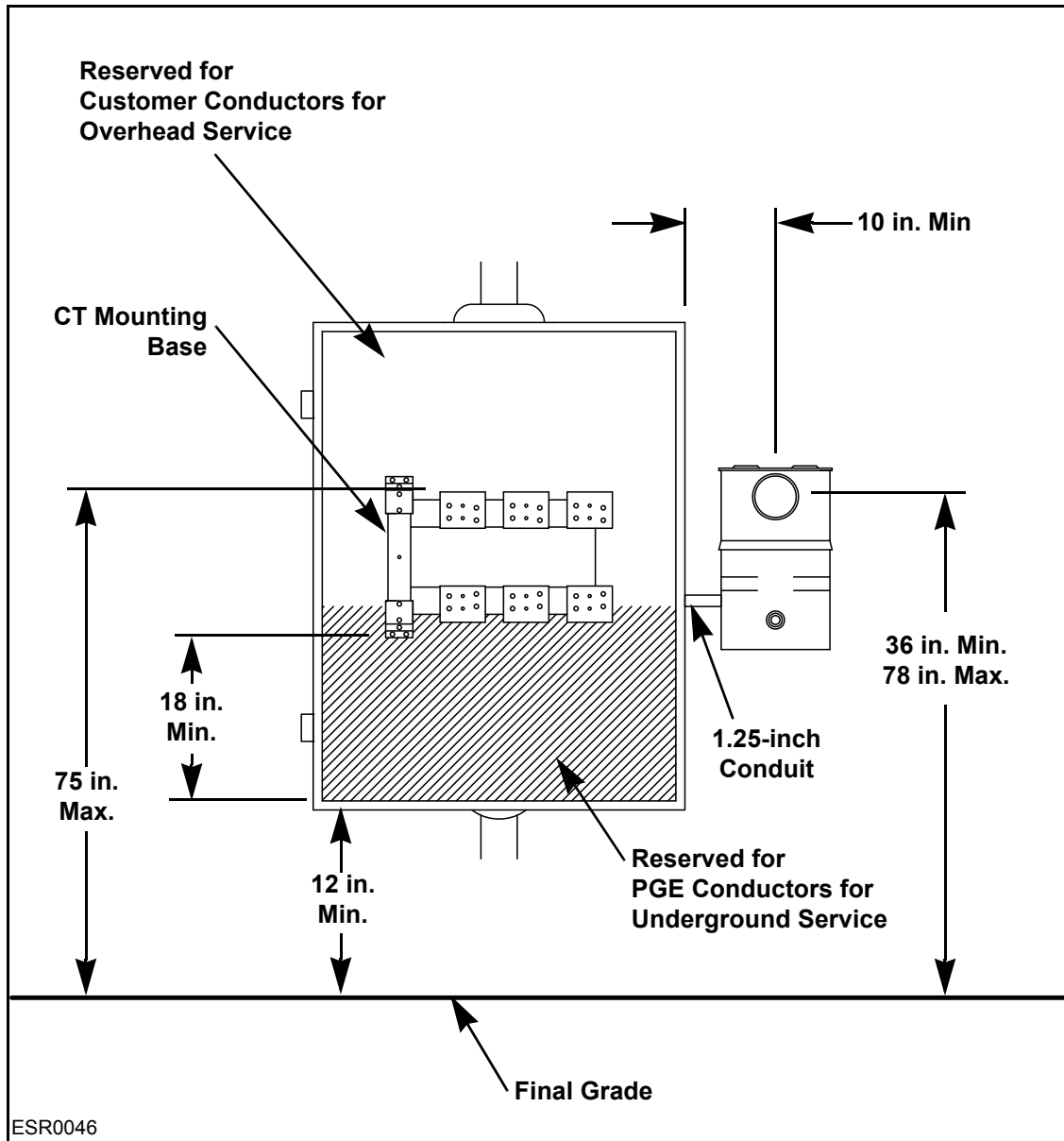
Figure 10-14: Current Transformer Metering, Post Mounted, 600 Volts, 800 Amps Maximum

### 10.7.2 Current Transformer Metering, Wall-Mounted

**Figure 10-15** and **Figure 10-16** show wall-mounted current transformer metering, 600 volts, 800 amps maximum (EUSERC 329B).

Follow these requirements when installing wall-mounted current transformer (CT) metering.

