

10 Commercial, Industrial, & Large Residential Services (800A or less)

10.1 General

This section describes PGE requirements for commercial, industrial, agricultural, and large residential services up to 600 volts. This section covers single-phase and three-phase services for self-contained and current transformer type metering. All commercial, industrial, agricultural, and large residential Customers must coordinate their service requirements with PGE before purchase and installation of equipment.

Meters must comply with accessibility and location requirements in [Section 5](#). For commercial meters located outdoors, the ground in front of the meter(s) must be “level” for a minimum area of 3’-6” by 3’-6”.

All doors must open outward to rooms that contain PGE metering or termination equipment. Doors must be equipped with a “panic bar”. (See Section 5.2, for “Meter or Electrical Room Checklist”.)

Each multiple metered service must have a permanently engraved metal or hard plastic label with a minimum 3/8” high letters to identify the Customer’s service address before power is connected (see Figure 10-5). It is the Customer’s responsibility to ensure that each meter socket is correctly labeled. PGE may check such meter installations to verify they are correctly labeled and charge a fee to the Customer for incorrectly labeled meter sockets.

Single-phase services over 320 amps continuous and three-phase services over 200 amps require current transformer (C.T.) metering except as referenced in [Section 10.2](#) below.

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

For this section, large residential services are single residential services over 320 amps continuous and all three-phase residential services. Residential meters shall meet the residential location and clearance requirements as outlined in [Section 5.1](#).

Where metering equipment is installed in a location where it might be struck by a motorized vehicle, the Customer is required to install and maintain a PGE approved barrier post (see Figure 6-5). Meter bases, terminal cabinets, current transformer cabinets, and transformers should be located away from landscape irrigation sprinklers.

Where the permanent final or finished grade (or the final platform landing) cannot be provided in front of metering or service termination equipment, at the time of connection, the Customer must supply and install a temporary minimum 4-ft by 4-ft platform of sufficient strength to support PGE personnel. Steps to the platform shall also be required, as needed.

10.2 Direct-connect (Self-contained) Metering

PGE requires a direct-connect socket-type meter when the ampacity of a single-phase service entrance is 400 amperes maximum (320 amps continuous) or less, or when the ampacity of a three-phase service is 200 amperes continuous or less. (See [Table 10-2](#)) Three-phase, three-wire services are no longer offered for new construction or rewires (e.g., meter socket replacement). All rewires shall be upgraded to four-wire, grounded services.

Limit the continuous duty on direct-connect meter sockets for motor loads to:

- 60 hp at 208/120-volt, three-phase
- 60 hp at 240/120-volt, three-phase
- 125 hp at 480/277-volt, three-phase

Motor sizes above these horsepower values shall be metered with current transformers (see [Section 10.6](#)).

10.3 Pull Box Requirements

Locate and make accessible all compartments for termination of PGE’s service laterals as close as possible to where the conductors enter the building. 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, fuses, etc.) in terminal boxes. The Customer must supply any terminal blocks.

PGE requires a main or entry level floor location for termination of load-carrying conductors.

The termination compartment for PGE conductors must meet EUSERC 342 requirements shown in [Table 8-1, \(Dimensions of Terminating Section for Meter Socket Modules \(EUSERC 342\)\)](#) or EURERC 343 shown in Figure 10-9, Pull Box With Terminating Facilities, 0-600 Volts, 0-800 Amps. **The Customer must supply any terminal blocks used. All doors must open outward to rooms that contain PGE metering or termination equipment. Doors must be equipped with a “panic bar”.**

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 main disconnect when more than 6 services are connected. When the sum of distribution section ampacities exceed the pulling section ampacities, the customer will be responsible to provide NEC approved load calculations.

The termination compartment for large residential (0-800 amps) modular metering section must meet size requirements of [Table 8-1](#).

10.4 Customer’s Responsibility for Maintaining Switchboards

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

Ensuring 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 torque wrenches will result in more consistent clamping forces on bolted connections. PGE recommends that bolted connections be torqued according to the table below.

Table 10-1. Maximum Torque Values for Bolted Connections*

Bolt	Aluminum	Everdur	Stainless Steel
3/8"	12 FT-LB	18 FT-LB	20 FT-LB
1/2"	25 FT-LB	40 FT-LB	45 FT-LB

*For set screw connections torque to manufacturer recommendations.

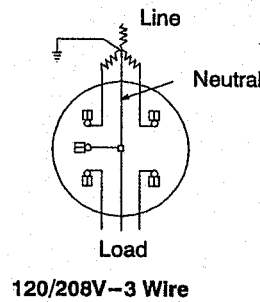
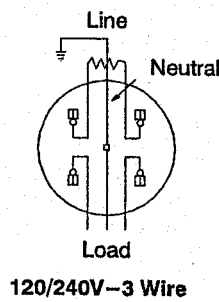
10.5 Primary Voltage Service (over 600 volts)

Consult PGE for requirements and equipment.

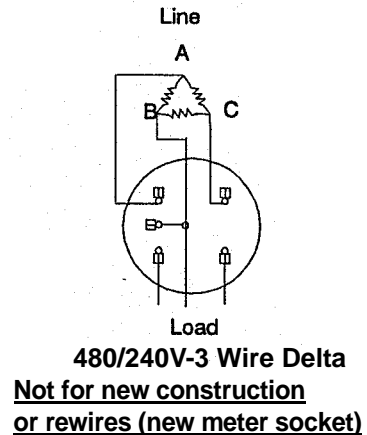
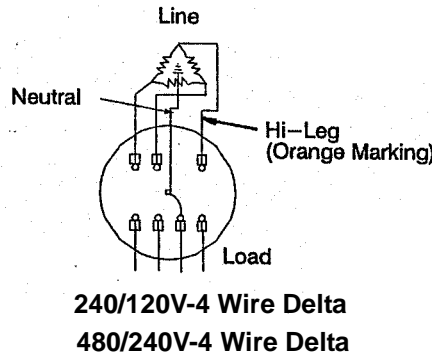
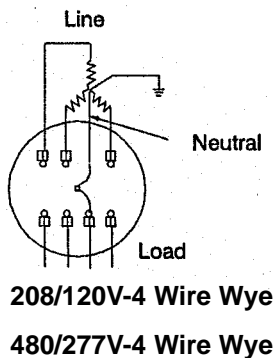
Table 10-2. Direct-connect Meter Socket Requirements

Type of Service	Socket Type
120/240 volt, single-phase, 3 wire	4 jaw
120/208 volt, single-phase, 3 wire (note b)	5 jaw
208/120 volt, three-phase, 4 wire	7 jaw
480/277 volt, three-phase, 4 wire	7 jaw
240/120 volt, three-phase, 4 wire	7 jaw
480/240 volt, three-phase, 4-wire	7 jaw

Single Phase



Three Phase



Note:

