



Electric Service Requirements ESR

January 2026



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Requirements go into effect on all new jobs and submissions without an approved PGE Job Sketch no later than **January 1, 2026**.

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Preliminary Information

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- [Terms Used in the ESR Book](#)
- [Maps of PGE's Service Territory](#)

About this Book

PGE's electric service requirements are designed to provide customers with electric service in a safe, affordable, and reliable manner over the life of the service. This *Electric Service Requirements (ESR)* book is intended to help customers obtain low-voltage electric service from Portland General Electric (PGE) for new services, relocated services, rewired services, and temporary services. Customers interested in medium voltage service should refer to PGE's [Medium Voltage Requirements](#) book.

This edition replaces all earlier editions. All new and updated content in this book is highlighted in gray, just like this paragraph. If changes have been made to a figure, the figure's caption is highlighted.

The ESR book is meant to be read and interpreted in its entirety. Individual figures or pages do not represent the complete requirements for service and should not be used out of context. This book may require different electrical equipment specifications than those previously accepted in PGE service areas. We highly recommend consulting PGE to resolve any questions concerning the requirements in this Guide.

IMPORTANT: Do not use figures in this book as construction plans. The text that accompanies a figure often contains important information not contained in the drawing. Additionally, customers must reference an approved job sketch for site-specific requirements.

Accuracy of Information and Conflicting Requirements

The ESR is updated on a biannual basis and, if the need arises, PGE may update it out-of-cycle. The information in the *ESR* book is subject to change without notice. The online version always contains the most current and definitive information. Customers must ensure they have the current edition.

Requirements are intended to comply with all governing codes, ordinances, and tariffs, but they may change if any of those codes, ordinances, and tariffs change. If information in this book conflicts with a code, ordinance, or tariff, the requirement(s) of the code, ordinance, or tariff take precedence.

PGE Contact Information

PHONE NUMBERS

Contact	Phone Number		
	Toll-Free	Local	Fax
Service Coordination To open a new request for service or schedule a final inspection	800-542-8818	503-323-6700	503-612-3501 971-253-2272
Customer Service To request billing and payment information for existing accounts	800-542-8818	503-228-6322	—
Tree Hotline	800-544-1794	503-736-5460	—
Oregon Utility Notification Center To locate underground utility cables	8-1-1 or 800-332-2344	503-246-6699	—
Outages and Emergencies, 24 hours To report a power outage	800-544-1795	503-464-7777	—
Light Out (streetlights) To report a streetlight problem	800-544-1795	503-464-7777	—
Energy Theft Hotline To report an energy theft	800-962-8184	—	—
Interconnection Team To obtain information on customer-owned solar and wind systems, and on batteries	—	503-464-8100	—

EMAIL ADDRESSES

Contact	Email Address
Service Coordination	service.coordinators@pgn.com
Tree Hotline	trees@pgn.com
Light Out (streetlights)	LightOut@pgn.com

Errors that May Cause PGE to Turn Down a Request for Electric Service

The following table lists common errors existing in new construction that may prevent PGE from approving a request for electric service until errors are corrected.

Error	Requirement
All Services	
Area around PGE equipment is obstructed or not level.	The ground in front of PGE equipment must be a permanent, unobstructed, level area that is a minimum of 48" wide by 48" deep, or the width of the equipment. See Section 5.3 .

Error	Requirement
Overhead	
The weatherhead or point of attachment (POA) is too low.	See Table 12 for the minimum clearances for service drops.
No mast guy.	Guying is required for a mast that extends more than 2' above the roof. See Table 25 .
The service drop is attached to the fascia board.	A service drop is not allowed to be attached to a fascia board.
The meter socket or weatherhead is in the wrong location.	PGE approval is required for the meter socket and its location before installation. See Section 5.2 .
The wrong style meter socket is installed.	PGE only accepts the ring-style meter socket. A ringless-style meter socket is not approved. See Section 3.10.2 .
Underground	
There is no pull string in the underground conduit.	Pull strings are required in all PGE conduits. See Section 6.3.2 .
The trench is shallow and/or conduit cover is lacking.	PGE requires a minimum cover of 30". See Section 6.2 .
The conduit connects to the wrong knockout on the meter socket.	Only the left knockout can be used on a 200 A meter socket. However, any of the bottom knockouts can be used on a 320 A meter socket.
The underground kick pipe must be straight and plumb.	No bends are allowed between the meter socket and the ground. See Section 7.2 .
The meter location is unapproved.	The meter must be in an approved location. Call PGE for meter location before starting any work. See Section 5.2 .
The meter socket is too close to the gas meter.	The minimum distance between the meter socket and a gas meter is 3'. See Section 5.4 .
The wrong style meter socket is installed.	PGE only accepts the ring-style meter socket. A ringless-style meter socket is not approved. See Section 3.10.2 .
Rewires of an Existing Structure	
Service is not brought up to current PGE requirements.	PGE requires that the meter socket, the weatherhead, and the meter and weatherhead locations be brought up to current requirements when service is being upgraded. Call PGE for the correct meter location before starting any work. See Section 3.6 .
Multiple-Meter and Nonresidential Services	
The three-phase high-leg is not in the correct position or is not marked with orange tape.	PGE requires that the high-leg conductor be on the right side of the meter socket. The high-leg terminal must be marked with orange tape in both the meter socket and in the panel, CT, or terminal cabinet.

Error	Requirement
Not using a safety-socket-type meter socket.	All nonresidential meter sockets, including required services, must be the safety-socket type (with a few exceptions). See Table 5 .
No lockbox.	A lockbox must be installed near the electrical room. See Section 13.3 .
A panic bar for the electrical room door is not on site.	PGE requires that electrical room doors open outward and be equipped with a panic bar. See Section 13.2 .
There are no permanent engraved labels on multiple-meter sockets.	PGE requires that all multiple-meter installations have a permanently engraved metal or hard plastic label on each meter socket. Letters on each label must be at least 3/8" high. See Section 3.10.8 .

Terms Used in the ESR Book

The following list provides definitions for terms used in the *ESR* book.

ANSI	American National Standards Institute.
ASME	American Society of Mechanical Engineers.
Backfill	Materials such as sand, crushed rock, or soil that are used to fill a trench.
Bushings	Plastic or nylon rings that attach to the ends of conduit to protect the electrical cable from sharp edges.
Bypass	A method that allows for service continuity to the customer while the meter is removed for testing or inspection.
Chamfered	The smoothing of internal rough edges of factory- or field-cut conduits to prevent damage to PGE underground conductors when pulled into the conduit.
Current transformer	A transformer that reduces the customer's load current by a known ratio to a secondary metering current that is within the capacity of the meter.
Current transformer meter	A meter that requires current transformers because its current capacity is not as large as the customer's current load.
Customer	The individual responsible for requesting electric service from PGE.
Direct-connect meter	A meter that is energized to line voltage and carries all the load current. No current transformer or voltage interface is used. Also called a Self-contained meter .
Disconnect	PGE requires a lockable, load-break disconnect. PGE prefers a knife-blade type disconnect that clearly indicates the open and closed position.
DPM	Design Project Manager
Drip loop	The loop formed by the customer's conductors that connects to the PGE service drop. The conductors are formed in a downward loop so water will not enter the customer's service mast (weatherhead).

Easement	The non-possessory right to enter onto and use the real property of another for a specific purpose. Easements are typically perpetual and run with the land. PGE frequently requires an easement for use of private or public property for the construction, operation, and maintenance of its power and power-related electrical facilities. These include poles, overhead and underground conductors, transformers, vaults, guy wires and anchors.
Elbow	A bend in a conduit having a small radius change in direction, also referred to as a standard radius. Small or standard radius bend elbows are not allowed for PGE conductors. See Sweep .
Electrician	A person issued an electrical contractor license by the state of Oregon.
EMT	Electrical metallic tubing.
EUSERC	Electric Utility Service Equipment Requirements Committee. An association of utilities and manufacturers that creates standard designs for the interface between an electric utility's service and a customer's facility. PGE is an active member of EUSERC.
Fault current	Maximum available current under bolted short-circuit conditions.
FCC	Field Construction Coordinator
Field heat bend	Creating an on-site bend or sweep in a duct by heating the duct with a conduit heat blanket, propane torch, or other heating appliance. Field heat bends are not allowed.
Field bend	A straight section of duct mechanically bent to achieve an angle in the duct. Field heat bends are not allowed.
Grounding	Grounding of customer equipment must be in accordance with the latest version of NEC 250. Code enforcement agencies may require that the ground connection be visible when an inspection is made. For safety reasons, the top of the ground rod should be flush with or below ground level in permanent application.
Handhole	An underground enclosure (precast box with knockouts inside for conduit) into which personnel reach but do not enter, for the purpose of installing, operating, or maintaining equipment or cable or both.
Hazard	Anything that poses a risk to PGE equipment, PGE employees, and/or members of the public.
High leg	On a 4-wire, three-phase delta connection, the conductor having the phase-to-ground voltage of 208 V on a 120/240 V service is called a high leg or wild leg. The high leg must be located on the right side and identified with an orange dot or tape.
IMC	Intermediate metallic conduit.
Lead	The horizontal distance from the surface of the pole to the point of entry of the anchor into the ground.
Low-voltage service	A low voltage services is a service less than 600 V.
Manual link bypass	Bypass facilities requiring the physical act of placing links across line and load bypass studs provided in the meter socket. See Bypass .

Manufactured home	A factory-assembled structure or structures, site specific, and transportable in one or more sections. These structures are designed to be used as a dwelling with a permanent foundation. See Section 9 .
Medium-voltage service	A medium voltage service is a service 600 V to 35 kV.
Meter	A device that measures and records the summation of electrical energy over time.
Meter base	See Meter socket .
Meter base ring	A metallic ring that secures the meter to the meter socket and which can be sealed by PGE.
Meter pedestal	A commercially built pedestal that contains a meter socket and customer disconnect switch.
Meter socket	A mounting device for socket-type meters that consists of jaws, connectors, and an enclosure. Sometimes called a Meter base .
Meter spot	Process in which PGE does a site visit and identifies the approved location for a meter. Customers are required to call for a meter spot to establish any new service and/or do a rewire to upgrade service.
Mobile home/Modular home	A factory-assembled structure or structures that is transportable in one or more sections, and which is built on a permanent chassis and designed to be used as a dwelling without a permanent foundation.
NEC	National Electrical Code.
NEMA	National Electrical Manufacturers Association.
NESC	National Electrical Safety Code.
NFPA	National Fire Protection Association. The NFPA publishes the National Electrical Code (NEC).
OESC	Oregon Electrical Specialty Code.
Open wire secondary	Three conductors individually supported on insulators on a pole or crossarm.
Oregon Utility Notification Center (OUNC)	The Oregon state agency that administers Oregon's excavation laws and handles statewide underground utility locate requests.
OSHA	Occupational Safety and Health Administration. Both the federal government and Oregon have OSHAs.
OUCC	Oregon Utility Coordinating Council.
OUNC	See Oregon Utility Notification Center.
Overhead service	Electric service supplied from PGE to the customer utilizing overhead conductors.
Permit	The granting of a temporary right to use the property of another for a specific limited purpose. Permits are often granted for specified periods of time. They are subject to revocation and are generally non-transferrable.
PGE	Portland General Electric.
Plastic conduit	See PVC conduit .

Plumb	To have the sides and front of customer-installed equipment and conduit perfectly vertical from both the front and side views.
Point of attachment	The location where the PGE overhead service lateral attaches to the customer's structure.
Point of delivery (POD)	The point where a power company's circuit connects to the customer's system. Also referred to as a Service point .
Power factor	The cosine of the angle between voltage and current, expressed as a percentage. Also, the ratio of the active power to the apparent power.
Primary	Over 600 volts.
PVC conduit	A gray, schedule 40 PVC conduit approved for use in electrical installations. Commonly referred to as Plastic conduit .
Qualified	Refers to a person who has been trained in and has demonstrated adequate knowledge of the installation, construction, or operation of lines and equipment and the hazards involved. This knowledge includes identification of and exposure to electric supply and communications lines and equipment in or near the workplace.
Readily accessible	According to NESC, a roof or other area is considered readily accessible if a person on foot can casually access it via a doorway, window, stairway, or permanently mounted ladder without extraordinary physical effort or the use of special tools or devices.
Rewire	A rewire occurs when a meter base, meter socket, or weatherhead is upgraded or the location of these parts is changed.
Right-of-way	The right to pass over a parcel of land, usually to and from another piece of land. These rights are usually granted by cities, counties, or other governmental bodies for public travel.
Secondary	600 volts and lower.
Safety socket	Device consisting of a manual link bypass facility and a circuit-closing nut-and-bolt assembly that will de-energize the meter socket while the meter is removed for test or inspection.
Self-contained meter	See Direct-connect meter .
Select backfill	Material used to bed and cover conduit or direct-buried cable. Select backfill consists of material that passes through a 3/4" sieve, with no more than 12% of that material passing a No. 200 mesh sieve. In addition, the material must be reasonably free of organic and otherwise undesirable materials, and it must contain no sharp or foreign objects.
Service entrance conductors	Customer-owned conductors that connect to the customer's service equipment from the service drop or service lateral.
Service point	The point where PGE's circuit connects to the customer's system. Also referred to as the Point of delivery (POD) .
Service trench	A customer-provided trench for the service lateral.
Service lateral	Conductors from the PGE system to the customer's house or customer-owned service pole. These conductors can include a pole, pedestal, vault, or transformer.

Service equipment	All electrical equipment included in the delivery of electrical power to a customer's premise.
Service upgrade	Anytime a service is being altered, modified, replaced, or updated, including in instances of service failures.
Single-family service	Service furnished to customers for domestic purposes in single-family dwellings.
Single phasing	The loss of a single phase on a three-phase service (in other words, running on two phases).
Socket	A mounting device consisting of jaws, connectors, and enclosure for socket-type meters.
Sweep	A bend in a conduit that has a factory-formed, large-radius change in direction.
Switchboard	A large panel (or assembly of panels) that contain buses, current transformers, meter switches, and protective devices.
Switchgear	This term was used in earlier versions of the <i>ESR</i> book. It has been replaced by switchboard. See Switchboard .
Temporary service	Electrical service provided for residential and commercial construction, seasonal sales lots, rock crushers or paving plants, and other limited-duration applications. These are normally limited to 12 months.
Test block facility (TBF)	An assembly used to de-energize a self-contained meter socket without disconnecting electric service to the customer.
Test switch	A device used by PGE to isolate a meter from current transformers.
UL	Underwriters Laboratory.
Underground service	See Service lateral .
Vault	A fully enclosed, structurally sound space that is part of an underground electric system, located above ground, below ground, or in a building, and accessible only to qualified personnel.

Maps of PGE's Service Territory

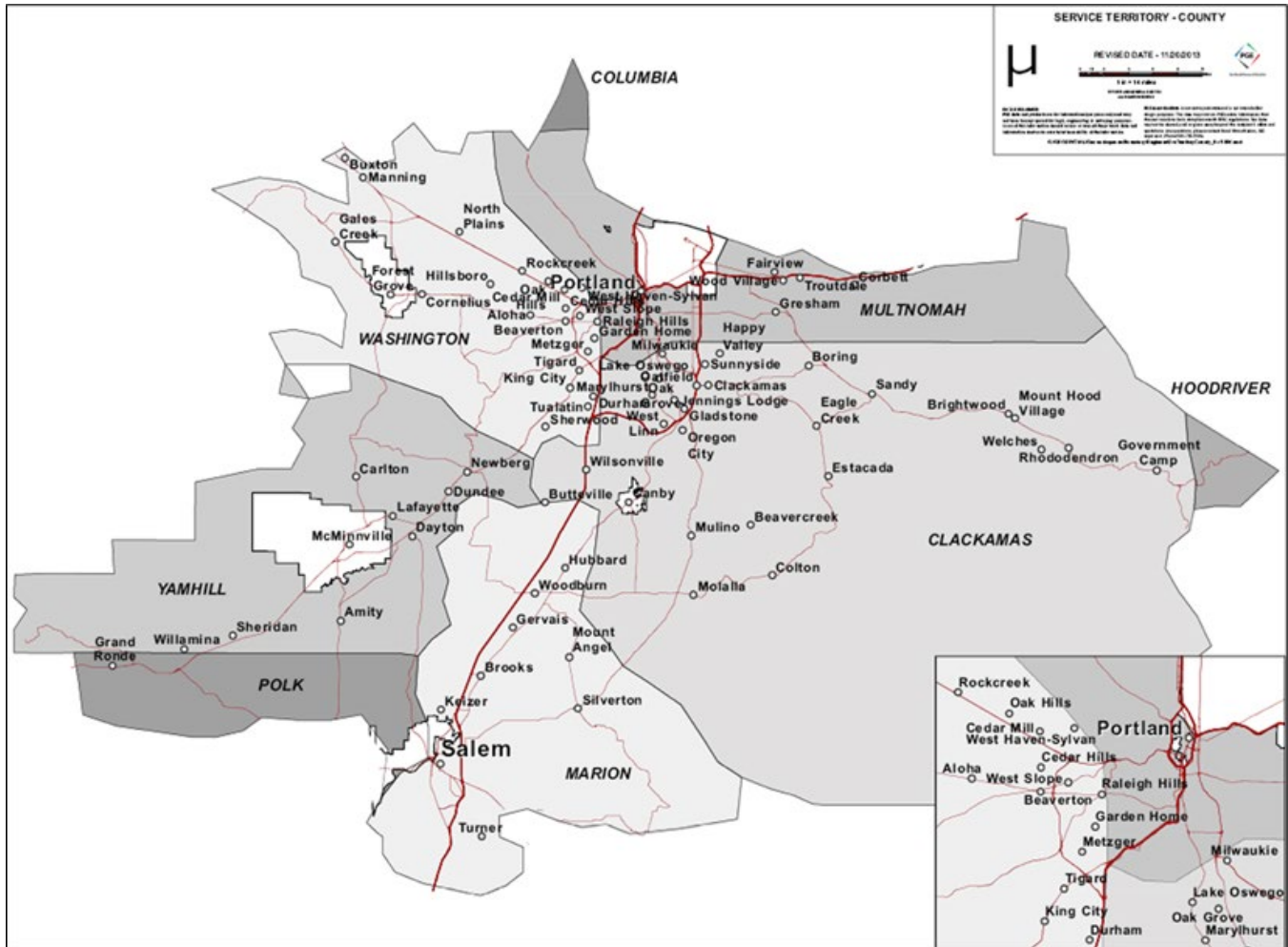


Figure 1. PGE Service Territory

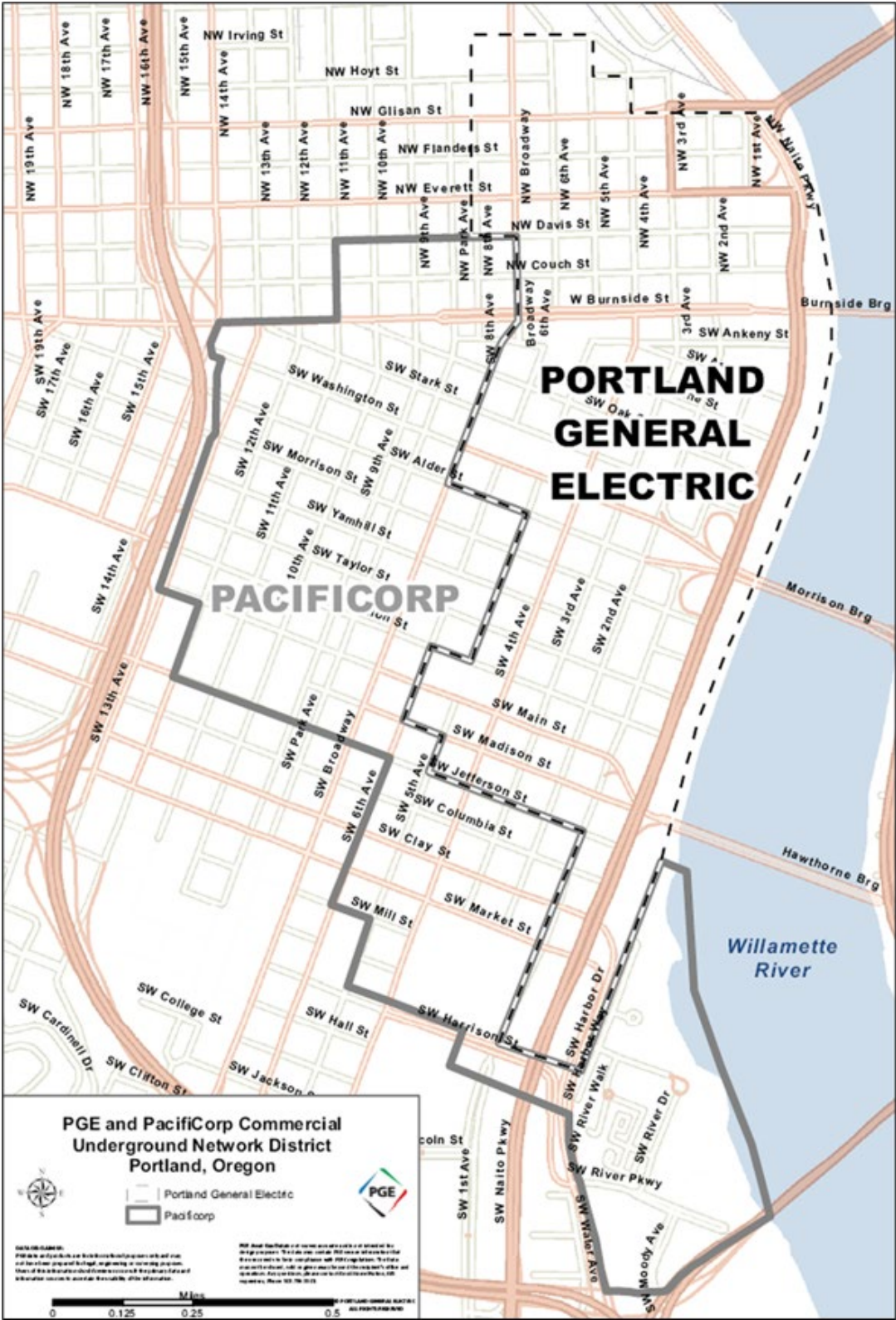


Figure 2. PGE Boundaries

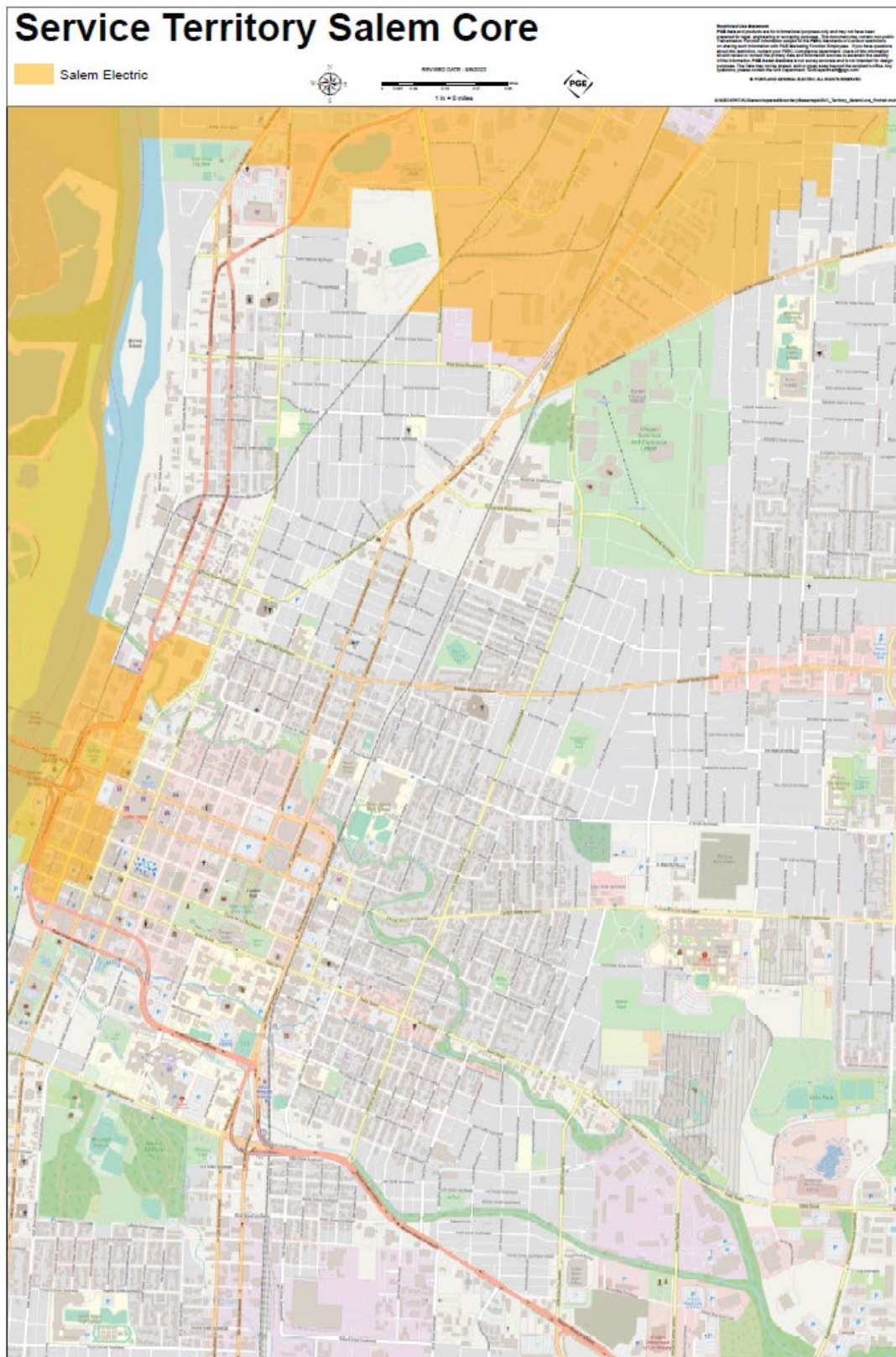


Figure 3. Service Territory Salem Core Map

1 General Requirements

Topics in this Section

- [Charges](#)
- [You, Our Customer](#)
- [Motors](#)
- [Customer Generation \(Generators, Solar, Wind, and Other Qualifying Resources\)](#)
- [Customer-owned Storage–Batteries](#)

1.1 Charges

Electric service (ES) is supplied to the customer under the rates, rules, regulations, and marketing programs approved by PGE's Tariffs. Rates for residential, commercial, and industrial customers are determined based on the type of customer and the amount of energy used at the site. Services typically have monthly basic charges and fees based on the amount of electricity used. PGE's Service Coordination team 503-323-6700 can assist you in determining the rate schedule for a new or upgraded service. See the PGE Tariffs at portlandgeneral.com for a complete list of rate schedules.

1.2 You, Our Customer

1.2.1 Definition of Customer

The customer is the individual who is requesting electric service from Portland General Electric (PGE). The customer may be the electrical contractor, developer, or homeowner installing the electric service. This book sometimes uses the word you to refer to the customer, too.

IMPORTANT: When you see the words "Consult PGE" or "Consult with PGE" in this book, it means you (the customer) must obtain PGE approval before installation. This applies to every installation. Failure to receive approval before installation will result in denial of service until the installation meets PGE's requirements.

1.2.2 Customer Responsibilities

1.2.2.1 Safety

The customer must comply with federal, state, and local laws and regulations concerning activities in the vicinity of PGE's electrical **conductors** and equipment. By complying with these laws and regulations, customers protect themselves, their family, and their employees—as well as PGE and its employees, contractors, and third parties—from injury, loss, or damage.

When PGE has determined a hazard exists at a service or within proximity to PGE equipment, the customer and/or PGE must take action to remediate that hazard up to and including the disconnection of service. A hazard is defined as anything that poses a risk to PGE equipment, PGE employees, and/or members of the public. Restoration or reconnection of the service will only occur after the hazard has been remediated and the service has been reinspected by the municipality and PGE. See PGE's Tariff [Rule H, Disconnection and Reconnection](#).

If PGE serves a customer by means of primary voltage or transmission voltage circuits on the customer's premises, or if a customer resells power and energy furnished by PGE, PGE requires the customer to obtain and maintain insurance coverage that PGE deems adequate to satisfy the duty of indemnification. PGE requires a separate indemnification, hold harmless, and/or additional named insured agreement.

1.2.2.2 Installing and Maintaining Switchboards

The customer is responsible for customer-owned metering equipment. Customers are responsible for the proper installation of equipment according to manufacturer's instructions and code requirements, as well as maintenance of customer-owned metering equipment including, but not limited to:

- Overcurrent devices
- Cable and bus connections and terminations, and
- All other electrical equipment.

1.2.2.3 Grounding and Bonding

Grounding and bonding are critical for safety and electrical reliability. The customer is responsible for ensuring that the electrical wiring and service equipment is grounded and bonded in accordance with applicable National Electrical Code (NEC) requirements.

1.2.2.4 Protecting PGE Equipment with Barrier Posts

The customer must provide barrier posts for protecting PGE electrical equipment when vehicles or other equipment can be near or around PGE facilities. For more information, see [Section 5.6.8](#).

1.2.2.5 Temporary Covers on All Openings

Where the customer provides openings for PGE equipment (such as a padmounted transformer) the customer must also provide and install a temporary cover. This cover must be 3/4" marine or exterior-grade plywood that is 6" larger than the opening and secured without damaging the concrete. PGE will remove the temporary cover during installation of the electrical equipment.

1.2.2.6 Landscaping

The customer must install and maintain landscaping in a way that prevents trees, shrubs, and other vegetation from interfering with the access, proper operation, or maintenance of PGE facilities. Plan for the mature height and crown spread of trees and shrubs. Common problems caused by landscaping and fencing are shown in [Figure 4](#).

Where overhead conductors exist near or on property, trees must not interfere with safe work clearances near line conductors and service drops. Trees must not be planted directly under wires. See PGE's *Tree Planting Guide* on portlandgeneral.com.

Where underground conductors exist, the front, sides, and back of PGE equipment must be clear of plants, tree roots, and fences. Landscaping clearances are based on safe work clearances detailed in [Section 5.5.4](#), and shown in [Figure 33](#), [Figure 34](#), and [Figure 35](#). Bark dust, landscape materials, fake rocks, and other items must not cover a vault lid or other below-ground PGE facilities.



Leave a 10-foot clearance in front of pad-mounted transformers.

PGE crews need the space to do their work safely.



Don't plant shrubs or trees this close to a transformer.

PGE will have to cut them back to safely work on its equipment.



Don't put shrubs, trees, fences, or objects within 3 feet of any side of a transformer.

PGE will have to remove them to safely work on its equipment.

Figure 4. Typical Landscaping Problems

1.2.2.7 Protecting Monuments and Property Markers

In accordance with Oregon law (ORS 92.004), utility infrastructure owned and maintained by PGE (such as vaults, ducts, and road crossings) must have a minimum separation of one foot from all monuments or property markers. The customer is responsible for ensuring that this requirement is met before any PGE infrastructure is installed.

1.2.3 Additional Load for Existing Customers

The customer must give PGE prior written notice before adding load or modifying existing electrical equipment. Contact the Service Coordination team 503-323-6700. This notice gives PGE an opportunity to determine whether changes are needed to its distribution facilities. See PGE Tariff [Rule C, Conditions Governing Consumer Attachment to Facilities](#).

PGE provides service conductors and transformers to accommodate existing or calculated demand load. New and existing customer service equipment may have a larger load rating than the calculated or existing demand. PGE may provide a placard that indicates the need to verify service source capacity before adding load, and to require that the placard be installed on the customer's service termination equipment.

1.2.4 Maximum Available Fault Current

The customer must furnish service equipment that is capable of interrupting and withstanding the maximum available fault current. The maximum available fault current depends on the characteristics of the service being provided. Upon request, PGE will provide the calculated maximum available fault current at the PGE point of delivery.

Table 1. Maximum Fault Current

Type of Service	Minimum Fault Current
Single-family residence, underground service, 0 to 400 A	22,000 A
Single-family residence, overhead service, 200 A or lower	10,000 A*
Single-family residence, overhead service, 201 A to 400 A	22,000 A
Single-family residence, 400 A and higher	Calculated upon request
Commercial, Industrial, Agricultural, and Multiple-Family Services	Calculated upon request
Network Services	Calculated upon request. Fault current levels are significantly higher.

* Where conditions such as short-service lengths or larger service transformers exist, the maximum available fault current may exceed 10,000 A.

1.2.5 Work Activity Near High-Voltage Overhead Power Lines Over 600 V

IMPORTANT: State law and Federal OSHA rules forbid non-qualified persons from entering, working, or otherwise moving equipment such as ropes, booms, poles, stages, or scaffolding within 10' of a high-voltage overhead power line. Some lines require greater clearance.

If work needs to be done near high-voltage overhead lines, the following requirements apply:

- The party responsible for conducting the work must notify PGE's Service Coordination team 503-323-6700 of the intended work activity at least five working days before the work is to be done. More lead time may be required depending on the nature of the work.
- The responsible party and PGE must agree to a mutually satisfactory method to accomplish the work activity safely.

1.2.6 Temporary Shutdown

A temporary shutdown of a customer's service may be required to safely maintain or upgrade PGE facilities. Temporary shutdowns will typically be scheduled for a time that is mutually convenient for the customer and PGE.

1.2.7 Power Factor

The current PGE Tariffs specify a charge for low-power factor for certain commercial and industrial customers. Low-power factor may cause inferior performance of the customer's electrical system. PGE recommends that the customer install corrective devices to make the most effective use of the electrical system. PGE can provide a copy of the Tariffs if the customer would like to determine potential savings during the design, or they can be accessed online at portlandgeneral.com. A second meter socket is not required to meter power factor.

1.2.8 Time-of-Use Metering

PGE's Tariffs may require time-of-use metering for certain commercial and industrial loads. Contact PGE Business Services team for special requirements.

Time-of-use metering is available as an option for residential customers. To discuss this option, call PGE's Service Coordination team 503-323-6700.

1.2.9 Call Before You Dig

IMPORTANT: Before you dig, call 8-1-1 or 800-332-2344 for the location of underground utilities; or visit callbeforeyoudig.org. In the Portland metro area, call 503-246-6699.

Oregon law requires a customer or excavator to call to determine the location of underground utilities two full working days (48 hours) before beginning excavation. The excavation must not be started until utility locations have been marked or the utilities have informed the excavator that they have no facilities in the area.

1.2.10 Power Quality

The characteristics of the customer's electrical equipment and devices must allow the PGE distribution system to operate efficiently without undue interference to PGE or to other customers. Whenever a customer's equipment has characteristics that cause undue interference with PGE service or to other customers, that customer must make changes in that equipment or provide—at their own expense—additional equipment to eliminate the interference. Where practical, PGE will furnish additional equipment in accordance with the present Tariffs.

PGE reserves the right to inspect and test any equipment connected to its **conductors** and to obtain any information necessary to determine the operational characteristics of that equipment. Before purchase, a customer must submit information to PGE regarding any equipment that might cause interference with service to other customers and/or require additional PGE facilities for its satisfactory operation.

For more information on power quality, call PGE at 503-736-5750 or send an email to TCC.Power.Quality@pgn.com.

1.2.11 Voltage Disturbances and Fluctuations

Electric service supplied by PGE may be subject to voltage disturbances that will not affect the performance of typical electrical equipment. However, these disturbances may result in the improper operation of voltage-sensitive equipment, such as computers or microprocessors. The customer must provide any power conditioning devices needed to obtain the quality of power necessary for optimum performance of voltage-sensitive equipment.

The customer may use additional facilities (such as a separate PGE transformer and a separate service) to minimize voltage fluctuations on secondary-voltage circuits for devices such as welders, induction heating equipment, and X-ray machines. If the operation of these types of equipment causes undue voltage fluctuations on PGE primary voltage lines, additional equipment (including a separate primary voltage line) may be required. Where practical, PGE will furnish additional equipment in accordance with the present tariff.

1.2.12 High-Frequency Equipment and Harmonic Distortion

The effects of the design and operation of high-frequency equipment—such as electronic heating systems, spark discharge devices, radio transmitting equipment, and equipment that generates harmonics, such as an induction furnace—must not create disturbances on the PGE electrical system that interfere with any other customer's proper operation of communication, radio, television, remote control, or other equipment.

Devices that can produce harmonic distortion—such as adjustable speed drives, electronic ballasts for fluorescent lighting, and switching power supplies for computers and electric vehicles—must be filtered so that the harmonic distortion that results from these devices is kept within the limits specified in IEEE 519-2022, Section 5. Compliance with this requirement is determined by PGE measurement at the point of change of ownership between PGE and the

customer, otherwise known as the point of delivery. PGE limits the maximum voltage distortion present to 5% for any one frequency and the total harmonic distortion (THD) to 8%.

1.3 Motors

To discuss the addition of a new motor to an existing service, call PGE's Service Coordination team 503-323-6700.

1.3.1 Protection

To assure adequate safety for personnel and to prevent damage to equipment, the customer must provide and maintain code-approved protective devices to protect all motors against overloading, short circuits, ground faults, and low voltage.

The customer is responsible for protecting three-phase motors against single-phasing system events. Primary single phasing occurs when at least one of the primary sides of the transformer phases is open and no longer delivers electricity. Single phasing may occur for numerous reasons, and it cannot be fully eliminated. However, risk to the customer's equipment may be mitigated by protection schemes as determined by the customer.

1.3.2 Starting

Motors may require reduced-voltage starters or adjustable-speed drives if either of the following is the case:

- The motor is rated in excess of 10 horsepower (hp) and normally starts more than four times an hour, or
- A motor is rated in excess of 35 hp.

PGE will furnish information regarding permitted starting currents. The starting currents permitted depend on the following:

- Frequency of motor starting.
- The size and character of a customer's load.
- The design of the PGE distribution system in the area.

Permitted starting currents will generally be equivalent to the maximum starting current, which—in the opinion of PGE—can be supplied without undue interference with service to other customers.

PGE will not normally invest in additional facilities to reduce voltage fluctuations on an individual customer's service caused by the starting of that customer's motors until the customer first installs all approved reduced-voltage starters. If the customer still requires additional facilities, these facilities will be installed at the customer's expense.

1.3.3 Adjustable-Speed Drive Controller

With prior permission from PGE, irrigation pumps or other equipment featuring an adjustable-speed drive (ASD) controller that normally require three-phase service, may be served with single-phase service. This single-phase service is limited to a direct-connect, safety-socket meter base that is rated 200 A or lower, 120/240 V or 240/480 V. An ASD controller must meet harmonic distortion requirements described in [Section 1.2.12](#).

When installing an ASD controller, contact PGE's Service Coordination team 503-323-6700 to determine whether the controller is affected by pole-top reclosers.

1.4 Customer Generation (Generators, Solar, Wind, and Other Qualifying Resources)

IMPORTANT: Contact PGE before installing any generation equipment.

This section provides basic information about PGE's standards and requirements for interconnecting, operating, and maintaining customer-owned and installed generation sources in parallel with PGE's electric distribution system. Customer generation does not include emergency or standby generation.

PGE's *Distribution Interconnection Handbook* (<https://portlandgeneral.com/renewable-installers/interconnection-qualifications>) provides a much more comprehensive guide to PGE's requirements for applications; technical screenings and studies; the commissioning process, and other information.

1.4.1 Responsibilities

1.4.1.1 PGE Responsibilities

- PGE will review customer applications and conduct any studies needed to determine and identify any customer costs required to upgrade PGE's system to support the proposed customer generation.
- PGE will provide and install meters, if necessary.

1.4.1.2 Customer Responsibilities

Customers are responsible for obtaining PGE approval for customer generation installations before installation. Failure to obtain PGE approval before installation may result in delays and unanticipated costs to the customer for any necessary corrections.

Whenever a new customer-owned production system is installed at an existing service, the equipment and working clearances must meet current requirements and working clearances. See [Section 3.6](#) for requirements around upgrades to an existing service. This means that when installing a production system (solar, battery, etc.), customers may need to modify their service (meter enclosure, electrical room, meter room, etc.) to meet current requirements. **Current meter socket requirements can be found in [Table 5](#).**

Projects that require design work (like a transformer or conductor upgrade) have a lead time for design requests.