- The Customer service entrance conduits must exit the enclosure on the load side of the CT. PGE will not allow customer conductors or conduit in PGE terminating and pull space.
- The current transformer cabinet must have two factory-installed, 24- x 48-inch hinged doors with handles in the center.
- For a four-wire delta service, the high-leg (wild) terminal must be located on the right side and identified by an orange mark.
- The meter socket must not be located above the CT enclosure without PGE approval.
- The cabinet must be a minimum of 12 inches above the final grade.
- See Section 5.2, *Meter Clearances and Location Criteria* for clearances.



**Figure 10-15: Current Transformer Metering, Wall Mounted, 600 Volts, 800 Amps Maximum (EUSERC 329B)**

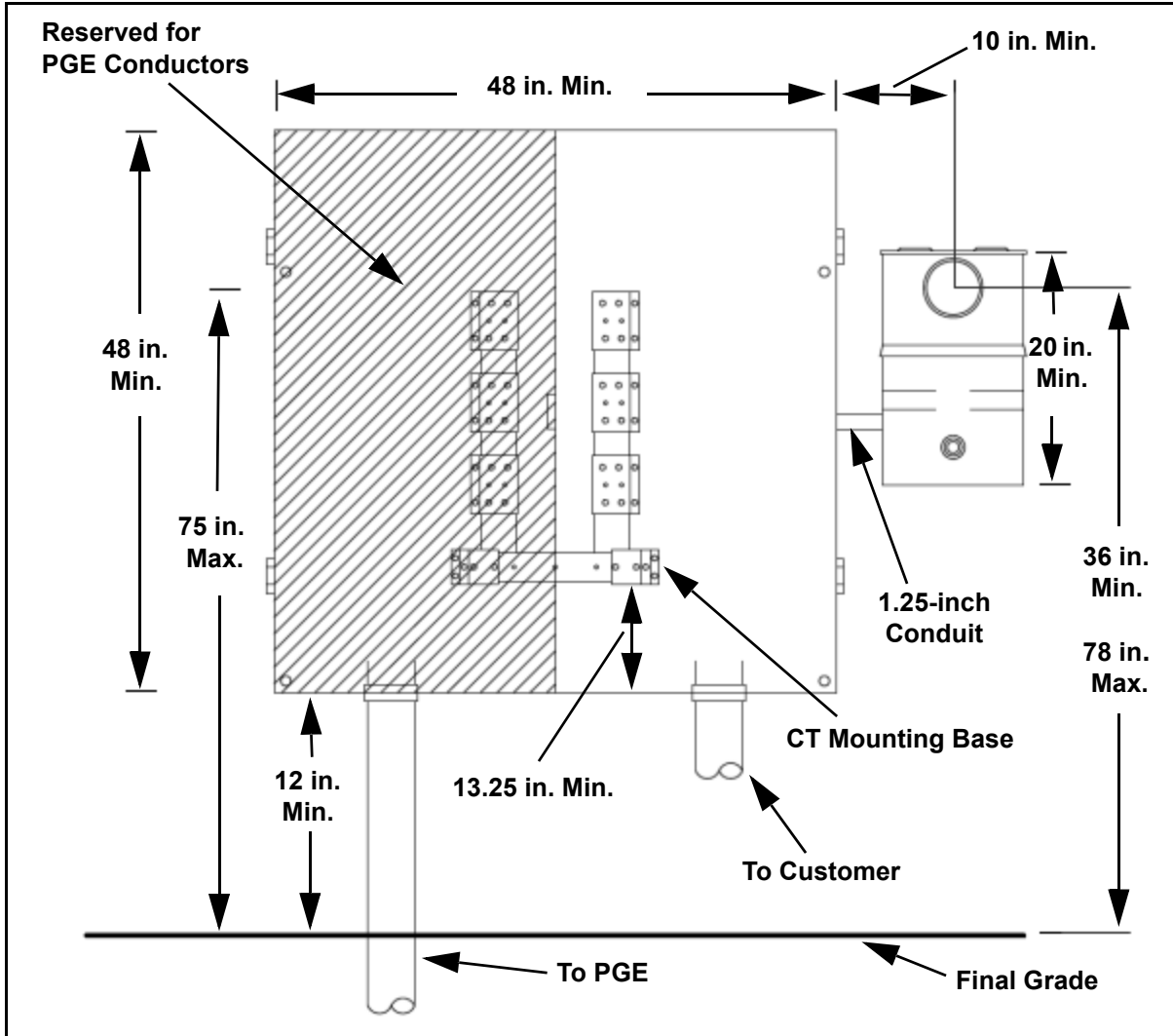


Figure 10-16: Current Transformer Metering, Line and Load Same Side, 600 Volts, 800 Amps Maximum (EUSERC 329B)

### 10.7.3 Current Transformer Cabinet

**Figure 10-17** shows a current transformer (CT) cabinet, 800 amp maximum and 0 to 600 volts (EUSERC 316, 317, and 318). See **Table 10-5** for the minimum dimensions of a CT cabinet.

