

Section 9 Electric Metering: Components

9.1. Scope

This section provides information to help applicants select electric metering equipment that Pacific Gas and Electric Company (PG&E) finds acceptable for use in electric metering construction projects.

The *Electric Utilities Service Equipment Requirements Committee (EUSERC)* book, Section 300, contains service and meter-equipment details for PG&E-approved components, as well.

9.2. Single-Family, Residential, Combination Meter Socket and Underground Service-Termination Box for Services, 0 Through 225 Amperes

Applicants must ensure that they meet the following requirements, which are illustrated in Figure 9-1, “Typical, Underground, Service-Termination Enclosure/Combination Meter-Socket Panel (Residential, 0 Through 225 Amperes),” and Table 9-1, “Dimensions for Figure 9-1,” both found on Page 9-2.

- A. *If* the neutral terminal is insulated from the enclosure, provide a bonding screw or jumper.
- B. Maintain a minimum radial clearance of 1-1/2 inches between energized bus terminals and ground or neutral services.
- C. Ensure that range-taking lugs accommodate *both* of the following:
 - #6 American wire gauge (AWG) to 1/0 AWG for services up to 125 amperes.
 - #4 AWG to 250 thousand circular mils (kcmil) for services rated from 126 amperes through 225 amperes.

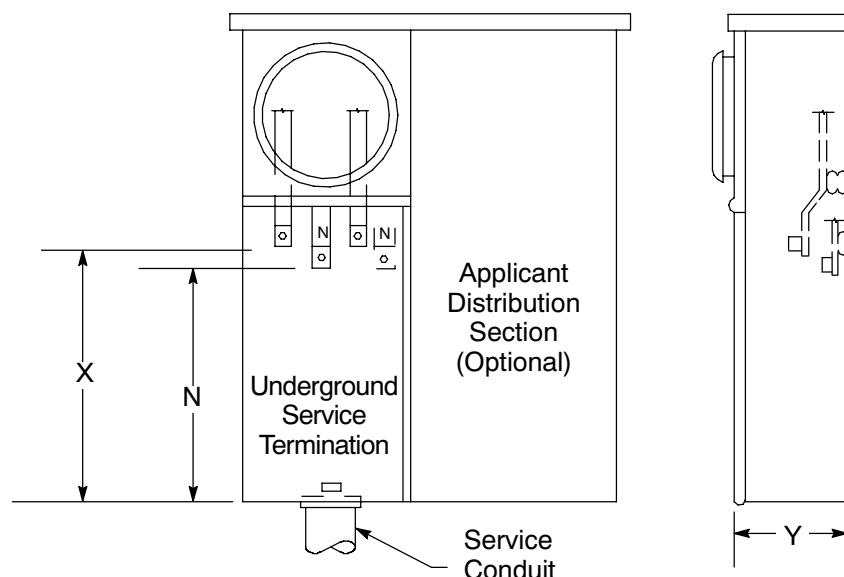


Figure 9-1
Typical, Underground, Service-Termination Enclosure/Combination Meter-Socket Panel
(Residential, 0 Through 225 Amperes)

Notes in reference to Figure 9-1.

1. The minimum dimension N from the neutral terminal to the bottom of the enclosure must be 6 inches for the 125-ampere unit and 8-1/2 inches for the 225-ampere unit. If the neutral terminal is insulated from the enclosure, PG&E will provide a bonding screw or jumper.
2. A minimum radial clearance of 1-1/2 inches must be provided between energized bus terminals and ground or neutral services.

Table 9-1 Dimensions for Figure 9-1

| Rating in Amperes | X Minimum Dimension | Y Minimum Dimension | N Minimum Dimension | Conduit Range |
|-------------------|----------------------------|---------------------|---------------------|---------------|
| | All Measurements in Inches | | | |
| Up to 125 | 8 | 4 | 6 | 3 |
| 126-226 | 11 | 5 | 8-1/2 | 3 |

9.3. Residential, Self-Contained Meter Socket and Service-Termination Box for Single Phase, 120/240 Volts, 226 Amperes Through 320 Amperes

Applicants must ensure that:

- A. The meter socket is located above and either to the left of or to the right of the underground service-termination pull box.
- B. PG&E's underground service conductors terminate in the enclosure exit above the meter socket.
- C. Overhead service conductors enter at the bottom of the 320-ampere meter enclosure.

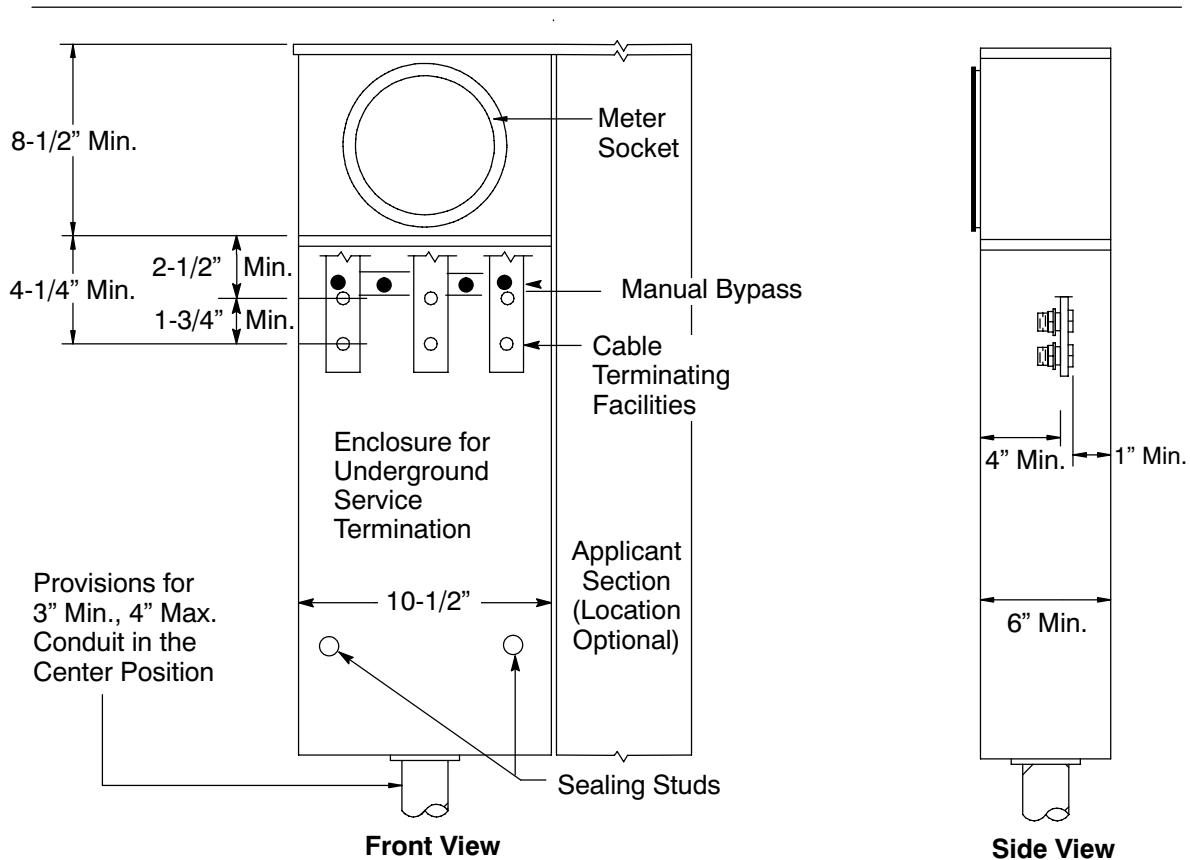


Figure 9-2

Typical Service-Termination Enclosure/Combination Meter-Socket Panel for a Class 320 Meter (Residential/Commercial, 120/240-Volt, 226-Ampere Through 320-Ampere Service)

9.4. Bused, Safety-Socket Meter Box for Self-Contained Metering, 0 Through 125 Amperes (Commercial)

Applicants must ensure that:

- A. All section covers can be removed independently; however, after the meter is in place, the upper cover must *not* be removable. After the meter is in place, the lower cover must be sealable.
- B. For three-phase, 4-wire delta service, the right side of the test-bypass block (i.e., two poles) is identified as the power leg. The power leg is marked by using the color orange.

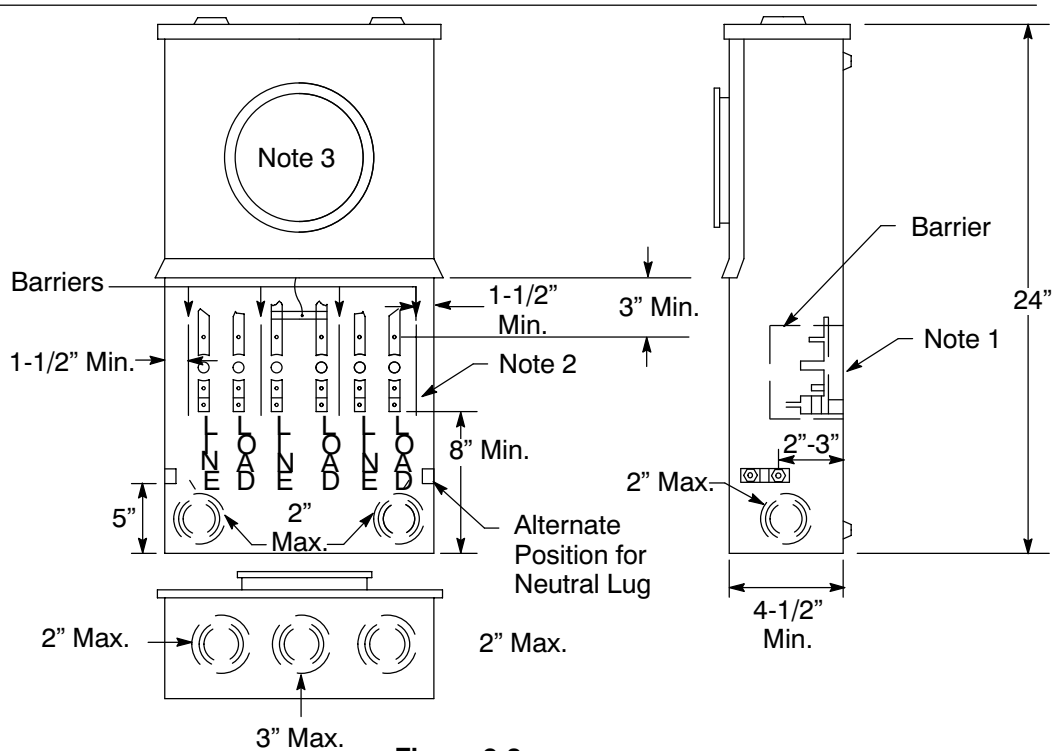


Figure 9-3
Bused, Safety-Socket Meter Box for Self-Contained Metering, 0 Through 125 Amperes

Notes in reference to Figure 9-3.