Customers must provide PGE 24/7 access. If gates or doors prevent entry, the customer must provide a lockbox with keyed access. PGE's key requirements are detailed in [Section 13.3](#).

- If upgrades must be made to PGE's infrastructure to accommodate a customer-owned generation source, the customer is responsible for the cost of the upgrade identified during the review.
- Customer equipment must comply with PGE requirements, as well as any other applicable codes, standards, statutes, administrative rules, tariffs, or rate schedules that may apply to the customer's interconnection.
- Customers are responsible for any required maintenance to their system.
- Customer-owned renewable generation facilities and associated equipment cannot be located on PGE poles, meters, or other PGE equipment.
- Customers are responsible for placarding customer-owned generation equipment (see [Section 3.10.8](#)).

1.4.2 Disconnect Switch Requirements

When customer-owned equipment is required to have a disconnect, the following requirements apply:

- The switch must be located within 10' of the PGE meter, in direct line of sight. Any variance from this requirement must be approved by PGE.
 - If PGE approves a variance, customers must procure a red phenolic map with white lettering that includes the location of:
 - ♦ The utility meter
 - ♦ The AC disconnect
 - ♦ Locations and orientations of the solar panel, and
 - ♦ A north compass. See [Section 3.10.8](#) for complete labeling requirements.
- The disconnect switch must be accessible 24 hours a day. The property owner must remove any hindrance (such as siding, caulking, enclosures, and landscaping) to allow unrestricted access. Fences must have an unlocked gate or PGE-approved lock allowing for unrestricted PGE access.

City and municipal requirements may require additional modes of disconnection. When a site requires more than one disconnect switch, PGE will require additional labels (see [Section 3.10.8](#)).

1.4.3 Emergency or Standby Generator

Any permanently installed emergency or standby generator must be connected to the customer's wiring system using a permanently installed, open-transition ("break-before-make") transfer switch intended for that purpose. The transfer switch must be used to disconnect all ungrounded conductors connected to the PGE system **before** connecting the generator to the customer's electrical system. The transfer switch must be designed and installed to prevent connection of the generator to the PGE system during any mode of operation.

To use a closed transition ("make-before-break") transfer switch, you must notify PGE before installation for review.

Customers **must** comply with the following requirements to prevent an accident:

- A portable generator may be connected to a permanent-wiring system only if the interconnection uses a permanently installed transfer switch. Failure to use such a switch can produce a hazardous situation for PGE or other service personnel.
- Electrical inspectors from the local jurisdiction must approve all transfer switches and/or transfer operating schemes.

1.4.4 Parallel Generation

IMPORTANT: Contact PGE before installing any parallel generation equipment. For information on parallel generation equipment call PGE at 503-464-8100.

Parallel generation is defined as the parallel production of electrical energy by customers or consumers where their sources of generation connect with the PGE system for distribution. Such sources, when customer-owned, may provide all or a part of a customer's requirements, or the customer may sell directly to PGE all or part of the output. Customer-owned sources include wind turbines, wheels, steam turbines, solar conversion, and geothermal devices. PGE will oversee each proposal for parallel generation on an individual basis and a special contract between the customer and PGE is required.

PGE must review proposed generation facility designs and approve operation of the customer's parallel generation system. PGE will also designate the metering type and location, and PGE will determine the method of interconnection between the customer system and the PGE system.

All parallel generation with production capabilities that will affect the service conductors by more than 30 A requires a lockable disconnect switch located within 10' of the interconnection meter (unless another location has been approved by PGE). This disconnect switch must be accessible 24 hours a day.

1.4.5 Cogeneration

Cogeneration is defined as the joint production of electric energy and useful thermal energy in a combined process. It typically includes a gas turbine or diesel-driven generator with waste heat recovery and a steam or back-pressure turbine. PGE will oversee each proposal for cogeneration on an individual basis by means of a special contract between the customer and PGE.

PGE must review proposed cogeneration facility designs and approve the operation of the customer's cogeneration system. PGE will also designate the metering location, type of metering, and the method of interconnection between the customer system and the PGE system.

Before installing any cogeneration equipment, contact PGE's Small Power Production group by calling 503-464-8300 or by sending an email to Small.PowerProduction@pgn.com.

1.4.6 Net Metering



WARNING

To ensure safety, customer-owned equipment cannot be turned on until the following occur:

- PGE reviews and approves the proposed interconnection.
- The system passes the local jurisdiction's electric inspection.
- PGE conducts its on-site inspection and gives permission to turn the system on.

PGE customers interested in adding solar, wind, or other renewable generation to a home or business must participate in PGE's net metering program. You can find information on this program at <https://portlandgeneral.com/net-metering-enrolled>. If you have any questions about net metering, call PGE at 503-464-8100 or send an email to NetMetering@pgn.com.

To ensure the safety and reliability of PGE equipment and personnel, all customers must submit a net metering application for PGE's review using the PowerClerk portal before purchasing and installing a system (<https://pgenm.powerclerk.com>). Customers applying for a new electric service must also submit a separate request for electric service in PowerPartner (<https://portlandgeneral.force.com/powerpartner>).

1.4.6.1 General Requirements

- Residential customers may have a generating nameplate capacity of 50 kW DC or smaller; and an export capacity of 25 kW AC or less. Commercial customers may have a nameplate capacity of 2 MW or smaller.
- Renewable energy must offset a customer load associated with the new or existing service. This program does not allow the sale of electricity by the customer.
- Net metering systems with production capabilities that will affect the service conductors by more than 30 A require a lockable disconnect switch with a visible open located within 10' of the meter. Any variance from these requirements must be approved by PGE.

- If a variance is approved, a warning label and map are required. Customers must procure a red phenolic map with white lettering that includes the location of:
 - ♦ The utility meter,
 - ♦ The AC disconnect,
 - ♦ Locations and orientations of the solar panel, and
 - ♦ A north compass
- The installed meter will be used for revenue or billing purposes, and it must be located at the point of interconnection.
- A clearly legible, hard-plastic (phenolic) warning label is required (see [Section 3.10.8](#) for labeling requirements).
- PGE requires a main disconnect in front of all meter banks that contain more than six meters. The main disconnect must be in the same location as the meter bank (as shown in [Figure 69](#)).
- A written agreement with PGE and proof of a passed electrical inspection by the local jurisdiction is required before PGE will schedule an inspection, reprogram or replace the meter to be bidirectional, and give permission to operate the renewable.
- PGE's bidirectional meter must be a minimum of 36" from the customer's equipment (inverter, production meter, etc.), as shown in [Figure 7](#). Any new application and system expansion must meet this requirement. Comprehensive meter clearances are outlined in [Section 5](#), [Table 13](#).

1.4.6.2 Bidirectional Meter and Billing

A bidirectional meter is provided free of charge to net metering customers when PGE makes its final inspection for the renewable. Information on the meter and customer's billing is available online at <https://portlandgeneral.com/net-metering-enrolled>.

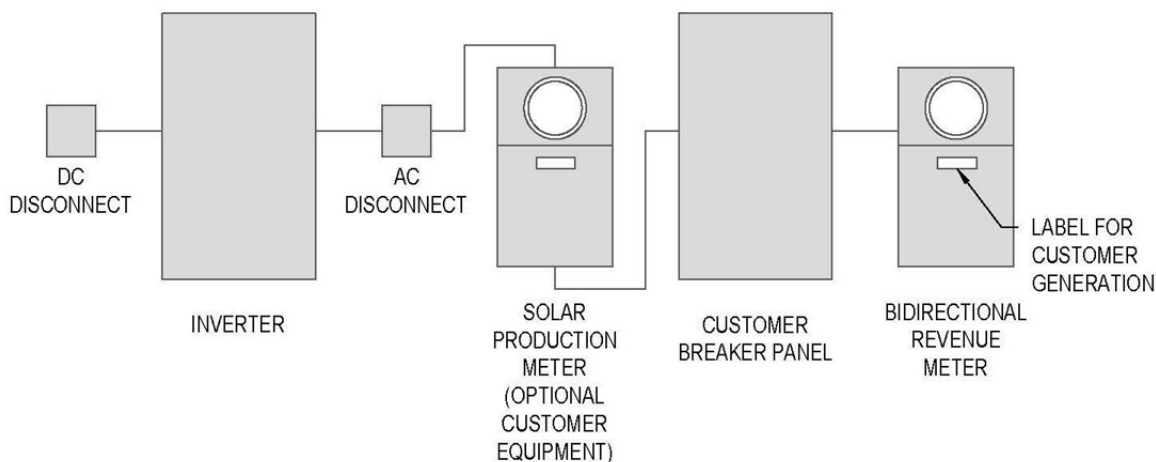


Figure 5. Typical Metering for Residential Net Metering (STD-D-6120)

1.4.7 Small Power Production

Small power production is a parallel generation arrangement for customer-owned facilities that:

- Have generation capacities of 10 MW or lower, and
- Meet the qualifying facility (QF) requirements outlined by the Federal Energy Regulatory Commission (FERC).

PGE is obligated to undertake a robust and lengthy review process. Small power producers looking to submit an interconnection request can do so online. For additional information and requirements, consult the [How Independent Producers Can Sell Power to PGE](#) page at [portlandgeneral.com](#) and PGE's Distribution Interconnection Handbook (<https://portlandgeneral.com/renewable-installers/interconnection-qualifications>).

Some installations require metering on the primary side. PGE will designate the metering location and type of metering. Consult PGE before designing the power production system.

Consult PGE's Small Power Production group by calling PGE at 503-464-8300 or sending an email to Small.PowerProduction@pgn.com.

1.4.8 Solar Payment Option

IMPORTANT: This pilot program closed in 2015, and new enrollments are not possible.

Existing SPO customers are eligible to remain in the program for the 15-year life of their agreement. SPO systems are not eligible for any type of upgrades, battery or renewable.

Solar payment option (SPO) power production—also known as the Oregon feed-in tariff—is a parallel generation arrangement for customer-owned solar electric facilities with a maximum dc nameplate of 100 kW (small- and medium-scale systems) or a dc nameplate of over 100 kW to a maximum of 500 kW (large-scale system).

Like net metering, SPO generation first offsets the customer's load before exporting excess generation to the grid. Electricity generated in excess of the customer's load passes through a PGE-owned bidirectional meter provided free of charge. Unlike net metering, a second PGE-owned bidirectional generation meter—a solar production meter—is also installed. The solar production meter measures all solar generation and is subject to a monthly service charge. The solar production meter socket must be wired the same as other PGE meter sockets, and the inverter conductors must be terminated in the lower section of the meter. [Figure 6](#) shows a typical residential metering arrangement for the solar payment option.

The solar production meter must be installed outside, within 10' of the other PGE-owned meter. Contact PGE for further information. A warning label must be mounted on, or adjacent to, each meter base.

Existing customers interested in transferring an active agreement to a new home must contact PGE's Solar Payment Option team. Transfer documentation and proof of liability insurance is required before interconnection. If you have any questions, call PGE at 503-464-8100 or send an email to the Solar Payment Option team at solar@pgn.com.

A written agreement with PGE is required before interconnection. For more information, see the PGE Tariffs at portlandgeneral.com.

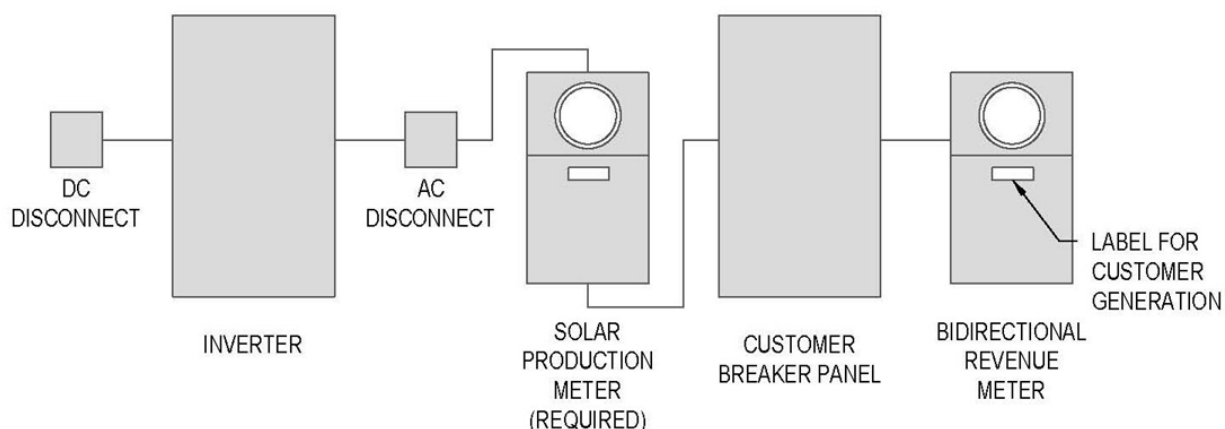


Figure 6. Typical Metering for Residential Solar Payment Option (STD-D-6120)

1.5 Customer-owned Storage–Batteries

PGE customers interested in adding energy storage systems (such as batteries) may do so to offset their energy use or serve as a backup energy system. Customer-owned storage may not discharge to PGE unless approved by PGE. Customers interested in installing a storage-only system or a storage-plus-renewable system (like a battery-plus-solar system) must submit an interconnection application in using the PowerClerk portal to ensure the safety and reliability of PGE equipment and personnel.

Standalone storage is not a qualifying renewable for the net metering program; however, applications for energy storage systems are reviewed by the Net Metering team. Standalone storage can have a maximum continuous output rating of 25 kW AC without an export capacity limiting device, or the standalone storage can have a capacity of 50kW AC or less with an export capacity limiting device to 25 kW AC. Contact PGE’s Interconnection team with questions by sending an email to NetMetering@pgn.com or calling PGE at 503-464-8100.

Commercial customers applying for systems greater than 25 kW must apply online via the Small Power Producers PowerClerk portal (<https://pgenm.powerclerk.com>). PGE’s Small Power Production group is available for consultation via email at Small.PowerProduction@pgn.com or by calling PGE at 503 464-8300.

1.5.1 Standalone Storage Requirements

Residential customers may install an energy storage system with a maximum continuous output rating of 25 kW AC without an export capacity limiting device, or the standalone storage can have a capacity of 50kW AC or less with an export capacity limiting device to 25 kW AC or smaller. Systems greater than 25 kW are not allowed on residential services.

Commercial customers may install a storage system 25 kW and greater by applying online via the Small Power Producers PowerClerk portal (<https://pgenm.powerclerk.com>).

Storage systems greater than 7.2 kW require a lockable disconnect switch with a visible open located within 10' of the meter. Storage plus renewable systems greater than 7.2 kW also require a lockable disconnect switch with a visible open located within 10' of the meter.

Customers are responsible for placarding customer-owned generation equipment (see [Section 3.10.8](#)).

A written agreement with PGE and proof of a passed municipal electrical inspection is required before PGE will give permission to operate the renewable.

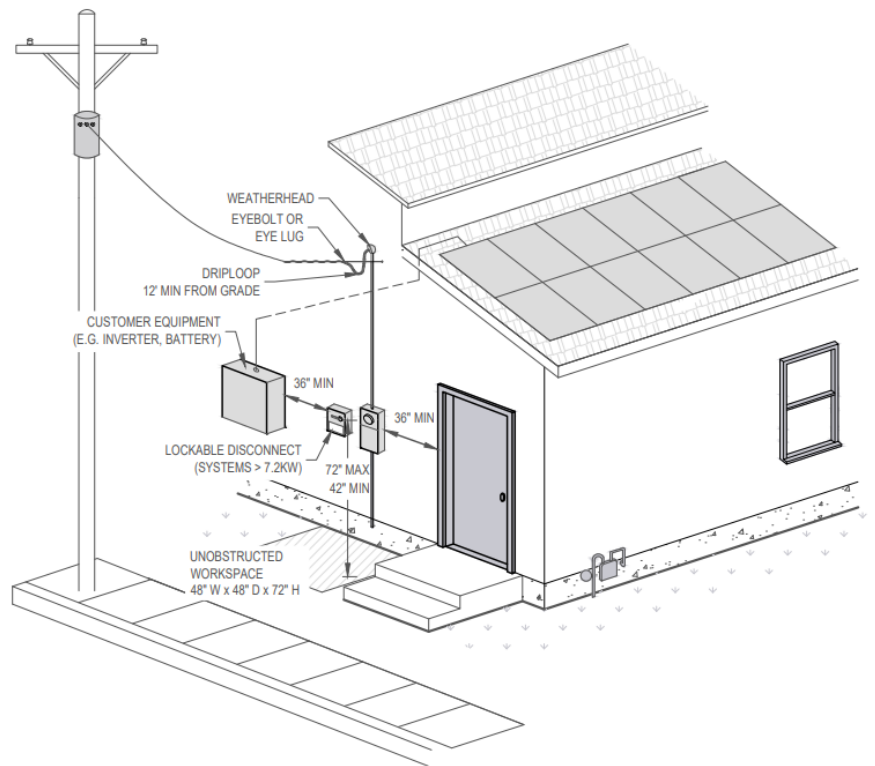


Figure 7. Meter Clearances from Customer-Owned Renewable and Storage Equipment (STD-D-2226B)

2 Permits and Applications

Topics in this Section

- [Codes and Ordinances](#)
- [Emergency Connects or Reconnects](#)
- [Permits, Rights-of-Way, and Easements](#)
- [Pre-Design Support](#)
- [Applying for Service](#)
- [Design Considerations](#)
- [Construction Considerations](#)
- [Streetlights](#)
- [Area Lighting](#)

2.1 Codes and Ordinances

The construction of new or upgraded services must conform to PGE requirements and to the applicable provisions of the following:

- National Electrical Code (NEC)
- National Electrical Safety Code (NESC)
- State rules and regulations
- City and county ordinances and codes
- Rules on file with or issued by regulators
- Occupational Safety and Health Administration (OSHA) rules (during construction and maintenance)

In case of conflict, the appropriate tariff, code, or ordinance supersedes the interpretation offered in this book. Always refer to the most recent publication of any code, ordinance, or tariff.

2.2 Emergency Connects or Reconnects

Requests for an emergency connect or reconnect can be made by an electrical contractor during emergency conditions, such as:

- A tree limb or storm damages a customer's service entrance equipment, or
- A farmer's irrigation equipment is damaged and water pumping service is needed immediately.

NOTE: For scheduled work requiring a permit, PGE generally does not accept the *Request to Energize* form and instead requires the Authority Having Jurisdiction (AHJ) to inspect the service before PGE performs its inspection and reconnection.

Shortly after an emergency condition, PGE will accept the *Request to Energize an Electrical Installation* form, available on the State of Oregon Building Code Division website (<https://www.oregon.gov/bcd/Formslibrary/0948.pdf>). The request must be signed by a supervising electrician and submitted to PGE's Service Coordination team, along with a copy of the temporary electrical permit, if required. The electrician must also provide a copy of the request to the customer and inspecting authority.

IMPORTANT: PGE may refuse to connect or reconnect the service if it is deemed unsafe.

For information on emergency reconnects between 7:30 am and 4:30 pm, call PGE's Service Coordination team at 503-323-6700. To call for an emergency connect before 7:30 or after 4:30pm, call 503-646-7777.

2.2.1 Permits, Rights-of-Way, and Easements

The customer is responsible—without cost to PGE—for all permits, rights-of-way, and easements required for the installation and maintenance of the electrical facilities that serve the customer.

On private property, an easement is required for the placement of electrical facilities. Electrical facilities include poles, guy wires, anchors, overhead and underground conductors, transformers, vaults, junction boxes, and pedestals.

For work in the road right-of-way, a permit from the local jurisdiction is required before such work may be performed. Permits may also be required if the electrical facilities cross public property, railroad tracks, ODOT-managed highways, parks, or state/federal land.

2.2.2 PGE Street-Operating Permit

Only PGE-approved excavation contractors are allowed to work under a PGE street-operating permit. Contact your PGE Design Project Manager to verify excavator requirements and confirm that your excavator is approved. Customers must ensure the excavator is approved at the time of excavation.

The following steps are required when operating under a PGE street-operating permit:

1. PGE acquires the permit and provides a copy to the contractor.
2. The contractor notifies the local jurisdiction before work is to begin according to the permit terms and conditions. Jurisdictions within the PGE service territory have varied requirements regarding the amount of advance time needed to provide notification.
3. A hard copy of the permit must always be on site during construction.
4. PGE must inspect all PGE trenches and conduits before backfilling.
5. Upon completion, the contractor submits a post-construction notification to the jurisdiction.

2.3 Pre-Design Support

NOTE: Detailed step-by-step timelines and project information are available for commercial projects and subdivision backbones in the *Commercial Guide* and *Subdivision Construction Guide*, respectively, at portlandgeneral.com/esr.

Creating a development partnership between your project team and PGE at the beginning of a project is critical to the successful and timely delivery of electrical service. New and existing services require extensive planning for utility facilities, utility conflicts, safety clearances, and adherence to jurisdictional requirements and/or right-of-way provisions. By contacting PGE early—before all design documents are finalized—we can help your design team develop an economical and effective option for your site and avoid costly redesigns.

The pre-design partnership will involve:

- Discussion of overhead and/or underground service options.
- Evaluating possible meter locations based on PGE requirements and site-specific clearances.
- Discussion of any unique clearances and utility conflicts.
- Understanding solar, battery, EV, and other green energy goals.
- Consideration of area lighting or streetlighting requirements.

To initiate the discussion, submit a request for service using PGE's PowerPartner portal (<https://portlandgeneral.force.com/powerpartner/s/login>).

2.4 Applying for Service

To apply for service, the customer must submit a request for service on PGE's PowerPartner portal (<https://portlandgeneral.force.com/powerpartner/s/login>). PGE will contact you within five business days to discuss your project.

IMPORTANT: If the local jurisdiction requires streetlights for your project, make note of this in your request for service. If this is not noted on the original request or the requirement is identified later, you must contact PGE's Service Coordination team 503-323-6700 and create a new work order for a Streetlight Project Manager to be assigned to the project.

PGE's design timeline depends on submission of accurate load information, required pre-design documents and notification if things change with the project (see [Appendix A](#)). Commercial customers must provide all the required information, including voltage, service size, connected load, square footage of new construction, the size of the largest motor, any electric vehicle charging stations, and any other requested information. A more detailed list of required information is available in PGE's [Commercial Guide](#).

PGE needs the pre-design information to develop the design, assess the suitability of proposed utility locations, and verify safety clearances. Once all complete pre-design documents are received, PGE will provide the customer with a design commitment date. Dates vary depending

on the type of project (residential, small commercial, large commercial, multi-use), job queue, weather, and may be up to 12 weeks or more in the future.

The customer will be held liable for any personal injury or property damage if adequate notice was not provided to PGE and/or PGE did not grant approval.

IMPORTANT: If changes are made in design documents, email the updated document(s) to PGE as soon as possible. Clearly detail on the drawing and/or email message the updates that have been made to the original. Some changes may require a complete re-design, on-site space considerations, and/or new equipment.

2.5 Design Considerations

NOTE: Detailed step-by-step timelines and project information are available for commercial projects and subdivision backbones in the *Commercial Guide* and *Subdivision Construction Guide*, respectively, at portlandgeneral.com/esr.

1. A PGE Design Project Manager (DPM) will respond within seven business days of receipt of your request for service. They will review the project and request any missing documents or other information needed to initiate a design. For many projects, the DPM will schedule a pre-design site visit.
 - a. If area lighting is desired or streetlights are required by the local jurisdiction, make note of this in the Request for Service Form on PGE's PowerPartner portal (<https://portlandgeneral.force.com/powerpartner/s/login>). If this is not noted on the original request or the requirement is identified later, customers must contact Service Coordination (503-323-6700) to create a new work order so that a streetlight project manager will be assigned to the project.
 - b. If the project site will include a battery, solar, or other renewable resources, a separate application, review, and approval is required. Application information is available at the [Generate Your Own Power](#) page at [PortlandGeneral.com](https://portlandgeneral.com).
2. PGE's design commitment date depends on the receipt of all necessary customer information and the amount of work in PGE's design queue. Commercial customers can obtain a list of required design documents in PGE's Commercial Guide. If the reviewing departments identify the need for additional documents, the amount of time it takes to obtain those documents is added to the timeline. Delays in receiving customer information are added to the design time, but not necessarily in a day-for-day ratio.
3. Your PGE DPM may send you a preliminary design, if applicable, and arrange a meeting with your design team and PGE internal resources to resolve issues.

4. Once PGE provides a final approved Job Sketch, the customer has six months to return the signed line extension cost agreement (LECA), pay any costs due, and build and energize the service. After six months, PGE must review the LECA and the design (and revise if necessary) before a project can move to the pre-construction stage. If changes are made after the design has been approved by the customer and gone through PGE's approval process, a redesign fee may apply at the time of review.

IMPORTANT: PGE's Job Sketch is the only approved plan for PGE-owned facilities.

Electrical or civil plan sheets from the customer's plan set that have been approved by the local jurisdiction's permitting authorities do not override PGE's drawing. The customer is responsible for reconciling any differences between the PGE-approved plan sheet(s) and the public works and building plans.

2.6 Construction Considerations

Construction lead times depend upon the timing of the following:

- Customer's return of the signed LECA and payment of any costs due.
- PGE will purchase materials upon receipt of the customer's LECA and any required payment. PGE can experience long lead times for many materials especially when there are global supply chain challenges. Some items can have lead times of twelve-months or longer.
- For underground services greater than 400 A, a pre-construction site visit by a PGE Field Construction Coordinator may be required.
- The project meeting the requirements of local ordinances and/or state laws. This may include approval of the electrical installation by the applicable electrical inspection authority. PGE will approve the service only after all service requirements have been met. This includes all the requirements referenced in this section of the *ESR* book, as well as the requirements in the rest of the book and in other PGE standards.
- Passing all required PGE inspections. Some projects have one inspection, while more complex, underground services may have a pre-construction conference, multiple inspections, and requests for documents.

NOTE: Underground services will require a trench and conduit inspection before backfilling.

- Passing the final inspection. PGE will inspect and approve the service only after the approval of the Authority Having Jurisdiction, and all service requirements have been met including those detailed in the *ESR* book, as well as any requirements in PGE's standards that are applicable to the site. Once a PGE service inspector conducts this inspection and the site passes inspection, a PGE meterman may be scheduled to install the meter. After installation of the meter, a PGE crew will install the wire and energize the service.

2.7 Streetlights

If the local jurisdiction requires streetlights for your project, make note of this in your request for service. If this is not noted on the original request or the requirement is identified later, you must contact PGE’s Service Coordination team (503-323-6700) and create a new work order for a Streetlight Project Manager to be assigned to the project. For more information, see [Section 14](#).

While PGE offers three options for streetlight facilities under our tariff, local jurisdictions determine which option is to be installed. Before PGE can start the design, the customer must provide the PGE Streetlighting project manager with a streetlight design layout stamped Approved by the appropriate local jurisdiction. The layout must include complete streetlight design details, including pole and luminaire specifications.

NOTE: Streetlight materials are ordered for each project and have long lead times, anywhere between eight weeks and six months. For Option A projects, material lead time are significant; contact the Streetlighting Project Manager as soon as possible so PGE can promptly order the project’s materials.

2.8 Area Lighting

Customers interested in illuminating perimeters, parking lots, or other locations can request PGE owned and maintained area lighting. Contact the Service Coordination team (503-323-6700) to start a work order and discuss the costs and design requirements (if any) with a PGE lighting project manager.

3 Services

Topics in this Section

- [Types and Sizes of Service Furnished](#)
- [Load Requirements](#)
- [Services to Mixed-Use Facilities \(Residential and Commercial\)](#)
- [Connecting and Disconnecting New Services](#)
- [Connecting and Disconnecting to an Existing Service](#)
- [Upgrade to an Existing Service](#)
- [Theft of Service or Unmetered Electric Service](#)
- [Relocation of Services and Facilities](#)
- [Point of Delivery](#)
- [Meter Installations](#)
- [Customer-Owned Equipment](#)

3.1 Types and Sizes of Service Furnished

For low-voltage services, services less than 600 V, the available electric service is 60 hertz (Hz), alternating current (AC), single-phase or three-phase (see [Section 3.2](#)). The nominal secondary voltages and maximum allowable services are listed in [Table 2](#) and [Table 3](#).

All services are limited to the maximum available transformer size that can be provided on the PGE system. Even so, some services listed in [Table 2](#) and [Table 3](#) exceed what PGE can provide and will require the customer to placard their service. Consult PGE for more information.

Customers interested in medium-voltage service (services 600 V to 35 kV) must consult PGE to confirm that they qualify. PGE's requirements are in the *Medium-Voltage Service Requirements* book found at portlandgeneral.com/esr.

3.1.1 Underground Service

An underground service uses conductors installed below ground, with PGE terminating the conductors inside a meter base or another ground-mounted box or vault.

The maximum allowable service size available at each voltage depends on the transformer configuration. For underground service requirements, see [Section 6](#).

IMPORTANT: PGE may not allow an overhead transformer to feed underground service. Consult a PGE Design Project Manager about your project.

Table 2. PGE Underground Service Types

Service Type	Secondary Voltage	Transformer Configuration	Maximum Allowable Service Size	
			Padmount Transformer	Overhead Transformer
Single-Phase	120/240	3-wire, grounded	800 A	800 A
	240/480	3-wire, grounded	100 A	400 A
Three-Phase	208Y/120	4-wire, grounded wye	3000 A	1600 A
	480Y/277	4-wire, grounded wye	3000 A	800 A
	120/240	4-wire, grounded delta	Consult PGE	1200 A
	240/480	4-wire, grounded delta	Consult PGE	600 A

3.1.2 Overhead Service

An overhead service is a service where PGE has terminated with overhead conductors. For example, overhead wires bring PGE's circuit to its connection with the customer's system at a weatherhead.

Table 3. PGE Overhead Service Types

Service Type	Secondary Voltage	Transformer Configuration	Maximum Allowable Service Size
Single-Phase	120/240	3-wire, grounded	800 A
	240/480	3-wire, grounded	400 A
Three-Phase	208Y/120	4-wire, grounded wye	1600 A
	480Y/277	4-wire, grounded wye	800 A
	120/240	4-wire, grounded delta	1200 A
	240/480	4-wire, grounded delta	600 A

3.2 Load Requirements

3.2.1 Single-Phase Service

Customers are responsible for providing PGE with accurate connected load information.

PGE limits the maximum single-phase, 120/240 V load served through one point of termination to the capacity of a 167 kVA, single-phase transformer.

Table 4. Single-Phase Service Load Requirements and Limitations

Equipment or Load	Requirements and Limitations
Loads > 2 kW	Must be operated at 208 V or higher.
Single-phase motors ≤ 5 horsepower (hp)	Motors larger than 5 hp require PGE approval. Single-phase motors larger than 3 hp may cause voltage dips that are objectionable to some customers.
Any single air conditioner ≤ 5 tons	Less than or equal to 5 tons.

Equipment or Load	Requirements and Limitations
Any single heat pump ≤ 5 tons	Less than or equal to 5 tons.
Electric heating, indoor or outdoor	No more than 48 A of load at 240 V when switched on or off.
Electric tank-style water heaters	No more than 48 A of load at 240 V when switched on or off.
Service rated > 320 A continuous	CT metering required (see Section 10.7). Customers requiring 400 A continuously cannot be served by a 400 A maximum (320 A continuous) meter base.
Excessive load for a single-phase service	PGE may require the customer to use three-phase service instead of single-phase service.

3.2.2 Three-Phase Service

Three-phase service will be provided upon request to residential and nonresidential customers in accordance with the current PGE Tariff. PGE provides the voltage supplied to a customer based on the customer's electrical needs and on the characteristics of the PGE distribution system in the area. PGE limits service at 208Y/120 V to a maximum demand of 500 kVA and 480Y/277 V to 2000 kVA. The customer must obtain a prior agreement from PGE for service to three-phase loads larger than 500 kVA at 208Y/120 V and 2000 kVA at 480Y/277 V.

- **Three-phase service over 200 A**
 - This service requires current transformer (CT) metering as described in [Section 10.5](#) or [Section 10.7](#).
- **Connection of single-phase loads to three-phase services**
 - On a 208Y/120 V or 480Y/277 V, three-phase service, all single-phase loads must be split evenly among the three phases.
 - On a 240/120 V, delta, three-phase service, single-phase loads (both 120 V and 240 V) must not utilize the high leg (wild leg). The exception is resistance heating equipment, which must be balanced across all three phases.
- **Three-phase, 480 V service**
 - This service may not be supplied where the total load is less than 50 kW except when:
 - ♦ The load consists of a single motor (such as for irrigation pumping) with nameplate rating of at least 20 hp, or
 - ♦ An existing 480 V transformer bank has capacity for the additional load.
- **Three-phase, 4-wire, grounded-delta service**
 - This service will not be supplied from underground primary systems. The high-leg (wild-leg), 4-wire deltas must be marked with UL listed orange electrical tape and be on the right side of the meter base or current transformer (CT) cabinet.
- **New three-phase, 3-wire service**
 - New three-phase, 3-wire service is not available from PGE. Conversion of an existing three-phase, 3-wire service is required when:
 - ♦ The customer adds to their existing load.
 - ♦ Electric work or repair is required in the meter base or meter socket.

- ♦ The meter base or meter socket is replaced.
- ♦ The service entrance conductors and/or the weatherhead is replaced.

3.3 Services to Mixed-Use Facilities (Residential and Commercial)

Services to mixed-use facilities with both residential and commercial customers are complex, and these services are not addressed in this *ESR* book. The *Commercial Guide* (found at portlandgeneral.com/esr) provides process specific information to support a partnership between customers with services 400A and greater, their project team, and PGE. Before plans are completed or electrical equipment is purchased, consult a PGE Design Project Manager for availability of service voltages, overhead or underground service options, transformer locations, and service entrance requirements. As part of PGE's design process, a PGE gear review is required for all services 400A and greater.

Where underground service is requested, the customer must provide sufficient space on their premises for the installation of PGE equipment and required clearances (see [Section 5.5.4](#)). This type of service may require a transformer pad and/or vault, or a Class A Vault.

3.4 Connecting and Disconnecting New Services

Only authorized PGE employees are permitted to make the permanent connection or disconnection of PGE electric service. In addition:

- Services must be inspected by the local jurisdiction before permanent connection by PGE.
- Services must not be energized without NEC-approved covers properly secured.
- For residential overhead services, the house siding must be installed before service will be provided.

3.5 Connecting and Disconnecting to an Existing Service

Customer upgrading an existing service may be required to modify their service equipment to meet current requirements; see [Section 3.6](#). Felling a tree, providing safe working clearances for roofing, painting, and siding, are not upgrades.

All requests for disconnection and reconnection must be scheduled with PGE's Service Coordination team 503-323-6700. Only authorized PGE employees are permitted to disconnect and reconnect any service on the PGE service side at the weatherhead. Electricians must not move the PGE service conductor.

Electricians may remove a residential 200A, self-contained meter after notifying PGE's Service Coordination team; however, electricians are prohibited from removing all other meters including common area meters, commercial meters, or any meter associated with a CT service.

IMPORTANT: PGE may not allow an overhead transformer to feed underground service. Consult a PGE Design Project Manager about your project.

When repairs or modifications are complete, electricians need to call for inspections. Services must not be jumpered before inspection by the local jurisdiction and permanent reconnection by PGE. The customer will be billed a charge according to the fee schedule at the time services were performed.

NOTE: If the customer requests the removal of a service conductor and the conductor is removed, the service no longer exists. If the customer later decides they want to re-install a service at the same location, this is considered a new service and must meet current PGE requirements.

3.6 Upgrade to an Existing Service

When an upgrade occurs to an existing service, PGE requires the service to meet current requirements, including working clearances. A service upgrade occurs when a service is being altered, modified, replaced, or updated, including in instances of service failure. Contact PGE's Service Coordination team to initiate a consultation **before the work is initiated** to understand the required upgrades.

A permit and inspection by the local code-enforcing agency and a PGE inspection are required before reconnection for the following:

- All services that have been disconnected longer than six months.
- Replacing outdated or unsafe equipment
- Increasing the amperage of a service like for a renovation, add-on, solar system, etc.
- Renovating a service for example going from a closed delta to a wye service.
- Relocating or replacing service equipment on a customer-owned structure.

If any upgrade is made to a PGE pole or customer-owned device located on a PGE pole, see [Section 3.10.2](#).

When an upgrade is made in an electrical room, the room must be retrofitted and/or brought up to the requirements as outlined in [Section 13](#).

3.7 Theft of Service or Unmetered Electric Service

Any unauthorized connections or wiring attached ahead of the meter that allow unmetered electric service—whether intentional or unintentional—must be immediately reported to the PGE Energy Recovery Unit. All calls will be treated in the strictest confidence and callers will remain anonymous.

The Energy Theft Hotline is 1-800-962-8184. The hotline is available 24 hours a day, 7 days a week.

3.8 Relocation of Services and Facilities

A fee may be charged if the customer requests or requires relocation of existing PGE facilities. For fees and additional information, see PGE’s Tariffs at portlandgeneral.com.

3.9 Point of Delivery

The point of delivery refers to the location where the PGE circuit connects to the customer’s system. PGE’s standard is to locate the point of delivery on the exterior of residential and commercial buildings, and written approval from PGE is required before the point of delivery can be located elsewhere. This aligns with industry best practices and the company’s obligation to build a safe, reliable, and cost-effective electric system.

For commercial and industrial customers, the point of delivery must be on the outside of the building, unless the customer demonstrates to PGE that no acceptable outdoor location exists. Service requests incorporating meter rooms must only be made when extenuating circumstances exist that make outdoor service equipment impractical or unfeasible. If PGE approves locating the point of delivery within the building, PGE will install service connections to the customer’s meter equipment at the main-floor or entry-floor level only. For more information, see [Section 13](#).

For residential customers, the point of delivery must be no more than 10' from the corner of the house closest to PGE power lines. PGE will determine the location of the customer’s meter equipment. Customer must contact PGE’s Service Coordination team at 503-323-6700 to schedule a site visit and obtain their meter equipment location. For sites with multiple residential services, location and grouping requirements are explained in [Section 8](#).

3.10 Meter Installations

IMPORTANT: PGE must approve meter locations.

PGE’s Tariffs and rate schedules require the delivery of each class and type of electrical service through one meter to one customer at one location.

The metering equipment location must be accessible to PGE employees 24 hours a day, 7 days a week, for reading, testing, and replacing meters, except where a separate service is used to minimize voltage fluctuations on secondary voltage circuits. For more information, see [Section 1.2.8](#).

Customer equipment can only be installed on the load side of PGE’s metering. Only main circuit breakers and blade-and-jaw (manual) disconnect switches are acceptable on the utility line side of a meter where required. Otherwise, all customer owned equipment, including load monitoring, control devices and current-limiting fuses must be downstream of utility meter(s). These devices are also not allowed inside of meter sockets or current transformer enclosures. PGE’s meter sockets must not be used as a junction box.

IMPORTANT: Customers are not authorized to relocate any meter belonging to PGE or interfere in any way with the meter or its connection. The person responsible for the electrical work must contact PGE for any work that involves relocation, rewiring, or new installation of a meter.

Licensed electricians are authorized to remove single-phase 120/240 V residential meters. The person responsible for electrical work must notify PGE'S Service Coordination team before re-energization. For more information, see [Section 3.10.3](#) and [Section 1.2.2.1](#).



With some types of meter sockets, removing the meter from the sockets does not de-energize the service. Before performing any electrical work, test the service with a voltmeter or other appropriate instrument to verify that it is de-energized. Death or serious injury may result if anyone performs work on an energized service.

3.10.1 Prohibited Meter Equipment Locations

For the safety of PGE personnel and customers, metering equipment (such as a meter base or CT cabinet) is prohibited in the following locations:

- Directly over a window well, stairway, ramp, or steps.
- In an area likely to be fenced. If a customer installs a fence or enclosure, they must—at their own expense—provide access acceptable to PGE or move the meter socket to a location identified by PGE.
- On the drive-through side of a commercial business. Existing services located within a drive-through are grandfathered unless the service is upgraded. Drive-through lanes will be subject to closure during working hours to accommodate PGE's maintenance needs.
- Mobile structures, such as a trailer, barge, crane, dredge, dragline, or any mobile pumping equipment; or on a floating dwelling unit (such as a houseboat).
- On poles owned by PGE.
- Places or surfaces where excessive vibration may interfere with the meter's operation.
- Any place where PGE determines that safety may be compromised.