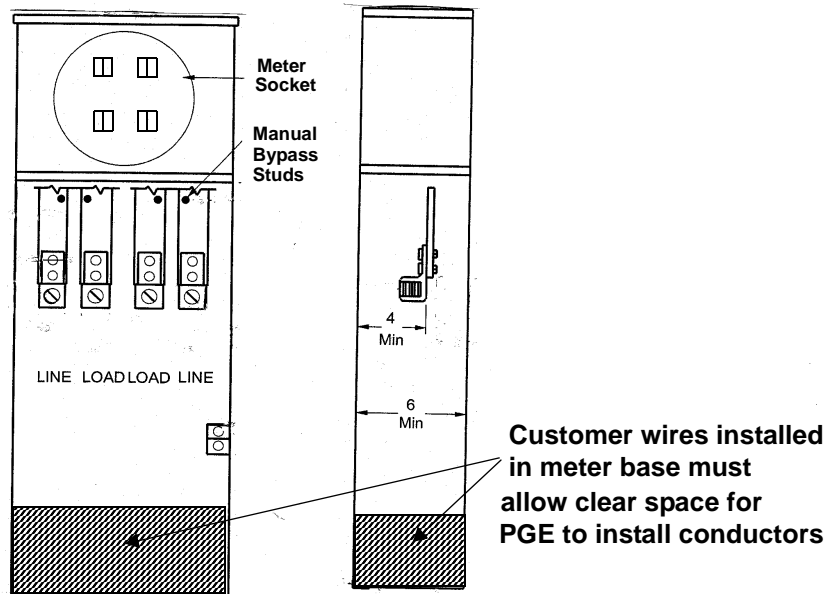
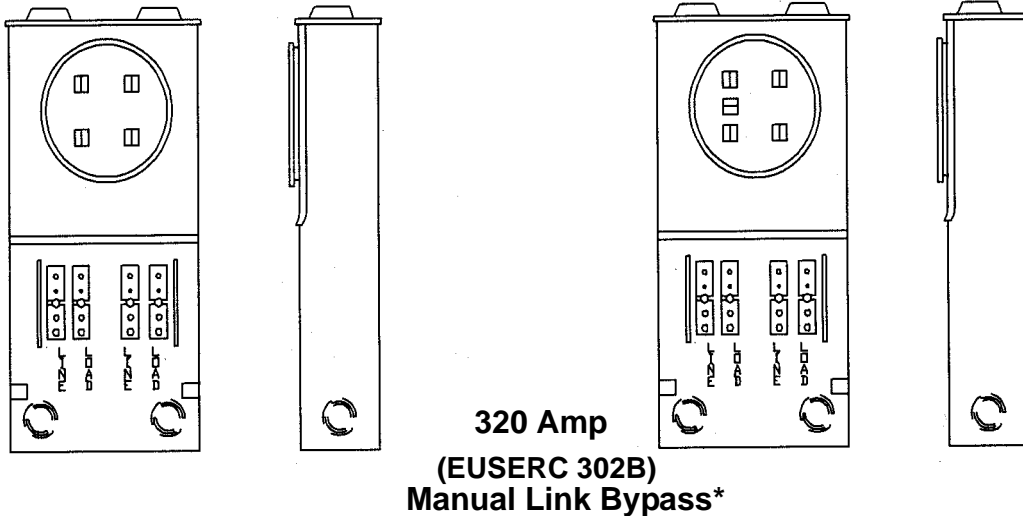
- a. For safety socket requirements, refer to [Figure 10-1](#).
- b. Contact PGE for information.
- c. 120 V service is no longer offered.

Figure 10-1 Commercial and Large Residential Single-phase, Direct Connect Meter Sockets

Safety Socket

EUSERC 304 for 100 Amp 120/240V, Single-Ph
EUSERC 305 for 200 Amp 120/240V, Single-Ph
All 480 Volt, 100 & 200 Amp

5 Terminal, Safety Socket
(120/208 Volt Single-Phase)



*PGE accepts this meter base for limited non-residential use.

Notes:

- a. The EUSERC Safety Socket with test link bypass is required for all 120/240 volt services rated 100 and 200 amps and 480 volt services rated up to and including 200 amps.
- b. No safety socket is required for service equipment rated 200 amps or less for the following uses: telephone booths, billboards, temporary construction, and residential pumps, gates, outdoor lighting, barns, and sheds.
- c. A manual link bypass is required for (1) all 120/240 volt single phase services with a nominal rating of 400 amps (320 amps continuous), and (2) 100 amp traffic control equipment.

Figure 10-2 Commercial Pedestal (0 - 200 Amps) (EUSERC 308)

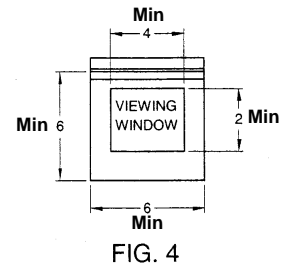
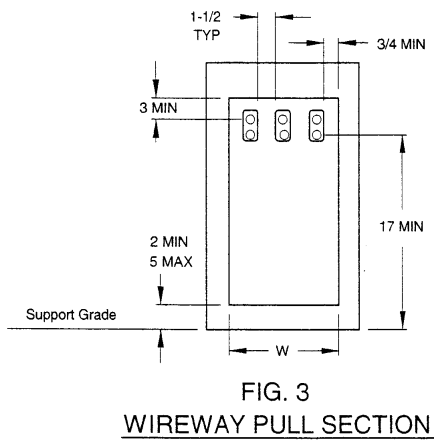
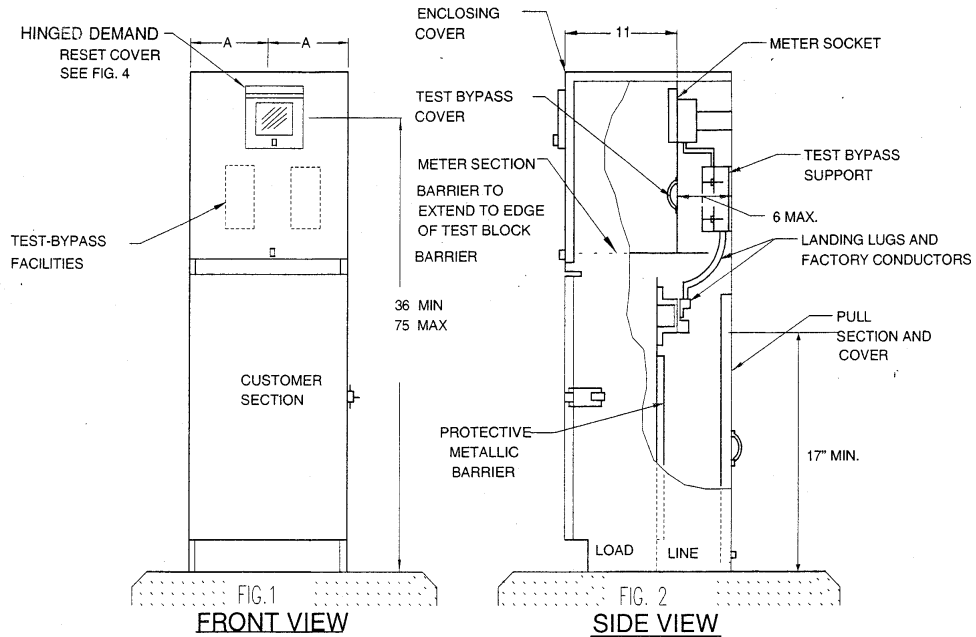