Follow these requirements when installing a CT cabinet.

- Only conductors associated with a single meter will be permitted in the CT cabinet. For other underground services, a separate terminating pull box will be provided for a PGE service lateral. See **Table 10-2** for minimum dimensions for pull boxes with terminating facilities.

NOTE: No connections, including the installation of monitoring equipment, will be made in any CT enclosure to supply any other meter.

- Customer conductors must exit the enclosure on the load side of the current transformers.

NOTE: The Customer's conductors will not be permitted in the PGE terminating and pull space.

- The cabinet must be mounted in a readily accessible location acceptable to PGE. The cabinet must be a minimum of 12 inches above the final grade.
- The top of the CT mounting bracket must not be more than 78 inches above floor level. The cover must have factory-installed hinges for side opening with sealing provisions, and be able to hold the cover in the open position at 90 degrees or more.
- A clear workspace is required in front of this cabinet. (See **Figure 5-3, Meter Clearances for Multiple-Meter Installations.**) The hinged door must open in the direction opposite to the room door so that room ingress or egress is not blocked. The location of the cabinets must be on the main or entry level floor.
- For overhead service, the Customer will provide connectors, terminate line, and load-side service conductors in all CT compartments. The Customer will connect conductors to the line and load sides of the EUSERC-approved mounting base. Line- and load-side terminations on CT landing pads require two bolts per connector.
- For underground service, the Customer will provide a EUSERC-approved CT mounting base for installation in a CT cabinet.
- A label that states, "Do Not Break Seal, No Fuses Inside" is required on the front of the CT cabinet.



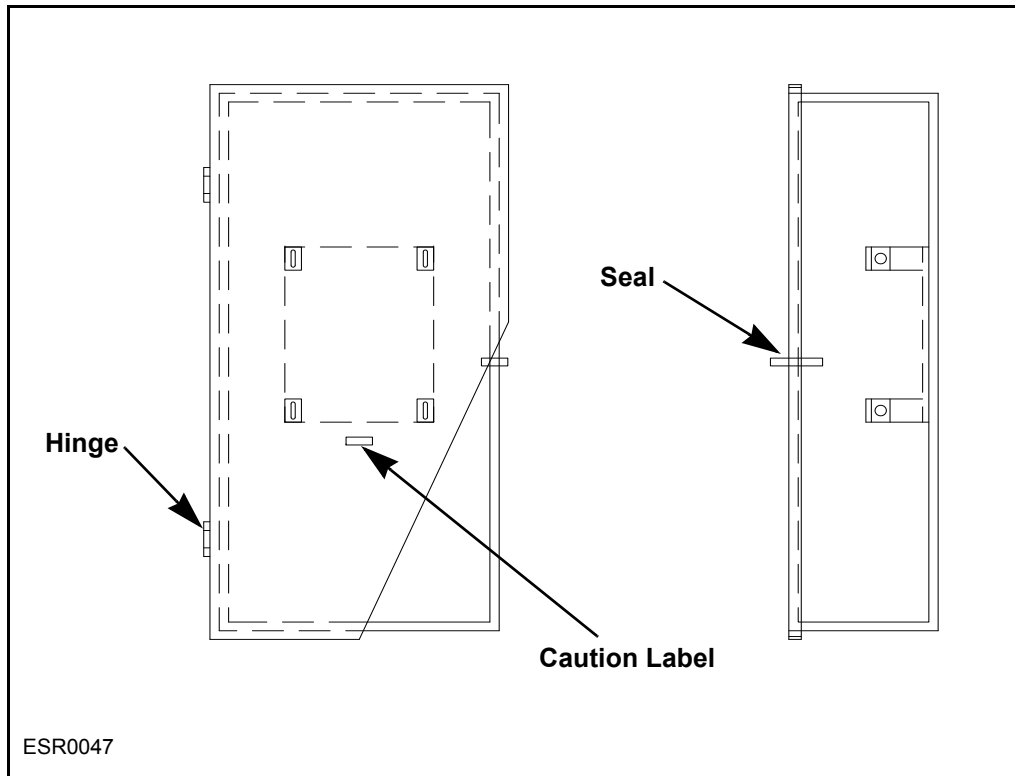


Figure 10-17: Current Transformer Cabinet, 800 Amp Maximum, 0 to 600 Volts (EUSERC 316, 317, and 318)