1. Aluminum-bodied terminals for #6 AWG through #1/0 AWG wire, suitable for copper and aluminum conductors.
2. For three-phase, 4-wire delta service, the test-bypass block on the right (i.e., two poles) must be identified as the power leg.
3. For meter socket jaw requirements, see [Section 5](#), “Electric Metering: General.”

9.5. Bused, Safety-Socket Meter Box for Self-Contained Metering, 0 Through 225 Amperes

Applicants must ensure that:

- A. All section covers can be removed independently; however, after the meter is in place, the upper cover must *not* be removable. After the meter is in place, the lower cover must be sealable.
- B. For three-phase, 4-wire delta service, the right side of the test-bypass block (i.e., two poles) is identified as the power leg. The power leg is identified by using the color orange.

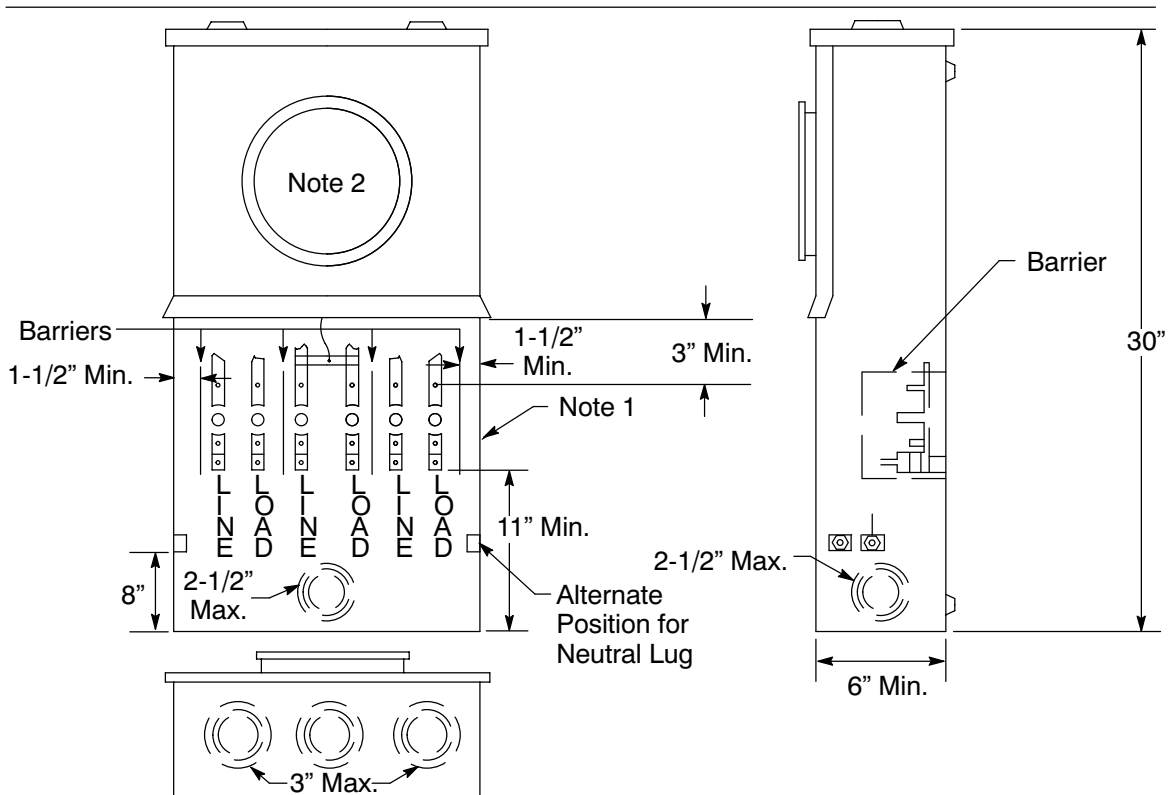


Figure 9-4
Bused, Safety-Socket Meter Box for Self-Contained Metering, 0 Through 225 Amperes

Notes in reference to Figure 9-4.

1. For three-phase, 4-wire delta service, the test-bypass block on the right (i.e., two poles) must be identified as the power leg.
2. For meter socket jaw requirements, see [Section 5](#), “Electric Metering: General,” Subsection 5.6., “Meter Types and Connections,” on Page 5-10.

9.6. Test Blocks for Self-Contained Metering, 0 to 225 Amperes

A test block is a specific type of test-bypass *device*. A test block differs from a test-bypass *facility*, which is any mechanism used to bypass meter sockets. Both test blocks and test-bypass facilities are used for self-contained metering exclusively.

Applicants must ensure that test blocks meet the following requirements.

- A. The hex nut must measure 5/8-inch across flats with a copper washer attached. The hex nut must de-energize the meter socket when backed off.

EXCEPTION: A sliding-link arrangement can be substituted for a circuit-closing hex nut, and actually is preferred in some applications. Contact your PG&E service planner for more information.

NOTE: See the “2008-2009 Service Planning Contact Information” at the front of this manual on Page iv for specific contact numbers listed by area.

9.7. Underground-Fed Combination Meter, Current-Transformer (CT), and Service-Termination Cabinet, Single Phase

Applicants must ensure that cabinets meet the following requirements.

- A. All securing screws represented in Figure 9-6, “Combination Meter, CT, and Underground Service-Termination Cabinet (Single Phase, 120/240 Volts, Over 320 Amperes),” located below, are captive. All panels and covers must be sealable.
- B. Outdoor CT cabinets are weatherproof.
- C. A neutral is bonded to the enclosure.
- D. CT cabinets are *not* used as splicing chambers.
- E. CTs are *not* tapped off to supply other meters or used by applicants for any other purposes.

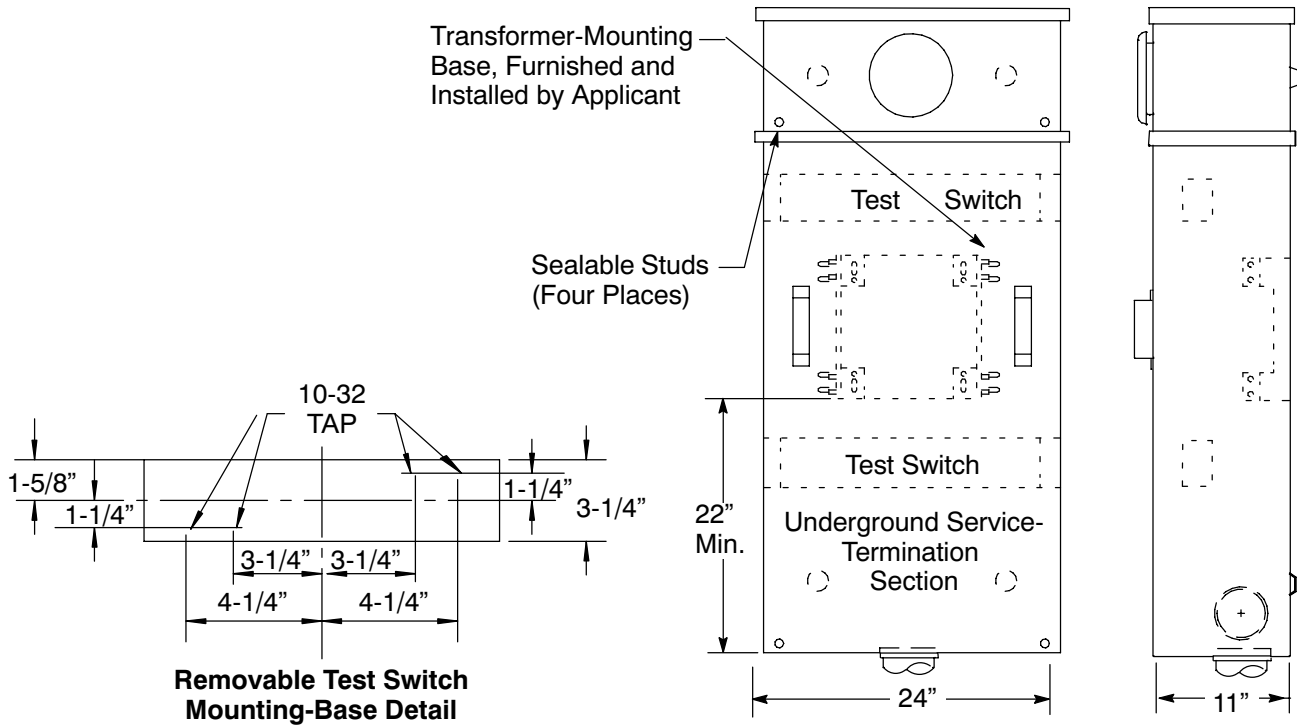
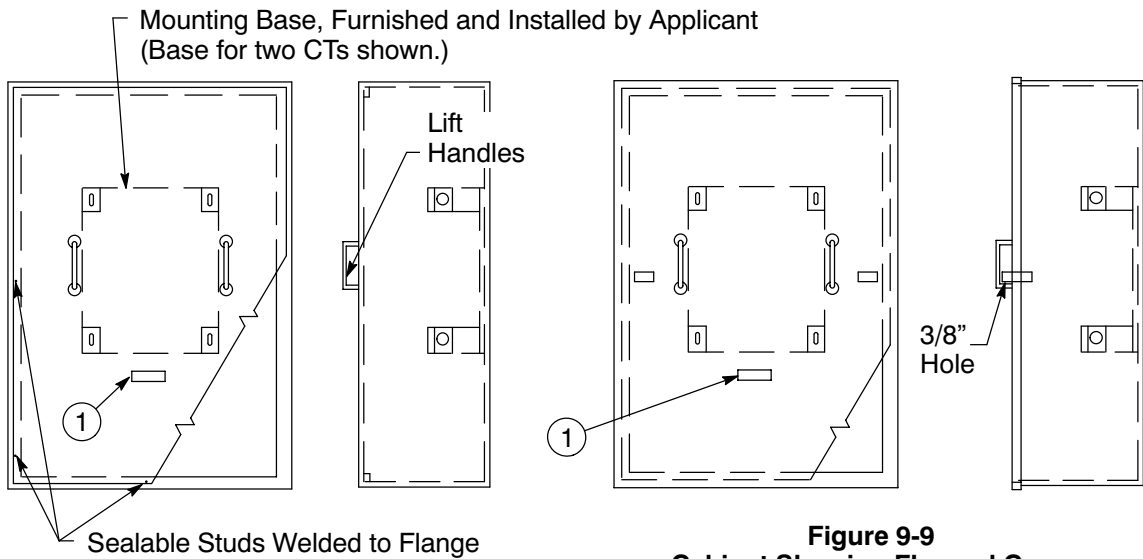