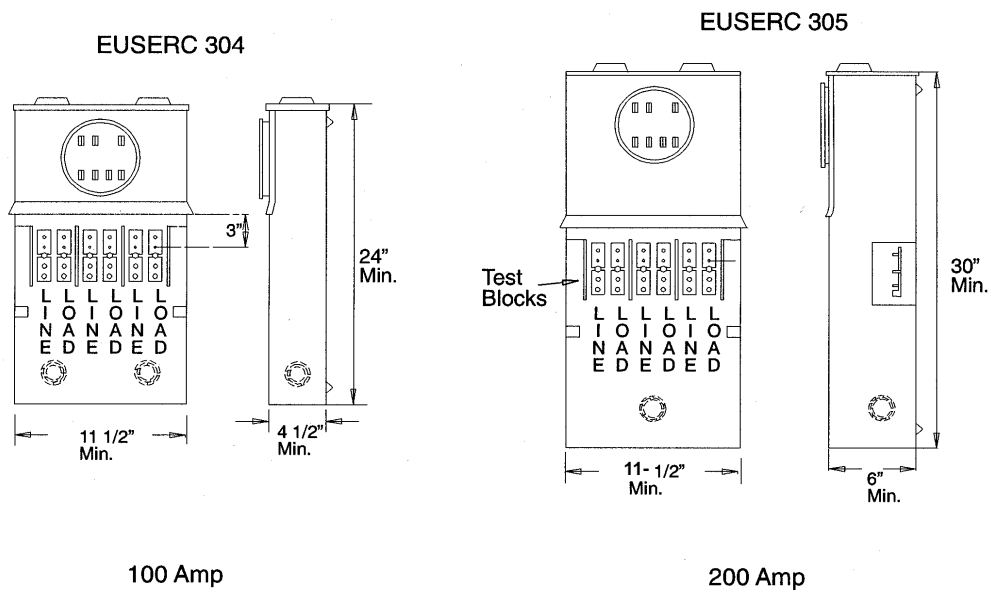
FIG. 4
HINGED DEMAND RESET
WITH POLYCARBONATE VIEWING

SEE TABLE 10-3 FOR
MINIMUM "A" & "W"
DIMENSIONS

Table 10-3. Minimum Dimensions for Pedestals

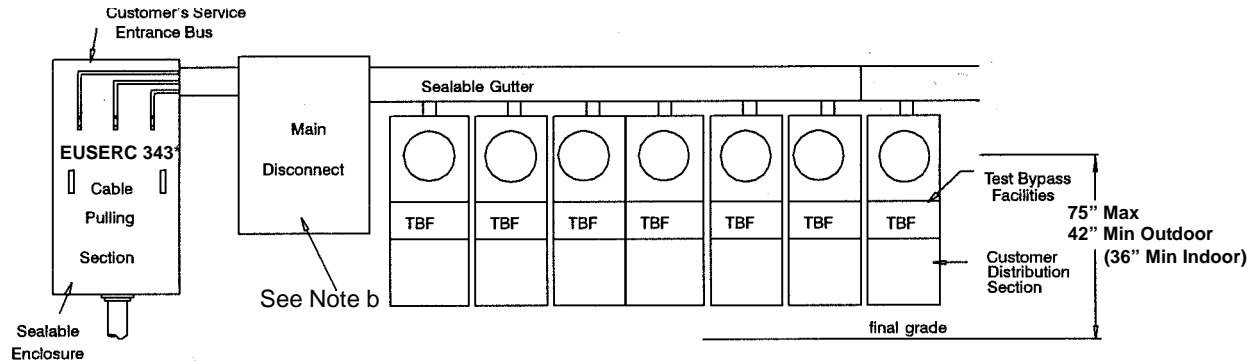
Service	W	A
1 Phase	10-1/2"	10"
3 Phase	12-1/2"	10"

- Notes:**
- a. Consult PGE for pad requirements.
 - b. See EUSERC 308 for additional notes.

Figure 10-3 Commercial Three-Phase, Direct-connect Meter Safety Socket**Notes:**

- The socket must be an approved EUSERC Safety Socket with test blocks which maintain service to the customer while the meter is removed for test or inspection.
- Three-phase 320 amp direct connect meter sockets are not approved for commercial use.
- For 4 wire delta services, the power (wild) leg conductor must be identified by orange marking, and located on the right side of the test blocks. The test block must also be factory marked and readily identified.
- 3 phase, 3 wire, 240 and 480 volt services are not approved for new construction or re-wires.**

Figure 10-4 Commercial Ganged Meter Socket Installation



* See Table 10-4

TBF = Test Bypass Facilities

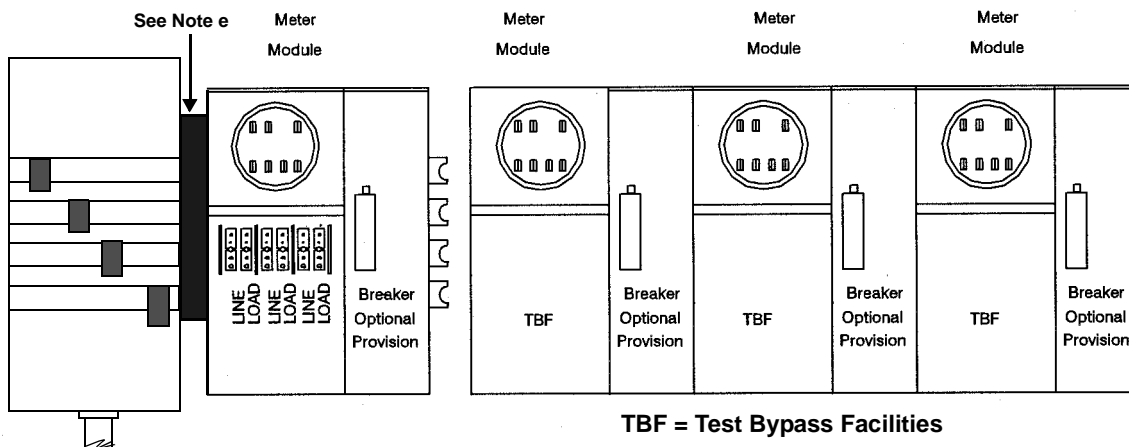
Notes:

- a. PGE terminates service conductors in the cable pulling section on bus extensions only and not on Customer's disconnect. Cable pulling section must be sized for PGE service termination (EUSERC 343) and must have bus extension drilled for landing lugs.
- b. NEC requires main disconnect when more than 6 services are connected. (When the sum of distribution section ampacity ratings exceed the pulling section ampacity ratings, the Customer will be responsible to provide NEC approved load calculations.)
- c. Meters must be accessible during normal work hours for meter reading and testing. Lock boxes must be installed outside of meter room.
- d. Each multiple metered service must have a permanently engraved metal or hard plastic label with a minimum 3/8" high letters to identify the Customer's service address, before power is connected (see Figure 10-5).
- e. "If cross-bussing is installed below or behind a terminating position, the cross-bussing shall be fully insulated or barriered." (EUSERC 347)

Figure 10-5 Meter Label



Figure 10-6 Commercial Module Meter Socket Installation
EUSERC 304/305/347



Notes:

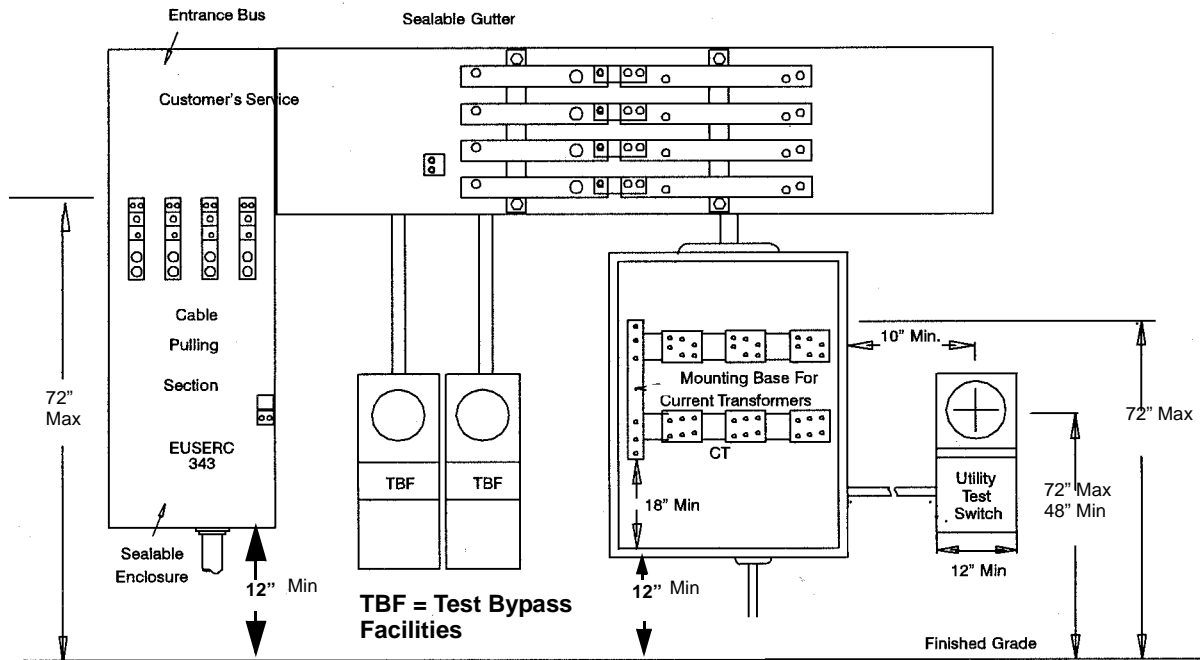
- a. NEC requires main disconnect when more than 6 services are connected. (When the sum of distribution section ampacity ratings exceed the pulling section ampacity ratings, the Customer will be responsible to provide NEC approved load calculations.)
- b. Meters must be accessible during normal work hours for meter reading and testing. Lock boxes must be installed outside of meter room.
- c. Each multiple metered service must have a permanently engraved metal or hard plastic label with a minimum 3/8" high letters to identify the Customer's service address, before power is connected (see Figure 10-5).
- d. "If cross-bussing is installed below or behind a terminating position, the cross-bussing shall be fully insulated or barriered." (EUSERC 347)
- e. A minimum 3" spacer is required between the pull section and meter socket.



Typical "double-stacked" meter socket installation



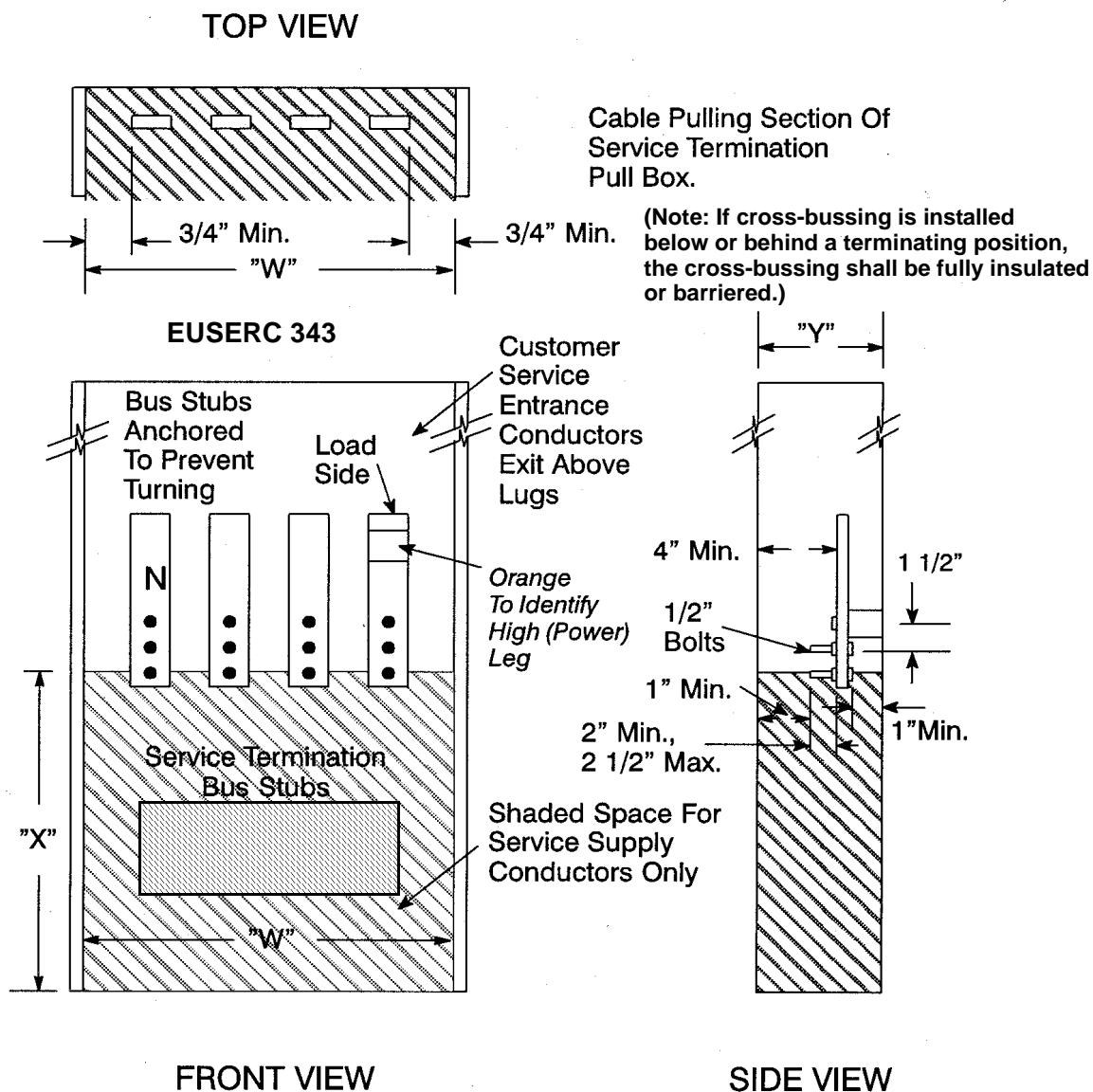
Figure 10-7 Combination Current Transformer/Direct-Connect Metering
 Wall Mount, 0 - 800 Amp



Notes:

- a. Bonding jumpers shall be used around knockouts.
- b. Pull section must be rated at the sum of the service maximum ampacity.
- c. Bonding and grounding per NEC, Article 250.
- d. Each metered service must have a permanently engraved metal or hard plastic label with a minimum 3/8" high letters to identify the Customer's service address, before power is connected (see Figure 10-5).
- e. For services larger than 800 amps, see Section 10-7 Switchboard Metering

Figure 10-8 Pull Box With Terminating Facilities– 0-600 Volts, 0-1200 Amps
EUSERC 343 & 347



Note: See [Figure 5-2](#) for clear working space.