Table 10-5: Current Transformer Cabinet Minimum Dimensions

Type of Service	EUSERC	Minimum Exterior Cabinet Dimensions (inches)			CT Mounting Base
		Width	Height	Depth	
Single-phase, three-wire 401 to 800 amps	Dwg No. 317	24	48	11	EUSERC 328B
Three-phase, four-wire 201 to 800 amps	Dwg No. 318	36	48	11	EUSERC 329B
Above 800 amps	See Section 11, <i>Commercial, Industrial, and Large Residential Services, 801 Amps or Higher</i>				
Line/load on same side of cabinet	N/A	48	48	11	EUSERC 329B

#### 10.7.4 Current Transformer Metering Conduit

The Customer must provide conduit between the meter socket and the CT cabinet. Follow these requirements when installing conduit.

- Use rigid steel or IMC conduit. A minimum of 1.25 inches is required with proper fittings and bushings to protect metering conductors and ensure bonding of metal parts.
- Schedule 40 PVC may be allowed when a bonding lug is provided in both the CT cabinet and meter socket. EMT conduit will be allowed for runs of less than 10 feet.
- For standard installation, conduit must be of sufficient length to ensure a minimum distance of 10 inches between the center of the meter socket and the CT cabinet.
- If the standard location is not suitable or workable, an alternate location may be approved. Any alternate location must have prior written PGE approval and must adhere to the following guidelines.
  - Conduit runs must be 50 feet or less, with no more than three bends totaling 270 degrees. No one bend greater than 90 degrees will be allowed.
  - Pull lines are required in all conduit as specified in Section 6.3.3, *Duct Proofing*.
  - When CT metering conduit dead ends on the back of a CT cabinet, use PVC flexible nonmetallic conduit to extend from the back wall to the front of the cabinet.
  - Secure all removable conduit fittings with 1/4–20 screws with sealing provisions. LBs (90-degree ells) may be allowed outside the enclosure for rewires only. LBs may not be used for new construction.

### 10.7.5 Current Transformer Meter Socket Enclosure

Use a meter socket enclosure for CT metering with a space reserved below the socket for a PGE test switch 9.5 inches in length. See **Figure 10-18** and **Table 10-6**.

Follow these requirements when installing a CT meter socket enclosure.

- Verify that the enclosure contains a mounting perch that is tapped for a test switch. PGE will install the test switch.
- **Do not** use a meter socket with circuit closers or bypass clips. They will not be approved.
- All unused openings must be covered and secured by the Customer.