Figure 9-6
Combination Meter, CT, and Underground Service-Termination Cabinet
(Single Phase, 120/240 Volts, Over 320 Amperes)

9.9. Separate CT Cabinet, 401 Amperes and Above, Single Phase and Three Phase

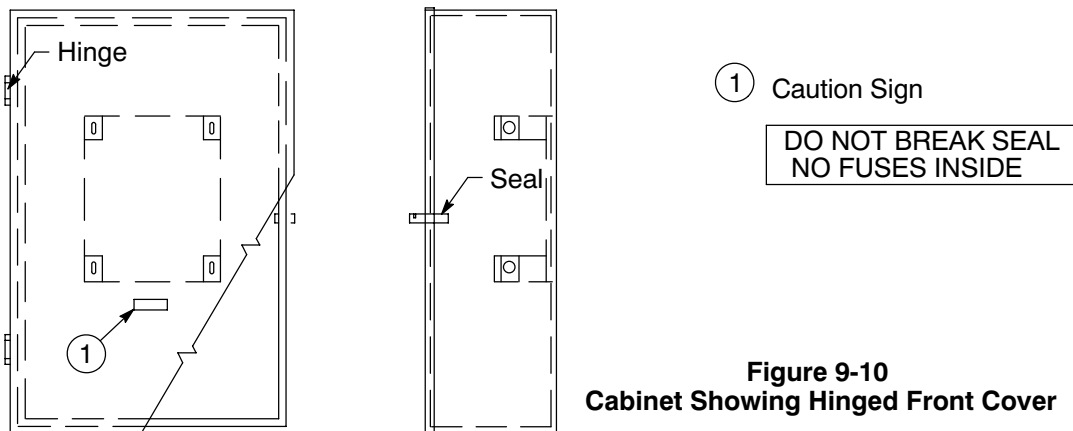
Applicants must ensure that cabinets meet the following requirements.

- A. All covers are sealable.
- B. Outdoor CT cabinets are weatherproof.
- C. Grounding lugs are provided.
- D. CT cabinets are *not* used as splicing chambers.
- E. CTs are *not* tapped off to supply other meters or used by applicants for any other purposes.
- F. PG&E’s underground service-lateral conductors do *not* terminate in CT cabinets.



**Figure 9-8
Cabinet Showing Stud-Mounted Cover**

**Figure 9-9
Cabinet Showing Flanged Cover
Fastened by Sealable Rivet Latches**



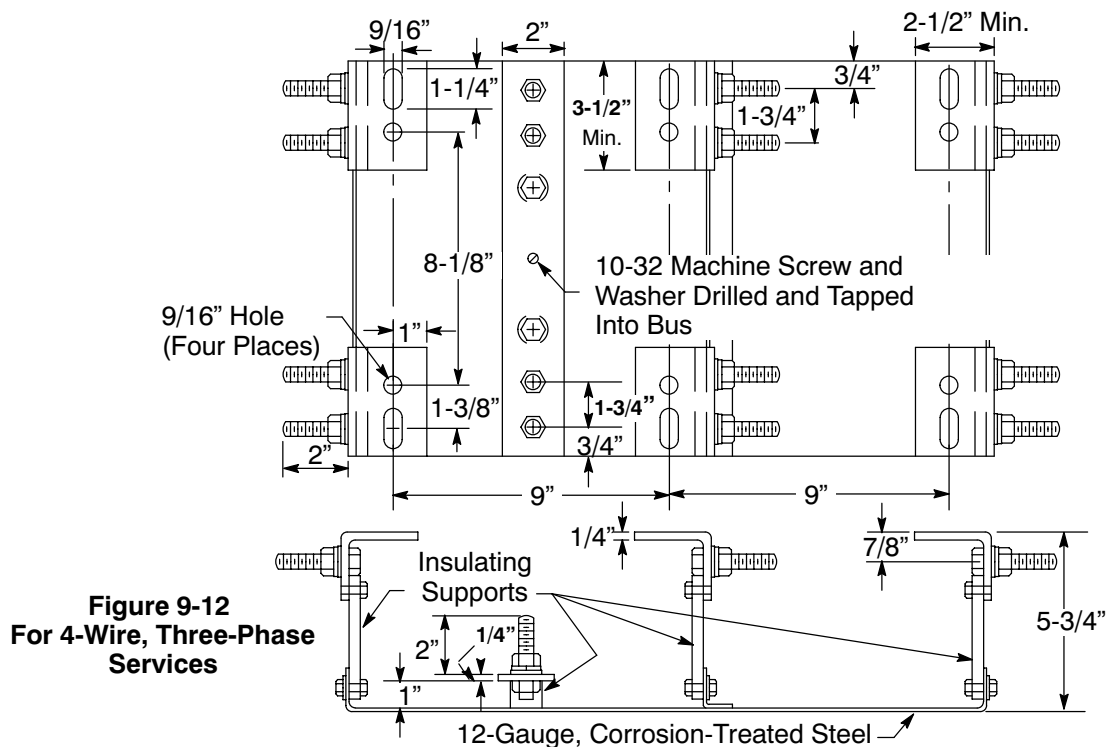
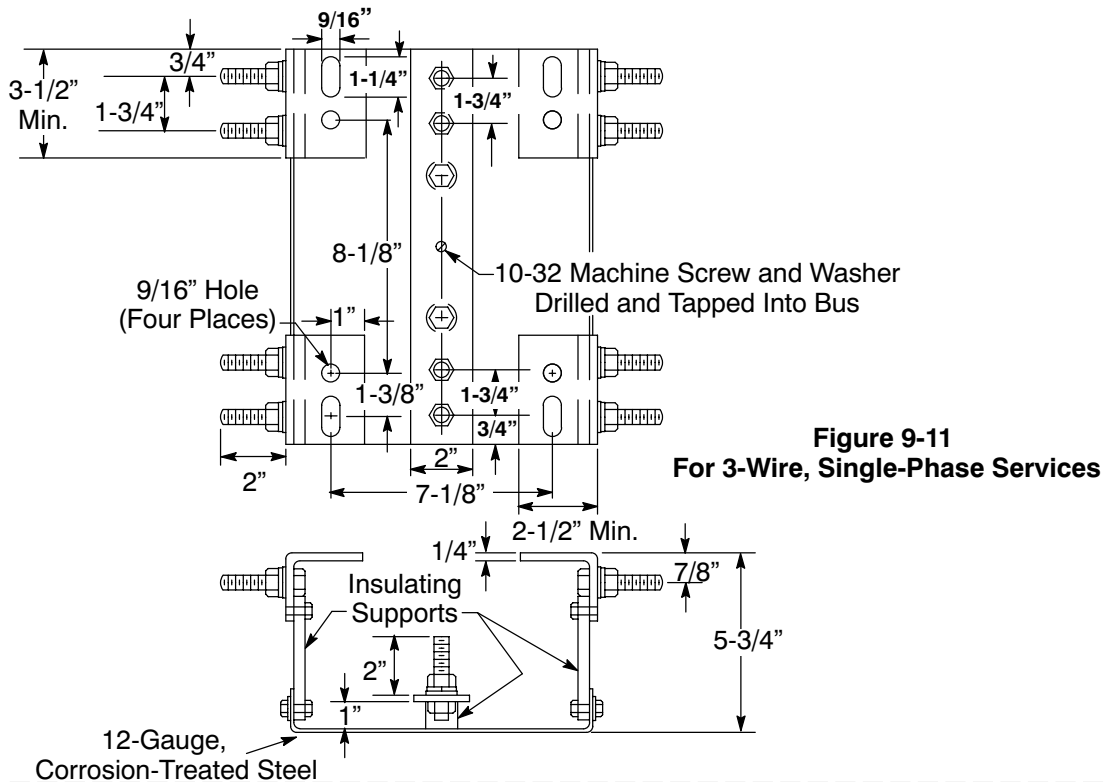
**Figure 9-10
Cabinet Showing Hinged Front Cover**

Table 9-2 CT Cabinet Dimensions

| Type of Service | Cabinet Size in Inches | CT Mounting Base |
|-----------------|------------------------|------------------|
| 3-Wire, 1Ø | 20w x 36h x 11d | Figure 9-11 |
| 4-Wire, 3Ø | 30w x 36h x 11d | Figure 9-12 |

9.10. CT Mounting Base, 201 Amperes Through 400 Amperes

Applicants must ensure that all of the required lugs are furnished and that conductors are connected to the line and load terminals on the CT mounting base. Also, applicants must ensure that the power leg conductor for a 4-wire delta service is marked clearly, as shown in Figure 9-9 on Page 9-9. The power leg is identified by using the color orange.