3.10.2 Acceptable Meter Sockets

Acceptable meter sockets are manufactured in accordance with the current Electric Utility Service Equipment Requirement Committee (EUSERC) requirements, and ANSI C12 and UL 414 standards for safety meter sockets. Consult PGE for meter socket types. The customer must provide and install the following:

- Meter sockets complete with terminal lugs. Ringless-style meter sockets are not approved.
- Meter jaws.
- Manual link bypasses or safety sockets (when required).
- Sealing means for all sections.

When a meter socket is installed in a switchboard, it must be wired by the switchboard manufacturer in accordance with EUSERC Drawing 300: Section II.E–Meter Sockets, General. The load side of the meter must be wired to the breaker or disconnect position. PGE will not provide service to a switchboard that has been wired or altered by the customer.

When a blank position is required in a multi-meter pack, the meter socket wiring and meter socket must be removed, and a permanent manufacturer-provided plate must be affixed to the meter position. (If manufacturer-provided plates are not available, PGE will accept a minimum 12-gauge steel plate that meets applicable NEMA ratings.) The plate must be riveted or welded in place. To prevent water intrusion, a watertight seal (such as a seal weld) is required around equipment with a NEMA 3R rating.

3.10.2.1 Meter Socket Requirements

Mixed-use services may require a combination of line items below (see also [Section 3.3](#)).

Table 5. Meter Socket Requirements by Service Type and Gear Rating

Service Type	Gear Rating	Phase	Voltage	Metering Enclosure Requirements	ESR Section	Relevant EUSERC Drawings
Single residential	100 A, 200 A	1 Φ *	120/240	Direct-connect, ring-type.	7.2 , 7.3 , 9 (mobile home)	301, 301A, 301B, 307
	320 A continuous (400 A)**	1 Φ *	120/240	Direct-connect, ring-type safety socket with manual test bypass (outlined within 302B)	7.2 , 7.3	302A, 302B
Single meter commercial	Up to 200 A	1 Φ * 3 Φ	Up to 480	Direct-connect, ring-type safety socket with manual test bypass, or commercial meter pedestal.	10.3 , 10.6 (pedestal)	304, 305, 305A, 308
	320 A continuous (400 A)**	1 Φ *	120/240	Direct-connect, ring-type safety socket with manual test bypass	7.2 , 7.3	302A, 302B
	400 A to 800 A	1 Φ *	120/240 240/480	CT-rated, ring-type safety socket with test switch or CT-rated commercial meter pedestal.	10.7	310, 339
	Up to 800 A	3 Φ	Up to 480	Switchboard with CT-rated meter panel with test switch.	11.2	320, 322, 325, 326, 332, 354
		1 Φ *	120/240 240/480			
	Up to 3000 A	3 Φ	Up to 480			
Multi-family, up to six meters	Up to 600 A	1 Φ *	120/240 240/480	Combination termination enclosure and ring-type multi-meter pack(s).	8.2	342

Service Type	Gear Rating	Phase	Voltage	Metering Enclosure Requirements	ESR Section	Relevant EUSERC Drawings
Multi-family	Up to 800 A*	1Φ*	120/240 240/480	Ring-style multi-meter pack(s). Safety socket required for house meter only.	8.1 , 8.2	353
	Up to 1200 A	3Φ	208/120			
	Up to 3000 A	3Φ	208/120	Switchboard with ring-style multi-meter bank(s). Safety socket required for house meter only.	8.1 , 8.2 , 11.2	
Multi-meter, commercial	Up to 800 A*	1Φ*	120/240 240/480	Ring-style, safety-socket, multi-meter pack(s) with manual test bypass. May include CT-rated meter(s).	10.6	339, 353
	Up to 1200 A	3Φ	Up to 480			
Multi-meter, commercial	Up to 3000 A	3Φ	Up to 480	Switchboard with ring-style, safety-socket meter panel(s) with manual link bypass and/or CT-rated meter panel(s) with test switch(es).	11.2	306, 325, 326, 332, 354

* PGE limits the maximum single-phase 120/240 V load served through one point of termination to the capacity of a 167 kVA single-phase transformer.

** If a residential service is loaded above 320 A continuous (or if the gear is loaded above 320A for 3 hours or more), it is exceeding its rating (NFPA - NEC, 2023 Edition). When customers overload their service and the required amperage exceeds 320 A continuous, PGE will require the customer to upgrade the metering enclosure to a CT-rated meter panel with a test switch or face de-activation of the service.

3.10.3 Sealing Provisions

PGE places seals on meter rings and associated service equipment to prevent injury and/or tampering. Sealing provisions for associated service equipment must use a stud/wing nut assembly or a clip suitable for use with a seal.

IMPORTANT: All cabinets and gutters containing unmetered conductors—other than mainline switches required by applicable codes—must have sealing provisions.

Removable sections of conduit may only be installed when approved by PGE and must be sealed by PGE. Unmetered conductors passing through a service disconnect compartment for a mobile home service pedestal must be in conduit and arrangements must be made for sealing.

3.10.4 Mounting of Meter Sockets

Plumb sockets in all directions and securely mount them to a rigid surface. Securely fasten conductors to their respective terminals and arrange them in a manner that will not interfere with the installation of PGE conductors, the meter, the cover, or with the operation of manual link bypasses.

The unmetered service conductor and the metered service conductor must not be run in the same conduit, raceway, or gutter. This does not apply to minor temporary repair jobs if they are coordinated with PGE before the repair is performed.

Adequate protection must exist for meters that could be subject to physical damage. Barrier posts are required when metering equipment is exposed to vehicle traffic. For information on barrier posts, see [Table 14](#) or contact PGE’s Service Coordination team (503-323-6700).

For clearance information, see [Section 5.2.2](#), [Section 5.5.1.3](#), [Table 14](#), and [Section 5.6.3](#).

3.10.5 Access to the Meter Socket

The meter socket must be mounted in a way that does not hinder removing the meter and/or cover from the base. The meter base panel, ring, and/or lid must not be sealed or obstructed in any way other than those methods allowed under the National Electrical Code (NEC) and this ESR book. Any hindrance—including but not limited to siding, caulking, enclosures, and landscaping—must be removed by the property owner to allow unrestricted access to the meter base.

3.10.6 Meters In Corrosive Areas

Meter sockets and other metering cabinets installed in highly corrosive areas (such as dairy farms, fertilizer plants, or chemical plants) must be constructed of stainless steel.

3.10.7 Meter Socket Adapters

Customer-owned meter socket adapters and meter collars are not allowed on PGE services.

3.10.8 Required Labeling

Before power is connected, PGE requires that the equipment and services listed in this section be identified by a permanently engraved metal or hard-plastic label, with letters no less than 3/8" in height. Customers must also comply with any additional labels required by NEC and/or the jurisdiction that have authorities’ labeling requirements (e.g., AFC labels).

IMPORTANT: The customer must ensure that each meter socket is labeled correctly. PGE may check meter installations to verify the socket labels are correct. If a meter socket is incorrectly labeled, PGE may charge the customer a fee in accordance with the fee schedule in PGE’s Tariffs applicable at the time the services were performed.

3.10.8.1 Services with Customer Generation and Parallel Generation

Services with customer generation (such as solar and wind) and parallel generation (such as batteries) in addition to voltage and/or address labels, require a customer-owned generation label as shown in [Figure 8](#). The label must be **red with 3/8" white text** and placed on the meter enclosure.

**WARNING: CUSTOMER OWNED GENERATION.
TWO SOURCES MAY BE PRESENT**

Figure 8. Example of Customer and Parallel Generation Meter Enclosure Label

When a system requires an AC Disconnect, a label that reads "AC Disconnect" is required at the meter base.

Systems with multiple AC Disconnects, require labels at both the meter base and each of the AC disconnects. The labels must be red with 3/8" white text, as shown in [Figure 9](#). Labels at each AC disconnect must include the type of generation disconnected and the numerical position of the disconnect in the total sequence, as shown in [Figure 10](#). "X" represents the number of disconnects.

**ALL (X) DISCONNECTS
MUST BE THROWN TO
FULLY ISOLATE THE
SYSTEM FROM UTILITY.**

Figure 9. Example of Disconnects Label

**AC DISCONNECT
(PV)
1 OF X**

**AC DISCONNECT
(BATTERY)
2 OF X**

Figure 10. Example of Multiple AC Disconnect Labels

For systems with a variance, the site map must be placed at the meter base.

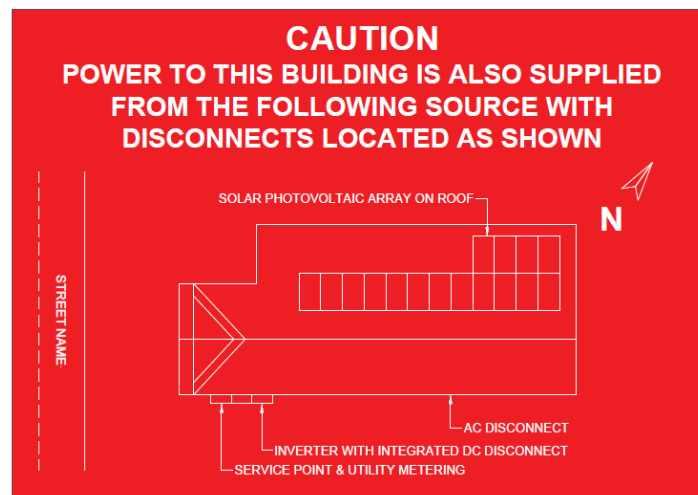


Figure 11. Example Label with System Variance

3.10.8.2 Voltage Labeling

Voltage labeling is required for:

- All 480 V services must be labelled **red with white lettering** as shown in [Figure 12](#).
- Buildings that have multiple services with different voltages require labeling of voltage on each termination section. Remote meter base installations with multiple voltages must have labeling of the voltage on the cabinet and the meter base.

3.10.8.3 Labeling for Multi-Tenant Installations

Each meter socket of a multi-socket installation must be labeled with the address and/or unit number as shown in [Figure 13](#). Sites that have multiple meters with different voltages require labeling on each termination section.

3.10.8.4 Structures with Multiple Services

Structures with multiple services must be labeled with the service name and voltage (Service #1-120/240 V and Service #2-277/480 V, for example) on the termination cabinet and transformer as shown in [Figure 12](#). The customer is responsible for ordering the labels and placing them on the termination section before the service is energized. The customer will provide PGE the label for the transformer and then PGE will affix it after installation of the transformer.

3.10.8.5 Services Exceeding What PGE Can Provide

Some services listed in [Table 2](#) and [Table 3](#) exceed what PGE can provide. In these cases, PGE requires the customer to placard their service as shown in [Figure 12](#). If a customer requests a service that exceeds what PGE can provide and PGE approves that service, the customer will be required to placard the service.

3.10.8.6 Front of Current Transformer (CT) Cabinets

On the front of each current transformer (CT) cabinet, place a label that reads: “Do Not Break Seal, No Fuses Inside,” as shown in [Figure 12](#).

3.10.8.7 Phase Labels

Termination equipment must be marked with the phases and neutral. Customers must match the rotation provided for the labels. Use manufacturer provided labels, or if unavailable, a professionally created permanent label.

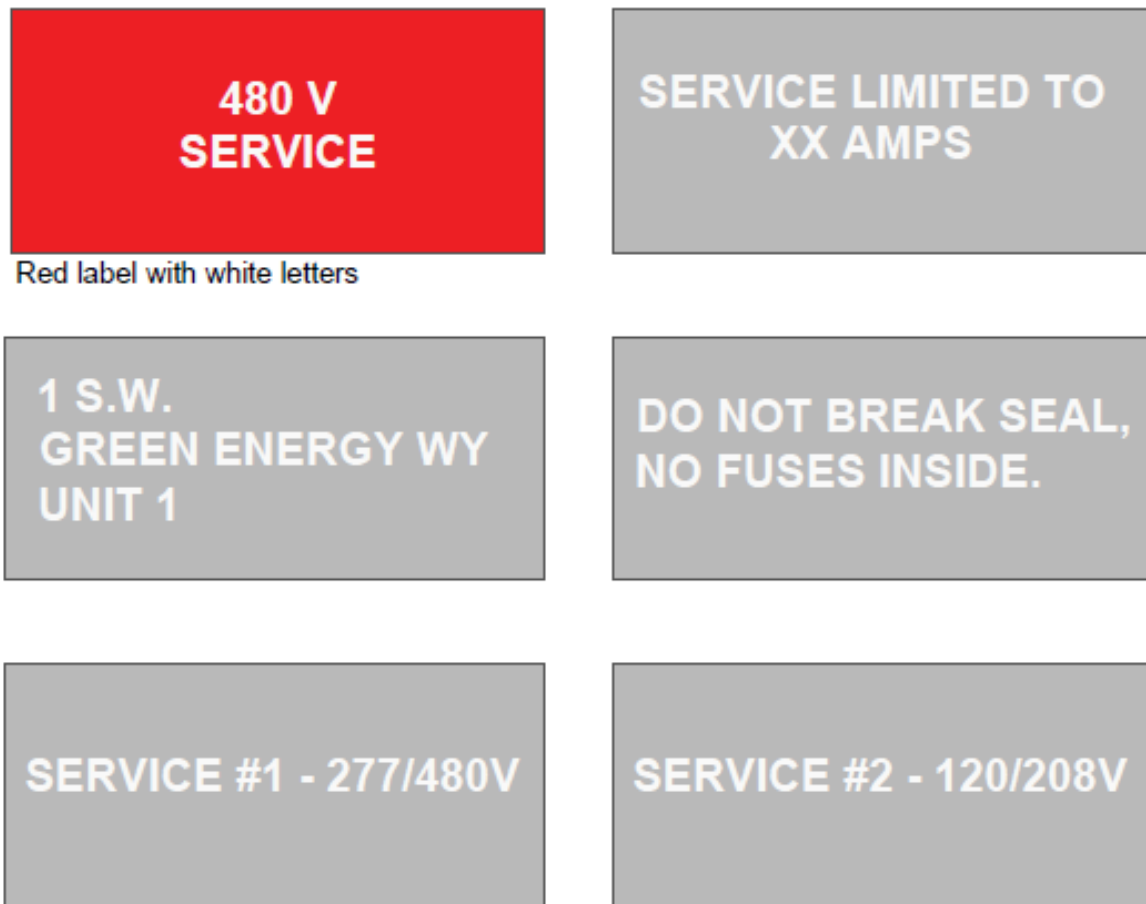


Figure 12. Example Labels (STD-D-6125)



Figure 13. Example Label with Unit Number

3.11 Customer-Owned Equipment

3.11.1 Enclosures that House both PGE and Customer-Owned Equipment

Where PGE and customer-owned devices are housed within a single enclosure (such as a switchboards or commercial pedestal), the utility sections must be separated from customer sections by metallic barriers. These sections must seal and lock separately.

3.11.2 Customer-Owned Equipment on PGE Poles

Customer-owned metering equipment, switching devices, conduits, conductors, or luminaires must not be mounted on a PGE pole. If customer-owned equipment was previously allowed on a PGE pole, that equipment must be removed when either of the following occurs:

- The customer's electrical equipment is modified in any way.
- The PGE pole is replaced, relocated, or removed.

3.11.3 Customer-Owned Poles/Posts and Guying

All customer-owned and customer-installed poles must meet PGE requirements for height, depth of setting, pole class, and guying for the life of the service. Customers will need to replace poles that fail an inspection.

- Customer-owned poles for permanent services must be new.
- Poles must be at least 24' long and be set no less than 5' below the ground level, with gravel backfill. For proper setting depths for poles longer than 24', contact PGE's Service Coordination team 503-323-6700.
 - Poles for residential services which do not cross an RV pad, road, or traffic area, may be reduced to a minimum length of 20 feet, with a minimum diameter of 5.5" at the top. Customer-owned poles and guying are shown in [Figure 74](#) in [Section 9.2.2](#).
- The size of the pole must be Class 6 or better. (Class 6 poles have a minimum top diameter and a 7" diameter at 6' from the butt.) Poles must be full-length. The pole must be pressure-treated or thermally treated by the manufacturer.
- All customer-owned poles must be guyed and anchored unless prior permission is obtained from PGE. Customer-supplied guys must meet the following requirements:
 - Guys must be minimum 5/16" galvanized steel cable. The guy must have a lead-to-height ratio of 1:2. The guy attachment must be at the height of the weatherhead.
 - Install a 3/8" eyebolt where the service attaches to the pole.
 - Allow 24" of cable to create the drip loop.

3.11.4 Customer-Owned Transformers Beyond the Point of Delivery

Any transformer furnished and owned by the customer beyond the point of delivery (POD) that is normally used for step-up or step-down of delivery voltages (such as 208 V stepped up to 480 V) must conform to the transformer types acceptable to PGE.

The use of grounded wye-delta transformers installed with the grounded wye towards the POD is allowed only with protection and relaying acceptable to PGE. This requirement reduces the chance a fault on the grounded-wye side of the customer's transformer will:

- Damage customer-owned transformers and/or electrical equipment.
- Cause improper operation of PGE protection equipment.
- Present a safety hazard for customer employees, PGE personnel, and the public.

4 Temporary Service

Topics in this Section

- [Basic Requirements](#)
- [Typical Structures for Temporary Service for Construction Work](#)
- [Construction Prerequisites for Temporary Service](#)
- [Overhead Temporary Service Equipment Requirements](#)
- [Underground Temporary Service Equipment Requirements](#)
- [Meter, Wire Connecting \(Conductor\) PGE Gold Temporary Service for Underground Residential Applications](#)

4.1 Basic Requirements

Temporary service is a means of supplying electricity to your site on a temporary basis. Typically, a temporary service provides power for the construction phase of a project while the site is being prepared for permanent service. Temporary service is provided either overhead or underground, depending on PGE's existing service to the area.

4.1.1 General Process for Obtaining a Temporary Service (Excluding Gold Temporary Service)

IMPORTANT: PGE will not connect and energize a temporary service if it fails to meet the requirement listed in this *ESR* book, lacks appropriate clearances, or is deemed unsafe by PGE.

The process of obtaining a temporary service typically includes the following steps:

1. Obtain an electrical permit for the meter base from the local jurisdiction.
2. Submit a temporary service request using PGE's PowerPartner portal (<https://portlandgeneral.force.com/powerpartner/s/login>), or contact PGE's Service Coordination team 503-323-6700 to request a site visit to identify an approved meter location (meter spot).
3. PGE visits the site and identifies an approved temporary meter location.
4. Prepare the job site and install the temporary service.

IMPORTANT: Before doing any digging, call the Oregon Utility Notification Center hotline 811 or 800-332-2344 to locate underground utilities.

5. For underground temporary services, before trenches and conduit are backfilled, schedule an inspection by calling PGE's Service Coordination team or your Field Construction Coordinator.
6. Customers must pass the inspections of the Authority Having Jurisdiction (AHJ) to verify compliance with local and/or state ordinances and laws.

7. Contact PGE's Service Coordination team to inform them that the site passed AHJ's inspection and is ready for the final PGE inspection of the temporary service.
8. PGE conducts its final inspection and later (if the site passes the inspection) PGE crews will be scheduled to connect and energize the service.

4.1.2 PGE Requirements for Identifying a Location for Temporary Service

IMPORTANT: Contact PGE's Service Coordination team 503-323-6700 to schedule a meter spot on all temporary services. PGE must confirm the location for all meters through an on-site visit before service can be established.

Common requirements for locating a meter include:

- A temporary service for construction work must be located so that the meter is protected from accidental damage.
- When practical, PGE will place the temporary service in a location that will be usable throughout the construction period. If a temporary service needs to be relocated, the customer must pay the relocation cost in accordance with the PGE schedule of charges.
- A temporary service must be located on the property being served.
 - If temporary power cannot be located on the property, then PGE may approve locating it in the public right of way with approval from the local jurisdiction. Any temporary service placed in a right of way must be located within a fenced or barricaded site that is not accessible to pedestrian traffic.

4.1.3 Customer Charges for Temporary Service

Charges vary depending on the type of service in the area and the applicable rate schedule in the Tariffs. PGE's Service Coordination team 503-323-6700 can explain current temporary service fees.

Residential single-family and qualifying multi-family dwellings in underground service areas may qualify for a PGE Gold Temporary Service (also known as an Enhanced Temporary Service). This is an unmetered service. See [Section 4.6](#) for additional details.

4.2 Typical Structures for Temporary Service for Construction Work

IMPORTANT: A service post for temporary construction is only allowed for up to 180 days.

Temporary service for construction work can be set up in one of four typical structures:

- A 6" x 6" overhead-service post in a non-road crossing.
- A 6" x 6" overhead-service post in a road or traffic crossing.
- An overhead-service pole is required when temporary construction power service is needed for more than 180 days.
- An underground service mounted on a 6" x 6" post.

4.3 Construction Prerequisites for Temporary Service

IMPORTANT: PGE has the right to refuse connection if height, strength, bracing, or other requirements in this section are not met.

Temporary structures must meet all the following requirements before PGE can provide service:

- Poles:
 - The pole and posts must be pressure-treated or thermally treated by the manufacturer with an American Wood Preservatives Association-approved standardized preservative.
 - All posts and poles must be one continuous piece.
 - The service pole (round) and service post (square) for the temporary service must be sound and in good condition for the duration of its use. The pole must be safe and suitable for supporting the tension of the service conductor.
 - To ensure strength, all lumber must be free of sucker knobs and have spike knots no larger than one-third of any face. Checks greater than 0.5" wide are not permitted. No visible wood decay is allowed.
 - To provide stability, use tamped, 3/4" minus crushed rock at a depth that equals the required depth of the pole or post.
- Clearances:
 - If a service conductor crosses a road or traffic area, the National Electrical Safety Code (NESC) requires a higher aboveground clearance. These crossings require the installation of an overhead service pole, or an overhead service post. See [Section 4.4.1.2](#).
 - A 4" x 4" overhead-clearance post is required when the distance between the electric utility point of attachment and the temporary service pole or post is greater than 60'. See [Section 4.4.2](#).
 - Overhead temporary services must meet the clearance requirements provided in this section and in [Section 5](#).
 - Underground temporary cables must be placed in a trench that meets the requirements of [Section 6.2.3](#). Temporary service cables laid on the ground—even with mechanical protection—are not permitted.
- Grounding rod:
 - The AHJ may require that the grounding connection be visible when the electrical inspection is made. For safety reasons, however, the top of the ground rod must be flush with or below the ground level.
- Temporary covers:
 - Where the customer provides openings for PGE equipment (such as a padmounted transformer), they must also provide and install a temporary cover. For temporary cover requirements, see [Section 1.2.2.5](#).

- Permits:
 - An electrical permit and inspection by the local AHJ is required for all temporary services.
- Stakes:
 - Only steel stakes may be used. Wood stakes are not acceptable.
 - The stakes must be set in undisturbed soil.
 - Each stake must be attached to the brace using a U-bolt.

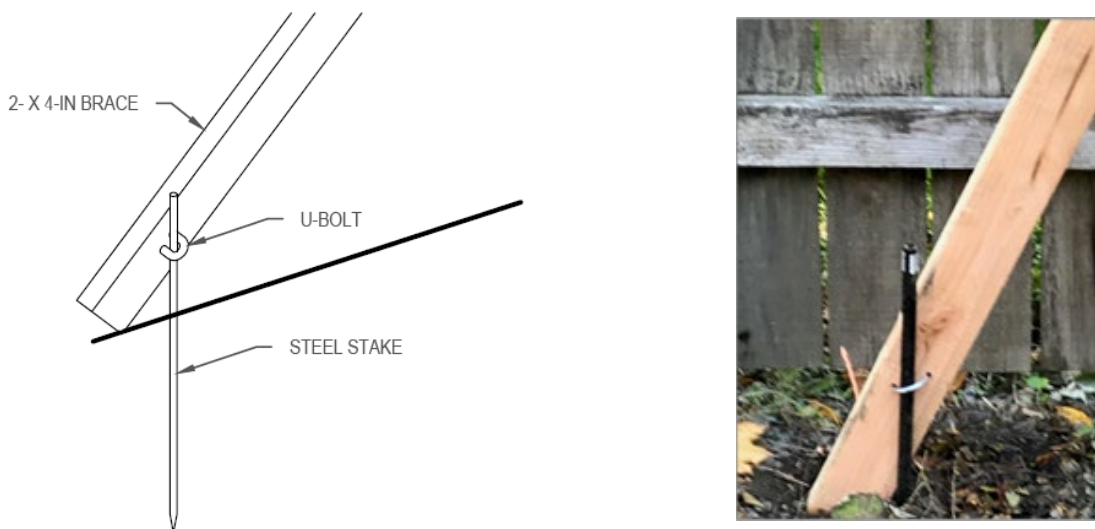


Figure 14. Required Steel Stake with Brace and U-Bolt (STD-D-6134)

4.4 Overhead Temporary Service Equipment Requirements

The following requirements apply to the construction of all types of overhead and underground temporary service:

- The meter socket must be NEMA type 3R (rainproof), and must be in good condition with no holes, bends, or damage. The meter socket must be plumb in all directions.
- Service equipment must be NEMA type 3R (rainproof), and must be in good condition with no holes, bends, or damage. NEC-approved covers must be properly secured.
- The center of the meter socket must be at least 42" and no more than 72" from the ground level.
- The electrical label or permit must be attached to the meter base.
- Service drop, and (where applicable) drip loop clearances must be in accordance with the requirements in [Section 5](#).

4.4.1 Overhead Service Post 6" x 6"

NOTE: The requirements here are in addition to the construction requirements in [Section 4.3](#).

The following requirements apply when installing an overhead service post:

- Bracing must be fully contained on the property, and usually, braced in the direction of the overhead power line, with the eyebolt facing the power source. The braces must not block the working space around the meter or service equipment.
- Use a #2 AWG-aluminum triplex conductor suitable for tensioned overhead service. This conductor must be long enough to reach the ground. Use an eyebolt and a wedge grip to attach the triplex conductor to the top of the post.
- All internal wire must be jacketed up to the end of the 24" tails where it will be connected to the triplex conductors.

IMPORTANT: The customer is responsible for the conductor from the meter base to where it reaches the ground.



Figure 15. Typical Overhead-Service Post

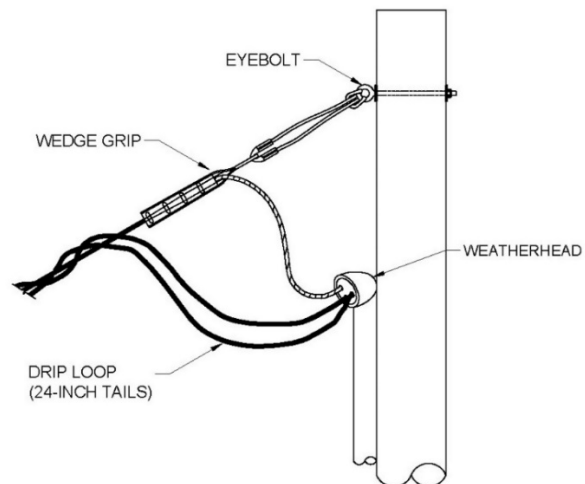


Figure 16. Detail of Attachment Point and Connection Point (STD-D-6130)



Figure 17. Typical Temporary Weatherhead Installation (Front view on left, side view on right)

4.4.1.1 Overhead Service Post in a Non-Road Crossing

NOTE: The requirements here are in addition to the construction requirements in [Section 4.3](#).

The following requirements apply when installing a service post in a non-road or traffic-free crossing (as shown in [Figure 18](#)):

- The post must be 6" x 6" square and at least 20' in length. Set the post at least 48" below ground level.
- The braces must be 2" x 4" and at least 12' in length.
- The stakes must be 0.75" round steel and be set at least 24" below ground level. [Figure 14](#) above shows a steel stake, brace, and U bolt.
- The eyebolt should face the power source.

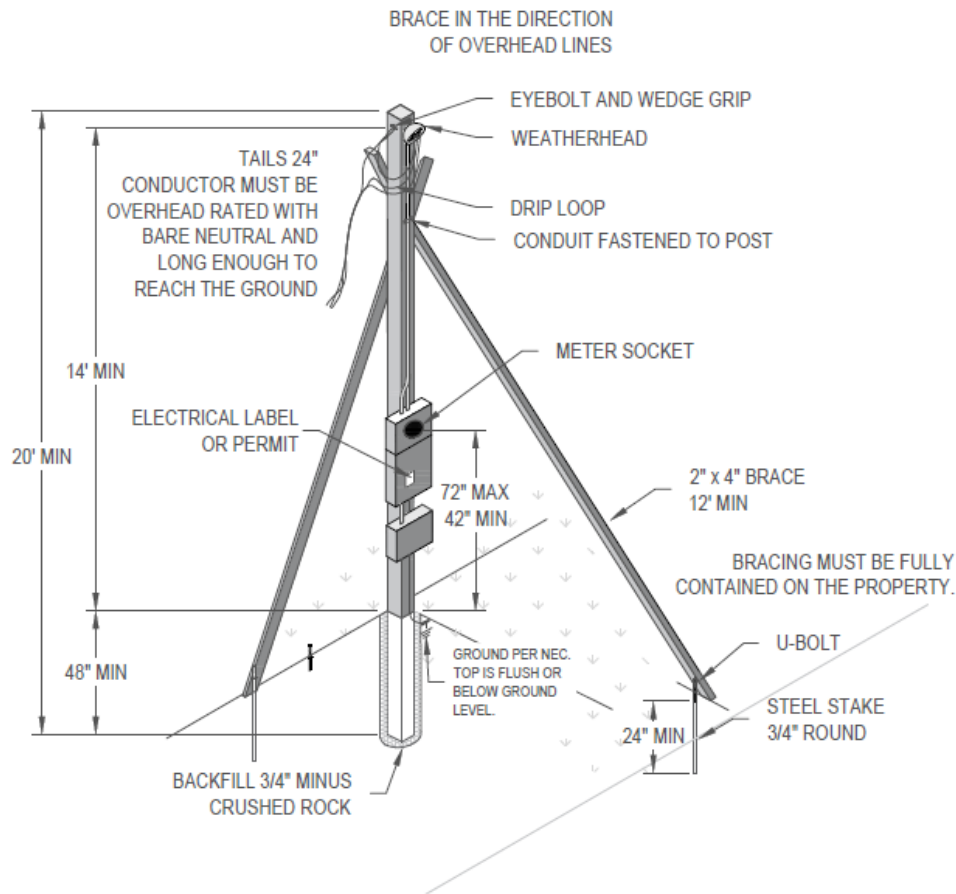


Figure 18. 6" x 6" Overhead-Service Post in a Non-Road Crossing (STD-D-6132)

Table 6. Material Requirements for Overhead Service Post in a Non-Road Crossing

Material Ownership	Materials
Customer Materials	Service Post, 2 Braces, Nails, 3/4" Minus Crushed Rock, 2 U-bolts, 2 Steel Braces, Conduit, Conduit Fastener, Weatherhead, Eyebolt, Wedge Grip, Conductor, and Meter Enclosure.
PGE Materials	Meter, Wire Connecting to the Customer's Conductor Tails

4.4.1.2 Overhead-Service Post in a Road Crossing or Traffic Crossing

NOTE: The requirements here are in addition to the construction requirements in [Section 4.3](#).

The following requirements apply when installing an overhead-service post (shown in [Figure 19](#)) when the service drop crosses a road or traffic crossing:

- The post must be 6" x 6" square, at least 24' in length, and set at least 48" below ground level.
- The braces must be 2" x 4" and at least 18' in length.
- The stakes must be 0.75" round steel and be set at least 24" below ground level. [Figure 14](#) above shows a steel stake, brace, and U bolt.
- The eyebolt should face the power source.

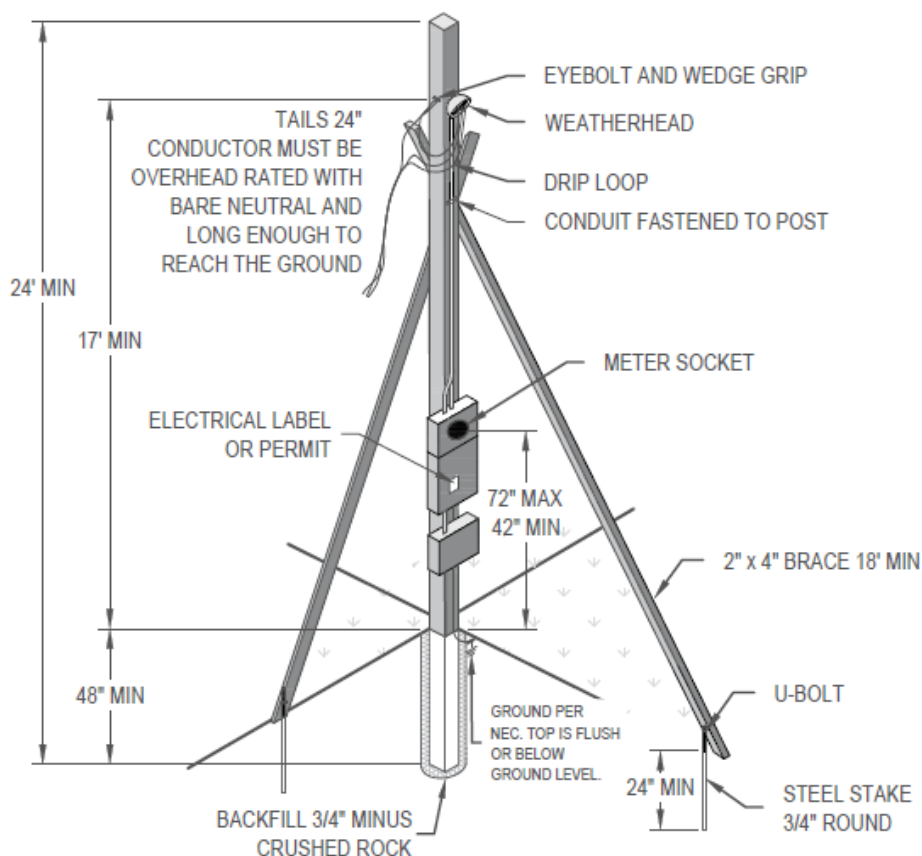


Figure 19. 6" x 6" Overhead Service Post in a Road or Traffic Crossing (STD-D-6136)

Table 7. Material Requirements for Overhead-Service Post in a Road or Traffic Crossing

Material Ownership	Materials
Customer Materials	Service Post, 2 Braces, Nails, 3/4" Minus Crushed Rock, 2 U-bolts, 2 Steel Braces, Conduit, Conduit Fastener, Weatherhead, Eyebolt, Wedge Grip, Conductor, and Meter Enclosure
PGE Materials	Meter, Wire Connecting to the Customer's Conductor Tails

4.4.2 Overhead Clearance Post 4" x 4"

NOTE: The requirements here are in addition to the construction requirements in [Section 4.3](#).

A 4" x 4" overhead-clearance post (shown in [Figure 20](#)) is required when the distance between the electric utility point of attachment and the temporary service pole or post is greater than 60'.

The following requirements apply when installing an overhead clearance post:

- The post must be a minimum 4" x 4" square and set in the ground at least 3'.
- The braces must be 2" x 4" and at least 18' in length. The temporary service must be braced in the direction of the overhead power line. Bracing must be fully contained on the property
- The stakes must be 0.75" round steel and be set in the ground at least 24". [Figure 14](#) above shows a steel stake, brace, and U bolt.
- Maintain a maximum of 60' between the posts.
- Maintain at least 8' between the post and the stake.

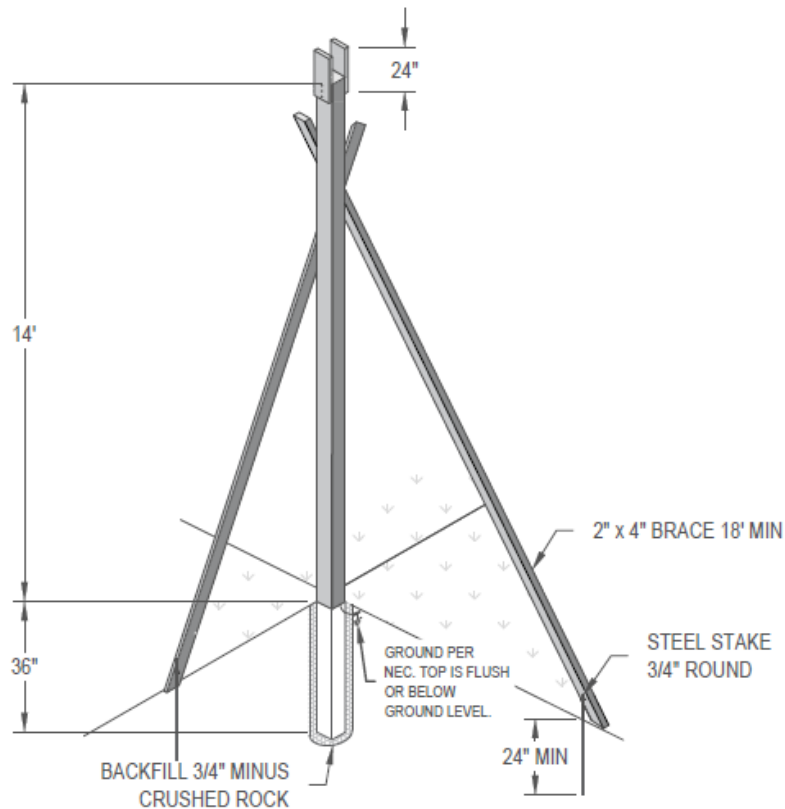


Figure 20. 4" x 4" Overhead-Clearance Post (STD-D-6138)

Table 8. Material Requirements for Overhead Clearance Post

Material Ownership	Materials
Customer Materials	Service Post, 2 Braces, Nails, 3/4" Minus Crushed Rock, 2 U-bolts, 2 Steel Braces, Conduit, Conduit Fastener, Weatherhead, Eyebolt, Wedge Grip, Conductor, and Meter Enclosure
PGE Materials	Meter, Wire Connecting to the Customer's Conductor Tails

4.5 Underground Temporary Service Equipment Requirements

4.5.1 Post-mounted Underground Service 6" x 6"

NOTE: The requirements here are in addition to the construction prerequisites in [Section 4.3](#).

A temporary underground service is available only in areas where the permanent service is from an underground facility. See [Section 6.3.2](#) for underground and conduit requirements.

The following requirements apply when installing a temporary underground service:

- The wood post must be a minimum 6" x 6" square and owned by the customer.
- The post must be set in firmly tamped, 3/4" minus crushed rock, with the earth domed to allow for settling.
- The conduit must be rigidly fastened to the wood post.
- Maintain a 36" minimum straight section of conduit between sweeps.

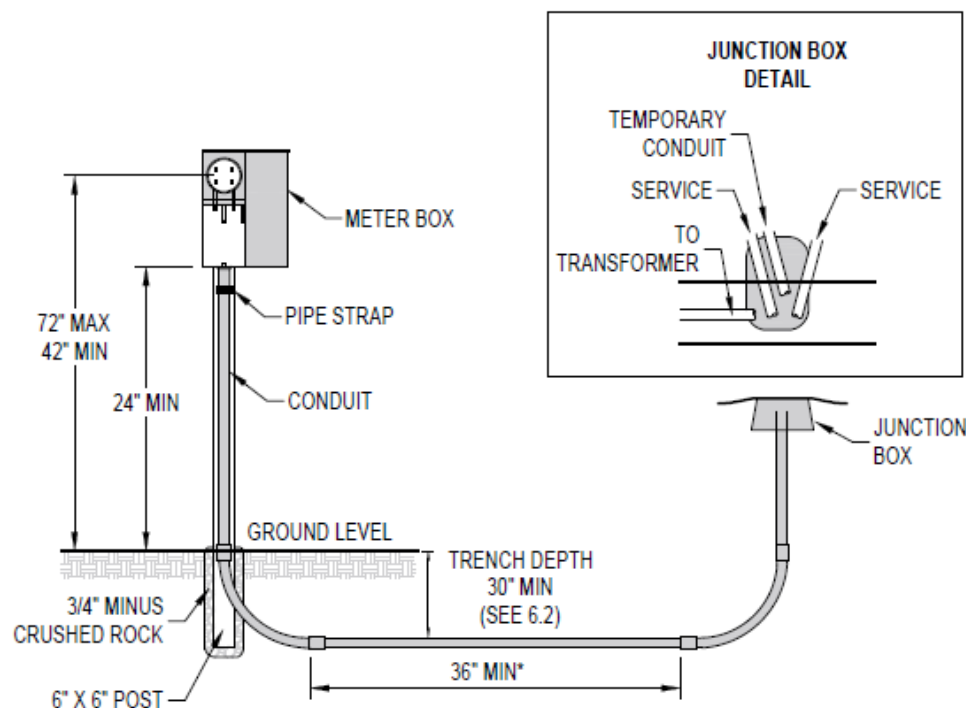


Figure 21. Temporary Underground Service Mounted on 6" x 6" Post (STD-D-6140)

NOTE: Permanent services require 5' of straight conduit between sweeps.