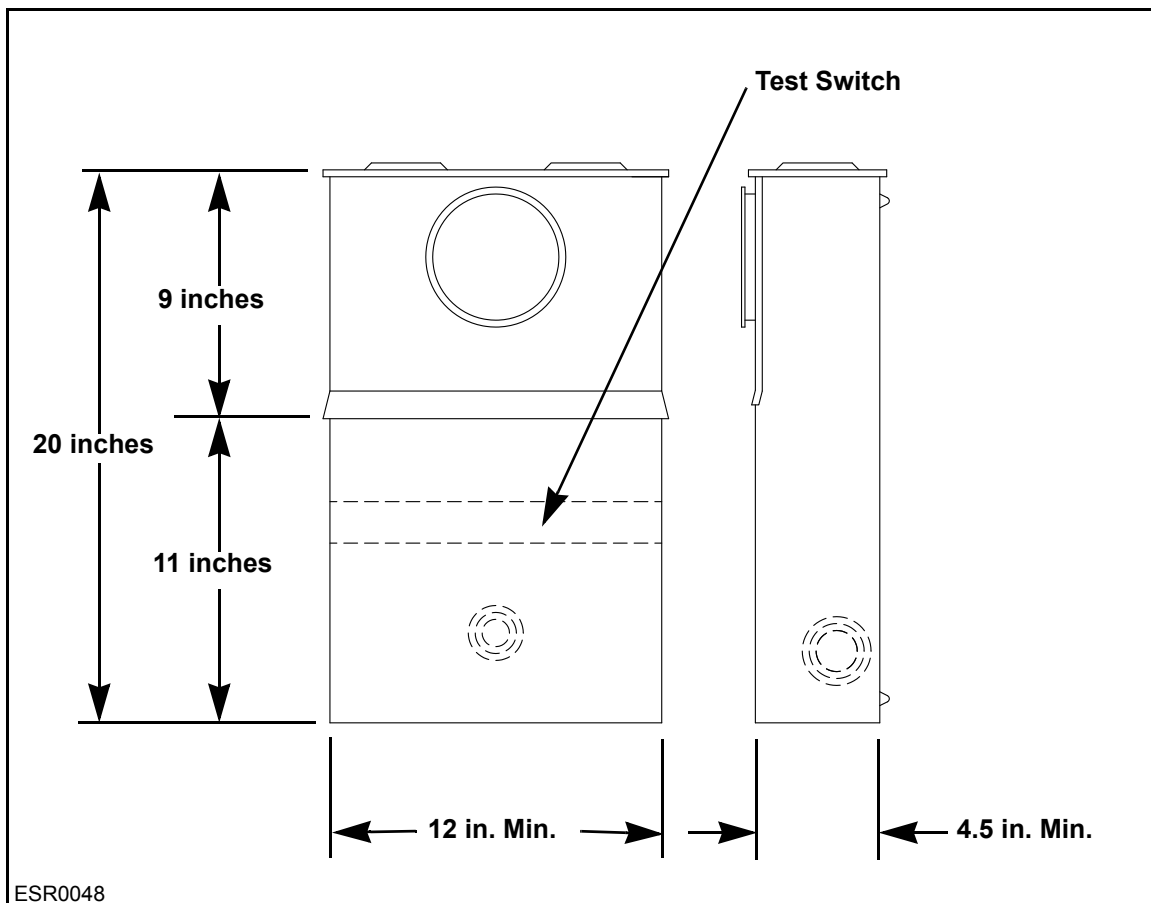


Figure 10-18: Current Transformer Meter Socket Enclosure

Table 10-6: Current Transformer Meter Socket Requirements

Type of Service	Socket Type
120/240 volt, single-phase, three-wire	6-jaw
120/208 volt network, single-phase, three-wire	8-jaw
208/120 volt, three-phase, four-wire	13-jaw
480/277 volt, three-phase, four-wire	
240/120 volt, three-phase, four-wire	

### 10.7.6 Transformer Mounting Base, Single-Phase and Three-Phase

**Figure 10-19** shows a transformer mounting base for installation in a current transformer (CT) cabinet, single-phase, three-wire, 800 amp maximum (EUSERC 328B). See **Figure 10-20** for a typical single-phase CT installation.

**Figure 10-21** shows a transformer mounting base for installation in a CT cabinet, three-phase, four-wire, 800 amp maximum (EUSERC 329B). See **Figure 10-22** for a typical three-phase CT installation.

Follow these requirements when installing a transformer mounting base—single-phase or three-phase—in a CT cabinet.

- On an overhead service the Customer must furnish all lugs and connect conductors to the line and load terminals of the CT mounting base. On an underground service, the Customer only needs to connect to the load side.
- The mounting base accepts bar-type current transformers only.
- Verify that the mounting base for the CT meets ratings for available fault current (50,000 amp maximum).
- Line- and load-side terminations on CT landing pads require two bolts for each mounting position.
- Termination of service conductors must be aluminum-bodied mechanical lugs. Use a one-position lug for 0 to 400 amps and a three-position lug for 401 to 800 amps.