9.11. Bused CT Cabinet, 3-Wire Service, 401 Amperes Through 800 Amperes

Applicants must ensure that cabinets meet the following requirements.

- A. All covers are sealable.
- B. Outdoor CT cabinets are weatherproof.
- C. Grounding lugs are provided.
- D. Neutral or unmetered wiring, either cable or bus bar, is located on either side of the cabinet.
- E. CT cabinets are *not* used as splicing chambers.
- F. PG&E's underground service lateral conductors do *not* terminate in CT cabinets.

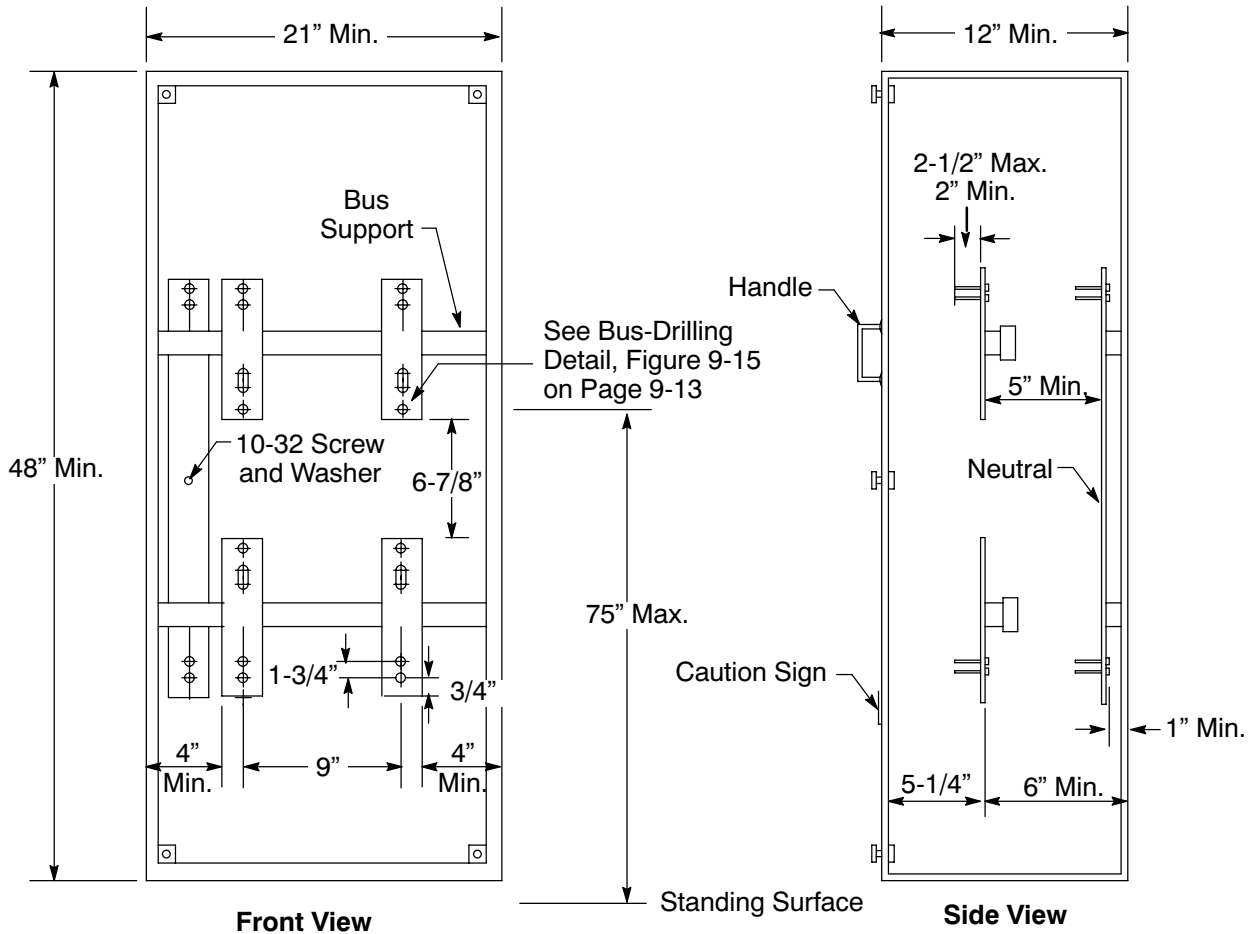


Figure 9-13
Bused CT Cabinet, 3-Wire Service, 401 Amperes Through 800 Amperes

9.11.1. Alternate CT Mounting Base, 3-Wire, One Phase or Three Phase

Applicants must ensure that mounting bases meet the following requirements.

- A. Insulated supports are rated for the serving voltage and have sufficient mechanical strength for the application.
- B. Mounting bases accept bar-type CTs only.
- C. Two 1/2-inch steel, Grade 5 bolts are provided for each cable-terminating and CT-mounting position. Each bolt must be furnished with a 2-1/4-inch diameter Belleville washer and a nut. Bolts must be secured in place and spaced as shown in Figure 9-11, "For 3-Wire, Single-Phase Services," on Page 9-10. All parts must be plated to prevent corrosion.

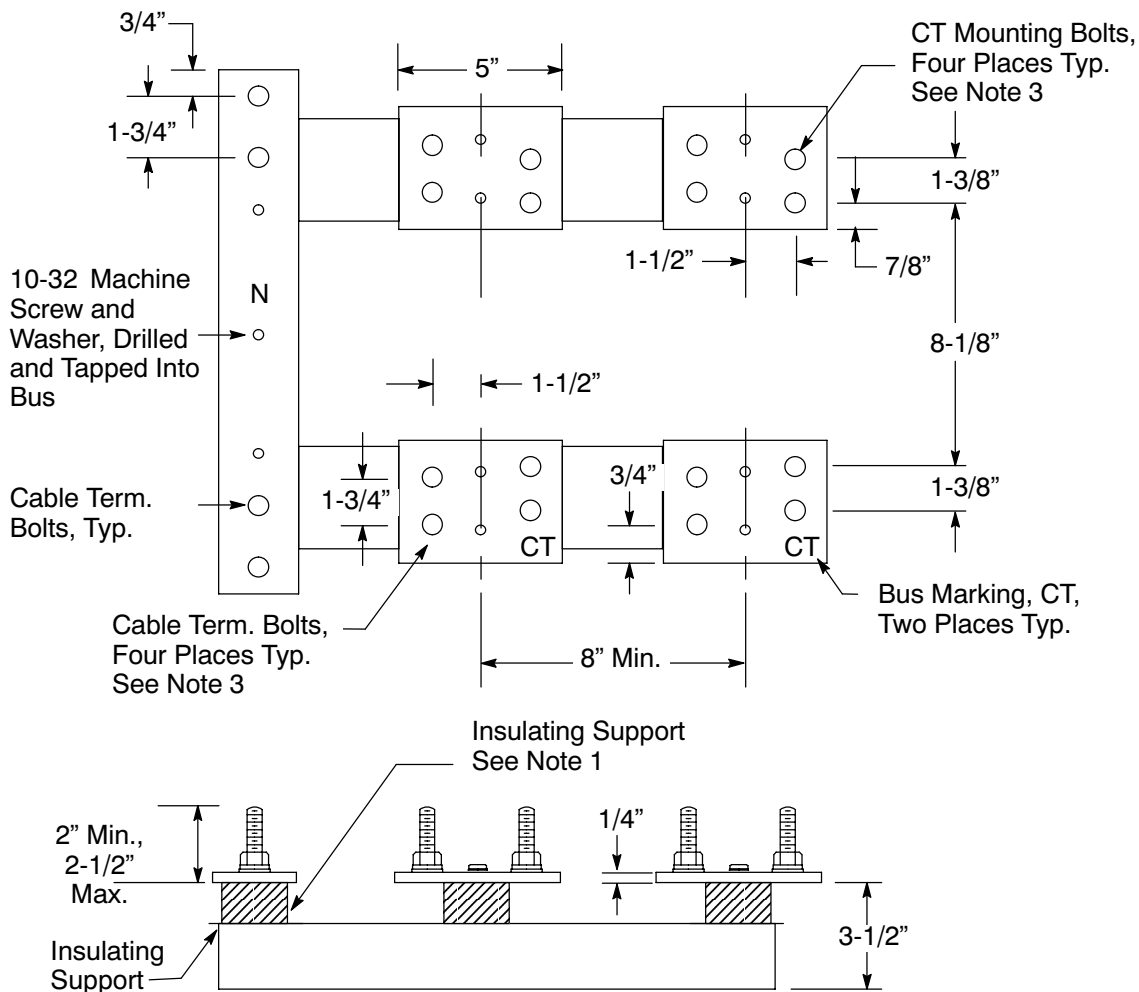


Figure 9-14
CT Mounting Base (Single Phase or Three Phase, 3-Wire, 401 Amperes Through 800 Amperes, 0 Through 600 Volts)

Notes in reference to Figure 9-14.

- 1. Insulated supports must be rated for the serving voltage and have sufficient mechanical strength for the application.
- 2. The mounting base accepts bar-type CTs only.
- 3. Two 1/2-inch steel, Grade 5 bolts must be provided for each cable-terminating and CT mounting position. Each bolt must be furnished with a 2-1/4-inch diameter Belleville washer and a nut. Bolts must be secured in place and spaced as shown. All parts must be plated to prevent corrosion.

9.12. Bused CT Cabinet, 4-Wire Service, 401 Amperes Through 800 Amperes

Applicants must ensure that cabinets meet the following requirements.