Table 9. Post-mounted Underground Service Material Requirements

Material Ownership	Materials
Customer Materials	Service Post, 2 Braces, Nails, 3/4" Minus Crushed Rock, 2 U-bolts, 2 Steel Braces, Conduit, Conduit Fastener, Weatherhead, Eyebolt, Wedge Grip, Conductor, and Meter Enclosure
PGE Materials	Meter, Wire Connecting to the Customer's Conductor Tails

4.6 PGE Gold Temporary Service for Underground Residential Applications

PGE Gold Temporary Service is an enhanced service that provides an unmetered, flat-rate, temporary service for underground **power** lines and padmounted transformers serving residential construction. The cost and installation of the temporary service will be provided according to all current PGE Tariff regulations. To request additional information, contact PGE’s Service Coordination team 503-323-6700.

Gold Temporary Service may only be used to power lights and tools, as well as any equipment of less than or equal to 5 horsepower (hp) that is necessary for the construction and final inspection of the associated residential dwelling(s). This includes testing of a domestic well pump and septic pump. Gold Temporary Service may not be used to operate permanently installed appliances, equipment, or construction trailers; or to heat or dry structures that are under construction.

When using a PGE Gold Temporary Service, the customer must use electrical extension cord sets (or other devices) that incorporate ground fault interrupters (GFIs) to comply with local codes.

A PGE Job Sketch (a.k.a. design) will be required if no transformer is present at the site, or a new transformer is required. The customer is responsible for installing the conduit according to the Job Sketch. PGE is responsible for installing the transformer for the Gold Temporary Service and no permits are required.

5 Clearances and Location Requirements

Topics in this Section

- [Basic Requirements](#)
- [Meter Location Criteria](#)
- [Meter Clearance Dimensions](#)
- [Clearances for Overhead Services](#)
- [Locations and Clearances for Transformers, Switches, Vaults, and Other Electrical Equipment](#)
- [Safety Clearances from Other Hazards](#)

5.1 Basic Requirements

This section describes the key clearances for meter sockets, transformers, working clearances, and safety clearances from other hazards.

Existing Power Lines – Customers and their contractors must call PGE to discuss required clearances to existing power lines at the site. National Electrical Safety Code (NESC) and PGE Standards outline horizontal clearances from wires, conductors, and cables to buildings, windows, balconies, chimneys, antennas, and other installations. These clearances vary depending on voltage, the type of power line, access below the lines to pedestrians and vehicles, and the purpose of the structure.

Changes in Design – If any details of your project change after the project has been designed, the meter gear review is completed, and the customer has returned the signed Line Extension Cost Agreement (including the meter location, meter gear specifications, or elevation grade changes), PGE will need to re-review your project to confirm that the requested changes are acceptable. If design changes are required or needed, PGE may charge a redesign fee in accordance with its Tariffs.

Landscaping – Landscaping, including shrubs, plants, and fences, must not obstruct PGE clearances. Plant trees and shrubs so the mature height and width are outside required clearances. For more information, see [Figure 33](#), [Figure 34](#), [Figure 35](#), as well as [Section 1.2.2.6](#).

Barrier Posts – Wherever PGE equipment (such as a transformer, switchboard, current transformer (CT) cabinet, or sectionalizing cabinet) is installed in a location subject to vehicle traffic, the customer is required to install and maintain PGE-approved barrier posts. For more information, see [Section 5.6.8](#).

Electrical Rooms – If an exterior location is not possible for your gear and PGE has approved your request for an electrical room, required clearances are in [Section 13](#).

Transformer Rooms – If pole mounted transformation and exterior padmounted transformer are not possible, the customer must design and build a Class A Vault on the exterior wall of their main floor to house the transformation necessary to provide electrical service to the building. *This room is owned and maintained by the building owner, but due to the danger involved, access is only for utility personnel. PGE has many requirements, both inside and outside of the structure, for the construction and security of this room.* Request Standard LD31007 for complete requirements and download the *Class A Vault Guide* at portlandgeneral.com/esr.

Additional clearances, required by PGE, NESC, OR-OSHA, municipalities and other third-party entities, or other codes and entities, may exist that are not included in this book. For this reason, PGE must review customers’ final plans and perform one or more on-site visits to confirm the location of meters, conduits, transformers, and other PGE-owned equipment before foundations are laid and equipment is purchased.

5.2 Meter Location Criteria

IMPORTANT: PGE must perform an on-site visit to confirm the location and meter socket for all meters before meter installation.

The customer must provide suitable space and provisions for mounting a meter socket at a location acceptable to PGE. Meters and current transformer (CT) cabinets will be located outdoors unless PGE confirms—before installation—that no acceptable outdoor location exists. The metering equipment location must be accessible to PGE employees 24 hours a day, 7 days a week for reading, testing, and replacing meters.

The customer is responsible for obtaining base flood plain elevation requirements from the local jurisdiction, and for ensuring that all customer-owned switchboards and metering equipment are installed in accordance with the following requirements.

Metering equipment, meter bases, and CT cabinets are prohibited in the following locations:

- Directly over a window well, stairway, ramp, or steps.
- In an area likely to be fenced. If a customer installs a fence or enclosure, the customer must—at their own expense—provide access acceptable to PGE or move the meter socket to a location identified by PGE.
- On the drive-through side of a commercial business. Existing services located within a drive-through are grandfathered unless the service is upgraded, and drive-through lane(s) will be subject to closure during working hours for PGE maintenance needs.
- On mobile structures such as a trailer, barge, crane, dredge, dragline, or any mobile pumping equipment; or on a floating dwelling unit (such as a houseboat).
- On poles owned by PGE.
- In places that may interfere with the meter’s operation or on surfaces with excessive vibration.
- Any place where PGE determines that safety may be compromised.

- In places where the meter face or the door to the PGE equipment is obstructed.
- Meters must not be blocked by any materials, including landscaping.

5.2.1 Meters in Gated Areas

If a meter must be located behind a fence, or a fence is added after a meter is installed, the customer must install a gate in one of the following places:

- On the same side of the site where the meter is located, or
- On the side of the site where there will be the shortest distance from the street to the meter.

PGE must be able to readily pass through the gate. If the gate is locked, PGE requires a lockbox on a visible location on the exterior of the gate with a key within.

5.2.2 Residential Meter Location Criteria

PGE locates residential meters and current transformer (CT) cabinets outdoors on the side of the structure closest to the PGE power line or—to prevent the meter from being located behind a fence—within 10' of the front (or street) side of the structure. If the side of the building does not have an unobstructed 48" set-back from the front of the metering equipment, then PGE must put the meter on the front of the building.

PGE will not locate meters within 36" of a window well or steps in a stairway, or in any other unsafe or inconvenient location. PGE will avoid approving a meter location on an exterior bedroom or bathroom wall or patio, or on exterior walls that are likely to be fenced in the future.

5.2.3 Nonresidential Meter Location Criteria

Locate nonresidential meters and current transformer (CT) cabinets outdoors unless PGE confirms—before installation—that no acceptable outdoor location exists. PGE will install service connections to customer's metering equipment only at the main level or entry floor level.

Indoor locations must have prior written approval by PGE and a PGE access plan. Locations must be within a room located on the structures outside wall with a door leading directly to the outside. For comprehensive requirements, see [Section 13](#).

5.3 Meter Clearance Dimensions

5.3.1 Metering Workspace Requirements

Workspaces must meet all the following criteria:

- The workspace must be permanently available for the life of the service.
- The minimum unobstructed level (flat) workspace in front of a meter is 78" high, 48" wide, and 48" deep (or the width of the equipment, whichever is greater). See [Figure 22](#). In some situations, PGE may also require handrails.
- The workspace must not contain water features (e.g., bioswale, rain garden, etc.).
- A meter installed in a cabinet requires a minimum 48" deep space to allow the cabinet door(s) to open to at least 90 degrees. Similarly, the workspace must allow equipment doors or hinged panels to open to at least 90 degrees and lock in the open position.
- Open cabinet doors on a piece of utility equipment must not block the exit.
- All meters and metering equipment must be located at least 36" horizontally from a gas meter.
- When live parts that are normally enclosed are exposed for inspection or servicing, the workspace must be suitably guarded if it is in a passageway or general open space.

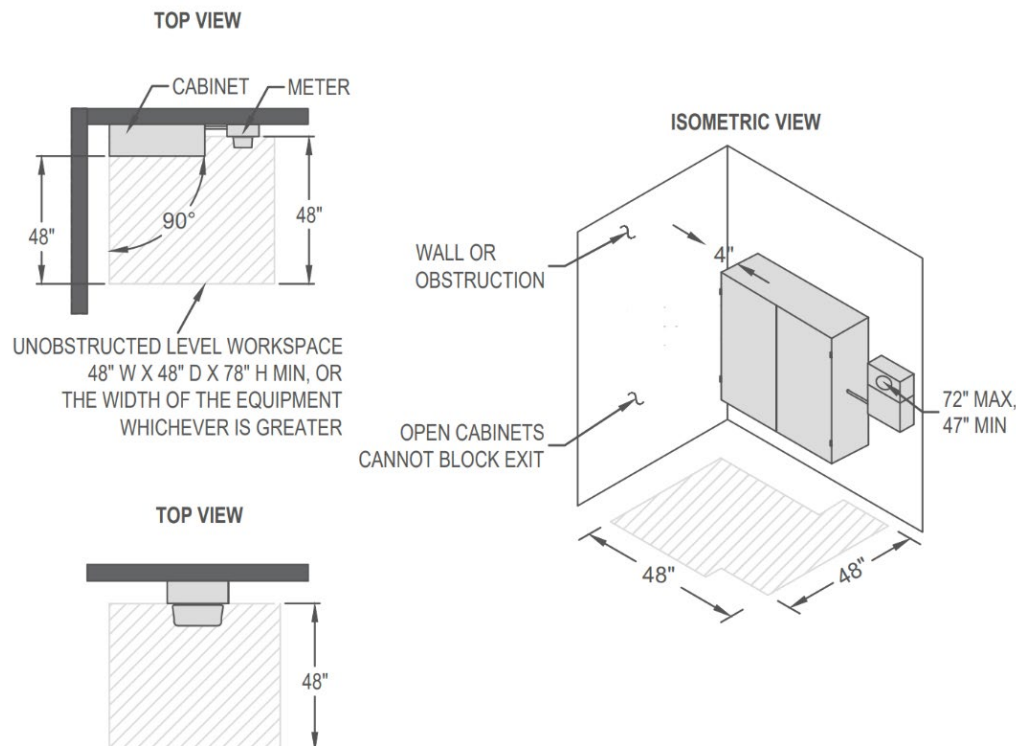


Figure 22. Minimum Unobstructed Workspace Around Metering Equipment (STD-D-1110)

IMPORTANT: Workspace will be measured from the front of the enclosure horizontally outward.

5.3.2 Single-Meter Installation

Table 10. Clearances for Single-Meter Socket and Switchboard Installations

Description	Clearance
Height of the center of the meter socket from the finished grade or floor.	42" min. – 72" max.
Horizontal clearance from the wall or obstruction to the center of the meter socket.	10"
Vertical clearance from the ceiling or obstruction to the center of the meter.	9"
Depth of level unobstructed workspace in front of the enclosure.	48" x 48" x 78"

5.3.2.1 Single-Meter, Flush-Mount Installation

If the meter cabinet will be recessed in the wall, install a flush-type box or meter cabinet designed specifically for that purpose so that the face of the meter cabinet projects outward beyond the building surface. The building face must not extend beyond the face of the meter box (as shown in [Figure 23](#)). A minimum 3/4" plywood backing is required.

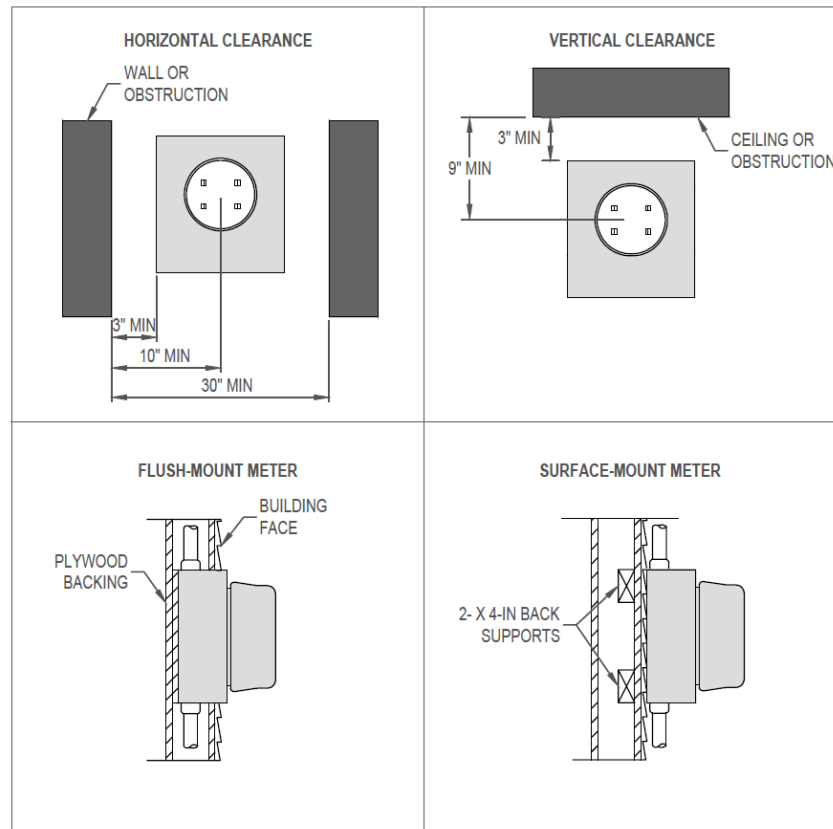


Figure 23. Meter Clearances for Single-Meter Installations (STD-D-1120)

5.3.2.2 Single-Meter, Surface-Mount Installation

A surface-mount meter must have at least two 2" × 4" back supports, as shown in [Figure 23](#).

5.3.3 Multiple-Meter Installation

A multiple-meter installation in a room or on adjacent walls must require the following additional requirements:

- All doors to a room that contains PGE metering and termination equipment of 120 V or higher must open out. The following doors must be equipped with a panic bar before service will be provided.
- Open cabinet doors on a piece of utility equipment must not block the exit.
- A minimum 90-degree clear open space is required when the CT cabinet door is open.
- No more than five meters are allowed in a single vertical gang meter stack.

Table 11. Clearances for Multiple-Meter Socket and Switchboard Installations

Description	Clearance
Clearance from the open door of a CT cabinet to a wall or obstruction. Clearance from the side of a termination enclosure/section to a wall or obstruction.	4" min.
Clearance from the side of a CT cabinet to a wall or obstruction.	30" min.
Clearance from the front of a CT cabinet to a wall or obstruction.	48" min.
Clearance from a residential meter to another residential meter. Meter packs with residential meters do not require separation.	3" min.
Horizontal clearance between the center of the meter to a wall or obstruction.	10" min.
Horizontal clearance between multiple meters located on adjacent walls.	16" min.
Height of uppermost meter socket above finished grade.	72" max.*
Height of lowermost meter socket above finished grade.	36" min.*

* Clearance is measured from the center of the meter.

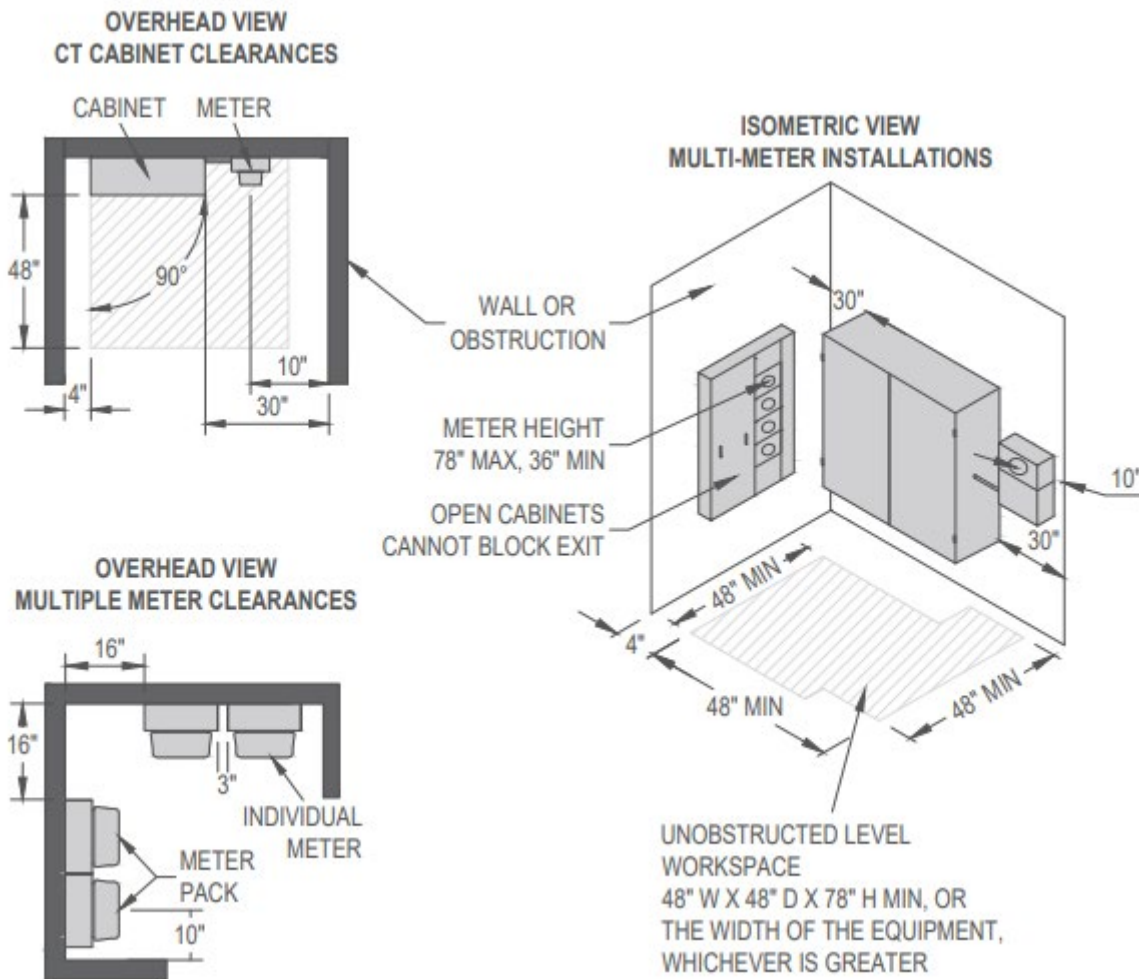


Figure 24. Meter Clearances for Multiple-Meter Installations (STD-D-1115)

5.4 Clearances for Overhead Services

All overhead services must meet ground clearance requirements for the life of the service. The clearances in [Table 12](#) are in accordance with the National Electrical Safety Code (NESC) and/or PGE standards.

In addition to meeting the required ground clearances, customer weatherheads should not exceed 5 feet above the roofline. In the event these requirements cannot be readily met, PGE may require a service post. Contact PGE to discuss options available for your site.

Table 12. Minimum Clearances for Service Drops, 750 V and Lower

Type of Clearance	Type of Structure or Feature	Clearance (feet)
Minimum service drop clearance. * (NESC Table 232-1)	Over roads, streets, and other areas subject to truck traffic.	17**
	Over alleys, parking lots, and driveways.	17**
	Over land traveled by vehicles.	17
	Over state highways (ODOT may require greater clearances).	19
	Over spaces and ways accessible to pedestrians.	12
Minimum clearances at the point of attachment. (NESC Table 232-1)	At height of attachment.	14†
	Drip loops of service drops for 120/240 V, 208Y/120 V, and 480Y/277 V.	12†
Minimum clearances from buildings for service drops not attached to the building. (NESC Table 234-1)	Vertical clearance over or under balconies and roofs accessible to pedestrians.	12††
	Vertical clearance over or under balconies and roofs not accessible to pedestrians.	3.5††
	Horizontal clearance to walls, projections, windows, balconies, and areas accessible to pedestrians.	5††
	Radio and television antennas not accessible to pedestrians.	3††
Minimum clearances from service drops (including drip loops) attached to a building or other installation over or along the installation to which they are attached. (NESC 234C-3 and Figure 234-2)	Vertical clearance from the highest point of readily accessible roofs, balconies, decks, fire escapes, or other attached structures over which they pass or to which they are attached. Refer to NESC 234C-3d for exceptions and more information.	11††
	From the highest point of roofs, decks, or balconies over which they pass above a not-readily-accessible roof and terminating at a through-the-roof service conduit or approved support, the service and its drip loops set not less than 18" above the roof; not more than 6' of the service cable over the roof located not more than 4' from the edge of the roof.	1.5††
	From the highest point of roofs, decks, or balconies over which they pass in any direction from doors, windows that are designed to open (except from above), porches, or fire escapes.	3

* Service drop is defined as a multiplex insulated conductor cabled on and supported by a bare neutral messenger (TX/QX).

** The PGE recommended clearance is based on meeting clearances over the life of the installation.

† The clearance is measured from any permanently climbable surface, such as a planter box or built-in air conditioner.

†† NESC considers a roof, balcony, or area to be readily accessible to pedestrians if it can be casually accessed using a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor uses special tools or devices to gain entry. NESC does not consider a permanently mounted ladder to be a means of access if the bottom rung is 8' or more above the ground or other permanently installed accessible surface.

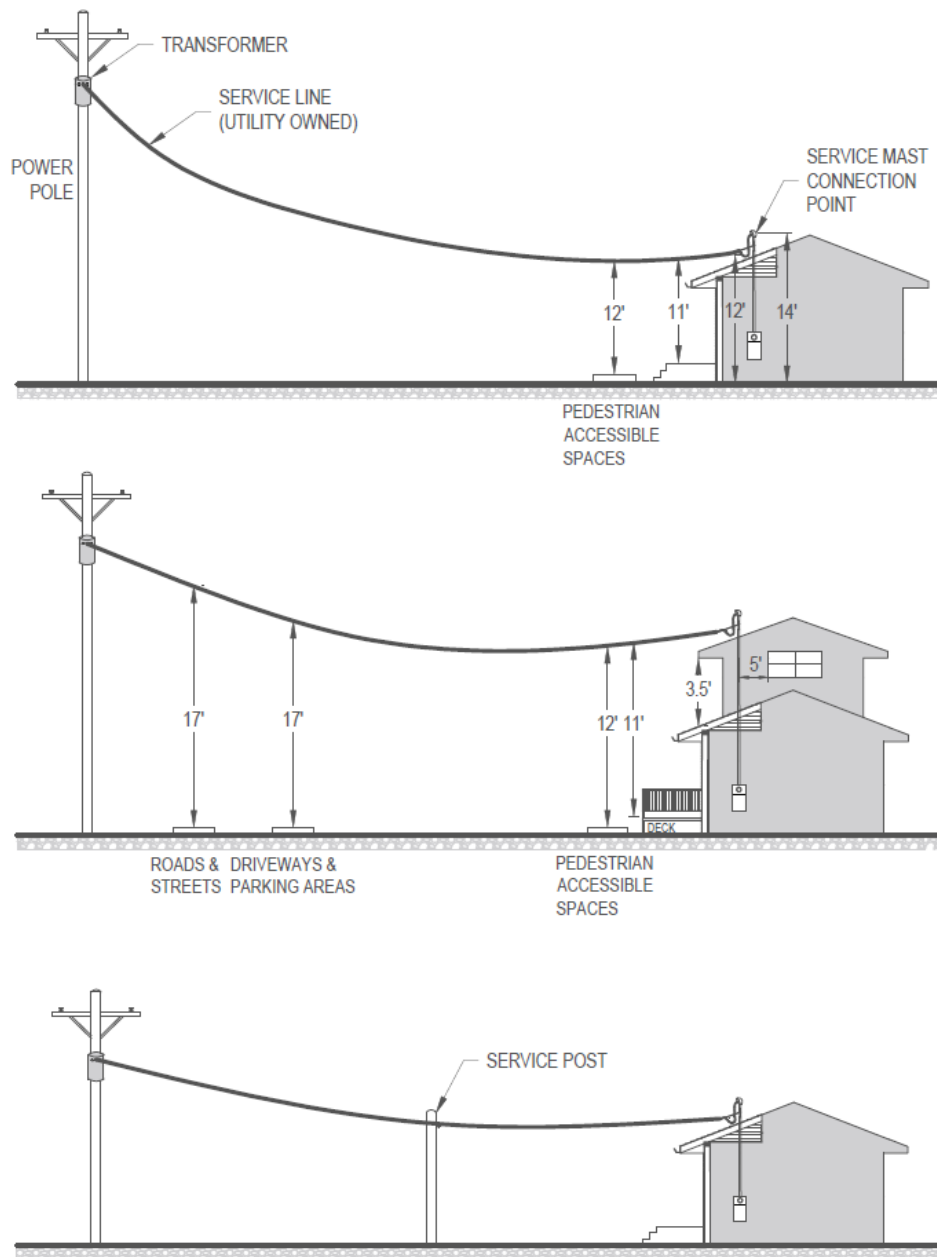


Figure 25. Clearances in Typical Overhead Service Configurations (STD-D-2220)

Buildings must not be constructed under or adjacent to power lines. NESC requires horizontal clearances from conductors to steps, buildings, porches, balconies, and roofs. Consult PGE for additional information.

IMPORTANT: PGE must approve the meter socket and location before meter installation.

Table 13. Meter Clearances for Overhead Services

Meter Clearances for Overhead Services	Clearance Distance
Distance between the meter base and the corner of the house closest to a PGE power line. Get PGE approval before installing a service drop on the gable side of a residence.	10' (120")
Horizontal clearance from PGE meter to a gas meter set, meter, regulator, or flange.	36"
Horizontal clearance from PGE meter to a window or door with a view of living spaces.	36"
Horizontal clearance from PGE meter to window wells.	30"
Horizontal clearance from PGE meter to customer-owned equipment (inverter, batteries, inc.)	36"
Service Drops and drip loops.	See Table 12
Weatherhead height above the roof.	24" min., 60" max
Weatherhead distance from the roof edge. See Section 7.3.2 for guying requirements.	48" max.
Cable and drip loop above an inaccessible roof as defined by NESC.	18"
Point of attachment for the cable must be a 3/8" eyebolt or 3/8" eye lug. Do not attach the cable to the eave on the house.*	24" from weatherhead*
Conductor leads to connection to the service drop.	24"
Service cable length.	6' max.

* PGE must be able to reach the point of attachment from an adjacent PGE power line using a single span of service drop cable. If a service is mounted on a customer-owned pole, locate the weatherhead within 2' of the pole top.

Additional requirements exist for single-family overhead services, see [Section 7.3](#).

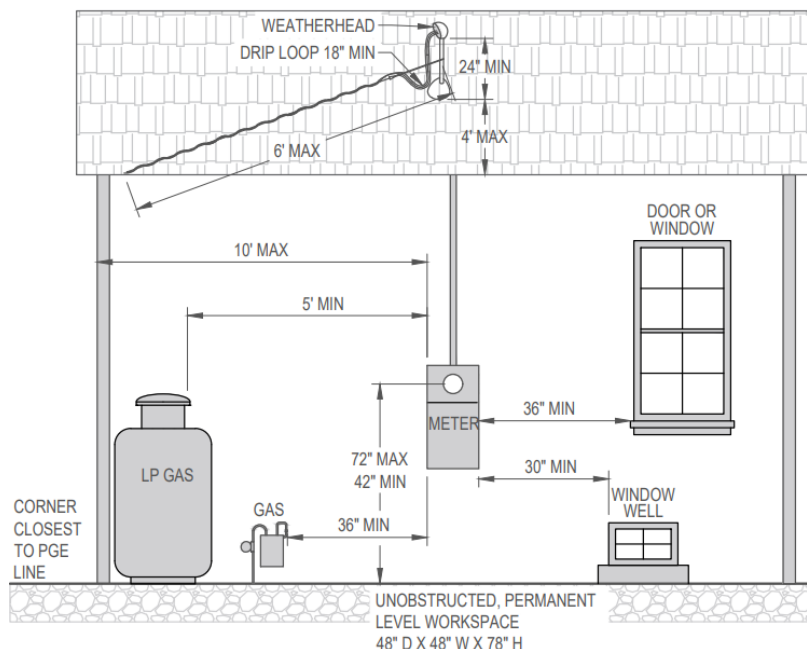


Figure 26. Residential Meter Clearances for Overhead Service (STD-D-2225)

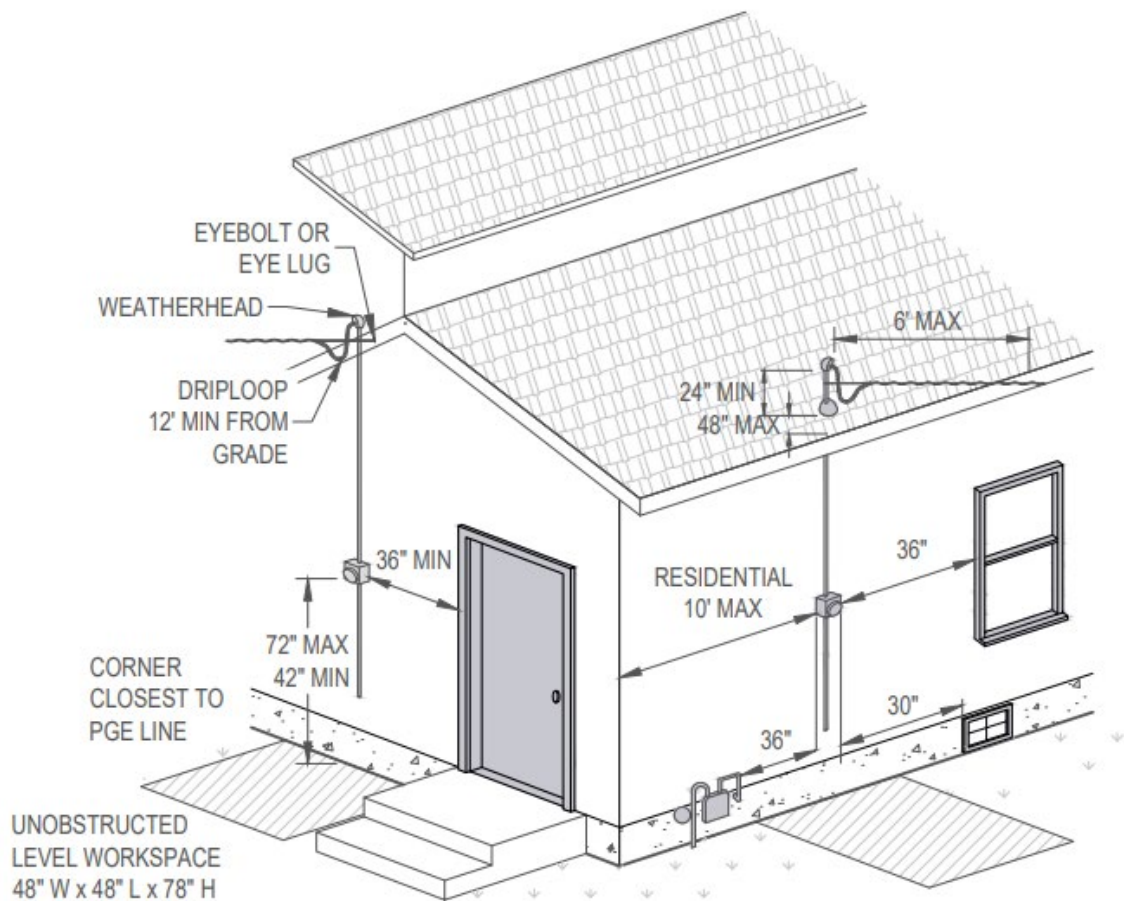


Figure 27. Metering Equipment for Overhead Service (STD-D-2226)

5.5 Locations and Clearances for Transformers, Switches, Vaults, and Other Electrical Equipment

PGE will select the location of electrical equipment using the clearances listed in [Table 14](#), any additional applicable NESC clearances, the size of the transformer, the working space clearances for the equipment, and a location with drivable access. Transformers must be located between 5' and 15' from a maintained drivable surface.

IMPORTANT: If PGE cannot obtain adequate clearances, customers must provide space on the main floor, with direct exterior access, of the building for a Class A Vault. The Class A Guide is available on portlandgeneral.com/esr.

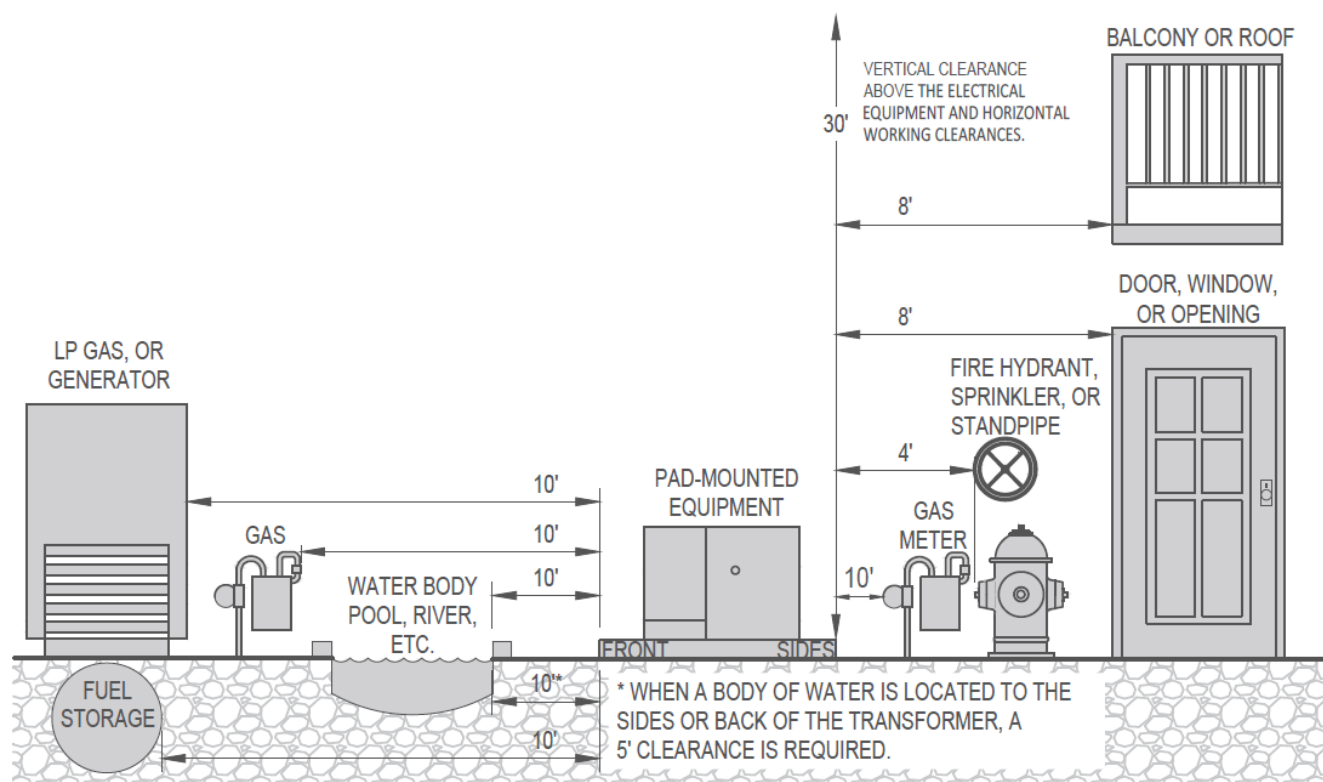
PGE equipment clearances must not be obstructed by landscaping, parking areas, sidewalks, driveway areas associated with truck loading docks, or other obstructions.

The following clearances must be evaluated.

- Safety clearances from electrical equipment to combustible surfaces and hazards, such as gas equipment, LP equipment, bodies of water, and vehicular traffic (see [Section 5.6](#)).
- Safe work clearances for PGE personnel in front of electrical equipment (see [Section 5.5.4](#)).

Table 14. Clearances for Padmounted Equipment

For This Clearance...	Clearance Distance	ESR section
Horizontal clearance in front of and extending parallel to the front of the equipment enclosure and any side with a door or access panel.	10'	5.5.4
Horizontal clearance from the side or back of the equipment to a combustible wall or roof, including overhangs, balconies, decks, and wood fences. See Section 5.5.1.3 for reduced clearances.	8'	5.5.1.2
Noncombustible walls (including steel, brick, or concrete) if the side of the transformer facing the wall does not have doors.	36"	5.5.1.2
Fire sprinkler valves, standpipes, and fire hydrants.	48"	5.6.4
Doors, windows, vents, fire escapes, and other building openings.	8'	5.4
The edge of a swimming pool or any body of water.	5'	5.6.6
Gas meter as measured from the nearest gas component.	10'	5.6.1
Facilities used to store LP or hazardous liquids or fuels.	10' or more	5.6.2
Underground fuel storage tank.	10' or more	5.6.3


Figure 28. Clearances for PGE Electrical Equipment (STD-D-3205)

5.5.1 Clearances of PGE Oil/Fluid-Filled Transformers from Structures and Other Oil/Fluid-Filled Equipment

Oil/fluid-filled electrical equipment must be located a certain distance from a combustible structure to comply with local requirements and national codes. The amount of separation depends on the flammability of both the insulating oil or fluid and that of the nearby structure. The minimum separation distance can be reduced by using a less-flammable dielectric fluid and/or a fire barrier.

5.5.1.1 Combustibility of Building Material

The combustibility of a building is evaluated in two ways:

- By the building structure only, or
- By the building structure in combination with the finish surface material applied to its inside or outside.

The National Fire Prevention Association (NFPA) lays out the following requirements for a noncombustible material: *The material, in the form in which it is used, and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat, of which no part will ignite and burn when subjected to fire.* (NFPA 5000, Section 7.1.4.1.1)

Coatings placed on the surface of a building can also affect combustibility (as shown in [Table 15](#)).

PGE has the following requirements for surfacing materials used on a noncombustible material:

- No surfacing material may be more than 1/8" thick.
- All surfacing materials must have a flame-spread rating of 50 or less.

Table 15. Flame-Spread Ratings of Selected Materials

Material	Flame-Spread Rating
Aluminum siding (with baked enamel finish on one side)	5-10
Brick or concrete block	0
Gypsum board (with paper on both sides)	10-25
Northern pine (treated)	20
Southern pine (untreated)	130-190
Plywood paneling (untreated)	75-275
Plywood paneling (treated)	10-25

To be considered a noncombustible structure, a building's design must use structural members made of steel (with fire coatings approved by local fire authorities), brick, or concrete. In addition, the building's exterior surface must have a flame-spread rating of 50 or less. All other designs require increased clearances between the structure and the oil/fluid-filled unit.

NOTE: Installing metal siding or a brick/stone facing on a wall constructed of wood studs does not meet the requirements for a noncombustible structure.