Table 10-4. Minimum Dimensions for Pull Boxes With Terminating Facilities (EUSERC 343)
(Applies Only to PGE Portion of Pull Box)

Total Service Amps	"W"		"Y"	"X"
	3 Wire	4 Wire	Depth	Lug Height
0-200	10 1/2"	14"	6"	11"
201-400	10 1/2"	14"	6"	22"
401-800	16 1/2"	22"	11"	26"
801-1200	22 1/2"	30"	11"	26"

10.6 Current Transformer Metering – 800 Amps Maximum

Current transformer (CT) metering is required when a three-phase service exceeds 200 amperes, or when a single-phase 120/240 volt service exceeds 400 amps (320 continuous amps). For services over 800 amps see Section 11.1 Switchboard Metering. PGE prefers switchboard metering, but it is not required for services 800 amps and below.

The CT cabinet and meter shall be mounted outside of the building as described in [Section 5.1 \(Meter Clearances and Locations\)](#).

10.6.1 The Customer will provide and install:

- The weathertight NEMA 3R rated metallic cabinet securely mounted on a rigid surface. The door is to be hinged and capable of being sealed. The cabinet is to be sized in accordance with [Table 10-6, \(Current Transformer Cabinet\)](#).
- EUSERC approved current transformer mounting bases are rated 50,000 amperes fault duty. Fault currents over 50,000 amperes must have switchboard metering. Contact PGE for fault currents.
- The remote socket enclosure, drilled and tapped for a PGE test switch.
- The conduit between the socket enclosure and the current transformer mounting base. Refer to [Section 10.6.3 \(Current Transformer Metering Conduit\)](#).
- Barrier post (6" diameter) required where metering equipment is installed in vehicle traffic area. Refer to [Section 6.4.5, Figure 6-4, and Figure 6-5](#).
- Bonding per NEC (Article 250) for all meter and CT enclosures.
- Both the current transformer cabinet and meter socket must be mounted plumb in both directions.

10.6.2 PGE will:

- Provide, own, and install the meter and test switch, with their associated wiring.
- Provide, own, and install line side service conductors on the current transformer mounting base and connectors for PGE owned conductors (for underground services only).
- Consult PGE for current transformer installation specifications.

Note: PGE equipment, transformers, and vaults shall not be located higher than the CT cans to prevent water drainage into the customers equipment.

10.6.3 Current Transformer Metering Conduit

The Customer must provide conduit between the meter socket and the current transformer cabinet. Use the following guidelines to install the conduit:

Use rigid steel or IMC conduit. A minimum of 1–1/4" 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 base. EMT conduit will be allowed for runs less than 10 feet.

For standard installation, conduit must be of sufficient length to insure a minimum distance of 10" between the center of the meter socket and the current transformer 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°. No one bend greater than 90° will be allowed.
- Pull lines are required in all conduit as specified in [Table 6-1 Note g](#).
- When CT metering conduit deadends on the back of a CT cabinet, use PVC flex non-metallic conduit to extend from the back wall to the front of the cabinet.
- Secure all removable conduit fittings with 1/4" x #20 metal screws with sealing provisions. (LB's may be allowed outside the enclosure for rewires only. LB's may not be used for new construction.)

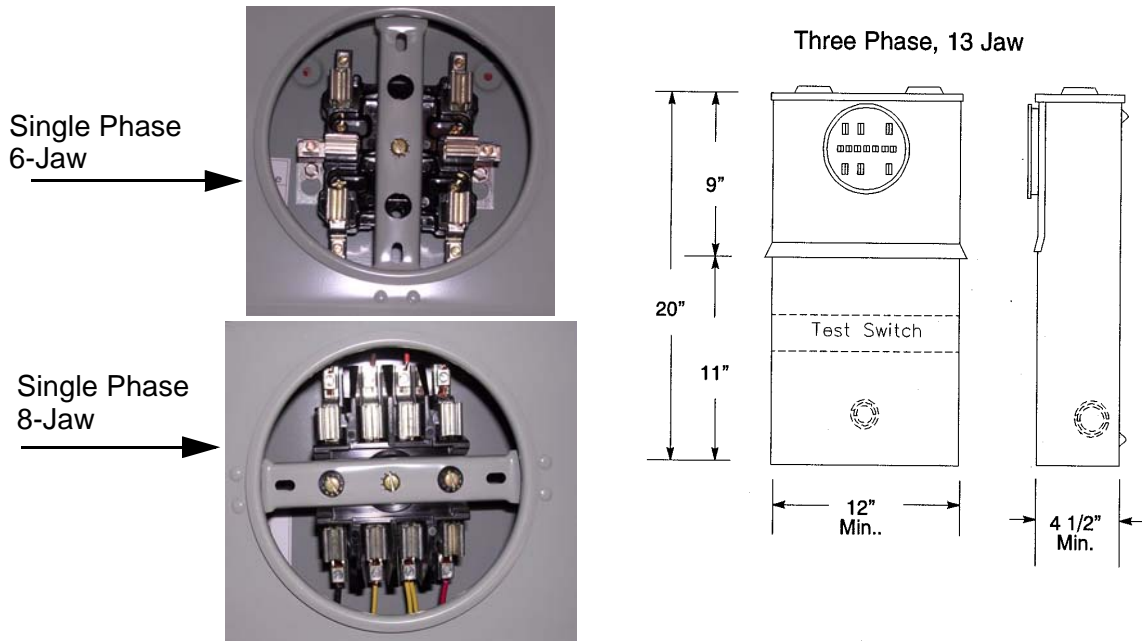
10.6.4 Current Transformer Cabinets

- Only conductors associated with a single meter shall be permitted in the current transformer enclosure. **No connections, including the installation of monitoring equipment, shall be made in any current transformer enclosure to supply any other meter.** For other underground services, a separate terminating pull box will be provided for PGE service lateral. See EUSERC 343 for pull box requirements.
- Customer conductors shall exit the enclosure on the load side of the current transformers. **Customer's conductors will not be permitted in PGE terminating and pull space.**
- The cabinet must be mounted in a readily accessible location acceptable to PGE. **Cabinet must be a minimum of 12" above the finished grade.**
- The top of the CT mounting bracket shall not be more than 6 feet above floor level. The cover shall have *factory installed hinges* for side opening with sealing provisions and shall be able to hold the cover in the open position at 90° or more.
- A clear work space (see [Figure 5-2](#)) is required in front of this cabinet. The hinged door shall open to the opposite direction from the room door so as not to block ingress and egress from the room. The location of cabinets shall be on the main or entry level floor.
- For overhead service, the Customer will provide connectors and terminate line and load side service conductors in all CT compartments. The Customer will connect his 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, PGE will provide connectors and terminate line side service conductor's current transformer cabinets directly on the current transformer mounting base.
- Cabinet must be 12" minimum above finished grade.