- A. All covers are sealable.
- B. Outdoor CT cabinets are weatherproof.
- C. Grounding lugs are provided.
- D. Neutral or unmetered wiring, either cable or bus bar, is located on either side of the cabinet.
- E. CT cabinets are *not* used as splicing chambers.
- F. PG&E's underground service lateral conductors do *not* terminate in CT cabinets.

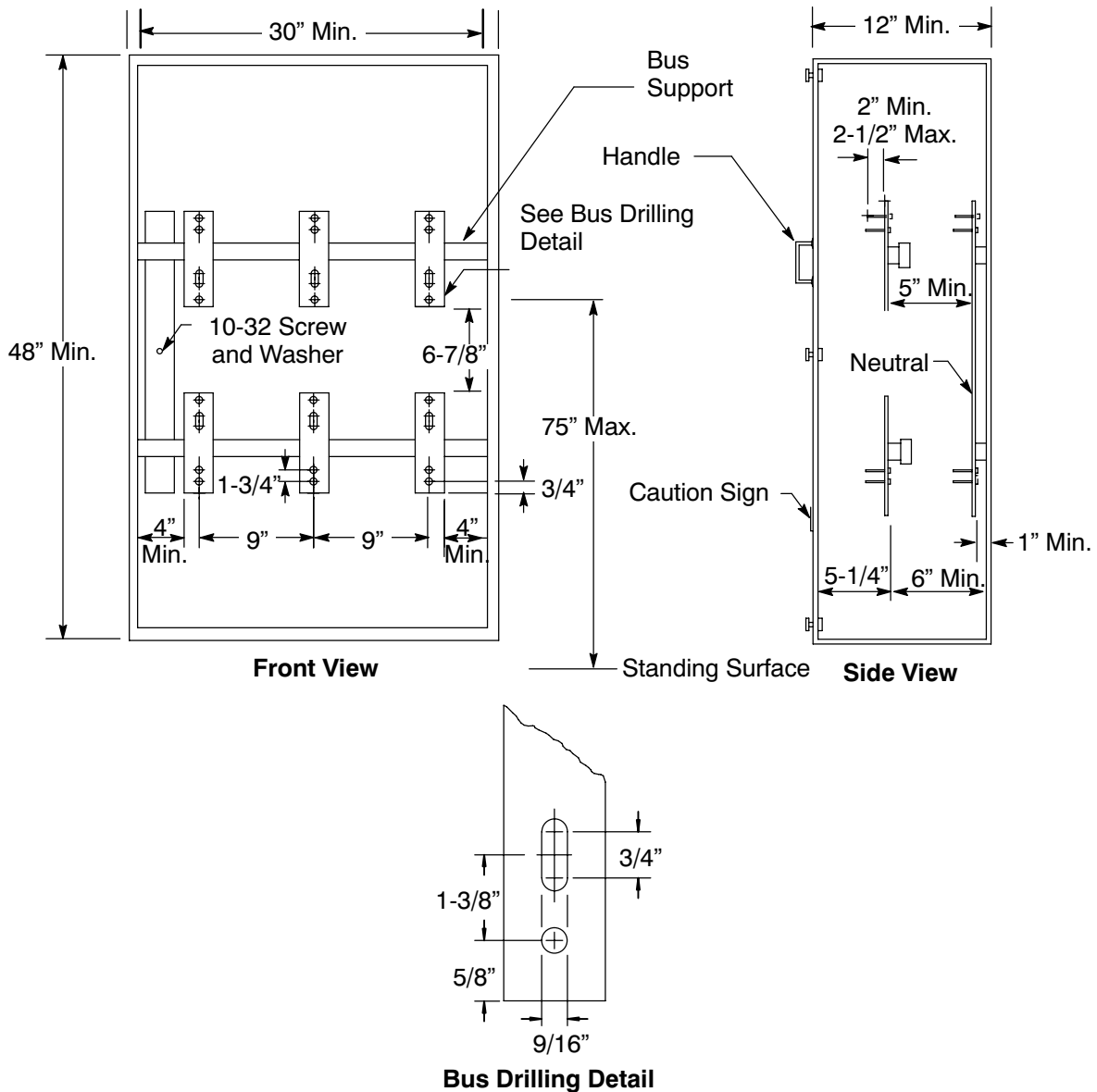


Figure 9-15
Bused CT Cabinet (4-Wire Service, 401 Amperes Through 800 Amperes)

9.13. Meter Box for Transformer-Rated Metering

Applicants must ensure that meter socket jaw requirements and connections are made according to the rules in [Section 5](#), Subsection 5.6., on Page 5-10.

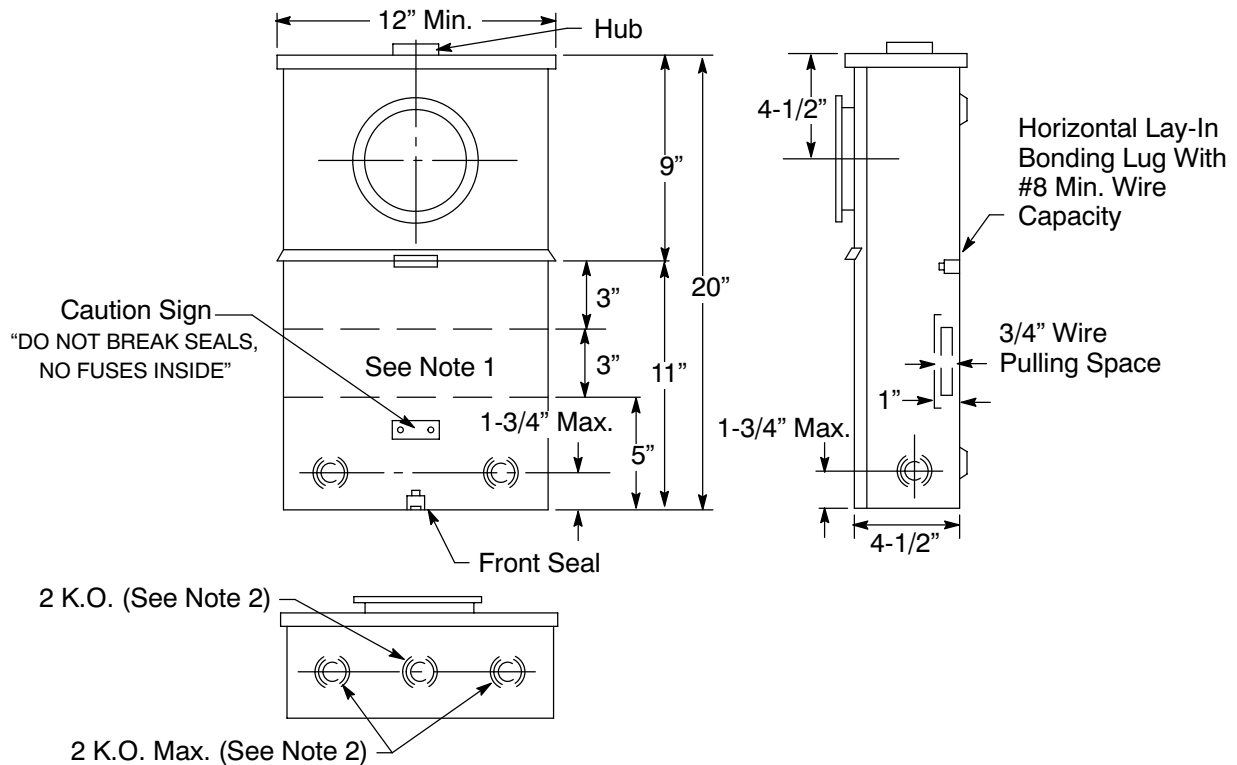


Figure 9-16
Meter Box for Transformer-Rated Metering (for Single-Phase or Three-Phase Installations)

Notes in reference to Figure 9-16.