5.5.1.2 Clearances of Oil-Filled Transformers from Buildings

Locate oil-filled transformers away from buildings wherever possible. When it is not possible to locate an oil-filled transformer away from a building, you must apply the minimum clearances shown in [Figure 29](#) and listed in [Table 16](#). The separations provided in [Table 10](#) apply to both padmounted and submersible transformers.

IMPORTANT: Transformer oil quantity may vary by manufacturer. The oil capacity is shown on the transformer nameplate.

NOTE: Locate transformers between 5' and 15' from a maintained drivable surface (see [Section 5.5.3](#)).

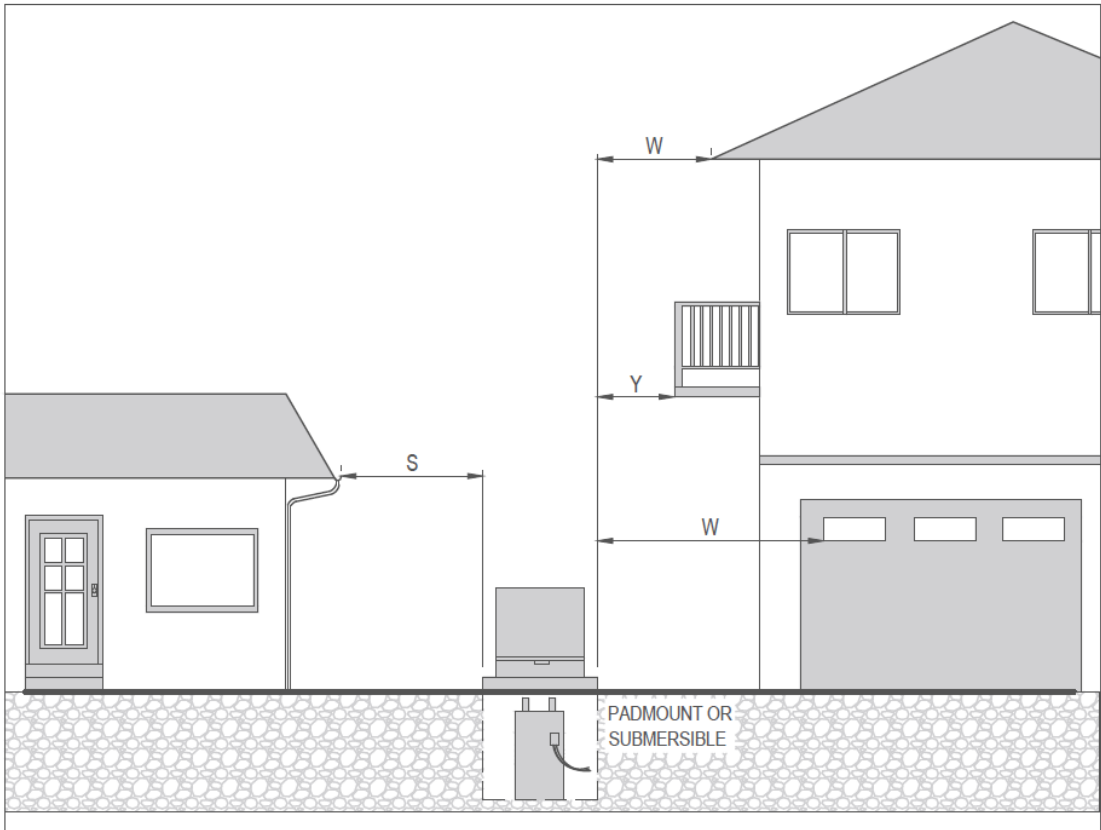


Figure 29. Minimum Clearances of Oil-Filled Transformers from Buildings (STD-D-3207)

Table 16. Minimum Clearances of Oil-Filled Transformers from Buildings

Oil Capacity (gallons)	Clearance			
	To Noncombustible Structure (S) (feet)	To Combustible Structure (Y) (feet)	To Any Opening in Structure (W) (feet)	Vertical Distance (Z) (feet)
0-499	3*	8 **	8 †	30 ^{††}
500-5000	25 *	50 **	50 †	50 ^{††}
5001 or more	50 *	100 **	100 [†]	100 ^{††}

* Clearance to the nearest component if the structure is noncombustible and there are no openings closer than 8'.

** Clearance to the nearest component (wall or overhang) if the structure is combustible.

† Opening in structure does not include windows that are not designed to be opened.

†† Clearance measured from the top of the cabinet to any barrier which is not a living space or workspace. This separation is for working clearance only.

5.5.1.3 Clearances of Oil-Filled Transformers from Other Oil-Filled Equipment

Locate oil-filled transformers away from other oil-filled equipment, such as electrical equipment and fuel storage tanks, wherever possible. Where it is not possible to locate an oil-filled transformer away from oil-filled equipment, the minimum clearances listed in [Table 17](#) must be applied. The distances in the table apply to both padmounted and submersible transformers.

NOTE: Minimum clearances between oil-filled transformers and structures or other oil-filled equipment may be reduced by constructing a fire barrier.

[Figure 30](#) and [Figure 31](#) show the minimum clearances of the side or back of a transformer from combustible and non-combustible surfaces. All distances are measured from the edge of the transformer pad.

Table 17. Minimum Clearances of Oil-Filled Transformers from Other Oil-Filled Equipment

Oil/Fluid Capacity of Either Container (gallons)	Horizontal Clearance (feet)
0-499	5
500-5000	25
5001 or more	50

Source: FM Global, FM Data Sheet 5-4, Transformers.

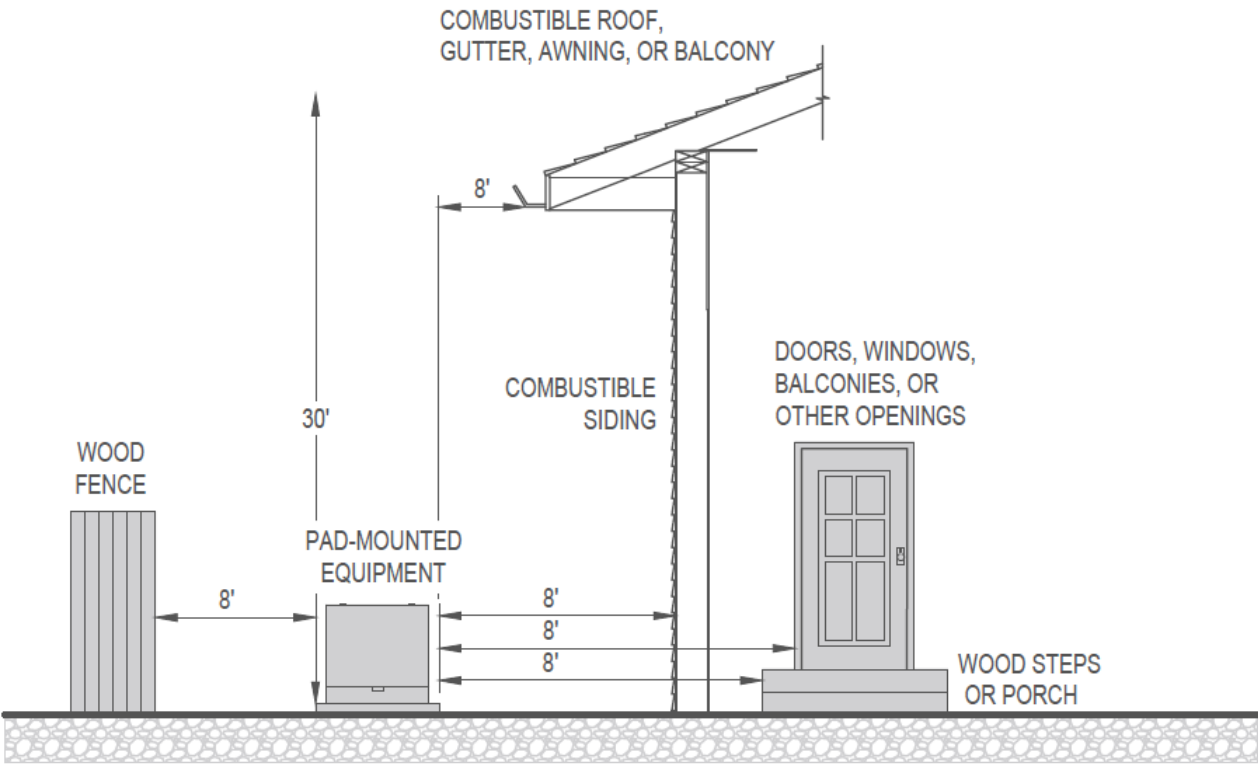


Figure 30. Minimum Clearances from the Side or Back of a Transformer to a Combustible Surfaces (STD-D-3215)

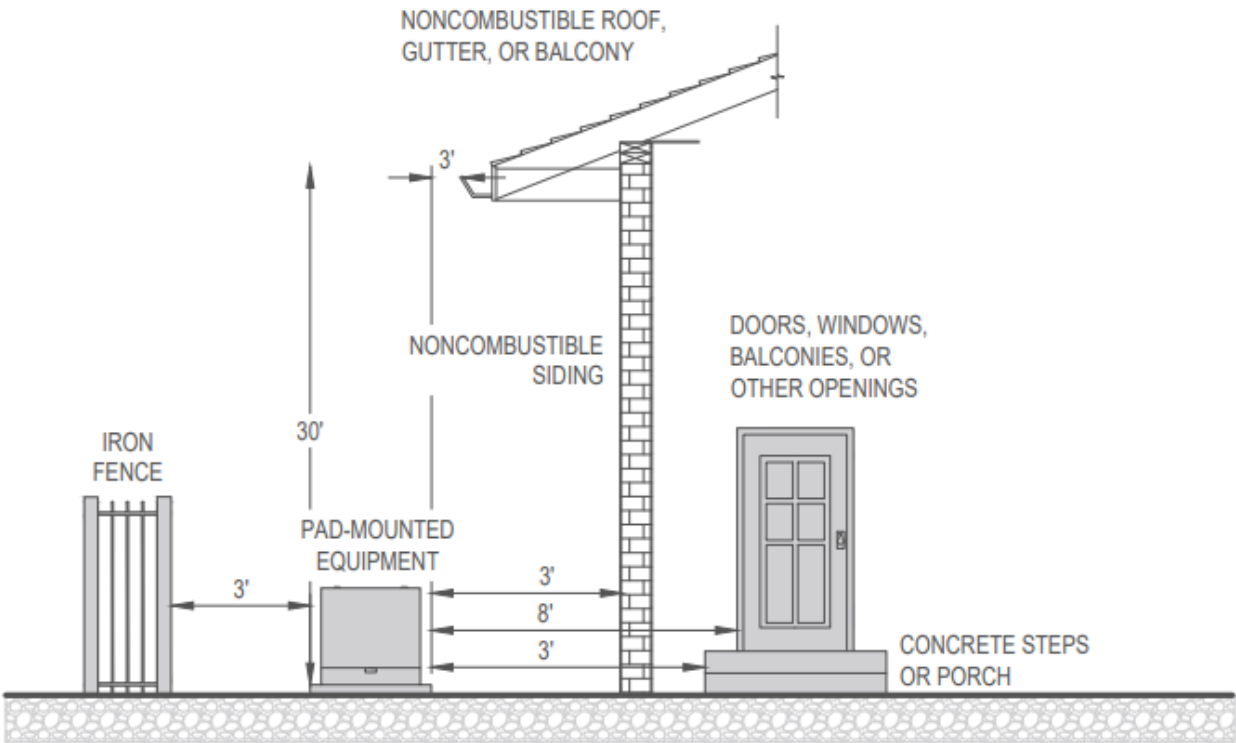


Figure 31. Minimum Clearances from the Side or Back of a Three-Phase Transformer to a Noncombustible Surfaces (STD-D-3215)

5.5.2 Working Areas Around PGE Transformers, Switches, Vaults, and Other Electrical Equipment

The work performed by PGE line crews requires that a clear and level working area be maintained around electrical equipment. Clearances must not be obstructed by any structure, wall, landscaping, parking spot, fence, gate, or other obstruction.

5.5.3 Drivable and Accessible Surface for PGE Equipment

There are two situations in which PGE defines a drivable surface:

Access - Space needed to provide a drivable and accessible surface for PGE vehicles and equipment.

Barrier posts (bollards) - Drivable surfaces traversed by cars, trucks, and other equipment that require barrier posts (bollards) for protection of PGE equipment. For requirements, see [Section 5.6.8](#).

PGE vehicles and equipment require drivable surfaces beyond what is required for typical cars and trucks. Because of this, PGE equipment must be located within 15' of a 12' wide permanent drivable surface (paved or compacted gravel) that allows for unrestricted access.

Table 18. Drivable Surface Requirements

PGE Equipment	Minimum Roadway Width	Maximum Distance from the edge of drivable surface to the equipment (feet)
Single-phase Transformer	12	15

The following surfaces are **not** drivable surfaces for PGE vehicles:

- Sidewalks
- Lawns and landscaped areas
- Underdeveloped/undeveloped open areas

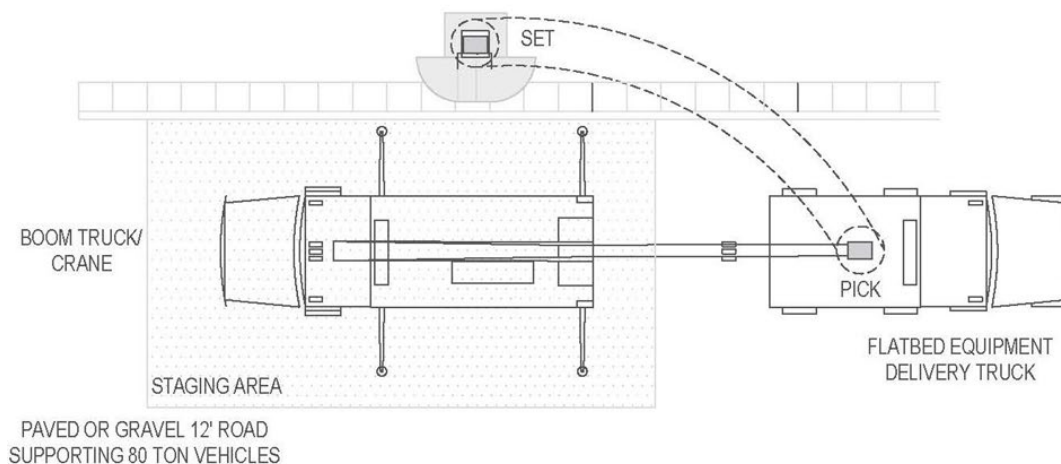


Figure 32. Access for PGE Vehicles and Bucket Trucks (STD-D-3201)

5.5.4 Clearances Around Padmounted Electrical Equipment

Padmounted equipment requires the following working clearances, as measured from the edge of the pad or vault:

- At least 10' of horizontal separation in front of and extending parallel to:
 - The front of the equipment enclosure and
 - Any side of the enclosure that has a door or access panel.
- At least 36" of horizontal separation on any non-opening side of the electrical equipment.
- At least 30' of vertical clearance above the electrical equipment and the required horizontal separation.
- At least 30' of horizontal clearance is required from any padmount transformers to switch/lateral vaults.

[Figure 33](#) and [Figure 34](#) show the required clearances for padmounted electrical equipment adjacent to a noncombustible structure and combustible structure, respectively.

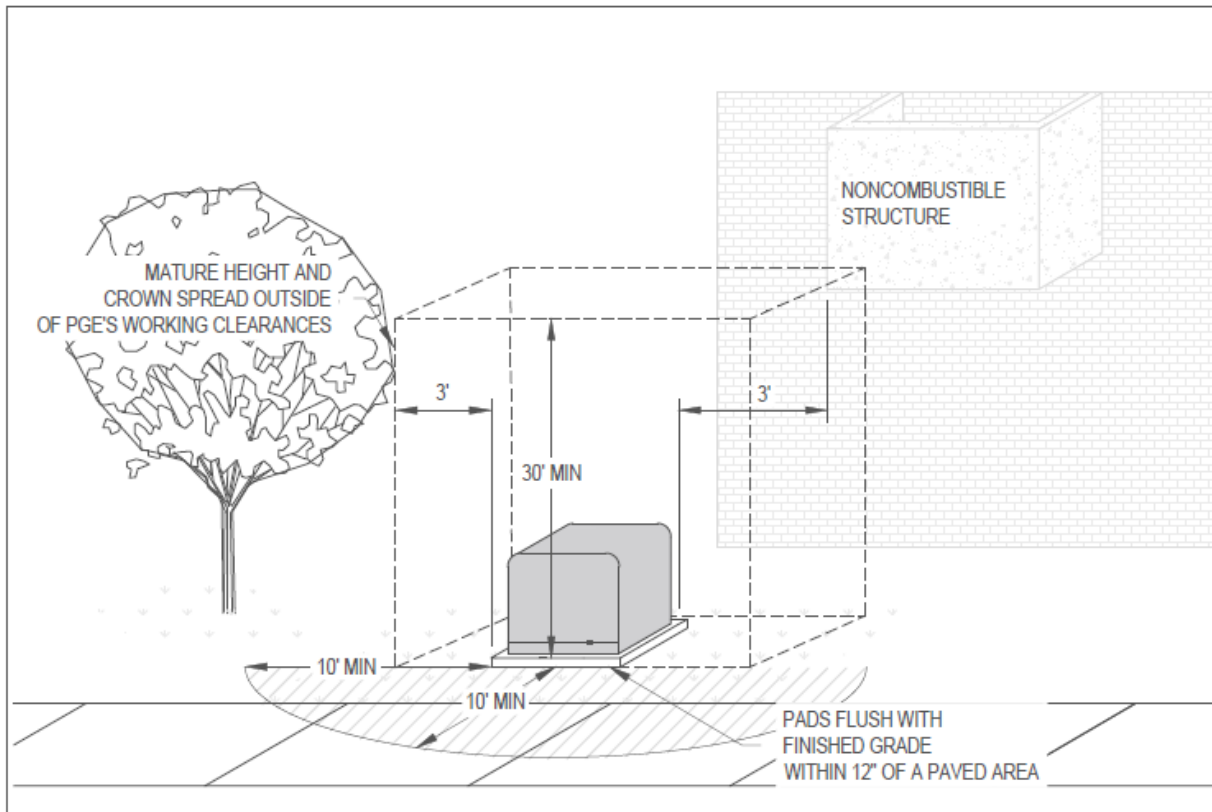
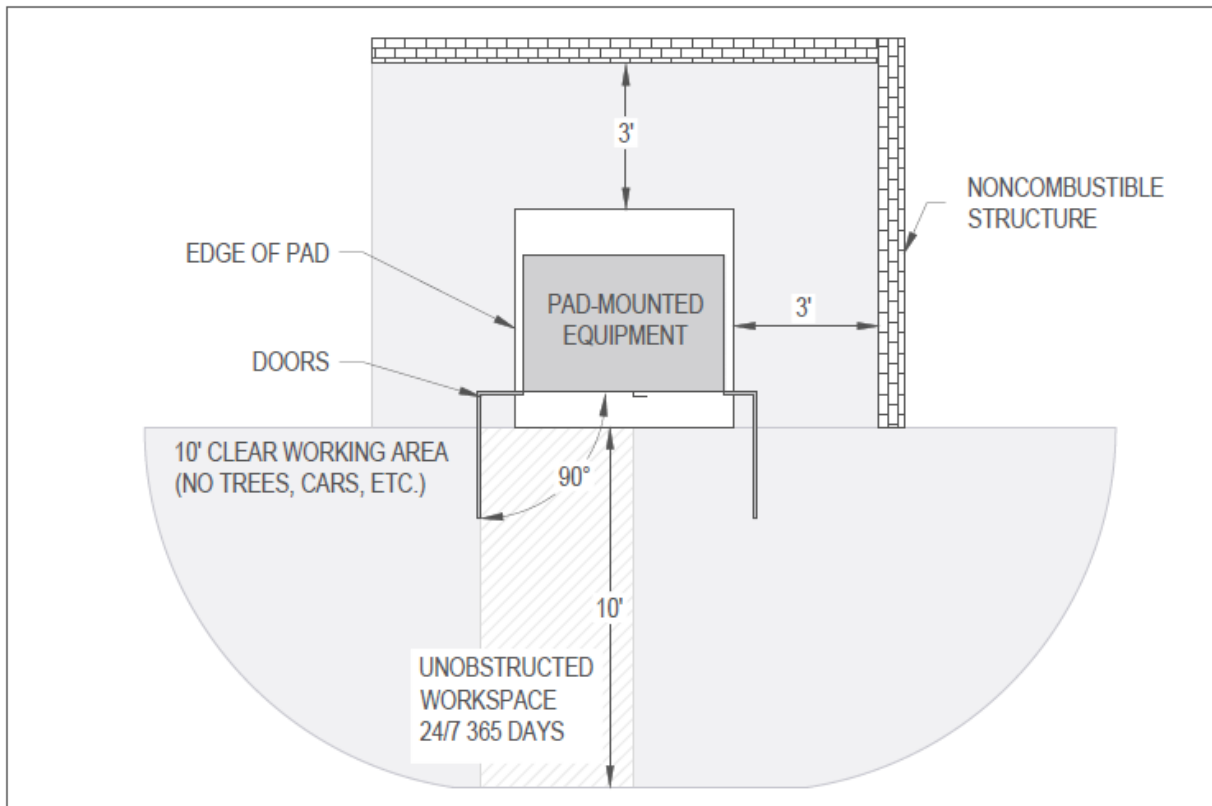


Figure 33. Working Clearances Around Padmounted Electrical Equipment Adjacent to a Noncombustible Structure (STD-D-3202)

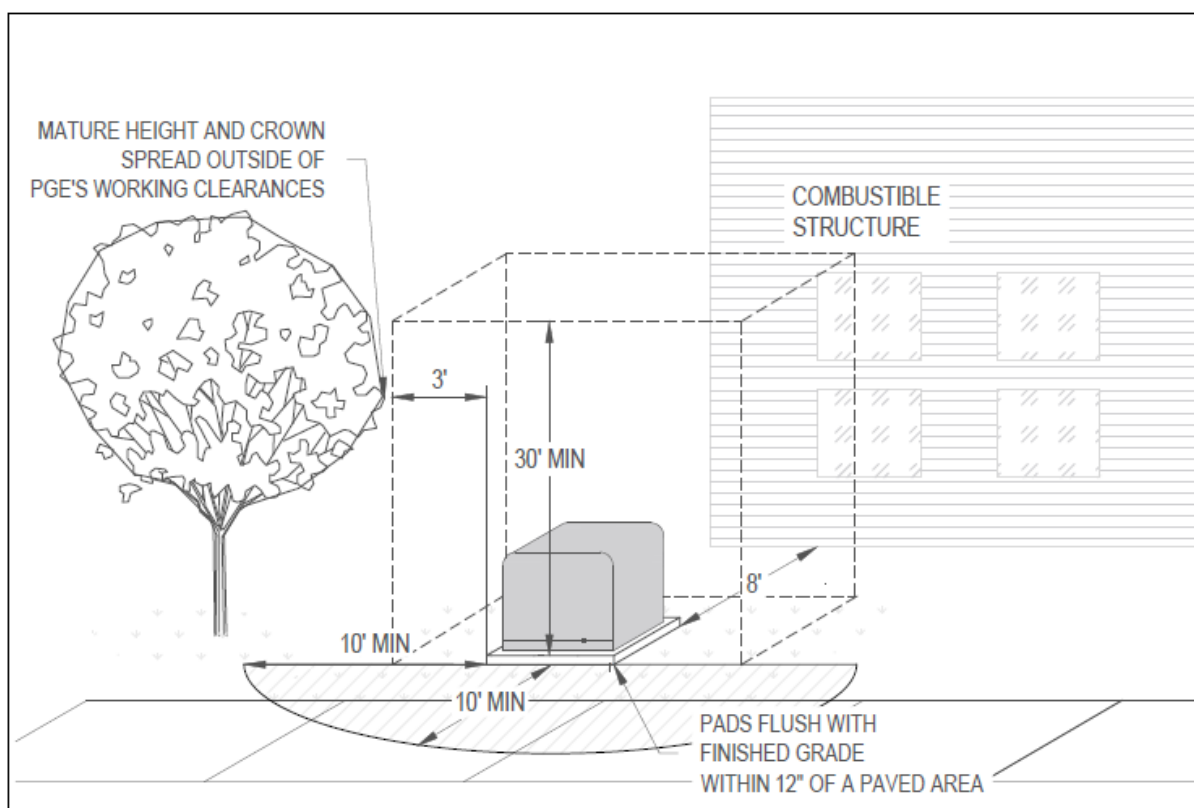
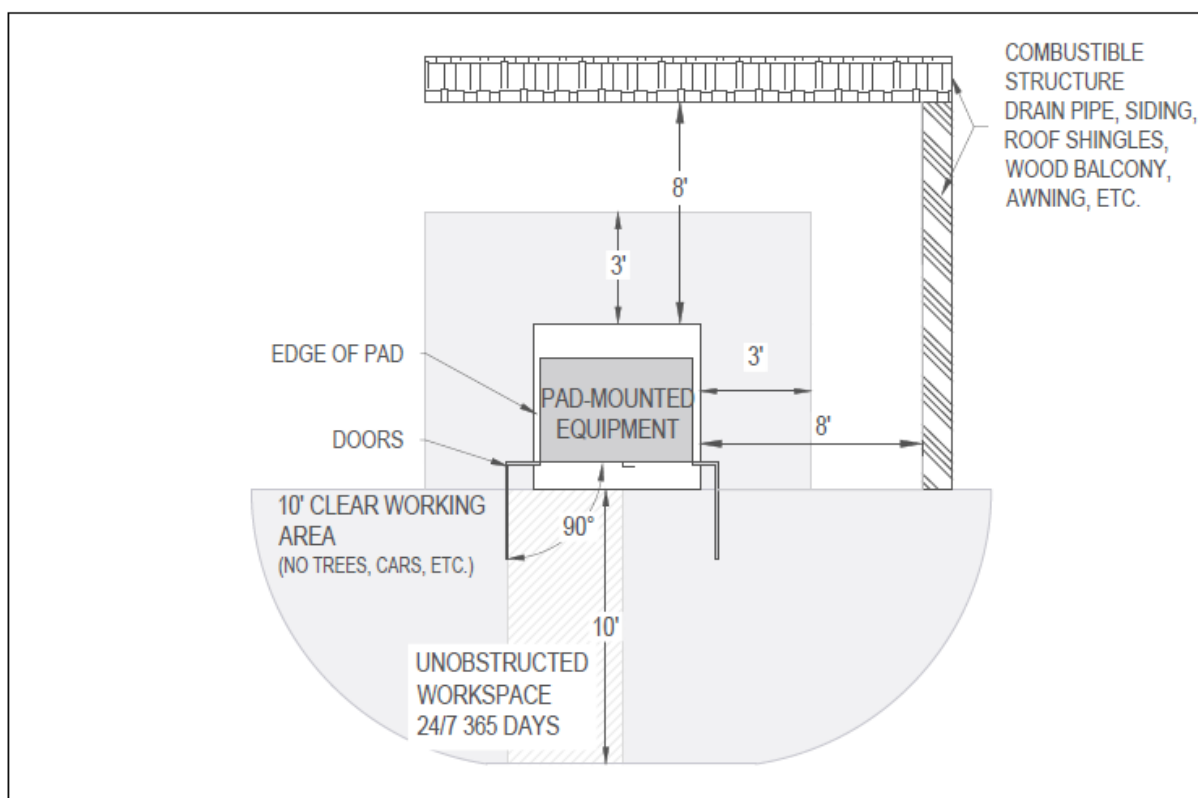


Figure 34. Working Clearances Around Padmounted Electrical Equipment Adjacent to a Combustible Structure (STD-D-3203)

5.5.5 Clearances Around PGE Submersible Equipment

Submersible equipment requires at least 5' of horizontal separation in front of and on the sides of the enclosure lid. At least 10' of horizontal separation from the front (vehicle-accessible) side of the enclosure lid is required. If the side opposite the lid hinges is not on the vehicle-accessible side, the side opposite of the hinges must also have 10' of horizontal separation in addition to the vehicle-accessible side. A vertical separation of 30' is required above the lid and horizontal separation. Awnings, landscaping, and balconies must not impede the 30' vertical clearance.

[Figure 35](#) shows the separation requirements for submersible electrical equipment.

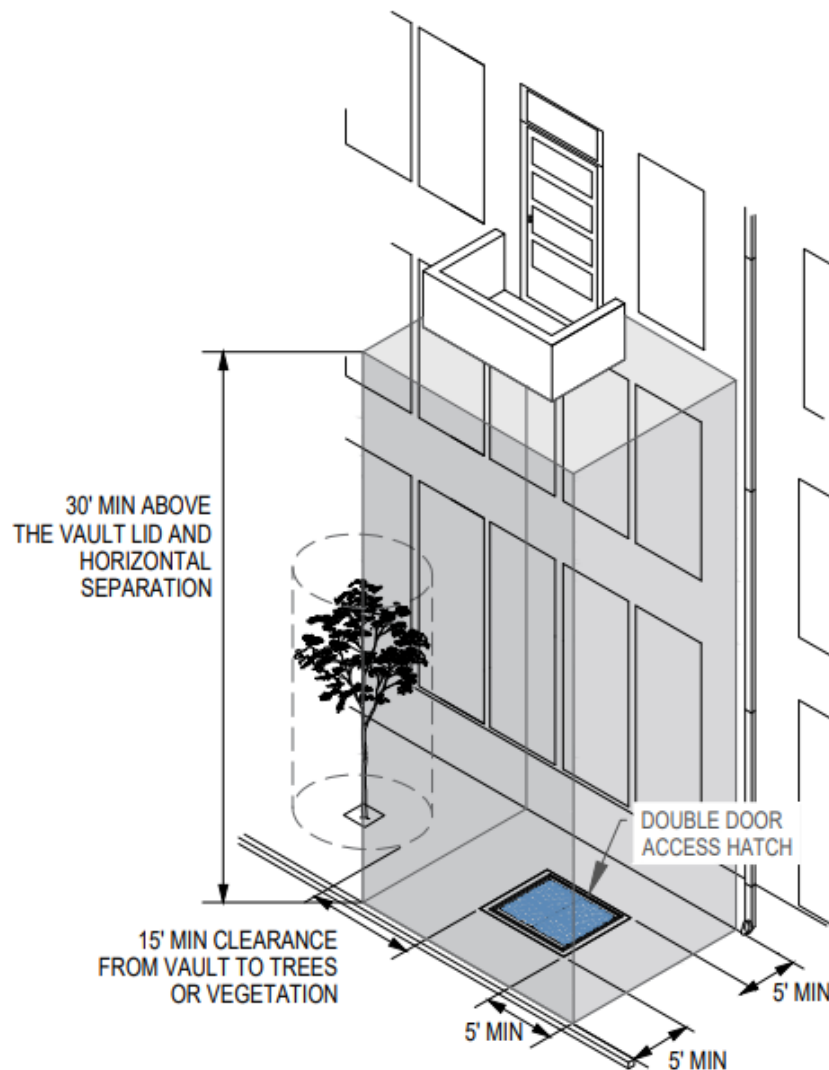


Figure 35. Working Clearances Around PGE Submersible Equipment (STD-D-3216)

5.6 Safety Clearances from Other Hazards

5.6.1 Clearances of PGE Electrical Equipment from a Gas Meter Set

Required clearances from gas:

- The minimum distance between a gas meter, regulator, or flange and a PGE meter is 3".
- The minimum distance from a gas meter, regulator, or flange and a PGE electrical switch, vault, or transformer is 10'.

The design of the gas meter set varies. Differences include:

- The regulator is not always the farthest component in the gas meter set.
- The nearest gas component could be an outlet elbow or flange.
- The customer gas line may extend beyond the last component.
- The length of the gas meter set varies with the number of meters and associated equipment.

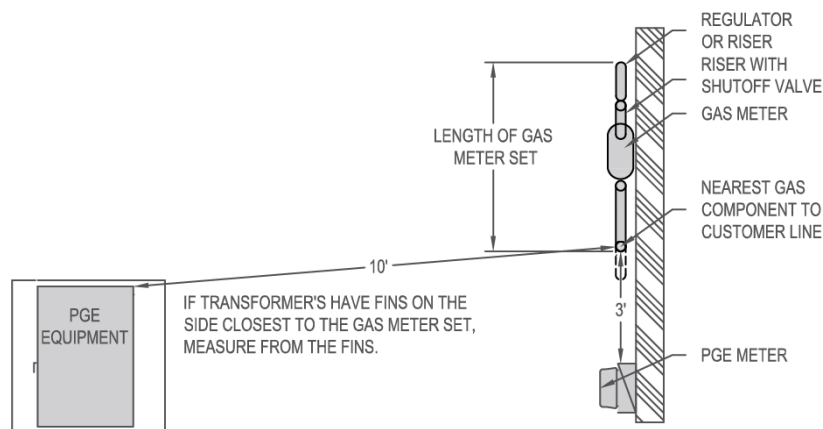


Figure 36. Separation of Electrical Equipment and a Meter from a Gas Meter Set (STD-D-2242)

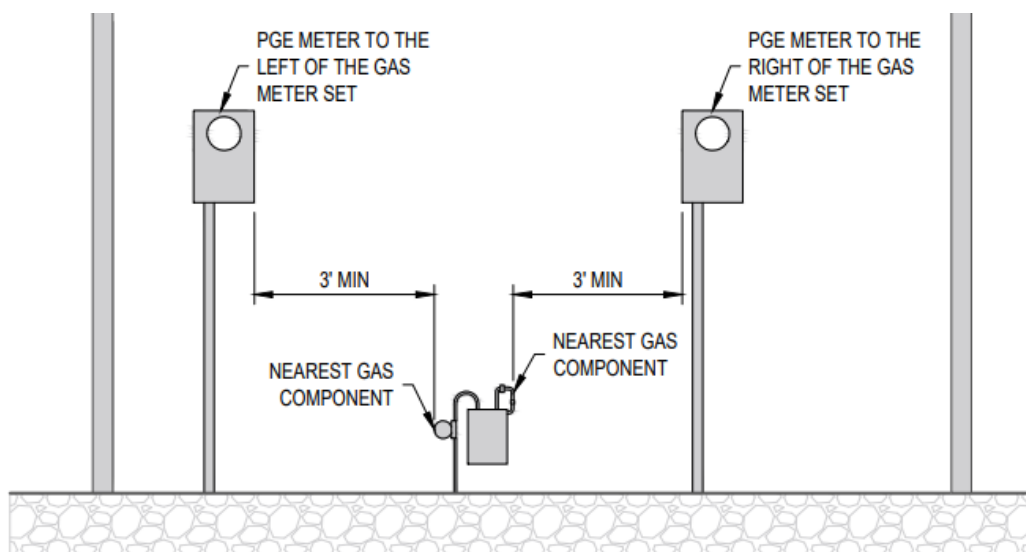


Figure 37. Separation of a Meter from a Gas Meter Regulator and Gas Meter Flange (STD-D-2242)

5.6.2 Separation of PGE Electrical Equipment from a Liquefied Petroleum Gas Container

Electrical equipment—such as a transformer, switch, vault, or pedestal—is a source of ignition and must be separated from a liquefied petroleum (LP) gas container (a.k.a. propane and butane).

As shown in [Figure 38](#), the separation distance for an LP gas container is either:

- The distance between the electrical equipment and the pressure-relief valve or filling connection(s) on any portable container, or
- The distance between the electrical equipment and the vent valve(s) for a container filled on site from a bulk truck.

The separation distances listed in [Table 19](#) must be applied to installation of electrical equipment on customer property with an LP container.

In some installations the conduit fitting into the customer's equipment may have to be designed to be gas-tight or to allow the required separation distance from LP gas containers. In all such cases, the customer is responsible for resolving this issue with the local Authority Having Jurisdiction (AHJ) and to provide, install, and maintain the necessary materials.

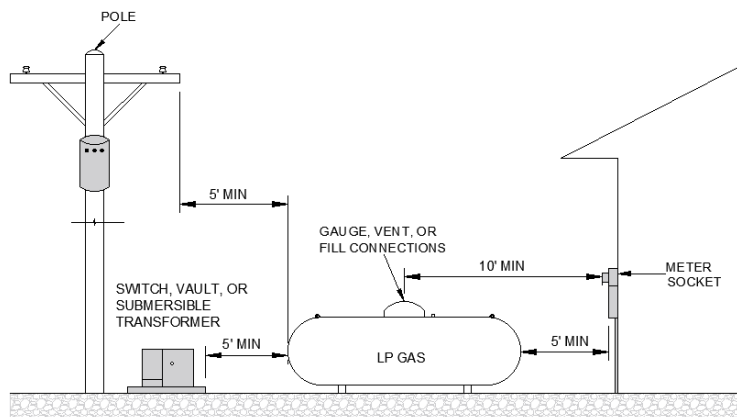


Figure 38. Minimum Distances from an Aboveground LP Storage Tank (STD-D-2250)

Table 19. Minimum Separation of a LP Container from Other Oil-Filled Equipment

Container Type	Tank Location	Container Size	Minimum Separation from Electrical Equipment (feet)	
			From Relief Valve of Containers Not Filled on Site	From Fill Tubes or Relief/Vent Valves of Containers Filled on Site
DOT*	Aboveground	All sizes**	5 [†]	10 [†]
ASME*			— [†]	10 [†]
ASME*	Belowground	0 to 2000**	— [†]	10 [†]
		2001 to 120,000**		50 [†]

* US Department of Transportation (DOT) rating.

** Container sizes are rated in gallons-of-water capacity (WC) in the US Customary System.

† Separation distance in any direction as specified in NFPA 58, Liquefied Petroleum Gas.

5.6.3 Separation of Conduit from a Fuel Storage Tank

Underground service conduits must have at least 10' of separation between the conduit run and the nearest point of a buried fuel storage of any construction (including metal or fiberglass).

5.6.4 Fire Hydrants

The clearance between fire hydrants and PGE poles, guys, transformers, and other electrical equipment must not be less than 4'.

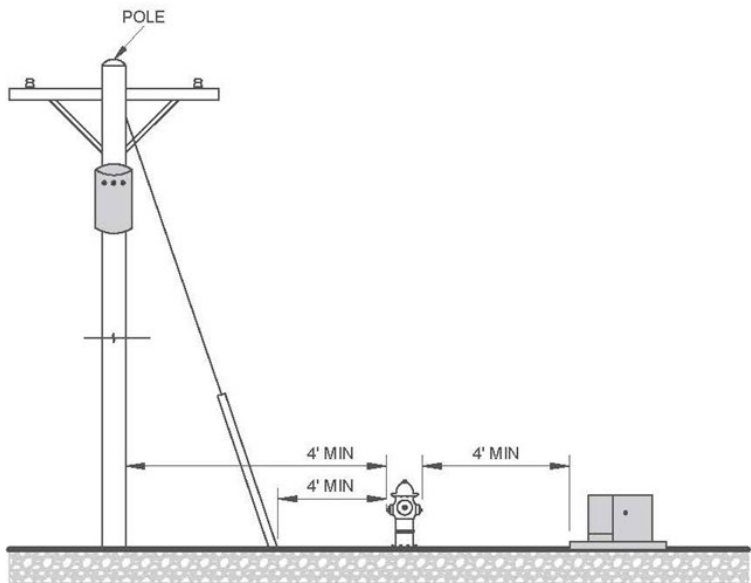


Figure 39. Clearances from Fire Hydrant to Support Structures (STD-D-2260)

5.6.5 Irrigation Sprinklers

Meter sockets, terminal cabinets, current transformer cabinets, and transformers must be located away from landscape irrigation sprinklers.

5.6.6 Overhead Clearances from Pools, Diving Structures, or Bodies of Water

The clearance in any direction from the water level, edge of pool, base of diving platform, or anchored raft must be at least 23' from TX, QX, or open supply **conductors**. The clearance in any direction to a diving platform must be at least 15' from TX, QX, or open supply **conductors**.

5.6.7 Underground Cable Clearances Near Water

PGE will not install facilities under or through a body of water (such as a river, creek, or stream) or water feature (such as a pool, pond, or fountain). When installing new facilities, all underground cable and conduit must be kept at least 5' from the edge of any body of water or water feature. Additional clearances or encasement may be required if the body of water is expected to continue to erode and/or shift over time (such as with wandering streams). Contact PGE for additional site-specific information and requirements.