Figure 10-9 Remote Socket for Current Transformer Meters
EUSERC 339



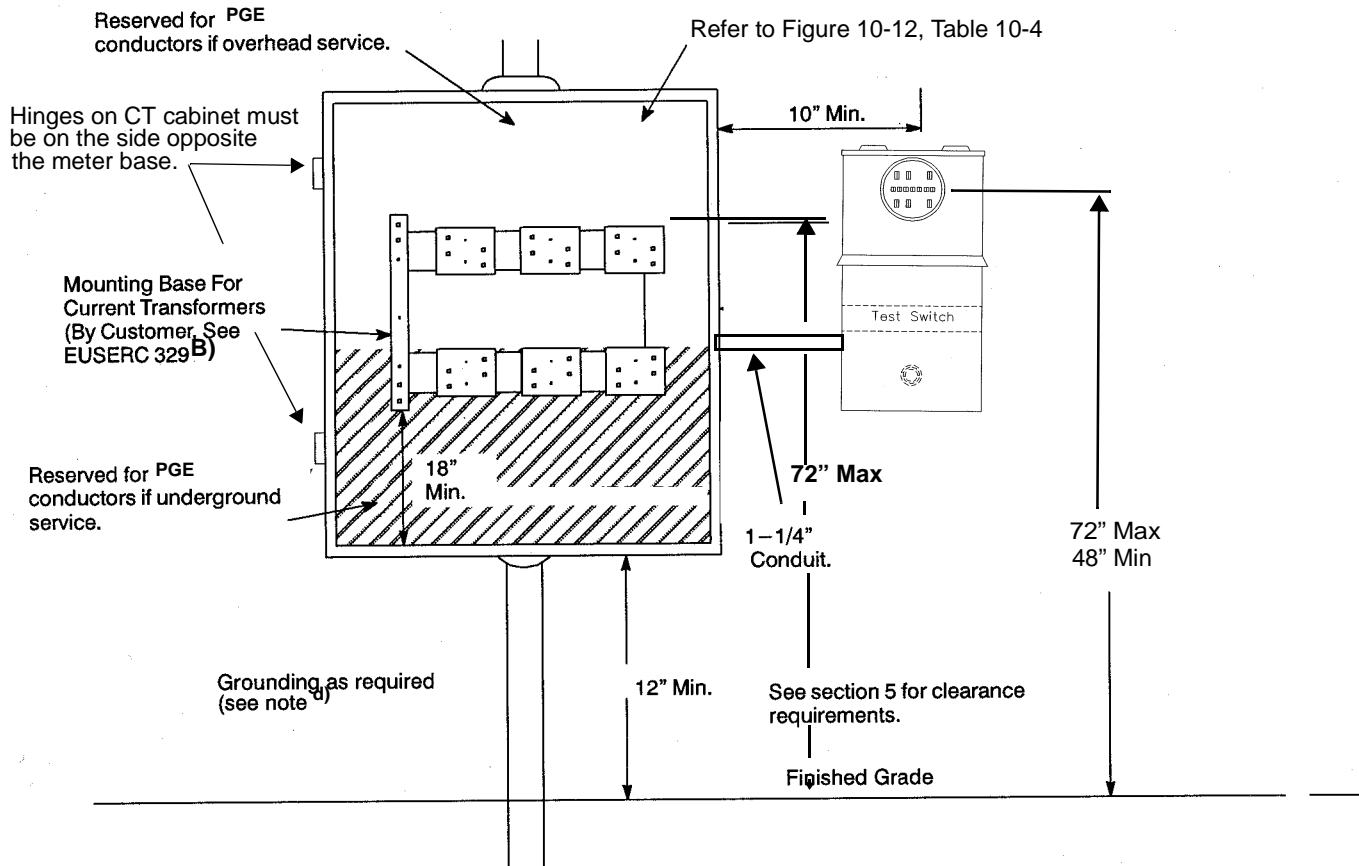
Use a meter socket enclosure for current transformer metering with a space reserved below the socket for a PGE test switch 9 1/2 inches in length. Use the following guidelines for the enclosure and meter socket:

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

Table 10-5. Current Transformer Meter Socket Requirements

	Socket Type
120/240 volt, single-phase, 3 wire	6 jaw
120/208 volt network, single-phase, 3 wire	8 jaw
208/120 volt, three-phase, 4 wire	13 jaw
480/277 volt, three-phase, 4 wire	13 jaw
240/120 volt, three-phase, 4 wire	13 jaw

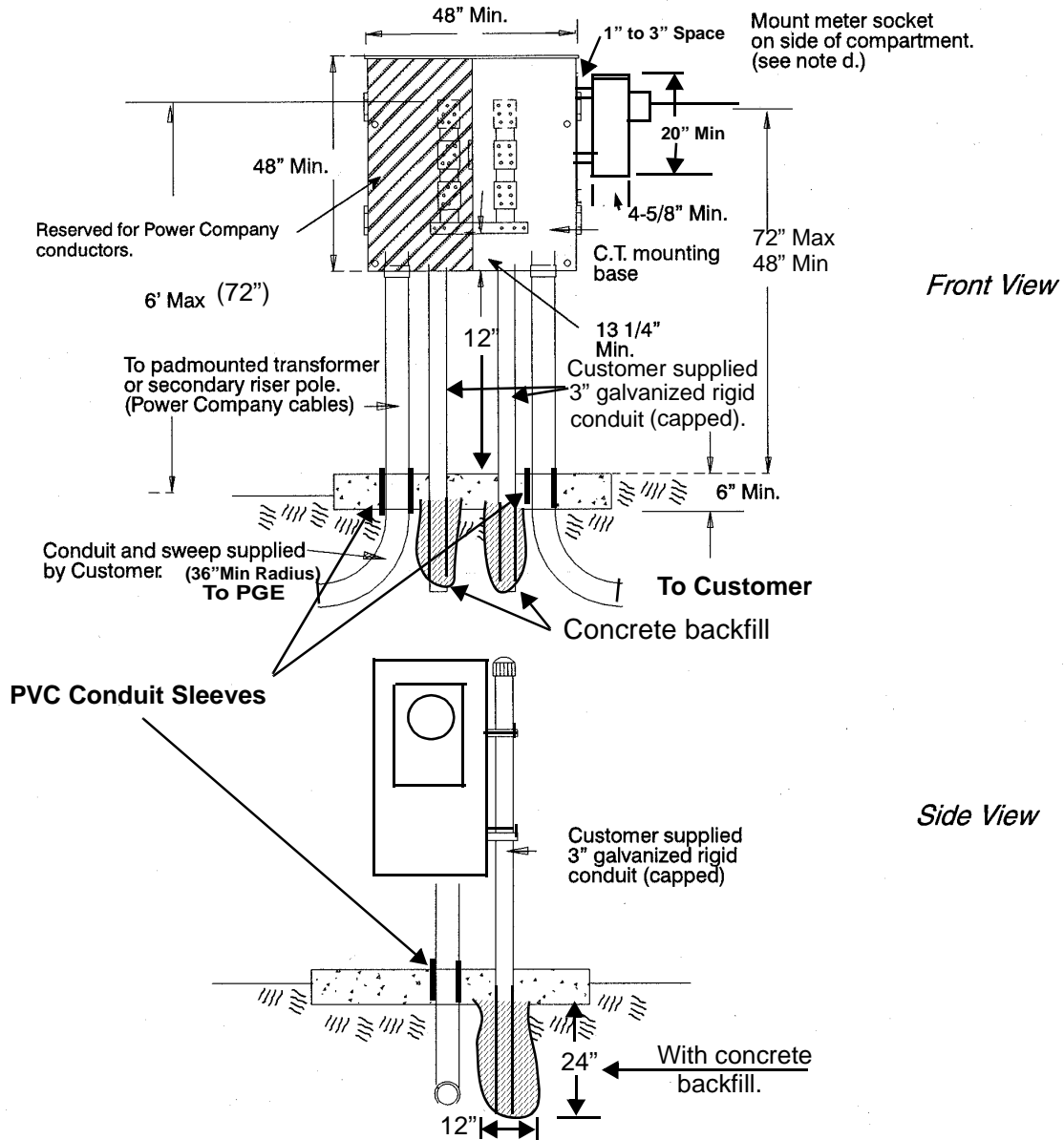
Figure 10-10 Current Transformer Metering-Wall Mount
Service Below 600 Volts, 800 Amps Max.