1. Location of mounting bracket for test switch or reactive transformer.
2. K.O.-knock out

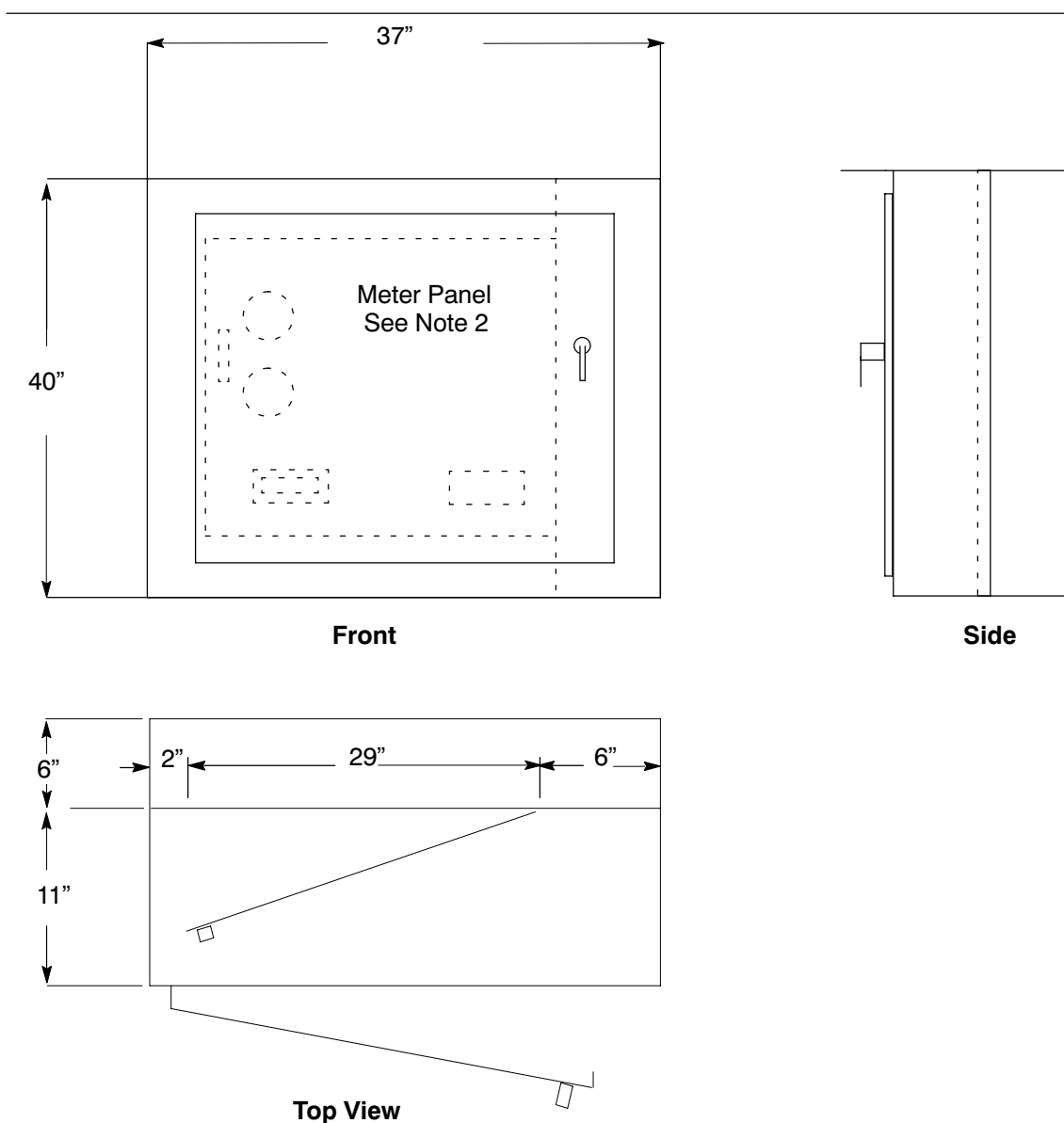


Figure 9-17
Remote Metering Cabinet (for Three-Phase Installations)

Notes in reference to Figure 9-17.

1. The enclosure must be:
 - a. Equipped with a device to secure the door in the open position at 90° or more.
 - b. Secured in the closed position with a handle-operated latching mechanism, and lockable with a padlock having a 5/16" lockshaft.
2. For meter panel requirements, see Figure 10-24, "Standard Switchboard Service Section, 30-Inch Panel for Socket Meters and Recorder," on Page 10-33.
3. Written information must be provided and marked inside of the meter panel. This information must include:
 - a. Potential Transformer/Current Transformer (PT/CT) designation (Type)
 - b. Rating Factor (RF)
 - c. Burden

9.14. Underground Service-Termination Pull Box

Applicants must ensure that underground service-termination pull boxes meet the following requirements.

- A. Pull box covers must be removable, sealable, provided with two lifting handles, and limited to a maximum size of 9 square feet.
- B. The panel can be sealed using two drilled stud-nut and wing-nut assemblies on opposite sides of the panel.
- C. The minimum dimensions specified in Table 9-3, “Minimum Wall-Mounted, Pull-Box Dimensions: 80% Rated Service, Residential, Single Phase *and* 100% Rated Service, Commercial/Industrial, Single Phase or Three Phase,” on Page 9-18, are used when the service conduit enters the bottom of the pull box and all load conductors exit above the terminals. When the service conduit enters from the side or back of the pull box, use the X dimensions from the closest portion of the conduit to the nearest termination bolt.
- D. A PG&E service planner is contacted when developing nonresidential, 601-amperes-and-above services where PG&E designs its facilities at 100% of the rated service. Applicants must ensure that they meet PG&E’s requirements for underground service-termination pull boxes, which include the following:
 - 1. Installing multiple sets of utility service cables.
 - 2. Using stacking lugs to terminate cables in any three-phase installation that is 1,200 amperes or greater.
 - 3. Providing additional space (i.e., depth, width, and termination height), when required, in any section of switchboard, panel board, or other enclosure intended as a termination point for PG&E’s service cables. This additional space will provide the mandatory clearances between phases and grounded surfaces, as well as accommodate the installed service cables.

See Document [063928](#), “Methods and Requirements for Installing Commercial Underground Electric Services 0-600 Volts to Customer-Owned Facilities,” for the appropriate conduit and cable requirements to use when designing nonresidential service installations. This document is included in [Appendix B](#), “Electric and Gas Service Documents.”

- E. ***Applicants must not use wall-mounted, cable-termination and pull enclosures for three-phase, nonresidential installations rated 401 amperes through 2,500 amperes.*** See Table 9-4, “Minimum Switchboard Pull Section Dimensions Over 600 Amperes, Single-Phase Service, 100% Rated, and Commercial/Industrial, Three-Phase Service,” on Page 9-18, and Table 10-1, “Minimum Bottom-Fed Pull Section Dimensions,” on Page 10-23, for bottom-entry installation requirements. See Table 10-2, “Pull Section Dimensions (Minimums) Below Ground Level,” on Page 10-25, for side-entry or back-entry requirements.

F. When installing an approved alternative to switchboard pull sections or free-standing enclosures, applicants can use an alternative installation method that includes separate, cable-splicing boxes and other specially fabricated enclosures (e.g., underground splice enclosure or primary box). Also, applicants may install their own conduits and cables to those enclosures; however, the enclosures must be acceptable to PG&E, (e.g., underground splice enclosure or primary box) and the enclosure locations must be acceptable to PG&E.

PG&E will install and terminate its cables to applicant-owned cables in an approved, alternative enclosure. That enclosure and the terminated or spliced connections will constitute the utility point of service (i.e., service point).

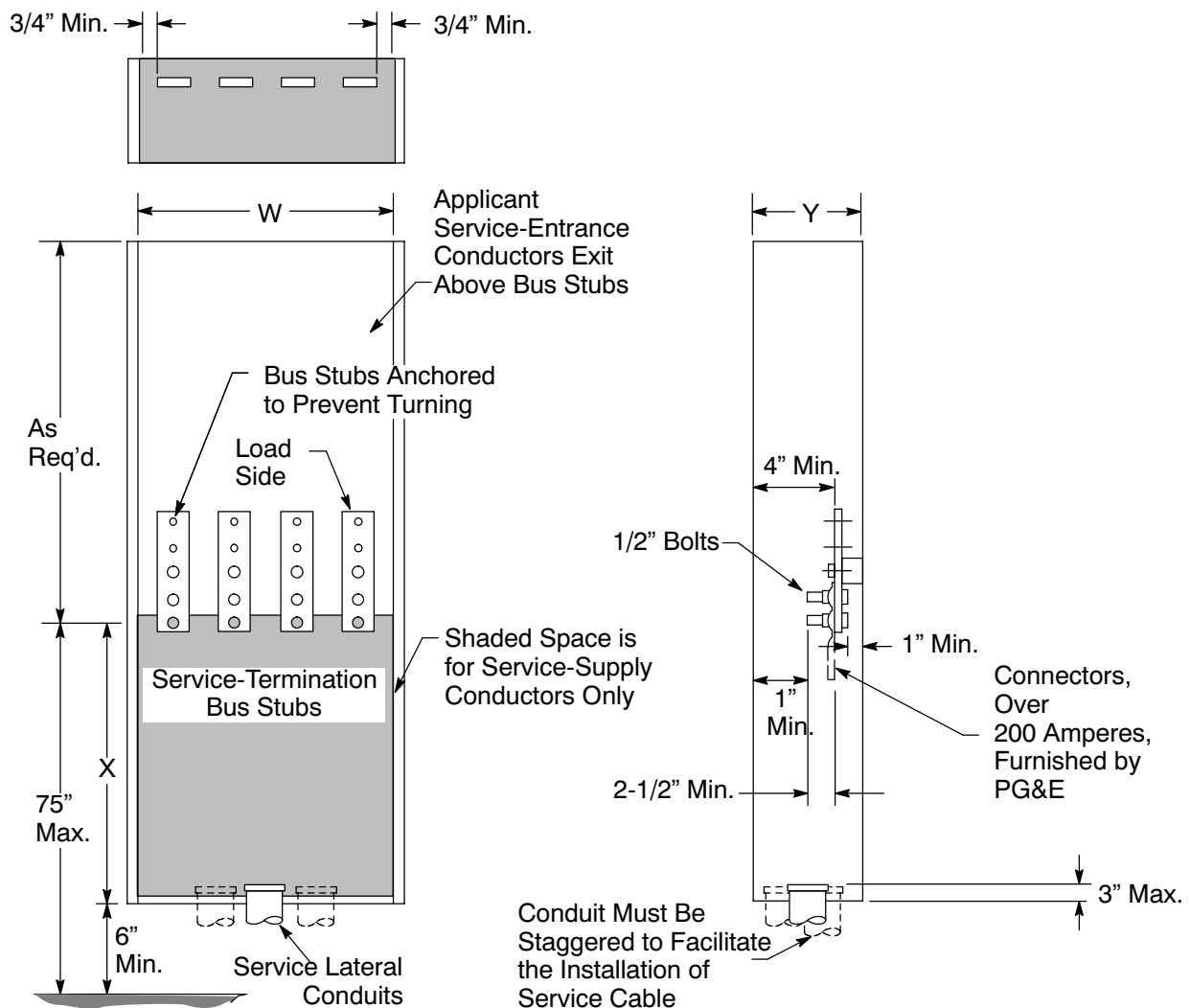


Figure 9-18
Underground, Service-Termination (Wall-Mounted) Pull Box (0 Through 600 Amperes)

Table 9-3 Minimum, Wall-Mounted, Pull-Box Dimensions: 80% Rated Service, Residential, Single Phase and 100% Rated Service, Commercial/Industrial, Single Phase ¹ or Three Phase ²

| Service Rating (Amperes) | Minimum Access Opening "W" | | X | | Y | |
|-----------------------------|---|--------|-----------------|--------------------|-----------------|---------------|
| | 3-Wire | 4-Wire | Bottom Entry | Side/Rear Entry | Bottom Entry | Rear Entry |
| | All Measurements in Inches | | | | | |
| 0-200 | 10-1/2 | 14 | 11 | 36 | 6 | 15 |
| 201-400 | 10-1/2 | 14 | 22 | 42 | 6 | 24 |
| 401-600 | 16-1/2 | 22 | 26 | 48 | 11 | 24 |
| Over 600 | See Table 9-4 below for Over 600-Ampere, Single-Phase Services Rated at 100%. | | | | | |

¹ See "Notes" for Table 9-4 below.