5.6.8 Barrier Posts (aka Bollards)

IMPORTANT: Consult with PGE for final location and number of required barrier post. When barrier posts are required, PGE **will not** energize service until they are installed.

Customers are required to install barrier posts (bollards) around all electrical equipment (such as transformers, switchboards, CT cabinets, or sectionalizing cabinets) in areas where that equipment is exposed to vehicle traffic. PGE must approve the barrier post design and location. [Figure 40](#) shows barrier post dimensions and installation details.

Barrier posts are required for the following:

- When the distance from a landscaped area to the side of PGE equipment is 5' or less.
- When the distance from the face (or back) of a standard 6" curb to the pad of the PGE equipment is 5' or less.
- When PGE equipment (poles, vaults, etc.) is accessible to vehicular traffic via a paved or gravel surface.

IMPORTANT: Sidewalks without curbs, parking lot tire stops, and other types of mountable curb do not provide adequate protection.

At the discretion of PGE given site conditions, such as when future development is anticipated and/or planned.

5.6.8.1 Placement and Clearance Requirements

The following requirements apply to barrier post installations:

- Install barrier posts on all sides of the equipment that are exposed to vehicles.
- Barrier posts must be spaced no more than 6' apart, measured from the face of the post. PGE may require barrier posts with less than 6' separation to maintain required safe working clearances in front of primary conductor connections. This may increase the total number of barrier posts required for the installation.
- On the sides of pad-mounted equipment with no door, locate posts at least 3' away from the housekeeping pad.
- On the sides of pad-mounted equipment with doors:
 - PGE requires 10' of unobstructed working clearance in front of primary conductor connections (see [Figure 41](#)); do not locate barrier posts in front of the left half of padmounted equipment or vaults (see [Figure 42](#)).
 - When placing barrier posts in front of the secondary conductor connections, a 4' clearance is required from the edge of the pad to the barrier posts.
 - Doors must be able to open 90 degrees.

5.6.8.2 Installation Requirements

- Install barrier posts in undisturbed earth. If 3' of undisturbed area is not available after the vault is set, the area between the vault wall and the barrier post hole must be filled with 3/4" minus compacted gravel.
- Each barrier post must be set in a concrete foundation that extends at least 3" below the bottom of the post.
- Areas with heavy vehicle traffic (such as truck traffic lanes and loading docks/areas) must have barriers with reinforced concrete foundations.
- Barrier posts must be 6" diameter, Schedule 40 galvanized steel posts. Post dimensions are listed in [Table 20](#).
- Steel posts must be filled with concrete. All concrete must have a minimum compressive strength of 3000 psi after 28 days.
- Barrier posts must have a domed top.
- At the foot of a barrier post located at final grade, the concrete must have a 2" dome to prevent water pooling.
- Paint all barrier posts safety yellow and apply two 3"-wide reflective bands near the top of each post, as shown in [Figure 40](#).
- Where a barrier post interferes with opening the equipment door or inhibits the workspace, a removable barrier post must be installed. PGE approval is required before installation.

Table 20. Barrier Post Dimensions for Specific Locations

Location	Dimension (inches)		
	Length of Galvanized Steel Post	Post A Hole Diameter	Post B Height Above Final Grade
Heavy vehicle traffic area	108	30	54
Car traffic area	96	24	42

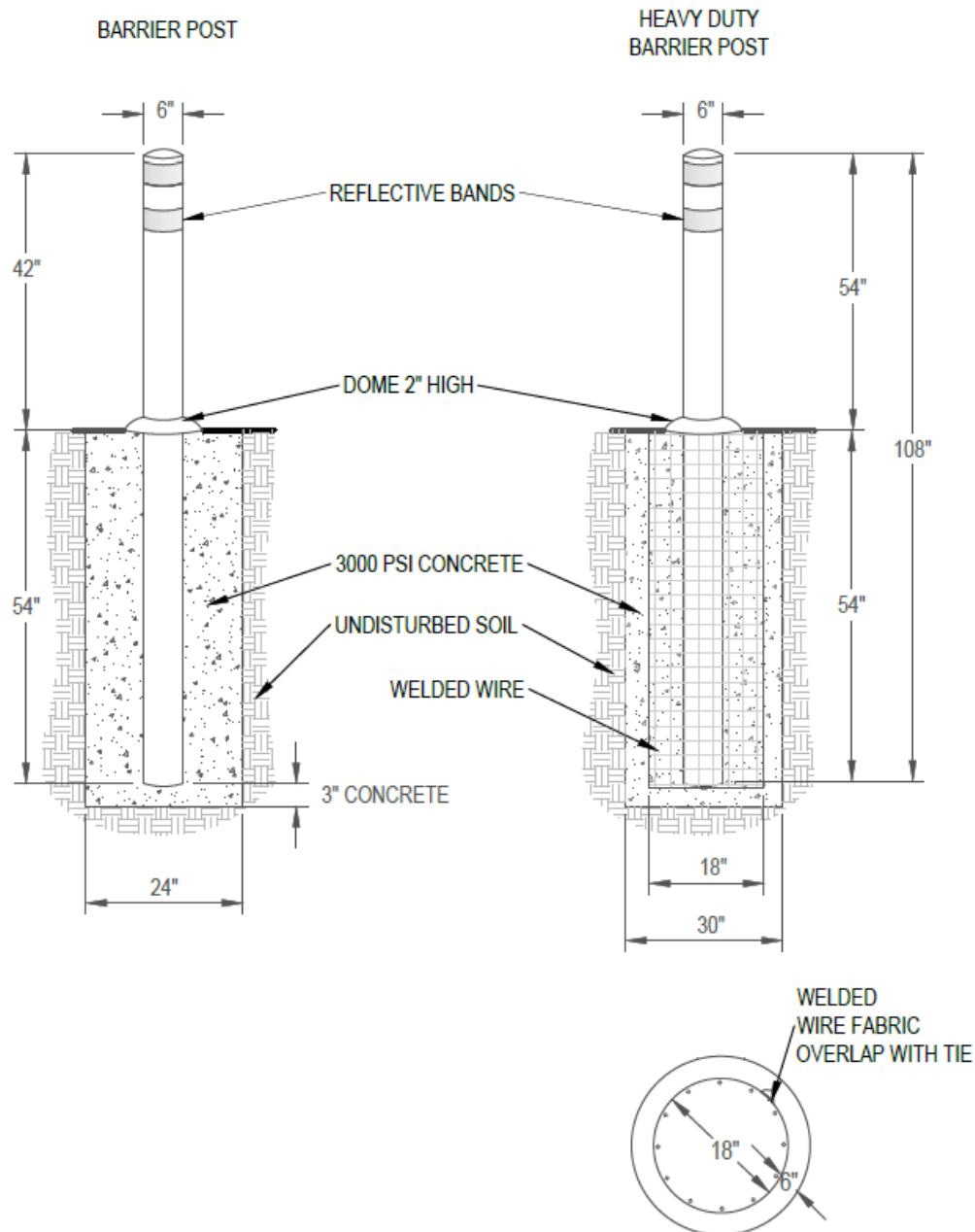


Figure 40. Barrier Post Dimensions and Installation Details (STD-D-3290)

IMPORTANT: Consult with PGE for final location and number of required barrier post. When barrier posts are required, PGE **will not** energize service until they are installed.

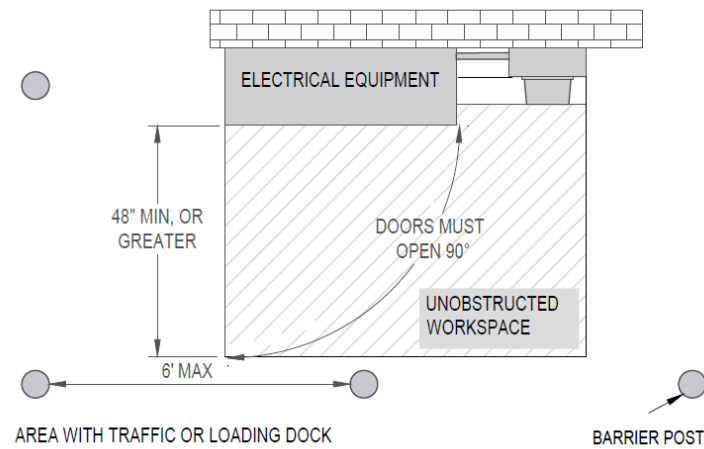


Figure 41. Placement and Clearances for Barrier Posts Around Electrical Equipment (STD-D-3292)

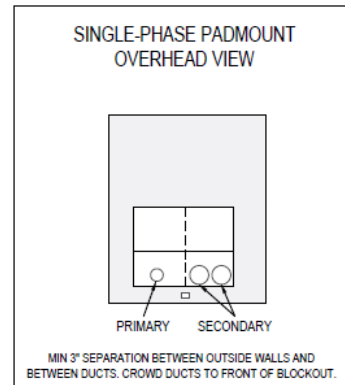
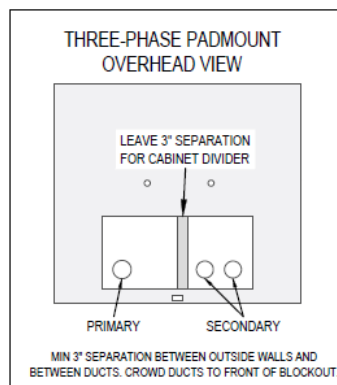
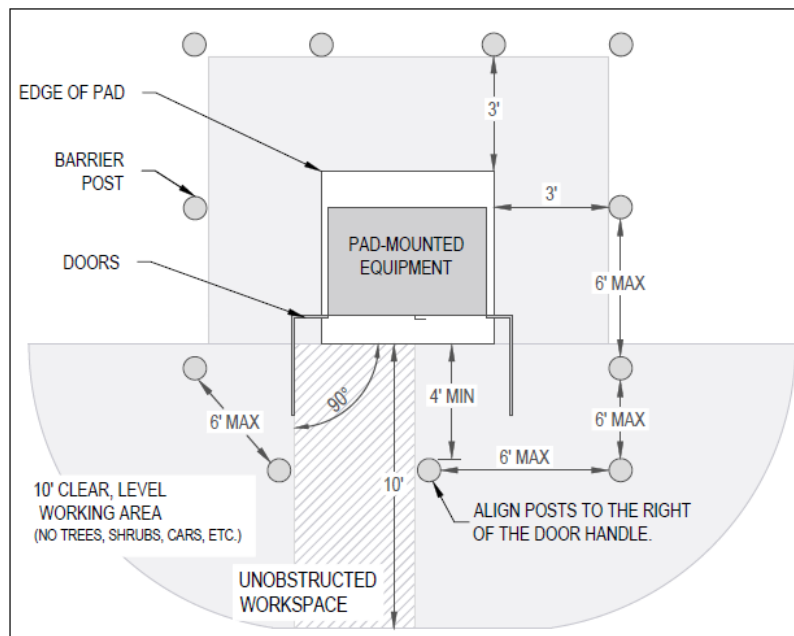


Figure 42. Placement and Clearances for Barrier Posts Around Padmounted Equipment (STD-D-3294)

6 Underground Requirements

Topics in this Section

- [Basic Requirements](#)
- [Trenches Provided by the Customer](#)
- [Conduit](#)
- [Concrete Pads and Vaults for a Padmounted Transformer](#)

6.1 Basic Requirements

IMPORTANT: If there are any changes to your project details (including elevation grade, landscaping, or building footprint), PGE must re-review the service entrance location. Changes to a customer project can affect the trench depth, conduit, vault, barrier posts, and other PGE requirements.

6.1.1 General Customer Responsibilities

The customer is responsible for trenching; backfilling; compaction; the installation of conduit and conduit markers; transformer pads or vaults; ground rods; and any other construction requirements for completion of underground service.

6.1.1.1 Plan

When an underground service is requested, PGE will plan and design that service to be fed with a padmount transformer. The customer must provide space for padmount equipment on private property with a PGE easement. Parking spaces, landscaping, or planter strips may need to be given up. PGE may determine that a Class A vault is required, if PGE determines that no room exists on the property outside the building or if the municipality has explicit language in their code prohibiting an above grade piece of equipment on private property. The *Class A Guide* is available on portlandgeneral.com/esr.

- For all trenching and transformer installations, the customer must meet any requirements of governmental authorities—including excavation permits—as well as those of PGE.
- Residential and commercial services less than 400 A require a meter spot.
- Commercial services 400 A and greater require a Pre-Construction Meeting at the site with a Field Construction Coordinator (FCC). Customers are responsible for scheduling the meeting before they install the conduit.
- Before backfilling, customers are responsible for scheduling an on-site inspection to verify that all requirements have been met.

6.1.1.2 Prepare

- Before you dig, or refresh previous locates, call 8-1-1 or 800-332-2344 for the location of underground utilities. For more information, see [Section 1.2.9](#).
- Refer to the Oregon Utility Notification Center’s Standards Manual for additional information about customer responsibilities, including potholing. Potholing is required near existing trenches and when directional boring.
- When a PGE standby crew is needed, schedule it several weeks ahead of time. A PGE standby crew will observe when a customer penetrates an energized facility. The customer is responsible for supplying the equipment and labor.

6.1.1.3 Protect

IMPORTANT: Do not undermine PGE equipment—including underground cable, transformers, vaults, or poles—unless approved by a PGE standby crew.

- Obtain appropriate materials to cover, mark, and protect the excavation.
- Safety tape or ribbon must be used to identify open-trench hazards.
- Appropriate materials are required for road plating and cover of exposed pits.

6.1.2 PGE Responsibilities

PGE is responsible for:

- Providing a list of approved handhole manufacturers and precast concrete vault manufacturers, available on portlandgeneral.com/esr.
- Providing a Job Sketch when a design is required, indicating the contractor level required by PGE for the project. PGE classifies excavation contractors into three levels, with restrictions based on vault size and installation complexity.
- Supplying conduit markers, ground rods, and secondary pedestals (PF-300s) at PGE yards to customers with job numbers.
- Identifying the service route and trench location for customer conduits to the PGE distribution line or transformer.
- Scheduling a PGE standby crew upon request when a customer penetrates an energized facility. The standby crew will open the facility to confirm conduit entry/exit and serve as a safety watch for the customer or contractor.
- Installing, maintaining, and owning the underground service tap line from the PGE distribution line or transformer through the customer’s conduit to the point of delivery, in most cases.

6.2 Trenches Provided by the Customer

The customer must comply with Occupational Safety and Health Administration (OSHA) rules and Oregon Utility Coordinating Council (OUCC) standards.

IMPORTANT: PGE must inspect all PGE trenches and conduit before backfilling.

6.2.1 Customer Responsibilities

When providing a trench, the customer is responsible for:

- Consulting PGE to determine the route and the point of attachment for:
 - Conduit location on PGE poles with PGE-installed standoff brackets
 - Underground service laterals
 - Meter locations
 - Service outlet locations
 - Current transformers
 - Terminal cabinet enclosures
 - All PGE conduit, vaults, pads, and PGE-owned equipment
 - Routing conduit under buildings or other permanent obstructions (not permitted)
- Locating the service entrance to ensure the meter and service are easily accessible from PGE distribution lines and convenient for the installation, operation, and maintenance of PGE meters and equipment.
- Obtaining a permit from the Authority Having Jurisdiction (AHJ) before performing any work in the right-of-way. Only PGE-approved excavation contractors may work under a PGE permit. The contractor must notify the AHJ 48 hours before work begins and have a copy of the permit on site.
- Ensuring that spoil (excavated material) is placed at least 24" back from the edge of the trench, as shown in [Figure 44](#). If this is not possible, trench shoring may be required to comply with OSHA rules. Spoil may be placed in the street if approval is received from the AHJ.

6.2.2 Marking Tape

Red underground marking tape is required above buried ducts or conduits. The tape must be centered 12" above the conduit. For conduit packages wider than 24", two runs of tape are required with a separation of 15" or less.

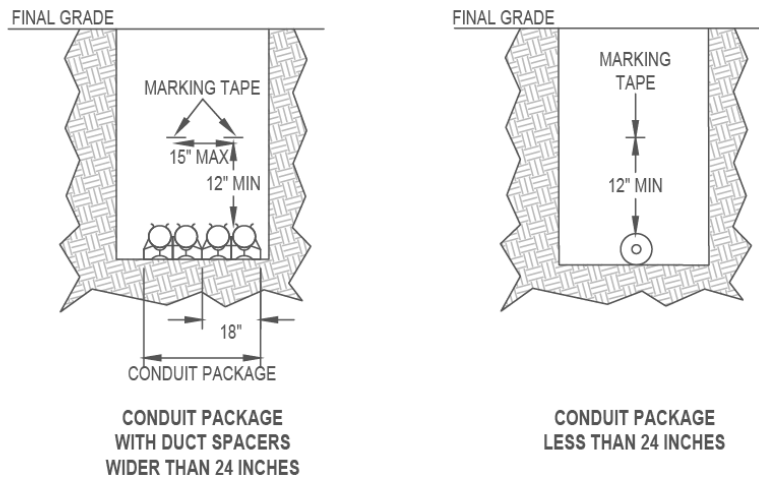
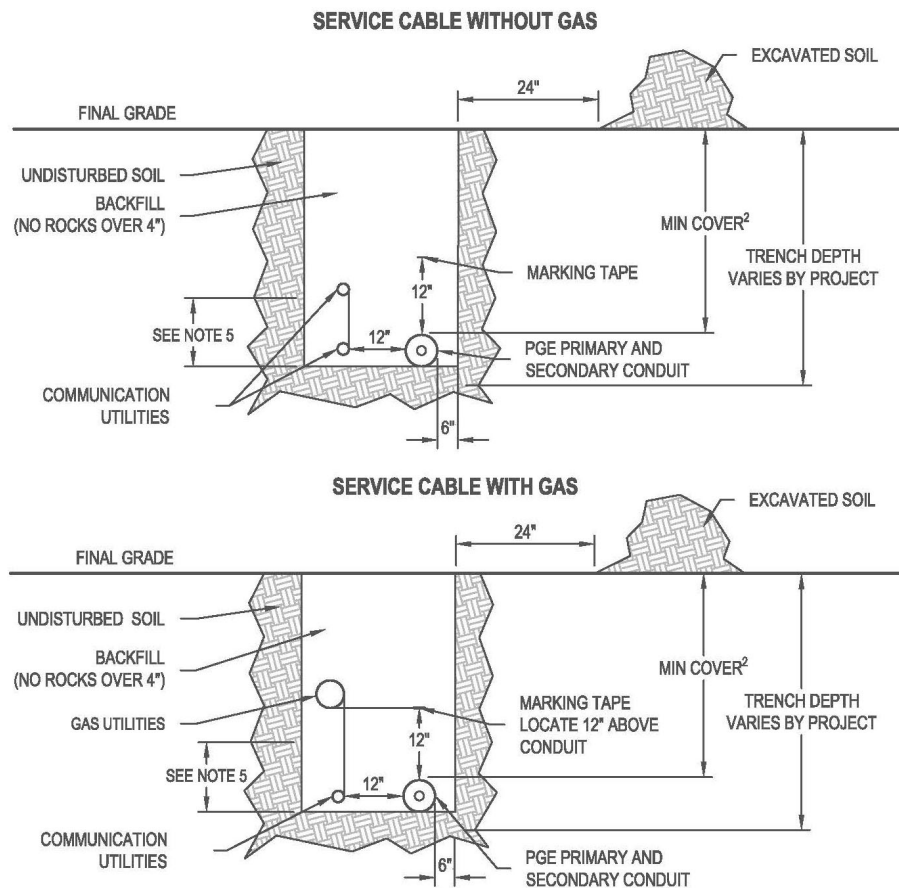


Figure 43. Placement of Marking Tape Above Ducts or Conduit (STD-D-3110)



CONSTRUCTION NOTES:

1. INSTALL CONDUIT AT DEPTHS NECESSARY TO ENTER ALL VAULTS, PADS, AND EQUIPMENT AS DETERMINED BY PGE.
2. PGE REQUIRES 30-INCH MINIMUM COVER. THE MINIMUM COVER MAY NEED TO BE MORE GIVEN MUNICIPAL REQUIREMENTS OR AT LOCATIONS WHERE A LARGE RADIUS SWEEP NECESSITATES IT.
3. INSTALL UNDERGROUND MARKING TAPE CENTERED ABOVE THE CONDUIT(S).
4. COMMUNICATION CONDUITS, WHEN PRESENT, MUST BE INSTALLED BEFORE PGE CONDUCTS THE TRENCH INSPECTION.
5. TRENCH NOT TO EXCEED 6 FEET IN DEPTH WITHOUT PGE APPROVAL.
6. WHEN APPLICABLE, SELECT BACKFILL MUST BE PLACED A MINIMUM OF 3 INCHES BELOW AND 6 INCHES ABOVE THE OUTSIDE WALL OF THE CONDUIT.

Figure 44. Service Cable Trench for Joint Use With or Without Gas (STD-D-3100)

6.2.3 Trench Dimensions and Cable Separation

Trench designs must provide suitable protective earth cover and separation between PGE-energized cables and other joint trench utilities along the entire trench length. [Figure 44](#) and [Figure 45](#) show the minimum requirements for trench depth and cable separation. Greater depths may be required by local jurisdictions. Communication conduit must be installed before PGE conducts the trench inspection (pre-backfill).

IMPORTANT: For single-family and duplex, residential subdivision, industrial, and commercial projects, finished grade must be established before trench excavation to ensure that minimum cover requirements for cables and conduits are met. Minimum cover requirements for cables are measured from the trench surface to the top of the cable or conduit.

On private property, customer-owned water lines are allowed in trenches adjacent to PGE-approved conduit. If the PGE service is not directly buried, the customer’s water line must have a minimum 1' vertical and 2' horizontal clearance from PGE conductors.

On public property, no water or sewage pipe may be in the same trench as PGE conduit.

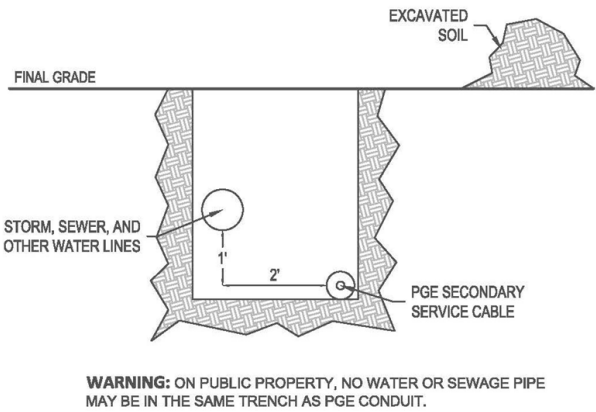


Figure 45. Clearances from PGE Service Cable to Water Lines on Private Property (STD-D-3109)

6.2.4 Duct Spacers

The ampacity limit of an underground conductor is determined in part by the vertical and horizontal spacing between ducts. For this reason, duct spacers are required for multiple duct-runs where a horizontal configuration in the trench cannot be obtained. Spacers must be selected to allow a 3' spacing between outside duct walls.

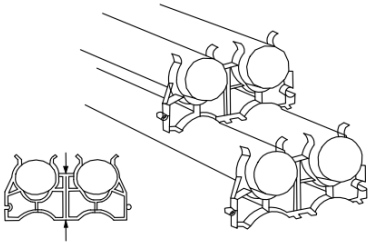


Figure 46. Duct Spacers

6.2.5 Select Backfill

When on-site backfill contains rocks larger than 4" or rocks with sharp corners, select backfill or backfill processed on-site must be used. Either backfill must be placed at least 4" below and 6" above the conduit or cable configuration. Backfill in the remainder of the trench must be free of rocks larger than 4" in diameter.

Select backfill must meet the following standards:

- 100% of the material passes a 3/4" sieve.
- No more than 12% of the material passes a No. 200 mesh sieve.
- The material is reasonably free of organic and otherwise undesirable materials.

Generally, 3/4-minus meets these requirements.

6.2.6 Mechanical Protection

For extremely adverse ground conditions—such as solid rock formations or conflicts with other utilities—conduit may be installed at a minimum depth of 12" if mechanical protection is used. Acceptable mechanical protection is a minimum 2" layer of red-dyed 3000 psi concrete directly above the conduit that has at least 6" of horizontal coverage beyond the end of the conduit.

6.2.7 Controlled Density Fill

Controlled density fill (CDF) or controlled low-strength material (CLSM) may be necessary in areas where future excavation of conduit is expected (road crossings, for example). Conduit in CDF must be fully encased at a minimum of 6" on all sides. Red concrete dye is required when CDF is used for backfilling a trench or any other energized equipment.

CDF must meet the following requirements:

- It must have maximum compressive strength between 100 and 200 psi.
- Its allowable slump is 7" (+/-2") at the time of batching.
- It must be dyed red with dye mixed at the batch plant.

Additional requirements exist for under-foundation backfill. Consult with PGE for requirements.

6.2.8 Mitigating Potential Surface and Subgrade Water Flows

The customer is responsible for obtaining base flood plain elevation requirements from the AHJ and for recognizing—and mitigating—potential surface and subgrade water flows that may let water enter customer-owned electrical equipment and/or toward PGE equipment (including vaults, pads, and poles). Measures taken may include conduit design, grading, and/or adding a second junction box for water mitigation.

6.3 Conduit

PGE must approve all conduit routes before any conduit is installed by the customer. Conduit must never be installed under bodies of water, buildings, decks, or other structures. If rock or other obstructions are encountered, consult PGE to discuss the route. When the conduit terminates at a PGE pole, PGE must be consulted for the exact conduit location (see [Section 6.3.3](#)). Before backfilling, PGE must inspect customer-installed conduit.

IMPORTANT: PGE will not install a conductor if the conduit system is improperly constructed. The customer is responsible for repairing—or for the costs associated with repairing—any conduit problems before installation of a PGE conductor. PGE owns and maintains the conduit system once a PGE conductor has been installed.

All primary and secondary cables must be in conduit. The customer must install either rigid steel or electrical-grade Schedule 40 gray PVC conduit. When multiple conduits are present, conduits must have 3" of clearance between the outside of conduit walls. All PVC joints must be glued.

All factory-cut and field-cut conduits must be chamfered to prevent damage to PGE cables. Connections to PVC conduit must use straight couplings with barbed threads on one end and NPT on the other end.

NOTE: PGE allows the use of HDPE duct for horizontal directional boring applications. Schedule 40 mechanical-interlocking PVC conduit may be used as an alternative to HDPE duct when directional boring is required. For more information on HDPE duct, see [Section 6.3.6](#).

To avoid damage to underground conductors and service equipment caused when soil settles, all service conduit riser elbows must be backfilled at least 4" deep with tamped 3/4" minus crushed rock. Steel risers may be required on risers that face traffic.

IMPORTANT: The conduit requirements listed in [Table 21](#) are for reference only. Requirements for each project depend on the Job Sketch (design) and requirements of the service.

Table 21. Conduit Requirements for Secondary Voltage Conductors (Reference only)

Service Entrance Ampacity	Single-Phase, 3-Wire		Three-Phase, 4-Wire	
	Conduit Size	# of Conduits	Conduit Size	# of Conduits
200 A or lower	3"	1	3" (min.)	1
320 A continuous	3"	1	—	—
400 A to 600 A	3"	2	4" (min.) *	2
800 A	3"	3	4" (min.) *	3
1000 A	—	—	4" (min.) *	4
1200 A	—	—	4" (min.) *	5

Service Entrance Ampacity	Single-Phase, 3-Wire		Three-Phase, 4-Wire	
	Conduit Size	# of Conduits	Conduit Size	# of Conduits
1201 A to 1300 A	—	—	4"*	6
	—	—	5" or 6"	4
1301 A to 1500 A	—	—	4"*	7
	—	—	5" or 6"	4
1501 A to 1600 A	—	—	4"*	8
	—	—	5" or 6"	5
1601 A and larger	—	—	Consult PGE	
	—	—		

* Where space allows 6" conduit may be substituted for 5" conduit. The PGE designer must confirm that sufficient space is available at vault penetration, sweeps, and building penetration, and in the customer's equipment. Consult PGE for conduit sizes for all three-phase services.

Additional conduit requirements for secondary voltage conductors include:

- 4" conduit may be substituted for 3" conduit, except for 200 A or 320 A continuous services.
- Large conduit size, additional conduits, or a larger bend radius may be required for longer runs, 4-wire full neutral, or direct connection to utility conduit. Consult PGE for specific requirements.
- Manufactured conduit spacers are required for multiple-conduit installations where a horizontal configuration in the trench cannot be obtained. When customers use multiple conduits in spacers, PGE requires 4" to 6" lifts for native soil. Alternately, customers may use 3/4" minus backfill.
- Contact PGE for approved conduit spacers.

6.3.1 Customer-owned Conductors

The customer's service conductors must be in a separate conduit system from PGE conductors.

6.3.2 Conduit Sweeps and Pull Lines

IMPORTANT: All sweeps must be factory made. Field bends or field heat bends are not acceptable.

Table 22. Sweep Radius Requirements

Diameter (inches)	Minimum Sweep Radius (inches)
2-4	36
5-6	60

Sweep requirements are as follows:

- Sweeps of PVC, rigid steel, and fiberglass are acceptable.
 - PVC Schedule 40 sweeps are acceptable if the run is less than 150' and has 180 degrees or less in bends.
 - Rigid steel or PGE-approved fiberglass sweeps are required for runs of 150' or longer, or a run of any length that has more than 180 degrees in bends.
- Each sweep must meet the requirements for iron pipe size (IPS) design in NEMA TC 14, Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

Table 23. Fiberglass Sweep Specifications

Diameter (inches)	Sweep Radius (inches)	Minimum Wall Thickness (inches)
2-4	36	0.085
5-6	60	0.110

IMPORTANT: The vertical height is typically greater than the sweep radius when installed at 90 degrees. Typically, 2-4" fiberglass has a vertical clearance of 58" and 5-6" fiberglass has a 7' vertical clearance. Consult with your manufacturer for specific dimensions.

Installation requirements are as follows:

- When all the bends in a conduit are added up, the sum must not exceed 270 degrees regardless of the conduit type.
- Sweeps must be separated by a straight section at least 5' long. There must be a straight section at least 3' long from a vault.
- Each sweep must have two extra-deep, fabricated PVC couplings.
- Cap all conduits at both ends during installation to keep them free of dirt and debris.
- All conduits must have a 500-pound-rated nonconductive pull line with 6' of line extending from each end of the conduit. The pull line must be installed after the conduit is joined and the glue is dry.
- Where a customer's conduit extends to a PGE pole, the customer must provide the sweep and install it at the exact location selected by PGE (see [Section 6.3.3.](#))
- Where a new conduit and/or pull line enters an existing PGE secondary vault or transformer, the installer is required—before installation—to schedule a PGE standby crew. The standby crew will meet the installer at the site on the day when the installer will be penetrating the PGE equipment.

IMPORTANT: Do not undermine PGE equipment—including underground cable, transformers, vaults, or poles—unless a PGE standby crew approves the work.

6.3.3 Standoff Brackets

If a customer’s job extends to a PGE pole, PGE will install a 12" or 18" standoff bracket. To obtain the exact location on the pole, contact PGE’s Service Coordination team 503-323-6700. A PGE service inspector will come to the site and either install the bracket on the pole or mark the location on the pole for the conduit.

Customers must install the conduit at a right angle to the PGE bracket. As shown in [Figure 47](#), install risers as far as possible from the pole, flush against the end of the bracket, to allow for later installation of fiber or power conduits closer to the pole.

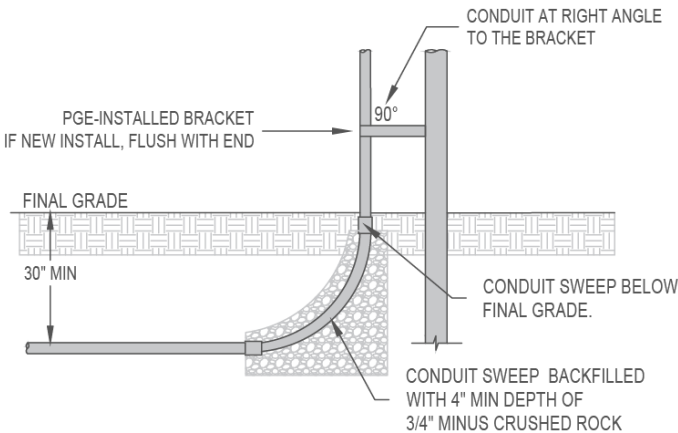


Figure 47. Secondary Voltage Overhead to Underground Service with Pole Bracket (STD-D-3130)

6.3.4 Duct Proofing (aka Mandrel Test)

After PVC and/or HDPE are installed, the contractor or installer is responsible for duct proofing all ducts installed before the job is complete and before the installation of PGE conductors. Duct “proofing,” also known as a mandrel test, involves pulling or pushing a mandrel and duct brush through a conduit. This process ensures a duct is clear of obstructions and grit, and that no portion of the duct has collapsed or is out of round. If the mandrel will not pass through the conduit, it must be replaced or repaired at that point by the installer.

Permitted mandrel types include either aluminum or hard plastic and must be round. Permitted duct brushes must be wire. Mandrels must be rated at 80 percent proof, meaning they must fill 80 percent of the installed duct’s inner diameter. The wire duct brushes must be rated at 90 percent proof, filling 90 percent of the installed duct’s inner diameter. A pulling aid is permitted, provided it is equipped with a load readout and does not exceed 500 pounds of pulling force. The pull string must have a maximum breaking strength of 500 pounds.

Any conduit sitting vacant, where PGE has not pulled in conductor, requires a mandrel test (aka are-proof) before PGE will create a design using it.

6.3.5 Conduit Locations

During construction, the customer must mark conduit locations with white paint or other marker, such as a plastic strip in accordance with Oregon Administrative Rules (OAR) 952-001-0070.

Conduits must be labeled on the vault wall with the PGE pad or vault number that the conduit is routed to. Pull strings must be tied to the vault lids in switch vaults and transformer vaults, and the vaults must be free of mud, dirt, and debris.

6.3.6 HDPE Duct and Connectors

HDPE duct may be used for horizontal directional drilling (HDD) applications. For safety reasons, all ducts must be black with three equally spaced extruded red stripes. For HDD applications, Schedule 40 PVC with a mechanical connection (such as Certa-Lok, Bore-Gard, or a similar mechanical connection product) may be allowed as alternate.

HDPE duct sections must be joined by s-wedge coupler with BonDuit or PGE approved equal. HDPE to PVC conduit transitions must also use an s-wedge couple with two-part conduit adhesive. The duct must meet the requirements of PGE specification LC20515, which is available on request from a PGE Design Project Manager. Contact PGE's Field Construction Coordinator (FCC) when using HDPE duct.

All HDPE direct-bore installations (regardless of length) must use woven polyester pull tape of a pulling strength of 2,500 pounds (such as Muletape, Herculine, or PGE approved equal) for all brushing and mandrel proofing of the conduit. A single continuous non-spliced run of tape must remain within the conduit.

6.3.7 Conduit Installed in Switchboards

In switchboards, the clear opening in the termination/pull section must allow for:

- 3" separation from the conduit to the steel channel inside the cabinet
- 3" separation between every conduit

To assist customers, the minimum opening of termination/pull sections with typical conduit configurations in switchboards is included in [Figure 48](#), [Figure 49](#), and [Figure 50](#).

TOP VIEW

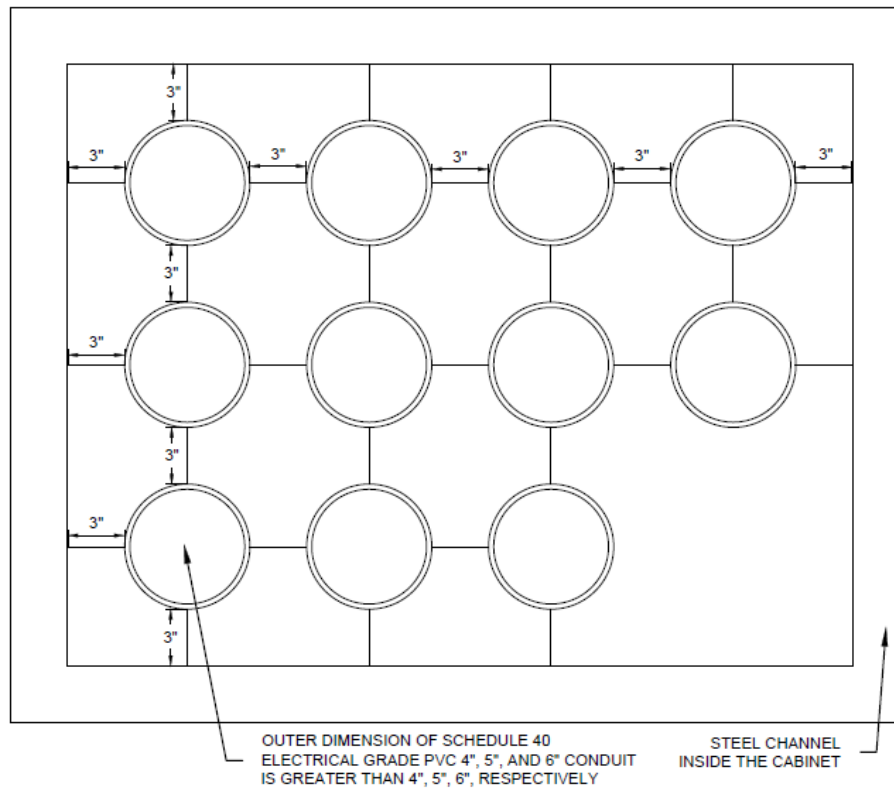
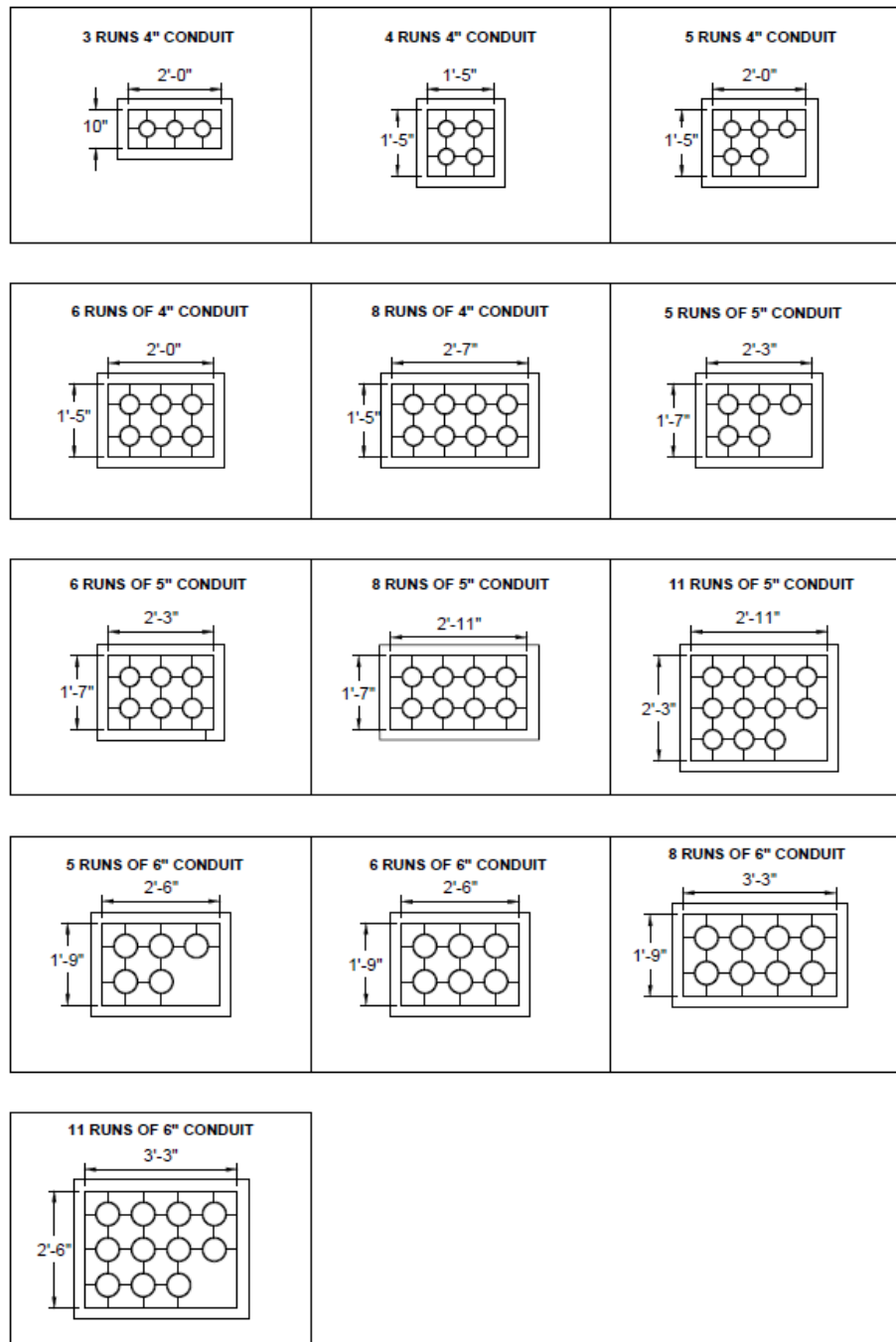


Figure 48. PGE's Required Separation of Conduit in Customer Gear (STD-D-3121)



1. ALL DIMENSIONS SHOWN ARE THE *MINIMUM* WIDTH AND DEPTH REQUIREMENTS FOR THE OPENING IN THE TERMINATION/PULL SECTION OF THE CUSTOMER GEAR. PGE RECOMMENDS ADDING A MARGIN OF ERROR TO THESE MINIMUMS.
2. CONDUITS MUST HAVE 3" OF CLEARANCE BETWEEN THE OUTSIDE OF THE CONDUIT WALLS, AND 3" OF SEPARATION FROM THE FRAME WITHIN THE CABINET.
3. ALL 400 A AND ABOVE GEAR CONFIGURATIONS, AND ANY PROPOSED ALTERNATE CONFIGURATIONS, MUST BE REVIEWED DURING THE GEAR REVIEW PROCESS.
4. CONTACT YOUR DPM TO DISCUSS ALTERNATIVE CONDUIT PATTERNS.