#### 10.7.6.1 Single-Phase Installation

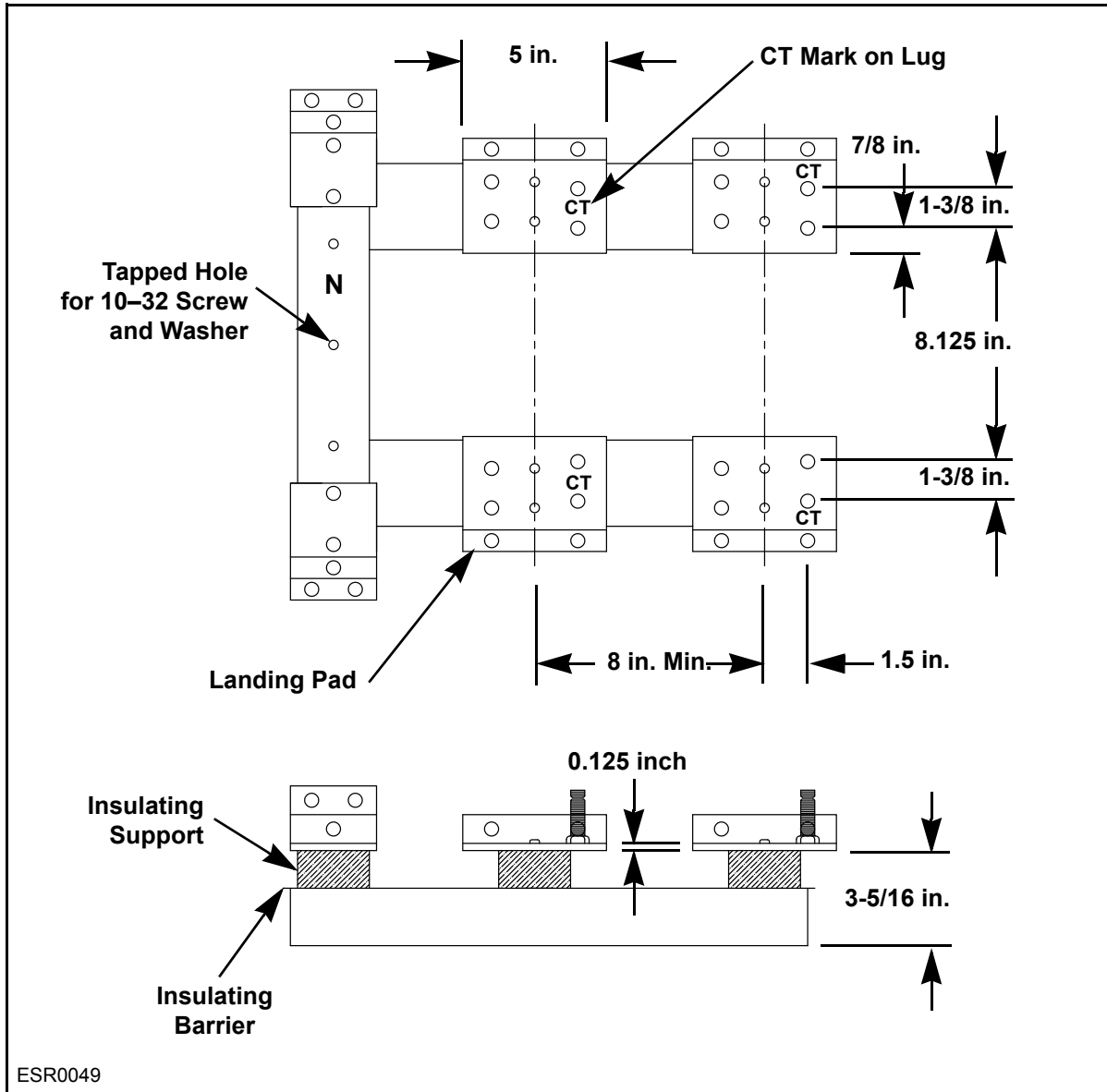
Follow this additional requirement when installing a transformer mounting base, single-phase, in a CT cabinet.

- See Section 5.2, *Meter Clearances and Location Criteria*.