² Maximum of 400 amperes.

Table 9-4 Minimum Switchboard (Floor-Standing) Pull-Section Dimensions: Over 600 Amperes, Single-Phase Service, 100% Rated and Commercial/Industrial, Three-Phase Service

| Service Rating (Amperes) | Minimum Access Opening "W" | | Termination Height "X" |
|-----------------------------|-------------------------------|--------|------------------------|
| | 3-Wire | 4-Wire | |
| | All Measurements in Inches | | |
| 321-400 | 24 | 24 | 42 Min.-72 Max. |
| 401-800 | 24 | 24 | |
| 801-1,200 | 24 | 30 | |
| 1,201-2,000 | 30 | 35 | |
| 2,001-2,500 | — | 42 | 60 Min.-72 Max. |

Notes in reference to Figure 9-18 on Page 9-17, to Table 9-3 above, and to Table 9-4 above.

1. If termination bus-landing stubs are installed perpendicular to the back of the board, a wider enclosure dimension will be required to accommodate the installation of PG&E's cables.
2. Maintain a clear working space. When return flanges are necessary, ensure they do *not* intrude into service-conductor space.
3. Dimension W is the minimum width of the pull section access opening.

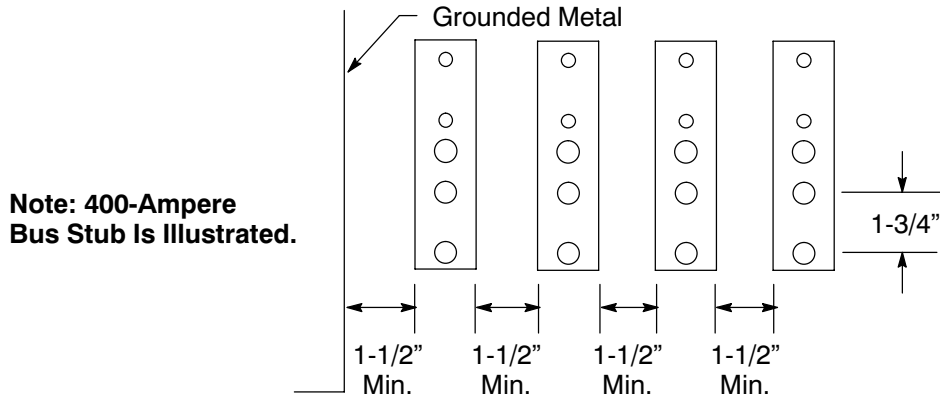


Figure 9-19
Detail of Clearance Requirements for Adjacent Termination Bus Stubs

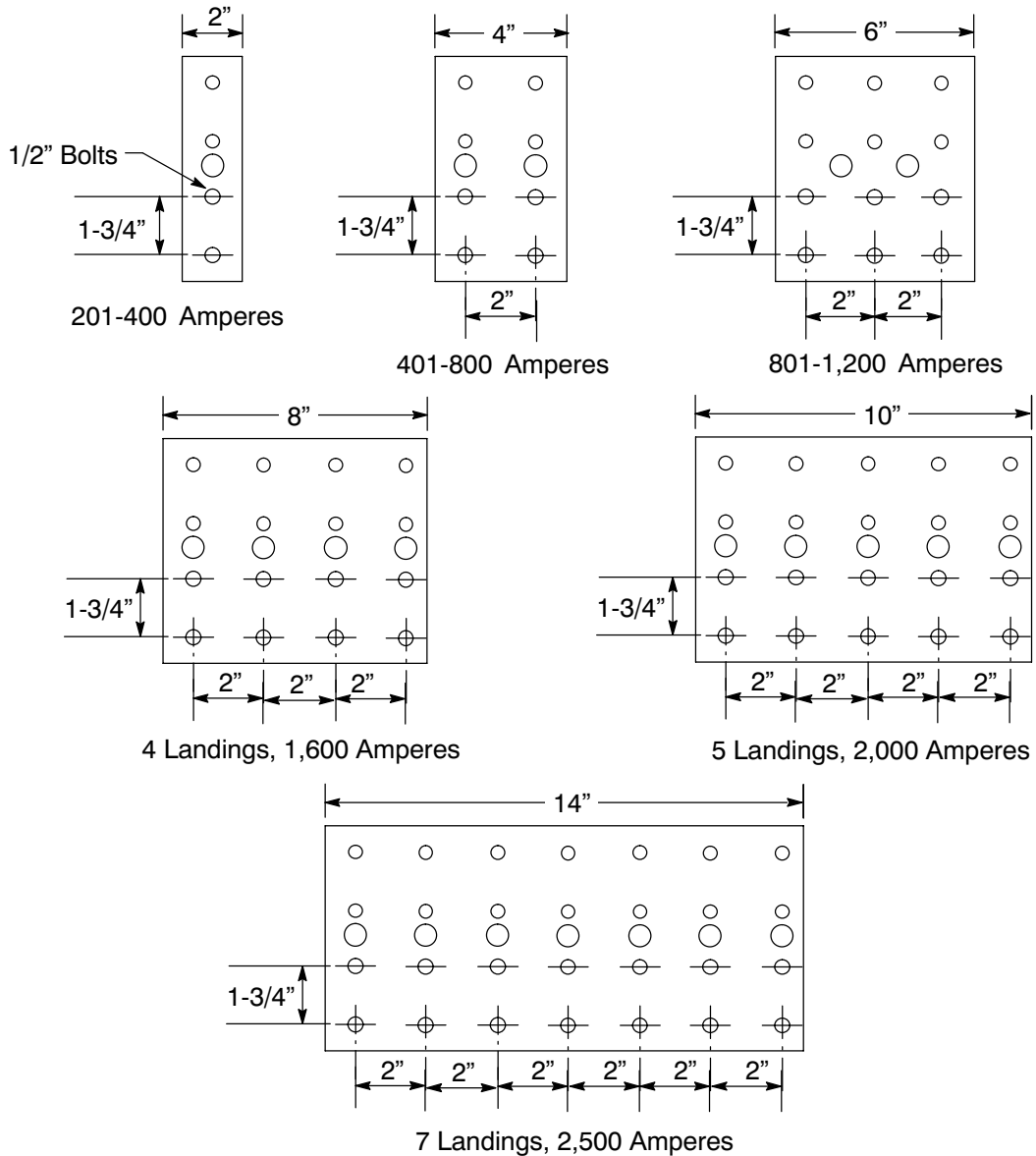


Figure 9-20
Detail of Aluminum, Termination Bus Stubs

9.15. Approved Service-Terminal Conductor Connectors

Applicants must observe the following requirements when they plan to install approved, service-terminal conductor connectors.

- A. Applicants must furnish and install PG&E-approved, range-taking connectors, suitable for aluminum conductors, for enclosures rated at 0 through 225 amperes.
- B. PG&E must furnish and install approved, cable-to-flat-bar connectors on the termination bus stub, as specified in Table 9-5, “Approved, Compression-Type Service-Terminal Connectors,” on Page 9-21, for enclosures rated above 225 amperes. For a Class 320-ampere panel, cable-to-flat-bar connectors on the termination bus stub are preferred; however, 320-ampere-rated meter panels with hex lugs termination are acceptable also.
- C. Applicants *may* use one-bolt, bus attachment connectors for 0- through 225-ampere services *if* the connectors are anchored to prevent the connector assembly from twisting.

Applicants must *not* use pin termination connectors to install cables larger than those intended for the range-taking connectors in their service panel or service enclosure.

NOTE: Do *not* peel stranded cables to fit conductors into termination connectors.

See PG&E Document [015251](#), “Connectors for Insulated Cables Underground Distribution Systems,” Table 28, “Specifications for Terminal Connectors-Aluminum Cable-to-Flat-Bar,” Page 26 of 44, for more information. This document is included in [Appendix B](#).

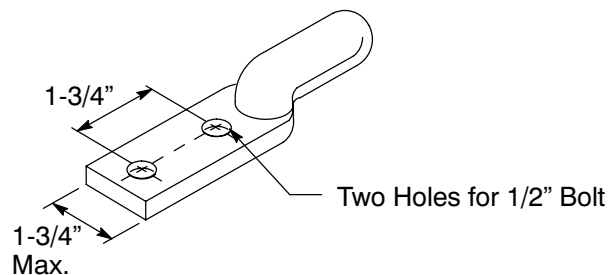


Figure 9-21
Service-Terminal Conductor Connector

Table 9-5 Approved, Compression-Type Service-Terminal Connectors

| Conductor Size: AWG or kcmil | Manufacturer and Catalog Number | | | | | | Tool Index Number |
|------------------------------|---------------------------------|--------------|--------------|----------------------|------------|--------|-------------------|
| | Mac | Homac | Burndy | Electrical Specialty | 3M Company | Code | |
| 4/0 | NLRB4/0-8N | AL-4/0-NTN | YAK28A-2G2 | — | — | 303759 | 4/0 AS |
| | MLB4/0-8N | — | YA28-A5 | AHL-4/0-BNTP | 40145 | — | 4/0 A |
| 350 | NLRB350-8N | AL-350-NTN | YAK31A-2G2 | — | — | 303758 | 350 A |
| | MLB350-8N | — | YA31-A3 | AHL-350-BNTP | 40156 | — | 350 A |
| 700/750 | NLRB750-8N | AL-750-NTN | YAK39A-2G2 | — | — | 303833 | 700/750 A |
| | MLB750-8N | — | YA39-AM 2 | AHL-750-BNTP | 40172 | — | 700/750 A |
| 1,000 | NLRB1,000-8N | AL-1,000-SSN | YAK44A-2NG7 | — | — | 303834 | 1,000 A |
| | MLB1,000-8N | — | YCAK44 A-2G2 | AHL-1,000-BNTP | 40178 | — | 1,000 A |

9.16. Underground-Service Auxiliary Pull Cabinet

Applicants must observe the following requirements when they plan to install an underground-service auxiliary pull cabinet.