Figure 49. Minimum Opening of a Termination/Pull Section with Typical Conduit Configurations in Switchboards (STD-D-3120)

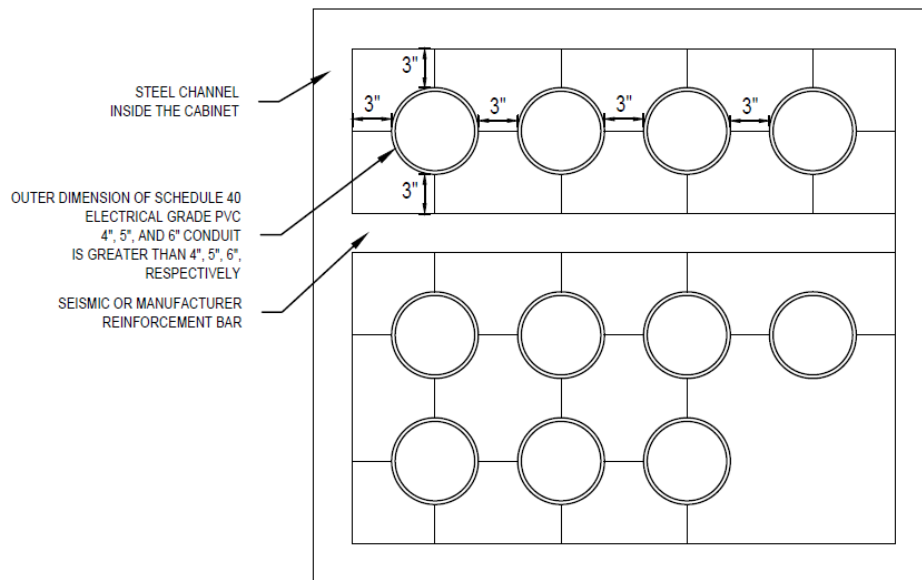


Figure 50. Switchboards with Seismic or Manufacturer Reinforced Bar (STD-D-3122)

6.4 Concrete Pads and Vaults for a Padmounted Transformer

6.4.1 Pad

Every padmounted transformer must have a precast concrete pad. Consult PGE for transformer dimensions and installation requirements. Pads must be flush with the finished grade within 12" of a sidewalk or other paved area.

The customer must install a 5/8" outside diameter x 8' ground rod inside the transformer. (PGE provides this ground rod.) The ground rod must be at least 4" above final grade. Consult the PGE Job Sketch for the location of the ground rod within the transformer pad cable block out.

6.4.2 Vault

PGE requires a vault under a cable compartment. Consult PGE for transformer vault dimensions. The vault lid must be installed 2" above the finished grade in landscaped areas and flush with the finished grade within 12" of a sidewalk or other paved area.

For vault clearances, see [Section 5.5.5](#).

6.4.3 Clearances

For the required clearances from a padmounted transformer, see [Section 5.5.4](#).

6.4.4 Excavation and Backfill

Excavate the entire area beneath the pad or vault to a depth of 18" below final grade. To prevent settling, compact and level all soil beneath the pad or vault before setting or pouring it. Backfill with compacted 3/4" minus gravel within 5' of the pad or vault.

6.4.5 Temporary Cover On All Openings

Where the customer provides openings for PGE equipment (such as a padmounted transformer), the customer must provide and install a temporary cover. This cover must be 3/4" marine grade or exterior grade plywood that is 6" larger than the opening and secured without damaging the concrete. PGE will remove the temporary cover when installing the electrical equipment.

6.4.6 Barrier Posts (aka Bollards)

IMPORTANT: Barrier posts must be installed before service is energized.

Customers are required to install and maintain one or more barrier posts around all electrical equipment (such as transformers, switchboards, CT cabinets, sectionalizing cabinets, or vault cabinets) in areas where that equipment is exposed to vehicle traffic. For barrier post placement, clearance, and installation requirements, see [Section 5.6.8](#).

6.4.7 Secondary Splice Pedestal (aka PF300)

Requirements for installing a secondary splice pedestal:

- Install the pedestal so that the ground level marker on the case is at final grade.
- The pedestal must be installed level with the horizon.
- The latch on the lid must face toward the street.
- The lid must be secured with a five-sided Penta-head bolt.
- Use at least 6" of 3/4" minus well-compacted crushed rock around and inside the base of the pedestal.
- The conduit stubs must be at least 2" above the inside grade to prevent rocks and debris from falling into the conduit.
- Cover and mark conduits as follows:
 - S for source.
 - SVC for service.
 - ST for streetlight.
- Install 500-pound-rated pull string in the source conduit so that 6' of pull string extends beyond each end of the conduit.
- The source conduit must be on the field side of the pedestal.
- Elbows must be 36" radius.
- The customer must install a 5/8" OD x 8-foot-long ground rod inside the secondary splice pedestal. (PGE provides this ground rod.)

Install the ground rod as follows:

- Bury it at least 7', 9" deep.

- Make sure that the rod extends at least 9" below the neutral bus behind the source conduit.
- Locate it as close to the back of the pedestal as possible.

NOTE: The requirements in this section are in addition to those in [Section 7.2.5](#).

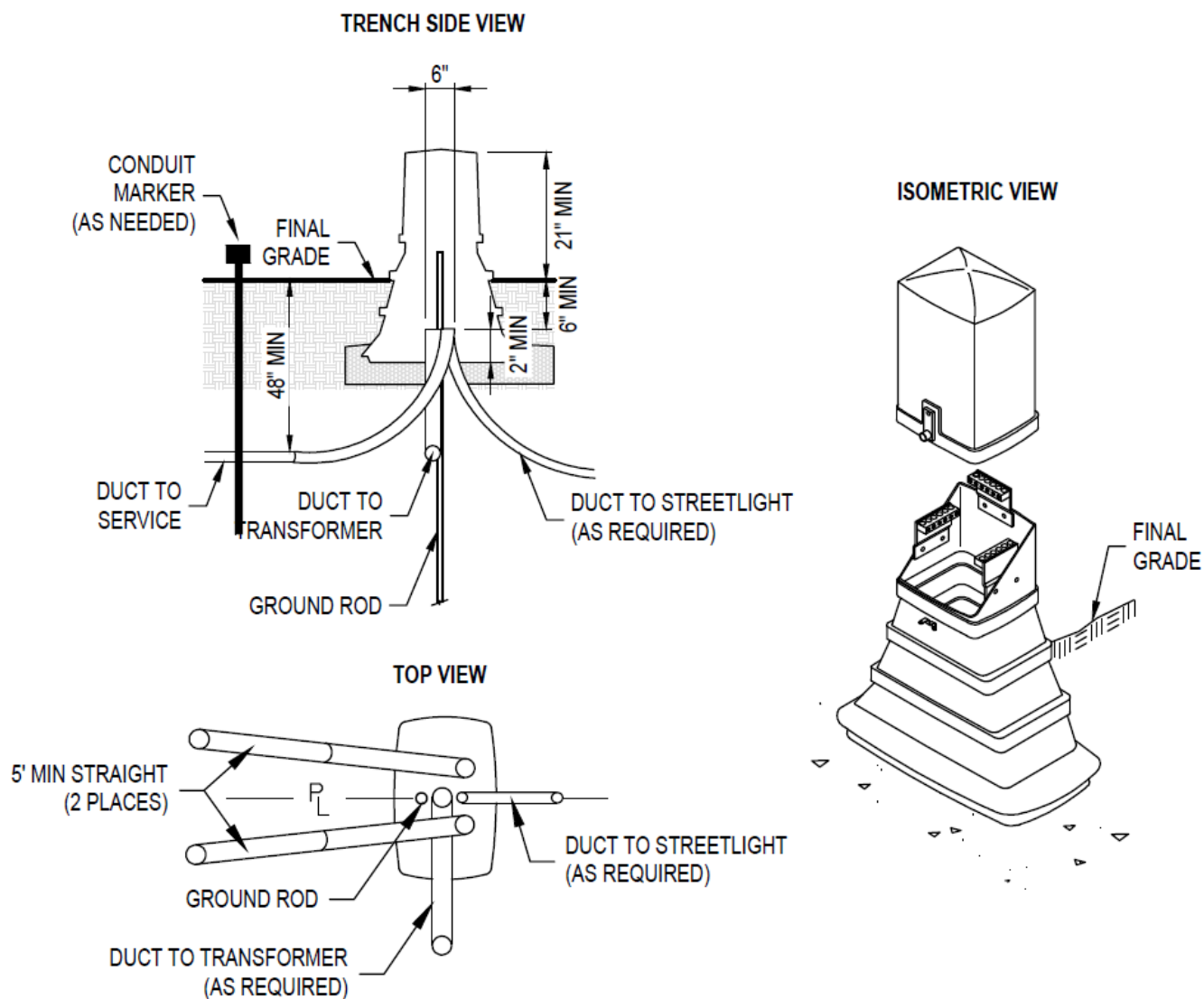


Figure 51. PF-300 Secondary Splice Pedestal (STD-D-3302)

6.4.8 Secondary Handhole (aka Carson box, 1730 Vault)

Requirements for a secondary handhole, such as the 17" x 30" x 18" deep secondary handhole:

- A list of approved manufacturers of secondary handholes is available on portlandgeneral.com/esr.
- Before capping the conduit, mark it and install 500-pound-rated pull string so that 6' of additional pull string extends beyond each end.
- The trench depth at the handhole location must be appropriate for the sweep being used. Cutting of sweeps is not allowed.
- Use at least 6" of well-compacted 3/4" minus backfill under the splice box and use 6" around the outside base.
- All handholes (1730 vaults) must be installed on property lines within the utility easement, and the handhole must be set 2" above final grade or on the high side of the slope. Handholes on a sidewalk must be set to grade. Alternate locations must be approved by PGE and noted on the drawing.
- The cost for relocation or adjustment of a secondary vault is the responsibility of the builder or developer requesting the move. PGE approval of the installation is based on final grade and location criteria set by the developer and his or her agent.
- For permanent service, use 3" Schedule 40 or fiberglass, 90-degree elbows with a 36" radius. Install to the proper depth for the sweep being used.
- The customer must install a 5/8" OD x 8' ground rod inside the handhole. (PGE provides this ground rod.)

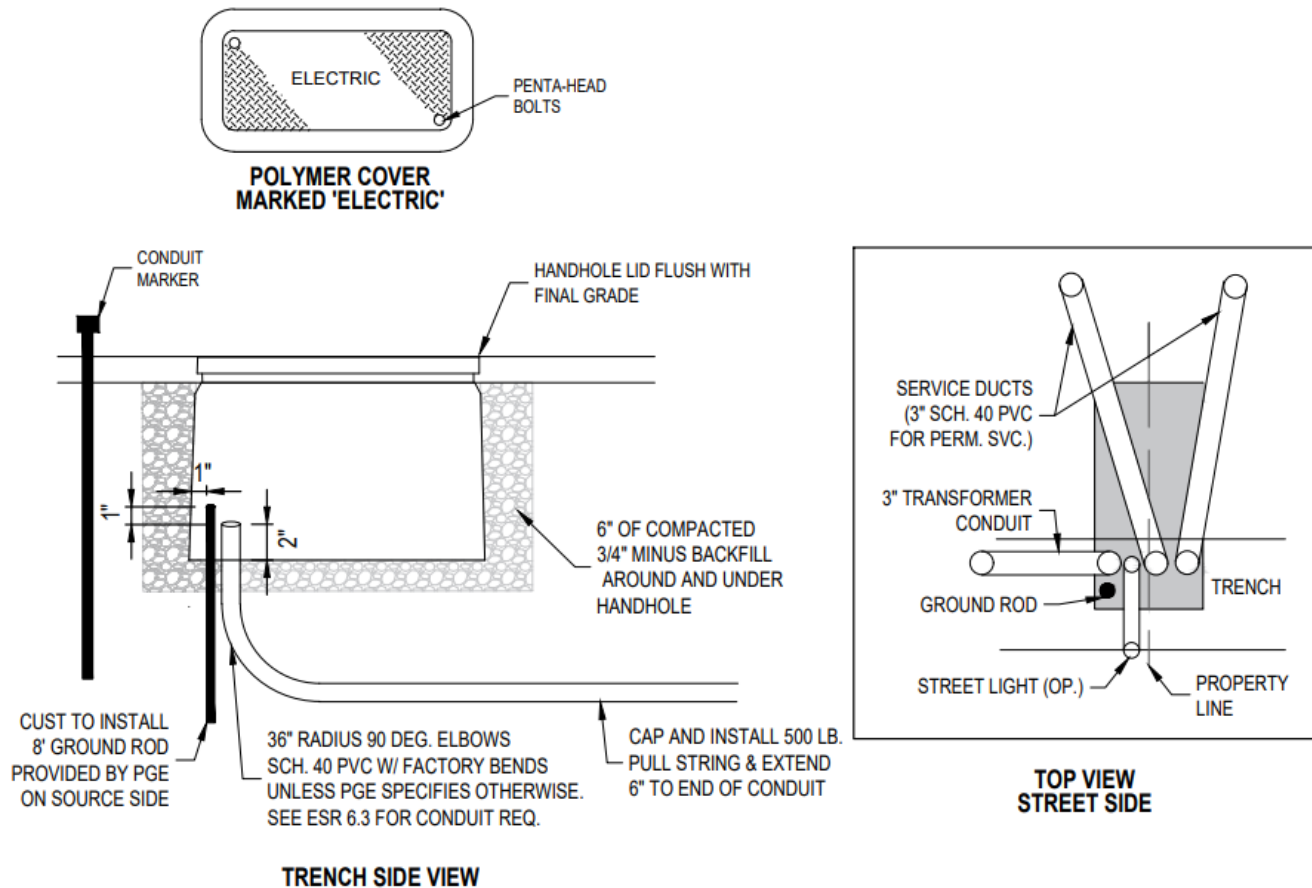
Install the ground rod as follows:

1. Locate the rod behind the feed conduit.
2. Bury the rod at least 7', 9" deep.
3. Ensure that the rod extends at least 3" above grade inside the handhole.
4. The lid must be installed with five-sided Penta-head bolts.

Install the secondary handhole hardware as follows:

- **Only hand tighten hardware.** Do not use drills or impact drivers to fasten bolts.
- Clean dirty hardware before installation.
- Do not secure hardware until cable is energized. Keep uninstalled hardware in a plastic bag at the bottom of the handhole for protection.

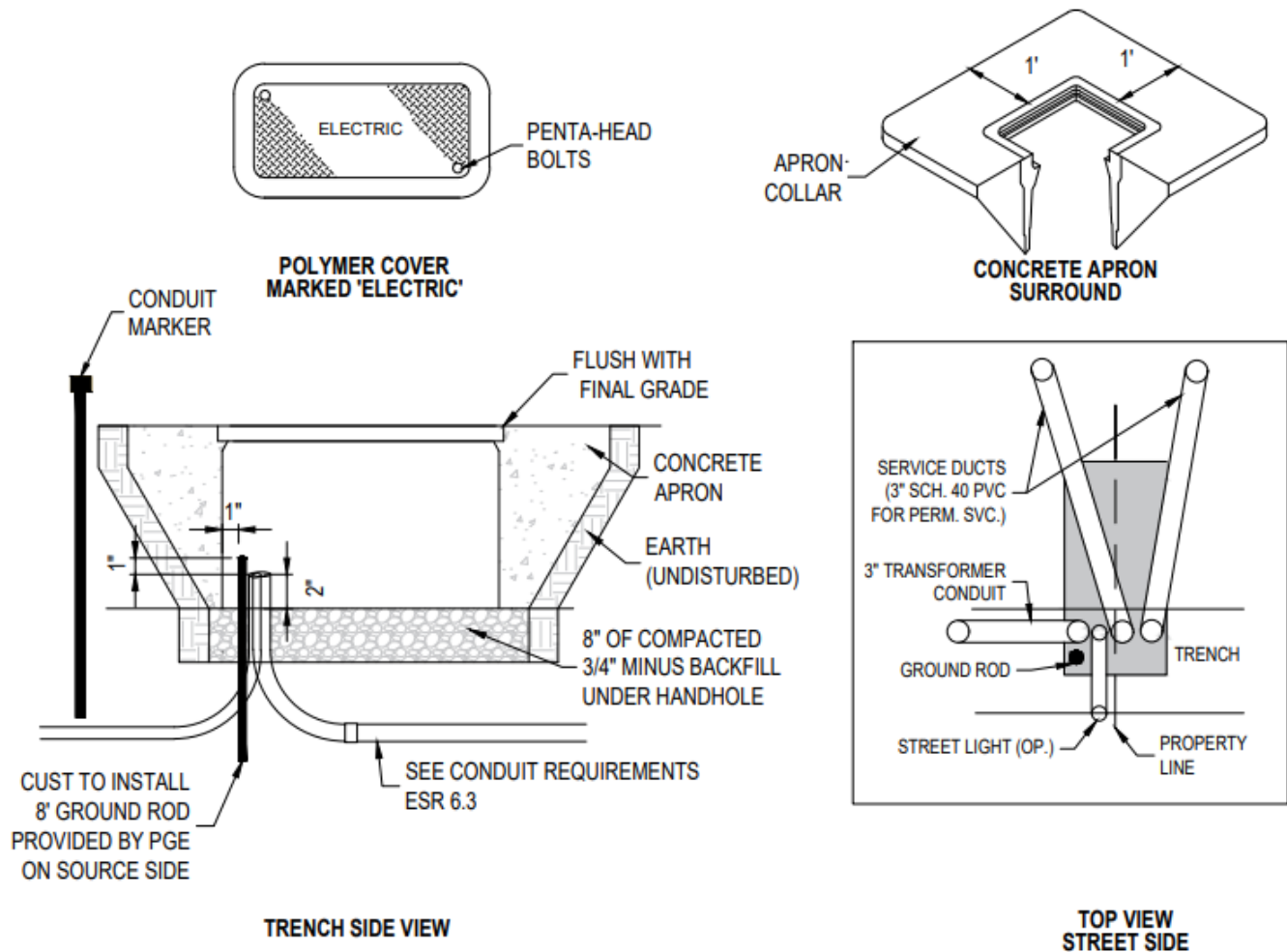
NOTE: The handhole shown in [Figure 52](#) has a 21.75" x 34.75" polymer cover marked ELECTRIC. This size may vary with the manufacturer.



CONSTRUCTION NOTES:

1. INSTALL HANDHOLES ON PROPERTY LINES WITHIN THE UTILITY EASEMENT AND AT FINAL GRADE. ALTERNATE LOCATIONS MUST BE APPROVED BY PGE.
2. RELOCATION OR ADJUSTMENT OF HANDHOLES WILL BE APPROVED BY PGE AND WILL BE THE RESPONSIBILITY OF THE BUILDER OR DEVELOPER REQUESTING THE MOVE.
3. PGE INSPECTION AND ACCEPTANCE OF HANDHOLE WILL BE BASED ON INSTALLATION, LOCATION, AND FUNCTIONALITY SET BY THE CUSTOMER.

Figure 52. Secondary Handhole (STD-D-3300)

**CONSTRUCTION NOTES:**

1. INSTALL HANDHOLES ON PROPERTY LINES WITHIN THE UTILITY EASEMENT AND AT FINAL GRADE. ALTERNATE LOCATIONS MUST BE APPROVED BY PGE.
2. RELOCATION OR ADJUSTMENT OF HANDHOLES WILL BE THE RESPONSIBILITY OF THE BUILDER OR DEVELOPER REQUESTING THE MOVE.
3. PGE INSPECTION AND ACCEPTANCE OF HANDHOLE WILL BE BASED ON INSTALLATION, LOCATION, AND FUNCTIONALITY SET BY THE CUSTOMER.

Figure 10. Secondary Handhole (STD-D-3303)

7 Single Family Service

Topics in this Section

- [Basic Requirements](#)
- [Underground Service](#)
- [Overhead Service](#)

7.1 Basic Requirements

A residence must contain cooking, bathing, and sleeping as defined by Rule B in PGE's Tariff.

The customer must:

- Procure, install, and maintain all service equipment, including service entrance conductors for overhead service, conduit, enclosures, and meter sockets.
- Provide rights of way and space for the installation and maintenance of PGE facilities.

In the figure below, all PGE-supplied materials are identified. All other materials must be supplied and maintained by the customer.

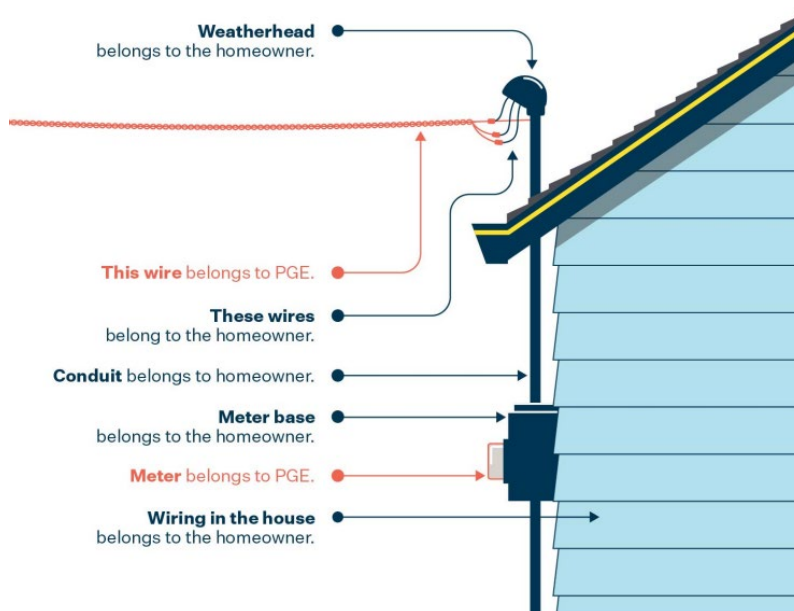


Figure 53. PGE Materials Ownership Graphic

IMPORTANT: The location of the service entrance on the customer's premises is an important consideration that *must* be discussed with PGE to ensure all clearances and access requirements are met (see [Section 5](#)). **Contact PGE's Service Coordination team 503-323-6700 to initiate a request to determine the point of attachment for overhead service drops, underground service laterals, and meter locations. Failure to receive approval before installation will result in denial of service until the installation meets PGE's requirements.**

Usually, the service entrance and meter are located near the PGE distribution power line to meet NESC clearance requirements for overhead service drops. PGE requires 24/7 access. For clearance and location criteria, see [Section 5.4](#) and [Section 5.2](#). See [Section 6](#) for underground and conduit requirements.

The following additional basic requirements also apply:

- The customer must not terminate the principal grounding conductor in the PGE sealed termination compartment.
- Customer wires installed in the meter socket must allow working space for the installation of PGE wires. Panel covers must be secured before inspection and energizing.
- The meter socket must not be used as a junction box (see [Section 3.10](#)).

IMPORTANT: Plan ahead for the necessary construction lead times. See [Section 2.6](#).

7.1.1 2 × 4 Framing with Reducing Swedge Couplers for Meter Base Applications

A 3" to 2.5" smooth wall swedge reducer (such as the one shown in [Figure 54](#)) may be installed as close as possible to the meter socket to reduce conduit size for 2" × 4" framing.



Figure 54. Reducing Swedge Coupler

7.1.2 Residential Sockets

A single-phase, direct-connect residential meter socket must be rated for a maximum current capacity of 100 A, 200 A, or 400 A (320 A continuous). All meter sockets must meet current ANSI C12, UL, and EUSERC requirements. Meter sockets must be ring-type.

All single-phase, direct-connect sockets rated 400 A (320 A continuous) must meet EUSERC 302B or EUSERC 302A with an approved manual link bypass (outlined within EUSERC 302B).

Loads greater than 320 A (NFPA 70 - NEC, 2023 Ed.) require current transformer metering (see [Section 3.10.2.1](#)). For more information, see [Section 10](#).

NOTE: For a single-family residential 200 A service, a bypass meter socket is approved, but not required. Consider a bypass meter socket if power interruptions during routine meter service would be a problem in the residence.

7.2 Underground Service

7.2.1 Design Phase Collaboration

Before preparing for underground service, the customer must obtain specifications and approval from PGE for the proposed installation. Special rules may apply in areas where local ordinances require underground service. Customers who already have adequate overhead service but want underground service should contact PGE to learn about its conversion policy.

7.2.2 Water Mitigation

The customer is responsible for identifying potential surface and subgrade water flow that may let water enter the customer's electrical equipment. PGE will coordinate with the customer to help prevent this water entry.

7.2.3 Customer Supplied Materials

The customer is responsible for the cost of all:

- Excavation, trenches, backfill, and site restoration
- Obtaining and installing PGE-approved conduit. See [Section 6.2](#) and [Section 6.3](#).
- Obtaining and installing the vaults, handholes, and/or junction boxes identified in the PGE Job Sketch. A list of approved secondary handholes manufacturers is available on portlandgeneral.com/esr

NOTE: PGE will install, own, and maintain the underground service lateral from its distribution source to the customer's point-of-delivery.

7.2.4 Upgrades

When customers with an existing service desire to update their service, PGE must evaluate the service, transformer, and meter location relative to current PGE requirements (see [Section 6.3](#)).

If a customer is upgrading an existing service and plans to upgrade their meter base, PGE must visit the site to identify the legacy service and from this, to determine the customer's requirements. When a customer is upgrading an existing service and must upgrade their meter base, PGE's Tariff Rule I allows PGE to require the customer to replace the conduit to the transformer. For customers served by a transformer two or three lots away from the home, PGE may reduce the customer's cost by allowing them to trench up to their property corner into a junction box.

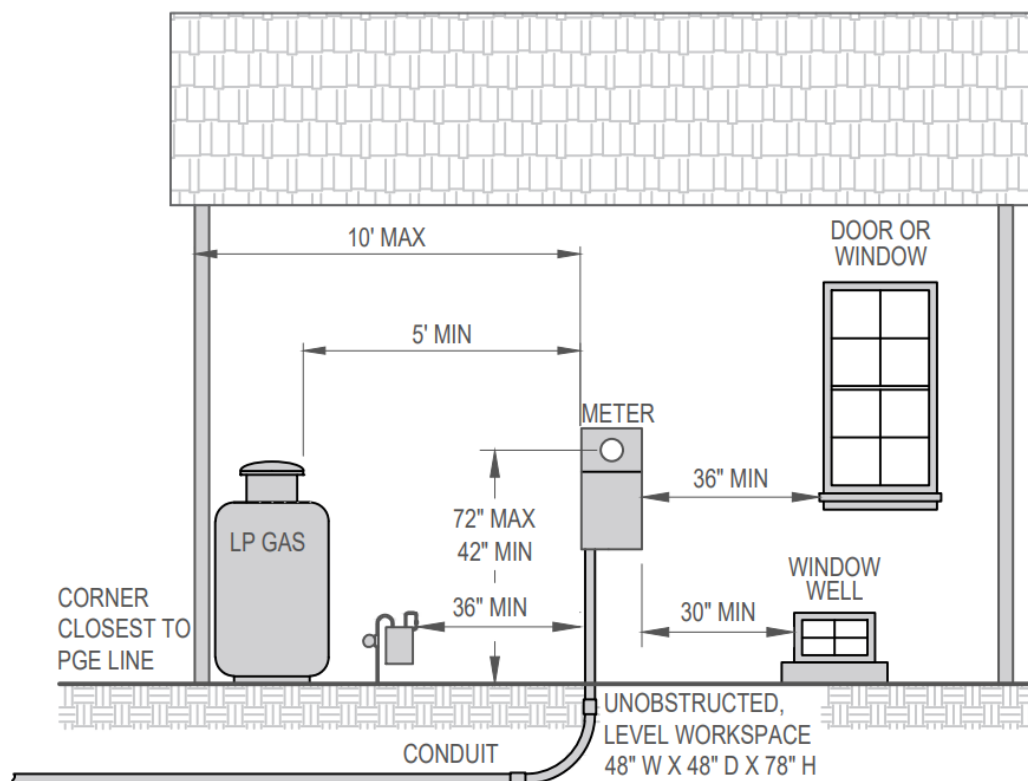


Figure 55. Underground Service Extension (STD-D-6004)

7.2.5 Underground Service Extension

The following basic construction requirements exist for all underground service extensions, in addition to those listed in [Section 7.2.5.1](#), [Section 7.2.5.2](#) and [Section 7.2.5.3](#):

- The point of delivery must be located on the front of the building or no more than 10' back from the front corner with 24/7 access. Contact PGE to determine the exact location of the meter socket.

7.2.5.1 Conduit

- The customer is responsible for the trench, backfill, compaction, surface restoration, and conduit as required for service extensions. Conduit sweep and pull line requirements are described in [Section 6.3.2](#). Use factory bends, with no more than 270 degrees of total bends.
- When the conduit extends to a PGE pole or handhole, consult PGE for the exact conduit location. PGE will install a standoff bracket on the pole. See [Section 6.3.3](#).

7.2.5.2 Meter Socket

- Customer-owned conductors cannot enter or pass through the PGE compartment in the meter socket except in a 320 A meter socket.
- Class 320 A meter bases are permitted to have an integrated customer load section if the utility section is equipped with manual link bypass studs in accordance with EUSERC 302B.
- The customer must provide and install a PGE-approved meter socket. Ringless meter sockets are not approved.

7.2.5.3 Service Entrance Riser

- The meter socket and conduit must be rigidly attached to the structure as shown in [Figure 56](#). 2" x 4" back supports are required. The meter socket and conduit must be straight and plumb.
- The service entrance riser must be in line with the left side of the entrance knockout for 100A and 200A services. All three positions are accepted on a 320A meter enclosure (see [Figure 55](#)). For detailed clearance requirements, see [Section 5](#).
- The service riser elbow must be backfilled with a minimum 4" depth of 3/4" minus crushed rock that is tamped to avoid soil settling.
- No bends are allowed in the conduit riser between the meter socket and the underground sweep. If local codes do not allow conduit in the foundation or footing, a surface-mount meter must be installed (see [Figure 61](#)).
- Sleeves are required around conduit that passes through a paved area adjacent to a building foundation. The sleeves prevent ground settling from pulling the conduit down.
- Hubs are not approved for use on the concentric knockout of underground socket enclosures. Approved bushings, box adapters, or other conductor protection are required for these enclosures.

7.2.5.4 Municipal Inspection

- The electrical label or permit must be displayed on the meter base.

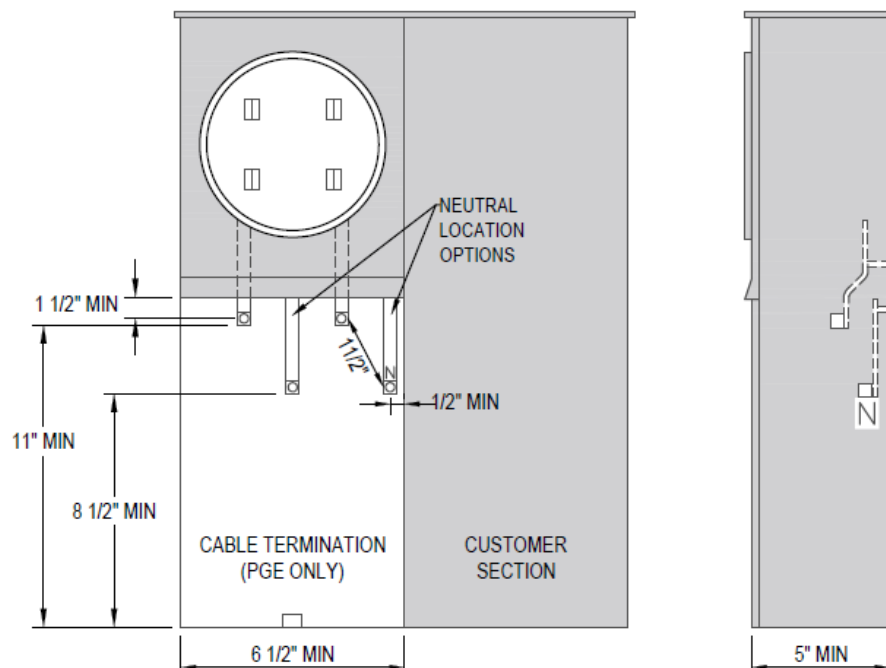
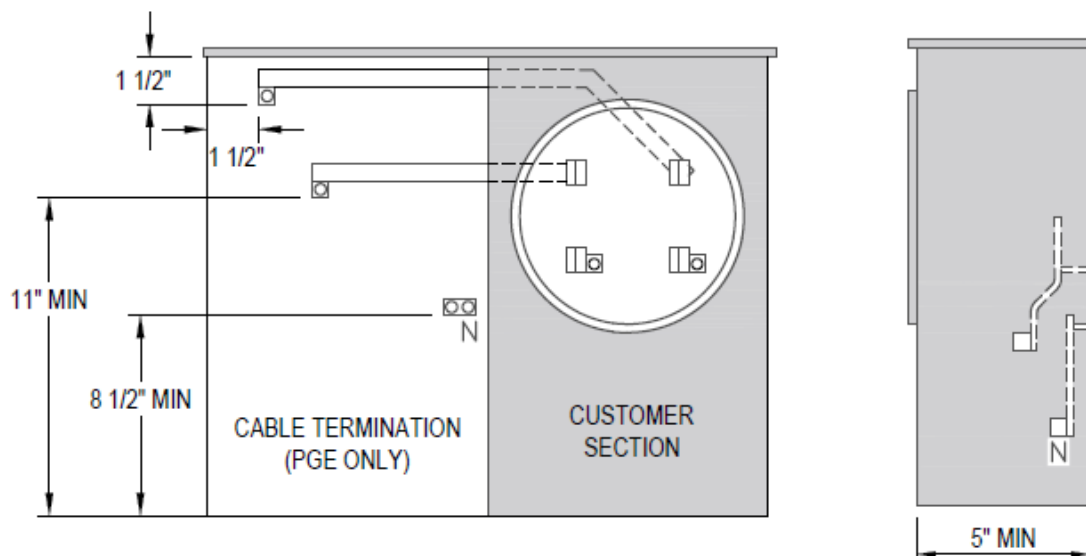
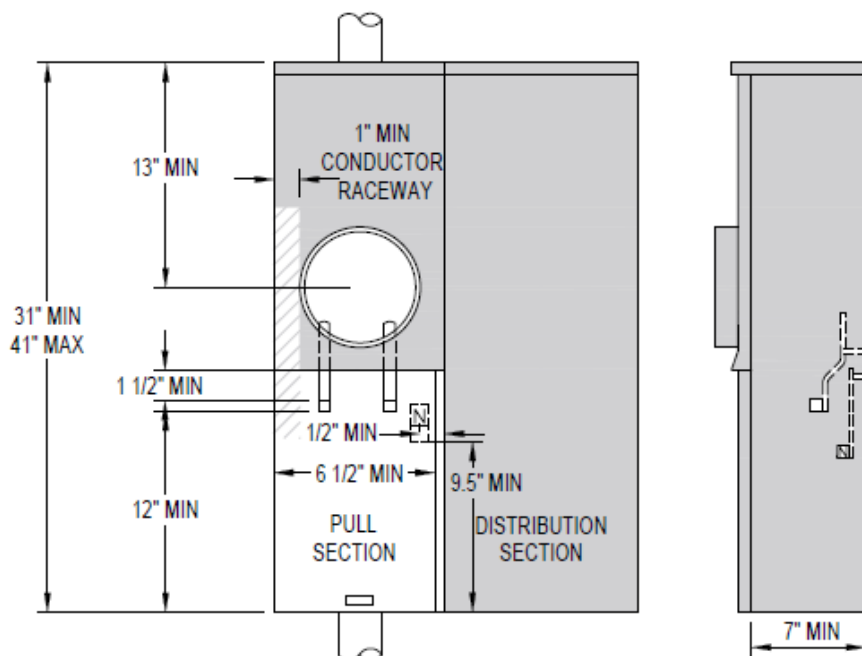


Figure 56. Residential Underground Approved Combination Meter Socket for 200 A Maximum Single-Phase Service (EUSERC 301) (STD-D-6000)

Table 24. Dimensions for Residential Underground Approved Meter Sockets for 100 A and 200 A Maximum Single-Phase Service

Amperes	Dimension (inches)		
	Neutral Lug Height	Hot Lug Height	Width
125	6.0	8.0	4.0
225	8.5	11.0	5.0

**Figure 57. Residential Underground Approved Meter Socket for 200 A Maximum Single-Phase Service (EUSERC 301A) (STD-D-6000)****Figure 58. Residential Underground Approved Meter Socket for 200 A Maximum Single-Phase Service (EUSERC 301B) (STD-D-6001)**

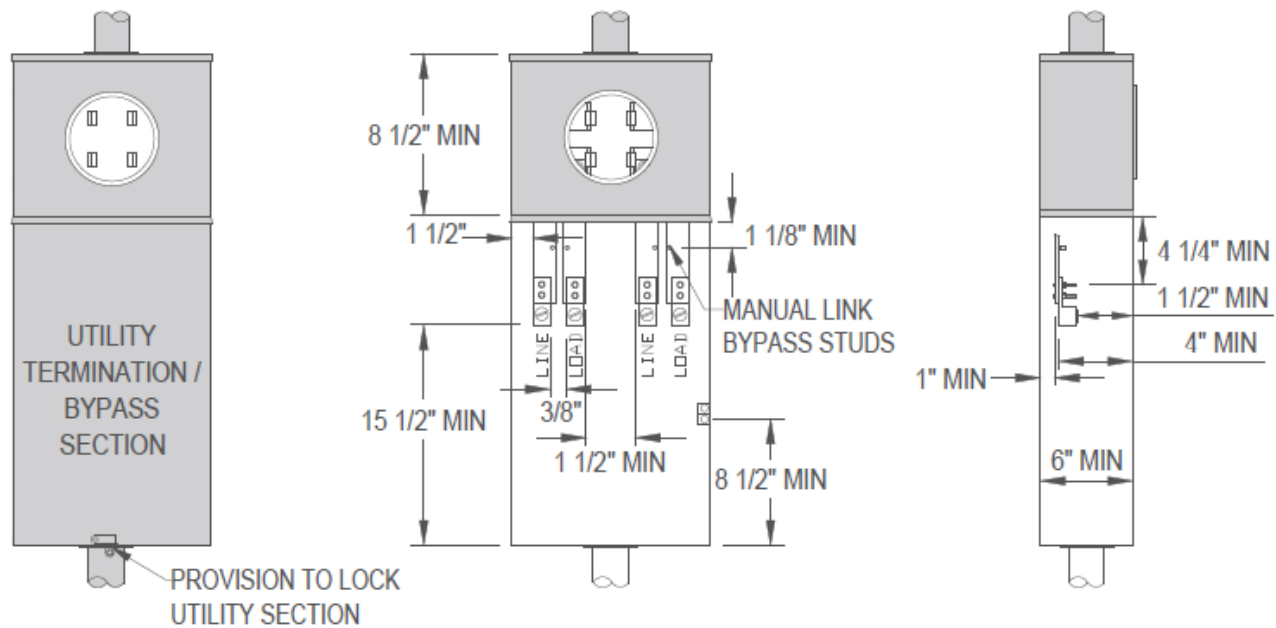


Figure 59. Residential Underground Approved Meter Socket for 400 A (320 A Continuous) Maximum Single-Phase Service (EUSERC 302B) (STD-D-6002)

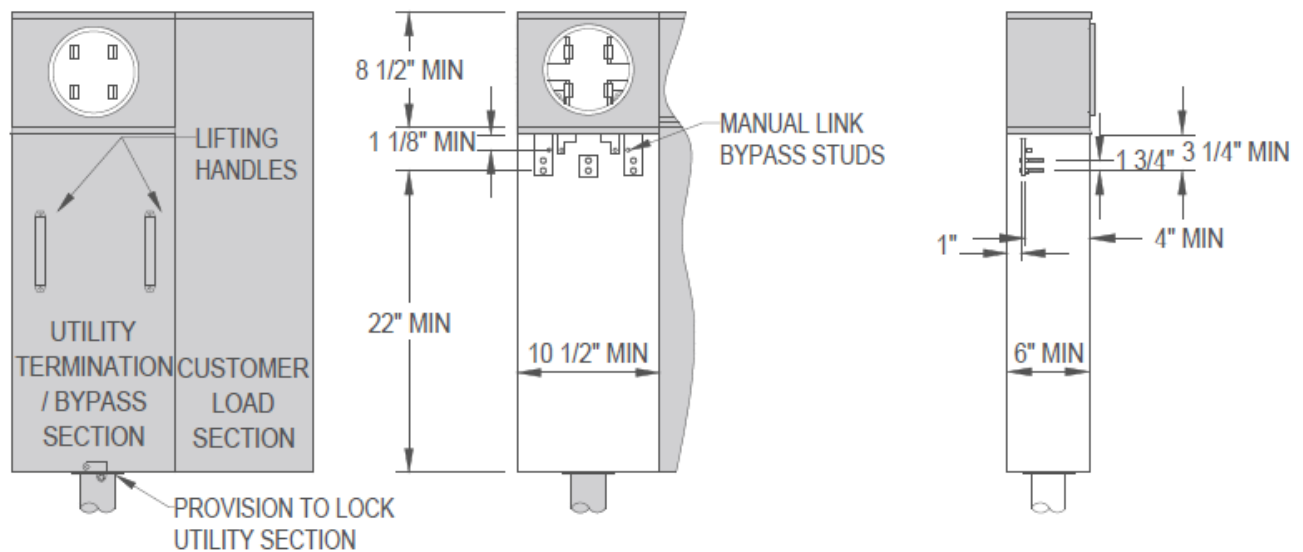


Figure 60. Residential Underground Approved Meter Socket for 400 A (320 A Continuous) with Manual Bypass. Maximum Single-Phase Service (EUSERC 302A with an approved manual link bypass (outlined within 302B) or 302B) (STD-D-6002)

7.2.5.5 Surface-Mount Installation

The customer must furnish and install the following for a surface-mount installation: an underground-type meter socket enclosure, conduit, utility easement (when required), and long-radius sweep, if needed.