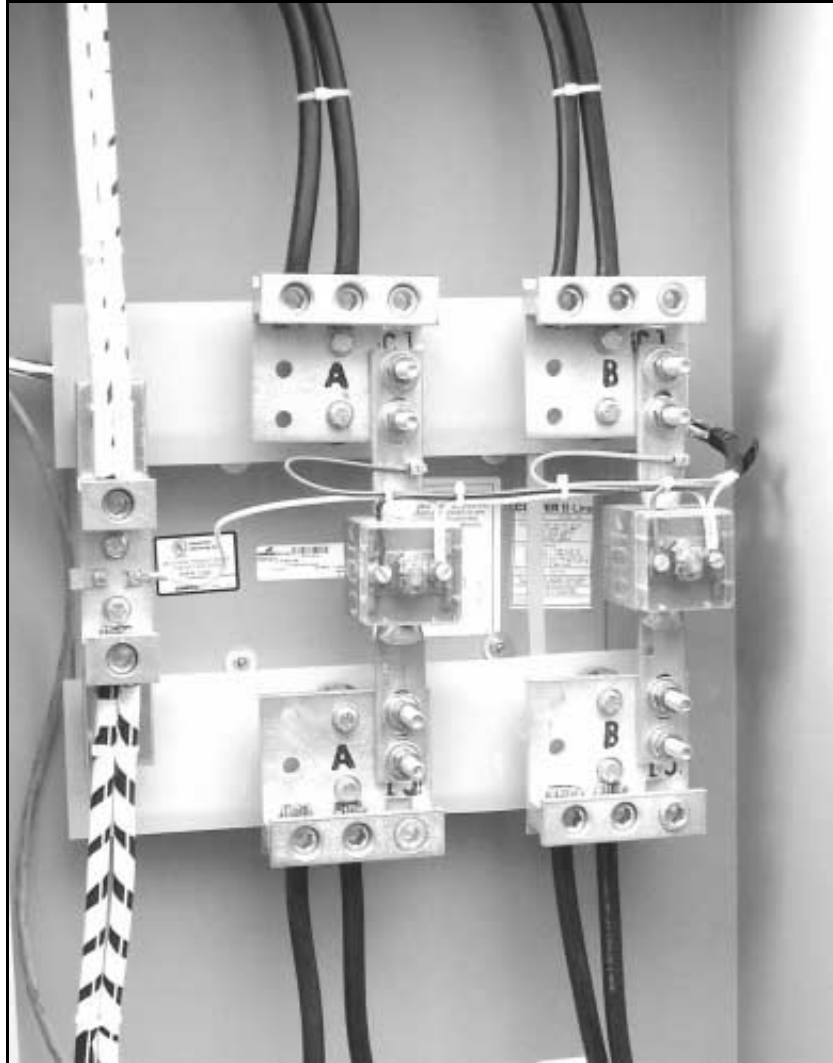
**10.7.6.2 Three-Phase Installation**

Follow this additional requirement when installing a transformer mounting base, three-phase, in a CT cabinet.

- For a four-wire delta service, the high-leg (wild) terminal must be located on the right side and identified by an orange mark.



**Figure 10-19: Transformer Mounting Base for Installation in a CT Cabinet, Single-Phase, Three-Wire, 800 Amp Maximum (EUSERC 328B)**