Notes:

- The Customer service entrance conduits must exit the enclosure on the load side of the current transformer. PGE will not allow Customer conductors or conduit in PGE's terminating and pull space.
- Current transformer cabinet door must have *factory installed* hinges.
- For 4 wire delta services, identify right hand CT mounting base as the power (wild) leg. The power (wild) leg conductor must be identified by orange marking, and located on the right side of the CT mounting base (NEC Article 215-8).
- Bonding must be in accordance with latest issue of NEC (Article 250 Grounding) The Code enforcing agency may require bonding connection to be visible when electrical inspection is made.
- Meter sockets shall not be located above CT cans due to safety of working in front of live bus.
- See Section 5.1 for location requirements.
- Cabinet must be 12" minimum above finished grade.**

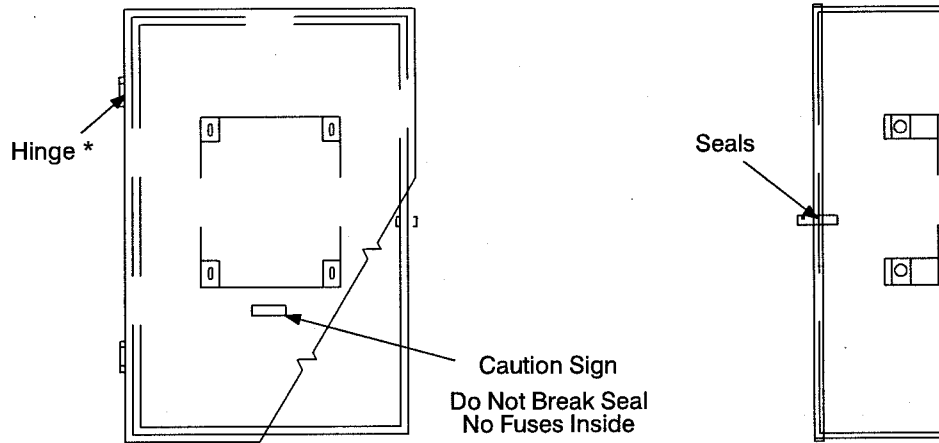
Figure 10-11 Current Transformer Metering – Post Mounted
 Service Below 600 Volts, 800 Amps Max.



Notes:

- The Customer must consult PGE before construction, and follow the guidelines as defined in [Section 10.6 \(Current Transformer Metering – 800 Amps Maximum\)](#).
- Cabinet must have two factory installed hinged doors with handles in center for opening.
- Meter must be mounted so it does not interfere with opening of the cabinet doors.
- For 4 wire delta services, the power (wild) leg conductors must be identified by orange marking and located on the bottom side of the CT mounting base.
- This configuration can be used as a wall mount if clearance allows.
- Cabinet must be 12" minimum above finished grade.**

**Figure 10-12 Current Transformer Cabinet – 800 Amperes Maximum, 0-600 Volt
EUSERC 316, 317, 318**



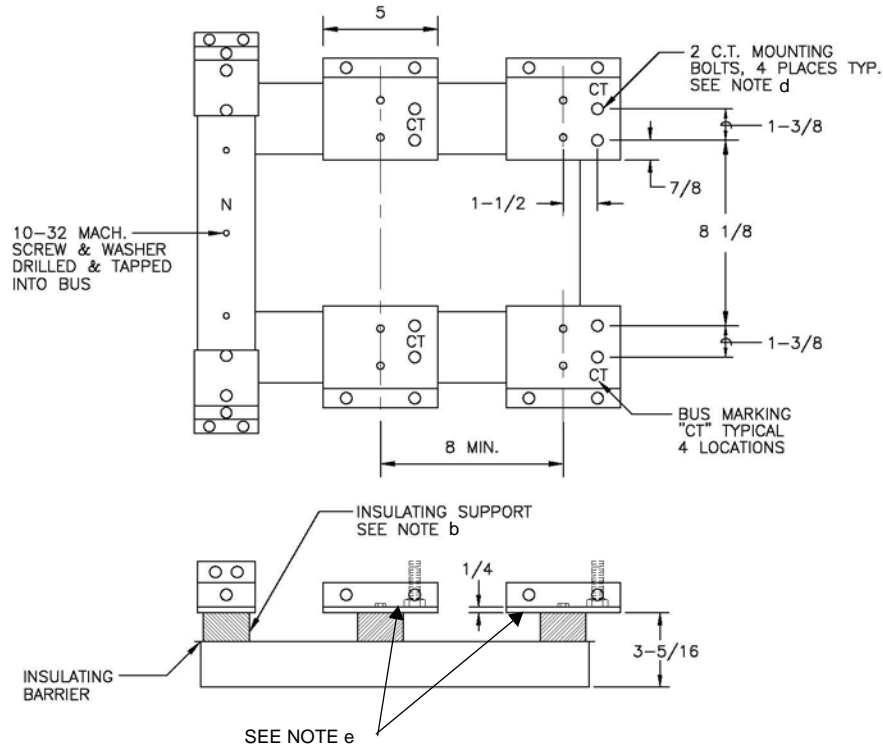
*PGE requires factory installed hinges on all CT cabinets.

Table 10-6. Current Transformer Cabinet

Current Transformer Cabinets					CT Mounting Base
Type of Service	EUSERC	Cabinet Dimensions (Exterior)			
		Width	Height	Depth	
Single-phase, 3 Wire 401-800 Amps	Dwg No. 317	24" min	48" min	12" min	EUSERC 328B
Three-phase, 4 Wire 201-800 Amps	Dwg No. 318	36" min	48" min	12" min	EUSERC 329B
Above 800 amps, see Section 10.7 (Switchboard Metering)					

Figure 10-13 Transformer Mounting Base for Installation in Current Transformer Enclosure

Single-Phase, Three-Wire, 800-Amp Max (Based on EUSERC 328B).



Notes:

- On overhead services, the Customer must furnish all lugs and connect conductors to the line and load terminals of the current transformer mounting base. On underground services, the Customer need only connect the load side.
- Mounting base accepts bar-type current transformers only.
- Verify that the mounting base for CT's 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 for service conductors shall be aluminum-bodied mechanical lugs. One position lug for 0 - 400 amperes and a three position lug for 401 - 800 amperes.
- See Section 5.1 for location requirements.