- A. Applicants may use auxiliary pull cabinets when there is more than one 90° turn in a service lateral run that will terminate in an underground service-termination pull box. Applicants must furnish and install auxiliary cabinets.
- B. Applicants must ensure that underground-service auxiliary pull cabinets:
 1. Have suitable grounding lugs and are provided with sealable covers.
 2. Are constructed of sturdy metal.
 3. Are weatherproof.
 4. Have an 11-inch minimum depth. When the available space is not large enough to provide the specified minimum dimensions, consult your local PG&E service planner.

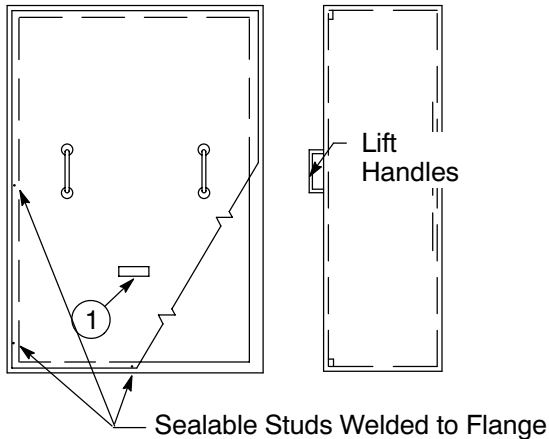


Figure 9-22
Cabinet Showing Stud-Mounted Cover

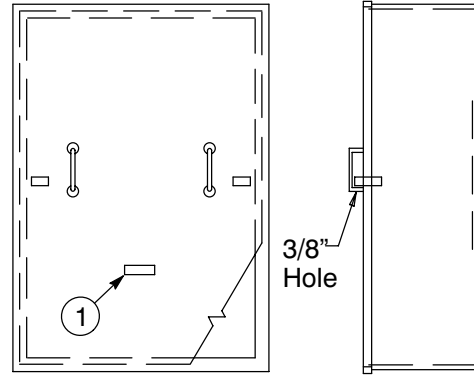


Figure 9-23
Cabinet Showing Flanged Cover
Fastened by Sealable Rivet Latches

① Caution Sign
 DO NOT BREAK SEAL
 NO FUSES INSIDE

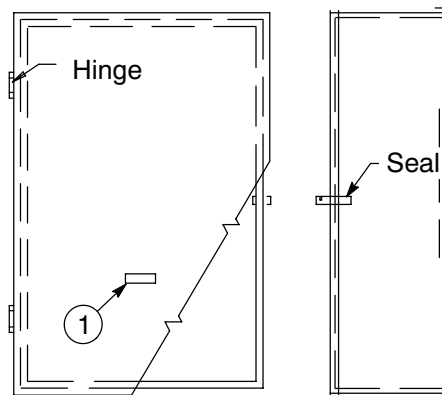


Figure 9-24
Cabinet Showing Hinged, Flanged Cover

Table 9-6 Minimum Connection Cabinet Sizes ¹

| Switch Service Capacity (in Amperes) | 3-Wire Service | 4-Wire Service |
|---|----------------------------|----------------|
| | All Measurements in Inches | |
| 225 | 24 x 24 | 24 x 24 |
| 400 | 24 x 30 | 24 x 30 |
| 600 | 24 x 30 | 30 x 36 |
| 800 | 30 x 36 | 36 x 36 |

¹ When service is over 800 amperes, consult your local PG&E service planner.

9.17. Nonresidential Service Pedestals (EUSERC 308)

Applicants must ensure that nonresidential service pedestals meet the following requirements.

- A. The meter socket is mounted on a support, attached to the meter panel, and provided with a sealing ring.
- B. The test-bypass compartment cover:
 - 1. Does *not* exceed a maximum weight of 25 pounds.
 - 2. Has a fixed top and sides that allow access to the metering compartment through a hinged door. The hinged door must be equipped with a device to hold the door open at 90° or more.
 - 3. Is sealable and fitted with a lifting handle.
 - 4. Has two lifting handles if the cover is more than 16 inches wide.
- C. Test-bypass blocks with rigid barriers are furnished, installed, and wired or bused to the meter socket by the manufacturer. Connection sequences must be line-loaded from left to right and clearly identified by block-letter labeling at least 3/4-inch high.

Applicants must ensure that test-bypass facilities are installed with the following clearances.

- 1. Facilities require 3 inches of vertical clearance from the upper test connector stud to the upper compartment access opening.
 - 2. Facilities require 3 inches from the center of the cable terminal screw to the lower compartment access opening.
 - 3. Facilities require 1-1/2 inches of side clearance from the rigid insulating barriers to the compartment sides and 1 inch to the compartment access openings.
- D. Utility compartment covers (i.e., meter covers, demand reset covers, and pull sections) are sealable and lockable using a padlock with a 5/16-inch lock shaft.
- E. Internal equipment attached to the outer walls of the enclosure is secured in place with devices that cannot be loosened from the outside. Do *not* use screws or bolts requiring special tools to install or remove them.
- F. The terminating pull-section of the pedestals:
 - 1. Comply with the minimum dimensions illustrated in Table 9-7 on Page 9-24.
 - 2. Accept a minimum 3-inch conduit.
 - 3. Have covers equipped with lifting handles.
 - 4. Are equipped with aluminum-bodied mechanical lugs, ranging from #6 AWG through 250 kcmil, for terminating the service conductors.
 - 5. Have insulated cables or busses installed between the termination lugs and the test-bypass facilities.
 - 6. Have protective metallic barriers, 16-gauge minimum, provided between the pull sections and their (the applicants') distribution sections.

7. Have a 1/4-inch minimum clearance between the applicants' section walls and the barriers to prevent screws and bolts from protruding into the pull sections.

For information on structural-mounting requirements and pedestal support, consult your local PG&E service planner.

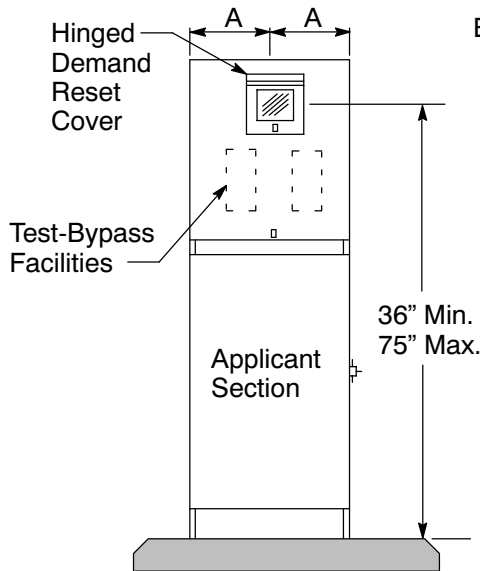


Figure 9-25
Front View

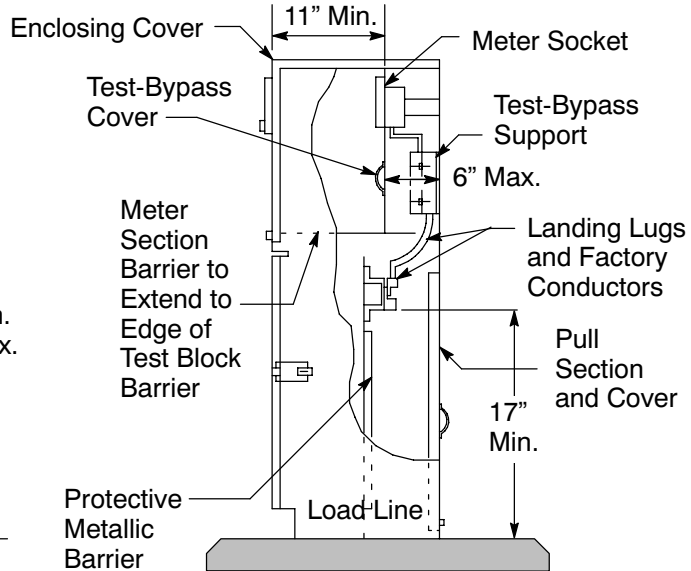


Figure 9-26
Side View

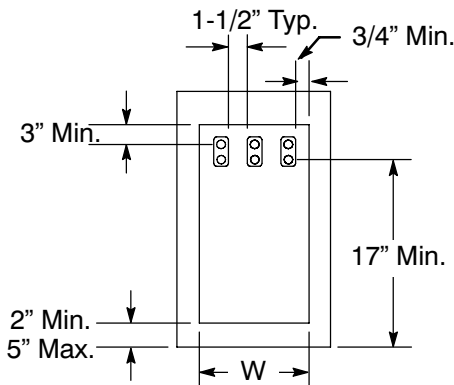


Figure 9-27
Wireway Pull Section

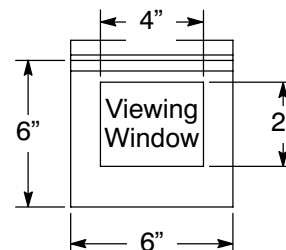


Figure 9-28
Hinged Demand Reset Cover With
Polycarbonate Viewing Window

Table 9-7 Minimum Dimensions (Inches)

| Service | W | A |
|--------------|--------|----|
| Single Phase | 10-1/2 | 10 |
| Three Phase | 12-1/2 | |

NOTE: These figures represent generic design configurations. To have other designs reviewed and accepted, consult your local PG&E service planner.