**Figure 10-20: Typical Single-Phase CT Installation**

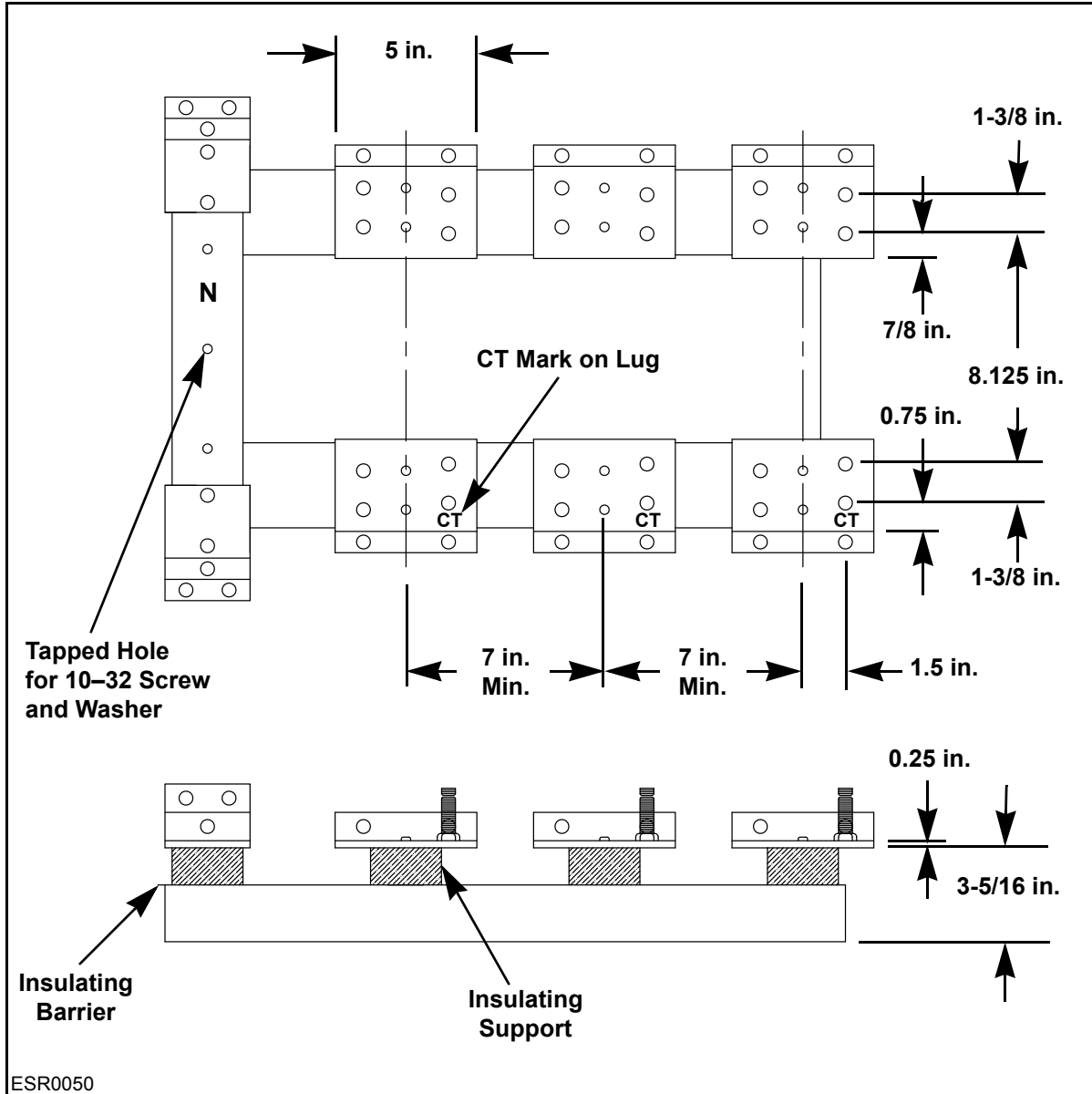
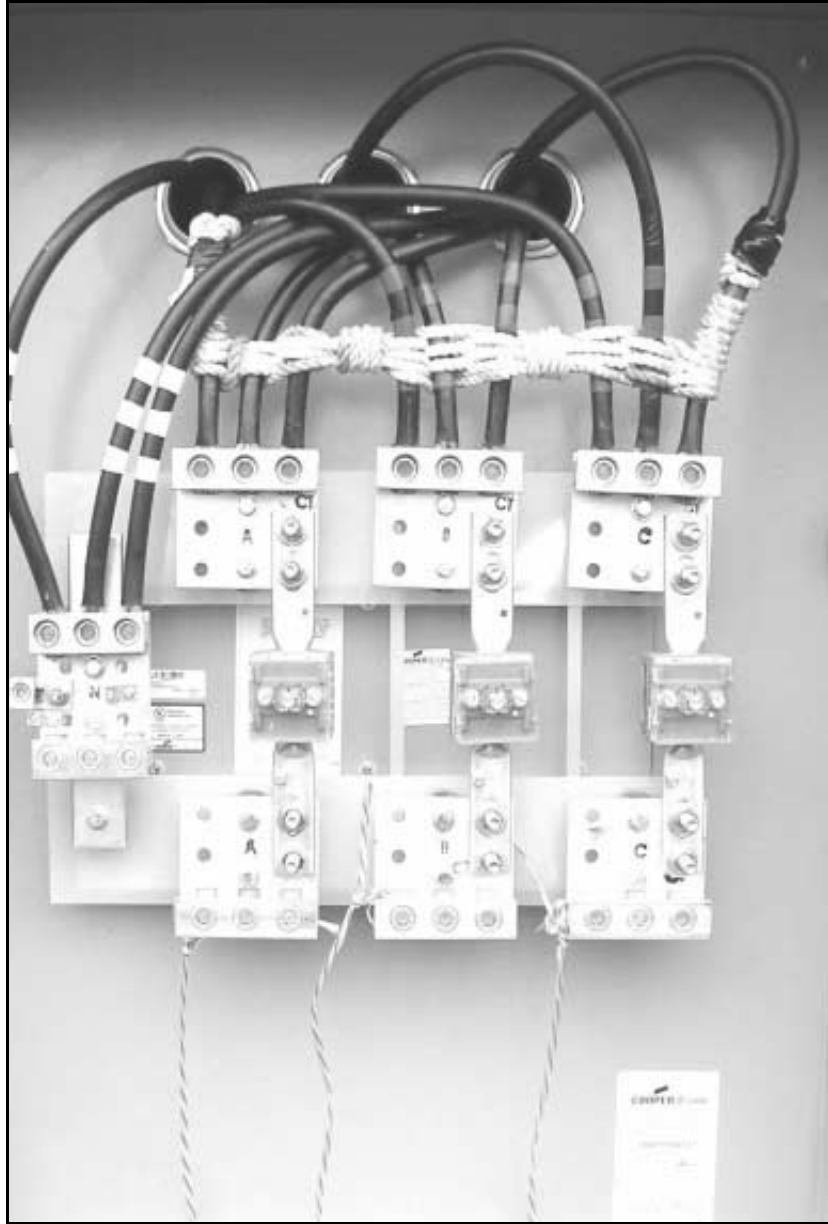


Figure 10-21: Transformer Mounting Base for Installation in a CT Cabinet, Three-Phase, Four-Wire, 800 Amp Maximum (EUSERC 329B)



**Figure 10-22: Typical Three-Phase CT Installation**