Typical Single-Phase CT Enclosure

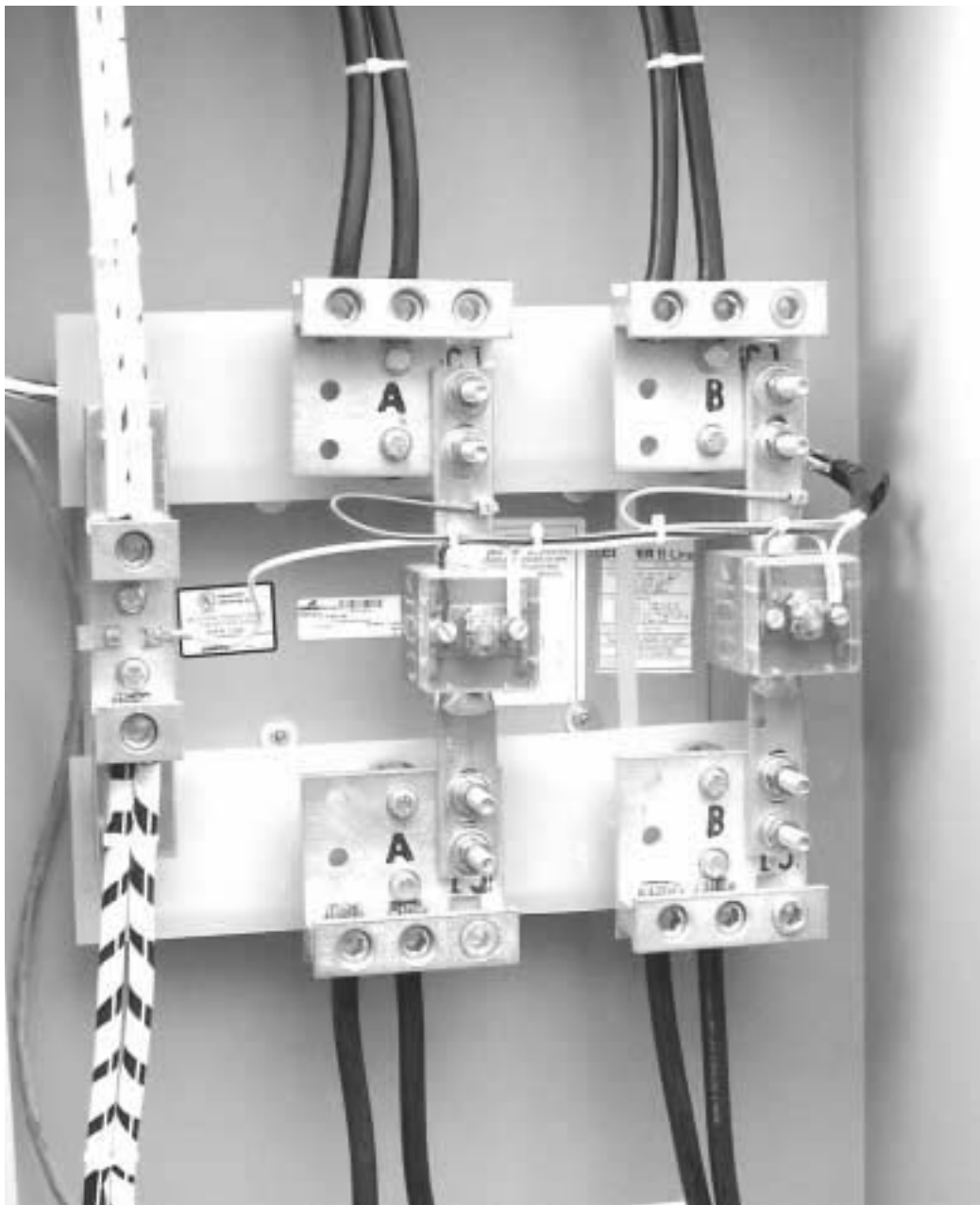
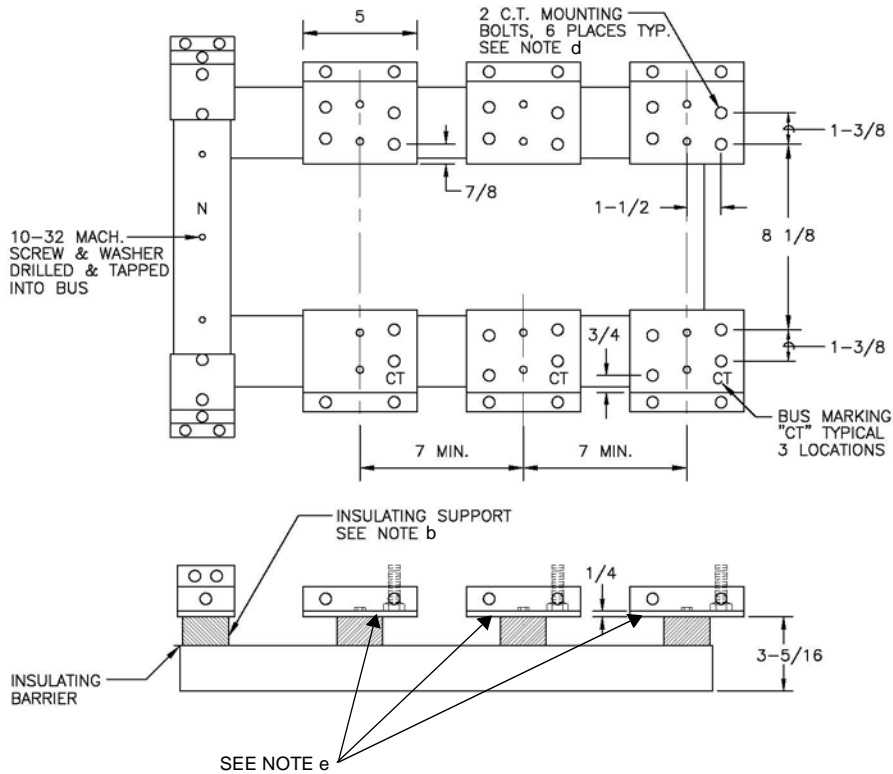


Figure 10-14 Transformer Mounting Base for Installation in Current Transformer Enclosure

Three-Phase, Four-Wire, 800-Amp Max (Based on EUSERC 329 B).



Notes:

- a. On overhead services, the Customer must furnish all lugs and connect conductors to the line and load terminals of the current transformer mounting base. On underground services, the Customer need only connect the load side.
- b. Mounting base accepts bar-type current transformers only.
- c. Verify that the mounting base for CT's meets ratings for available fault current (50,000 amp maximum.)
- d. Line and load-side terminations on CT landing pads require two bolts for each mounting position.
- e. Termination for service conductors shall be aluminum-bodied mechanical lugs. One position lug for 0 - 400 amperes and a three position lug for 401 - 800 amperes.
- f. For 4 wire delta services, the power (wild) leg conductor must be identified by orange marking and located on the right hand side of the CT mounting base.

Typical Three-Phase CT Enclosure