The following requirements apply to a surface-mount installation and the optional seismic footing design below:

- No bends are allowed in the conduit riser between the meter socket and the underground sweep. If local codes do not allow conduit in the foundation or footing, a surface-mount meter must be installed.
- On a brick or concrete block siding, use a 1/4-20" x 3.25" lead sleeve expansion bolt in joint in place of a lag screw on an anchor strap.
- The conduit riser must be in line with the left side of the entrance knockout for 100A and 200A services. All three positions are accepted on a 320A meter enclosure.
- For 2" x 4" framing, it is permitted to use a 3" to 2.5" smooth wall swedge reducer installed as close as possible to the meter socket. For more information, see [Section 7.1.1](#).

NOTE: The requirements in this section are in addition to those in [Section 7.2.5](#).

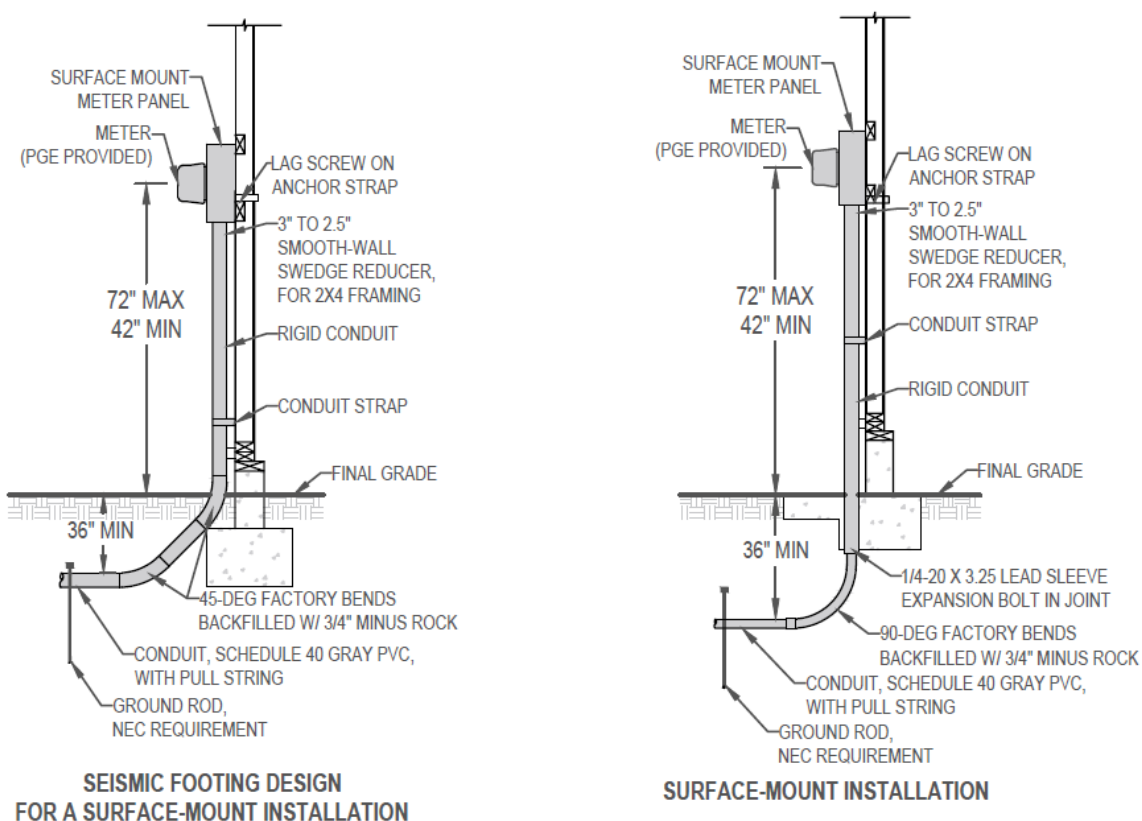


Figure 61. Surface-Mount Installation (Right) and Seismic Footing Design (Left) (STD-D-6008)

7.2.5.6 Flush-Mount Installation

The following requirements apply to a flush-mount installation:

- No bends are allowed in the conduit riser between the meter socket and the underground sweep.
- The conduit riser must be in line with the left side of the entrance knockout.

NOTE: The requirements in this section are in addition to those in [Section 7.2.5](#).

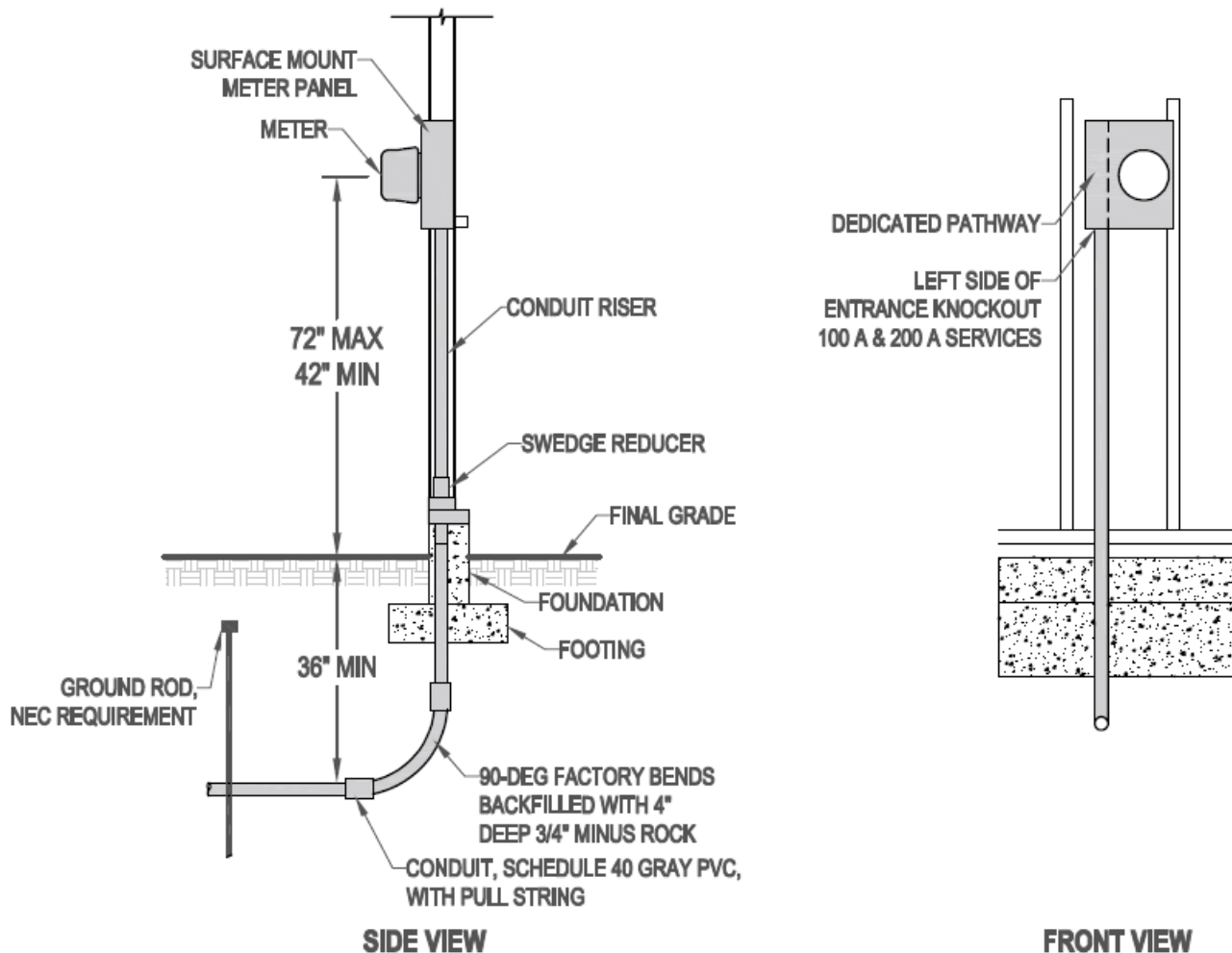


Figure 62. Flush-Mount Installation (STD-D-6008)

7.2.5.7 Underground Conduit System for Long-Side Service

The following lists the requirements for installing an underground conduit system for long-side service:

- The customer must provide a continuous electrical conduit with a pull string in the conduit from the meter socket to the pedestal or handhole. The pull string must be rated for 500 pound service.
- If the pedestal is energized, consult PGE before installing the conduit.

NOTE: The requirements in this section are in addition to those in [Section 7.2.5](#).

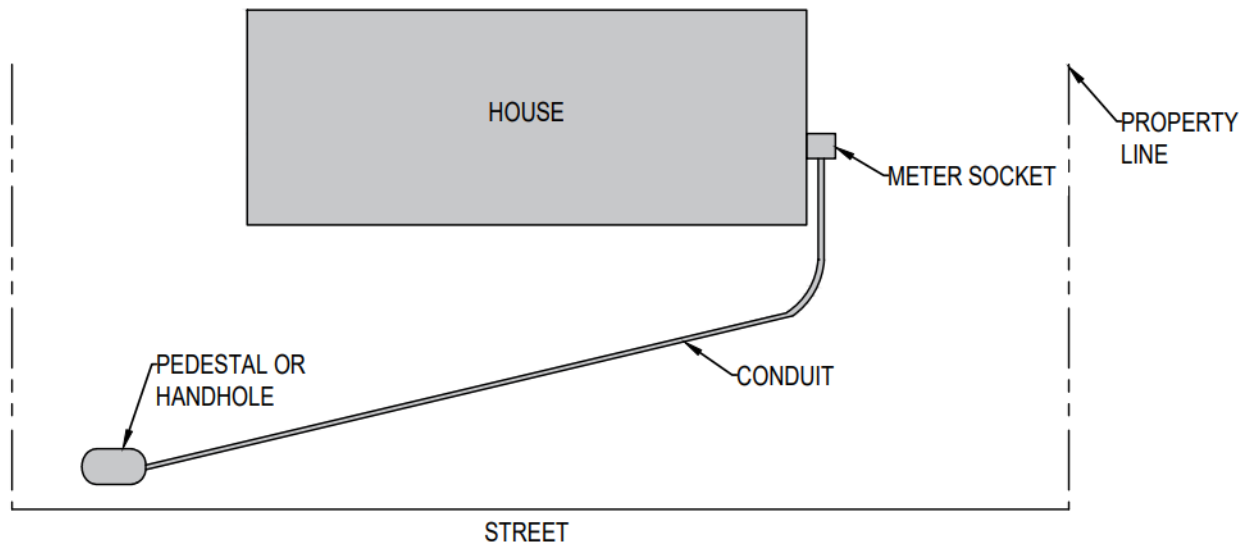


Figure 63. Overhead View of An Underground Conduit System for Long-Side Service (STD-D-6006)

7.2.6 Post-mounted, Freestanding Residential Meter Pedestal

NOTE: Before a pedestal can be installed, the customer must install the following:

- An underground-type meter socket.
- Hardware for the 6" × 6" post.
- Conduit with pull string.
- Utility easement.
- A trench.
- A 5/8" outer diameter (OD) × 8'-long galvanized ground rod. (PGE can provide this ground rod.)

The following is required when installing a post-mounted, freestanding residential meter:

- A minimum 6" × 6" pressure-treated wood post owned by the customer must be installed. Firmly tamp the earth around the post and dome the earth to allow for settling. Railroad ties are not allowed.
- Use a strap to secure the conduit to the post.
- PGE will determine the exact location of the meter.
- The post must be installed at least 7' from the service post.
- An electrical label or permit must be displayed on the meter base.

NOTE: The requirements in this section are in addition to those in [Section 7.2.5](#).

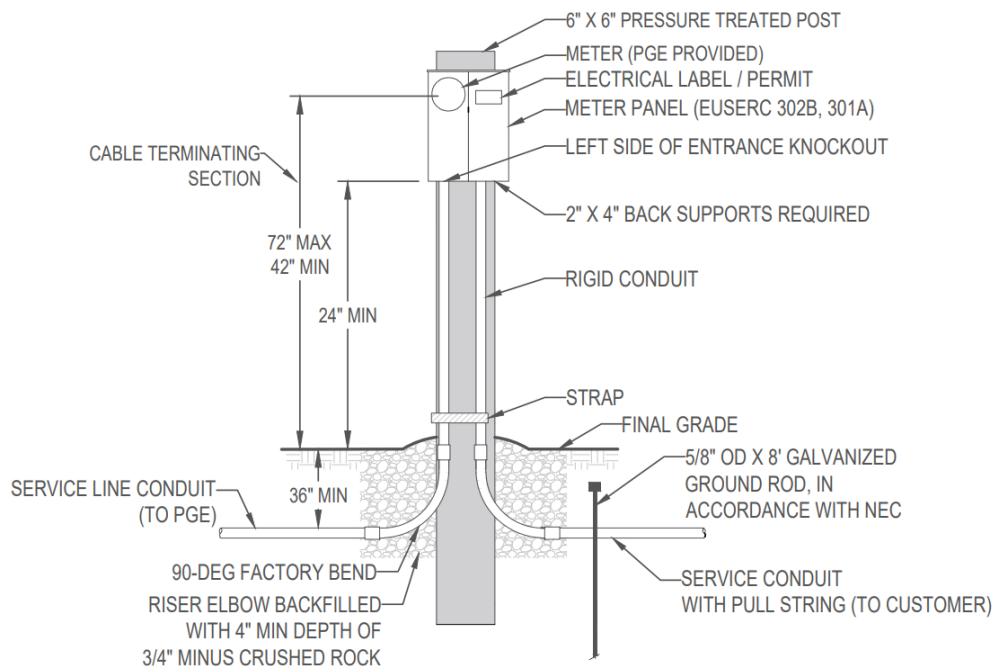


Figure 64. Post-Mounted Freestanding Residential Meter Pedestal (STD-D-6018)

7.3 Overhead Service

If a customer is in an overhead service area, PGE will install an overhead service drop from the PGE distribution **power** lines to the service entrance on the customer's residence, building, or structure. PGE will also install underground service in an overhead area. (See [Section 7.2](#) for requirements.)

PGE requires all new services to be located such employees can use full fall protection when installing and maintaining the service. To meet this requirement, the service must be accessible using a bucket truck or a ladder whose base can be positioned on level ground, rested upon a flat pitch, and secured. In addition, the service cannot be in a location where PGE employees must step out onto a roof when installing or maintaining that service.

IMPORTANT: Contact PGE for a meter spot to ensure your new or rewired service meets PGE requirements. For more clearance information, see [Section 5.3.2](#) and [Section 5.4](#).

The customer must provide a single attachment point within 2' of the weatherhead that can be reached from an adjacent PGE **power** line using a single span of service drop cable. If a service is mounted on a customer-owned pole, locate the weatherhead within 2' of the pole top. In all cases, the point of attachment must be high enough above the finished grade and in a proper position to provide minimum clearances as specified in [Section 5.4](#).

It is important to avoid overhang of a service drop above adjacent property, and to provide a service drop route without obstruction by buildings, trees, or other objects. Locate the point of attachment on the building wall that faces the nearest PGE **power** line, or on a service mast capable of withstanding the tension of the service drop.

Extend and tie supports for service drops from and into the main structural members of the building. Extend the service mast through the roof on a typical single-story building unless adequate clearance exists at the gable end of the building (see [Figure 27](#) for illustrations of roof and gable-side service drops). The service entrance riser conduit for overhead installations must be a minimum Schedule 40 PVC.

Use a rigid metal pipe clamp for the point of attachment for a service mast. For attachment to a building, use a 3/8" eyebolt connected to a significant structural member, such as a rafter or roof plate. For a single-story building, the attachment must not be below the downhill slope of the roof or the rain gutters.

IMPORTANT: Do not attach the service to a fascia board.

If you encounter a problem in meeting these clearances, PGE will help you to determine specific requirements that comply with the codes.

NOTE: For residential overhead services, the house siding must be installed before energizing the service.

See [Section 7.3.1](#) for information on overhead service for surface-mount and flush-mount metering.

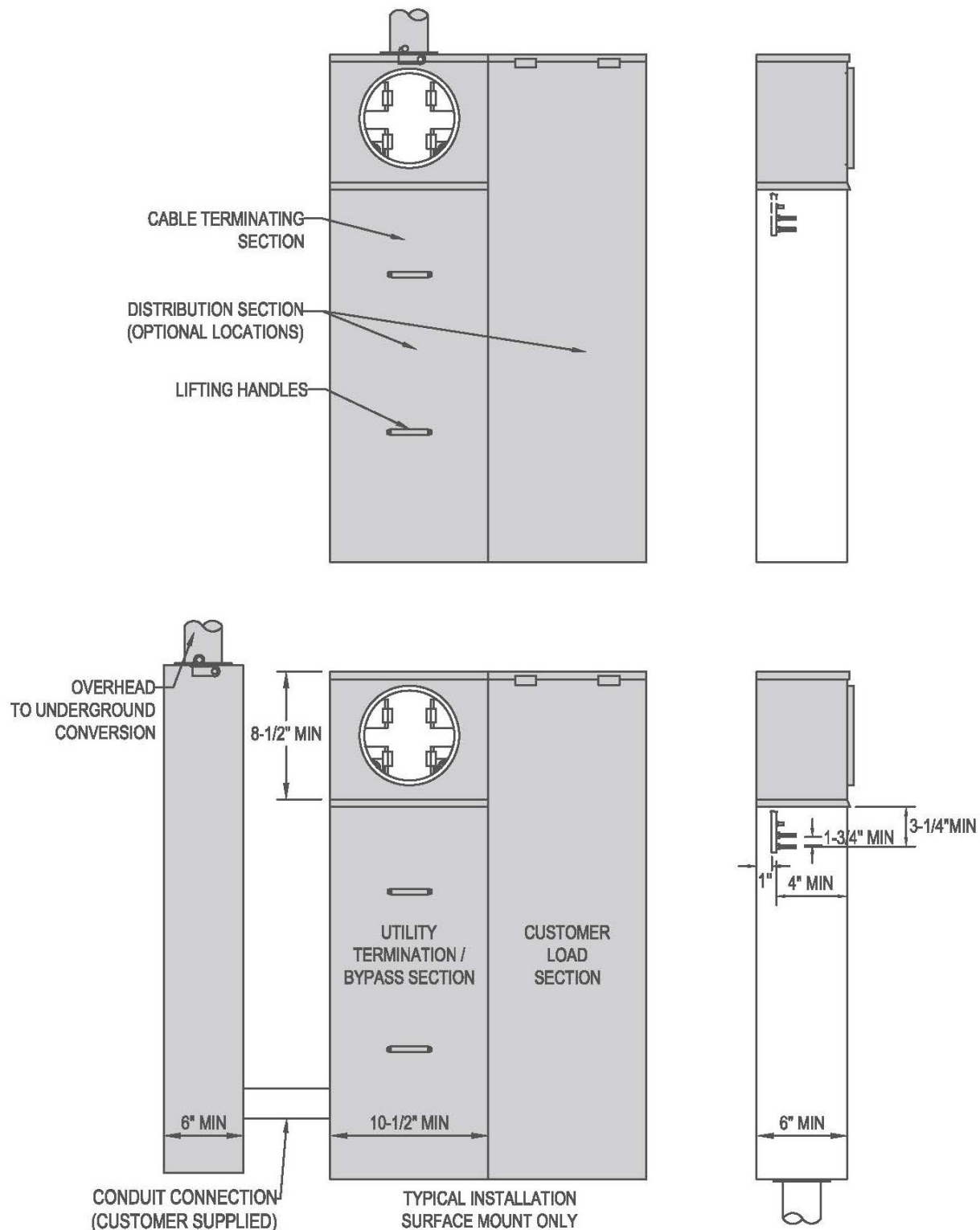


Figure 65. Residential Overhead Approved Meter Socket for 100 A, 200 A, and 400 A (STD-D-6010)

NOTE: PGE also approves 302A with an approved manual link bypass (outlined within 302B) and 302B for 320 A continuous services.

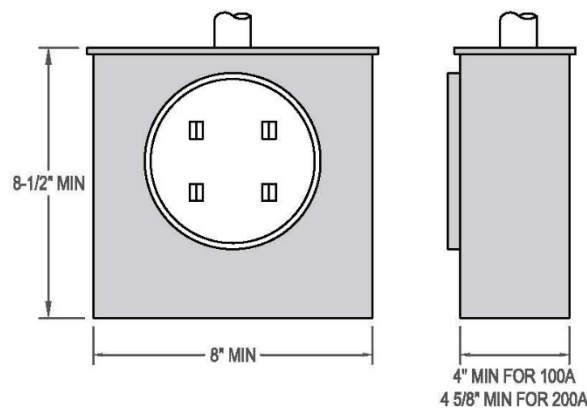


Figure 66. Residential Overhead Approved Meter Socket for 100 A and 200 A (STD-D-6012)

7.3.1 Surface-Mount and Flush-Mount Installations

Requirements for surface-mount and flush-mount installations:

- PGE will determine the exact location of the meter socket for new and rewire installations. To obtain the location, call Service Coordination (503-323-6700). The customer must provide a minimum 4' x 4' level workspace in front of all metering equipment.
- Mount the service mast on the side nearest the distribution pole. See [Section 5](#) for clearance requirements between the roof and the service conductor.
 - Allow 24" conductor leads for connection to the service drop.
 - The maximum distance between the center of the service mast and the edge of the roof or outer edge of the gutter is 4'.
- The guy must be 1/8" galvanized steel strand or larger.
- The service mast must be continuous rigid steel conduit and securely attached. See [Table 25](#) for guy requirements by mast size and for maximum height without guys.
- Conduit coupling must not be installed above the roof line.
- On a flush-mount installation, the building face must not extend beyond the meter box face.
- On a brick or concrete block siding, use a 1/4-20" x 3.25" lead sleeve expansion bolt in the joint instead of a lag screw on an anchor strap.
- An electrical label or permit must be displayed on the meter base before calling PGE's Service Coordination team for an inspection.

NOTE: The requirements in this section are in addition to those in [Section 7.3](#).

Table 25. Guy Requirements by Mast Size

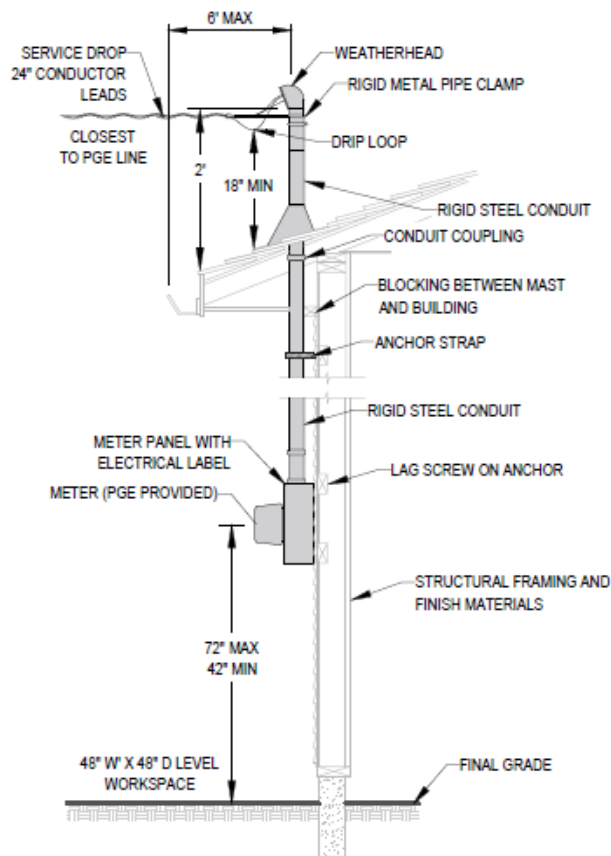
Service Mast Rigid Steel Conduit Size	Service Size	Utility Service Length	Length of Unsupported Mast
2"	200 A or less	Less than 100 feet	24"
3"	201 A to 400 A	Less than 80 feet	

7.3.2 Service Mast Guy and Anchor Requirements

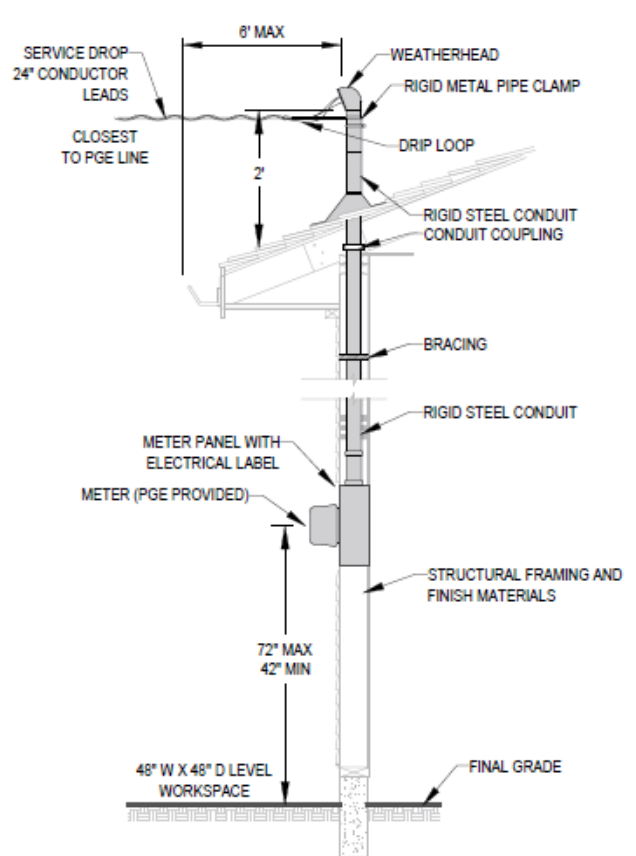
Requirements for mast guys and anchors (see [Figure 67](#) and [Figure 68](#)):

- Fit the roof plate between the shingles and then use 1/4-20 bolts to secure the plate to the rafters.
- The roof plate must be installed so that the service alignment extension falls between the guys.
- Anchor Strap 1:
 - Must accommodate a 2-3/8" diameter service mast.
 - It is made from 3/16" x 1" galvanized steel.
 - A 3/8" eyebolt and washer with a header block between the rafters is acceptable. An eye lag is not allowed.
 - Set screws are required.
- Anchor strap 2
 - Must accommodate a 2-3/8" diameter service mast.
 - It is made from two 2" x 4" studs, 3/16" x 1" galvanized steel, and two 1/4-20 x 3" lag screws or 1/4-20 bolts.
 - Set screws are required.
- The maximum distance between the push brace and the weatherhead is 18".
- When using a push brace, two braces are required.

NOTE: The requirements in this section are in addition to those in [Section 7.3](#).



**OVERHEAD SURFACE MOUNT METERING
UNSUPPORTED - MAST HEIGHT 24"**



**OVERHEAD FLUSH MOUNT METERING
UNSUPPORTED - MAST HEIGHT 24"**

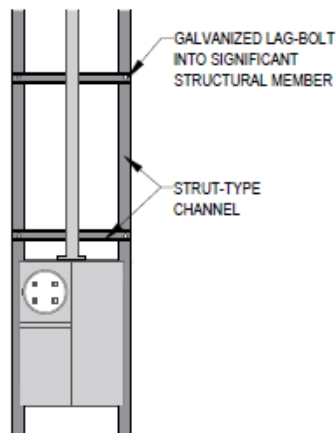
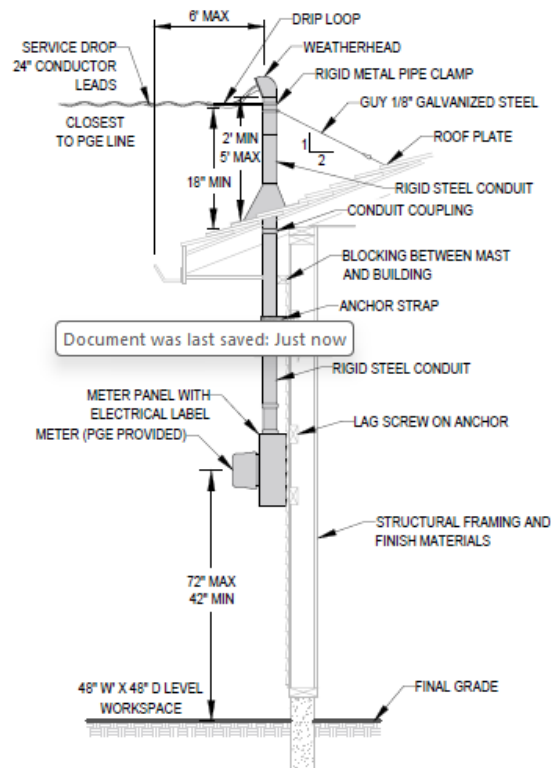
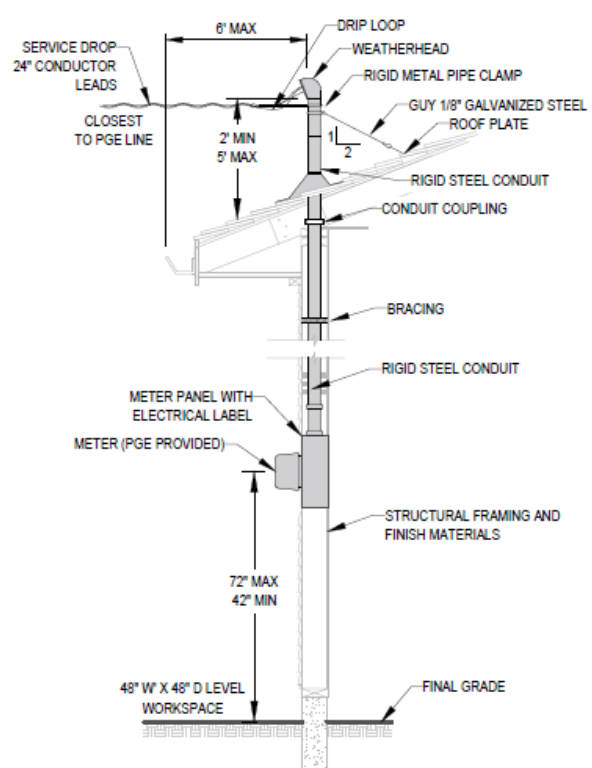


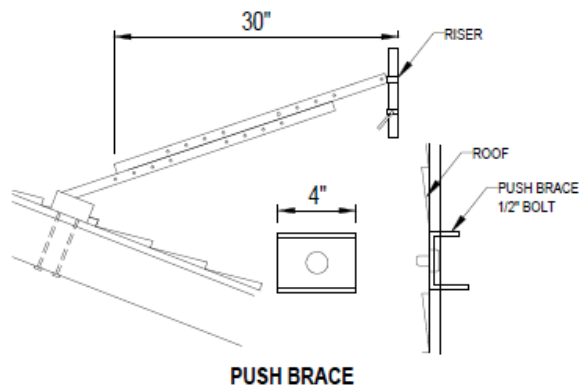
Figure 67. Overhead Service with Service Mast (STD-D-6023)



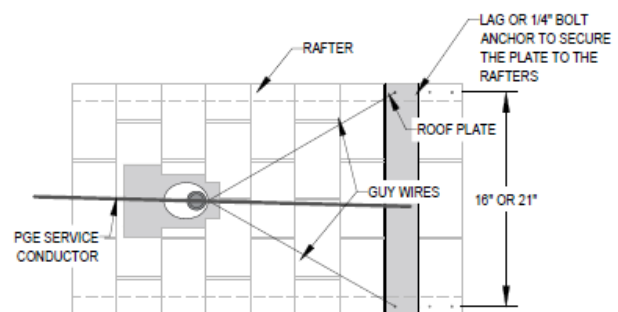
**OVERHEAD SURFACE MOUNT METERING
WITH SERVICE MAST GUY**



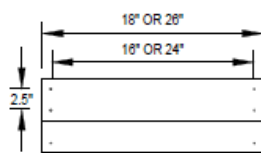
**OVERHEAD FLUSH MOUNT METERING
WITH SERVICE MAST GUY**



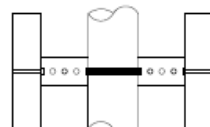
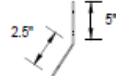
PUSH BRACE



METHOD OF GUYING



ROOF PLATE

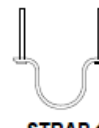


SIDE VIEW

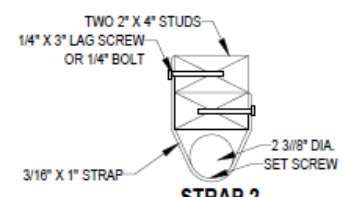


OVERHEAD VIEW

MAST ANCHOR BRIDAL



STRAP 1



STRAP 2

ANCHOR STRAPS

Figure 68. Overhead Service with Service Mast (STD-D-6022)

8 Multiple-Family Service

Topics in this Section

- [Locational Requirements](#)
- [Service Requirements](#)

8.1 Locational Requirements

PGE will determine the location of service entrance equipment on the customer's premises to ensure all clearances and access requirements are met (see [Section 5](#)). Failure to receive approval before installation will result in denial of service until the installation meets PGE's requirements. PGE requires 24/7 access to utility equipment.

Table 26. Meter Locations by Service Type

Service Type	Examples	Meter Options
Multiple-family units on a single tax lot (apartments)	Apartments, duplex, triplex	Grouping required.
Common wall construction with individual tax lots	Townhouses, row homes	Individual meters required, unless PGE requires grouping to achieve a safe route, compliant with all clearance and access requirements.
Multiple individual dwellings on a single tax lot	Tiny homes, cottages, ADUs	PGE Standard is grouping meters at the primary residence in a single multi-pack meter base with hard labels (see Section 3.10.8.3). See the following exceptions below.

Non-Standard Requests - When multiple individual dwellings exist on a single tax lot and the customer requests a non-standard option, PGE must evaluate whether the proposed route is safe and meets all clearance and access requirements. *Any request deemed unsafe or noncompliant will be denied.* If a non-standard metering arrangement is approved, an easement must be granted to PGE for all secondary services, and the Applicant must pay any additional costs in addition to standard route costs, as specified in PGE Tariff Rule I.1.C.1.

Metering Additional Dwellings on an Existing Tax Lot - For an existing tax lot proposing the addition of *one or two* dwellings, individual metering from the new dwelling(s) may be allowed under the following conditions:

- The new dwelling(s) is closer to PGE power lines than the primary residence; or
 - The new dwelling(s) is accessed from a different direction than the primary residence and it is
- When PGE allows separating metering, separate meter bases with permanent, hard-wired labels will be required.

Contact PGE and the local AHJ for location-specific requirements for specific situations.

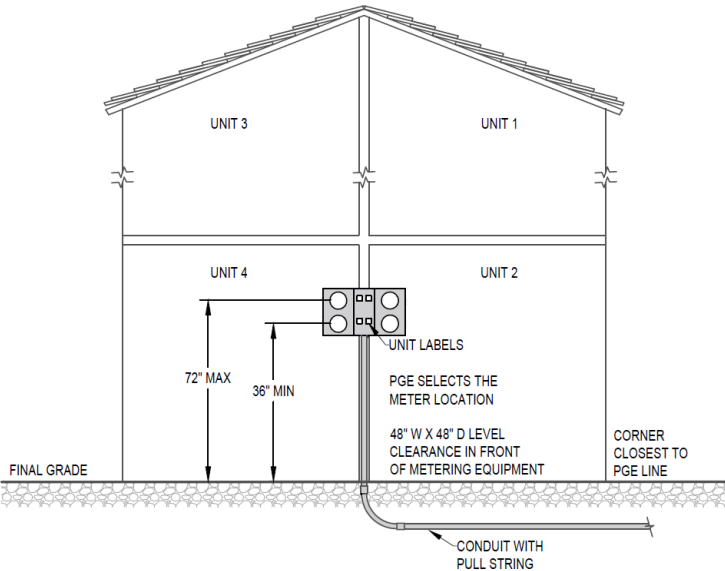


Figure 69. Underground Service for a Multiple-Family Dwelling (STD-D-6052)

8.1.1 Location of the Main Disconnect (Six-Disconnect Rule)

PGE requires a main disconnect in front of all meter banks that contain more than six meters. The main disconnect must be in the same location as the meter bank as shown in [Figure 70](#).

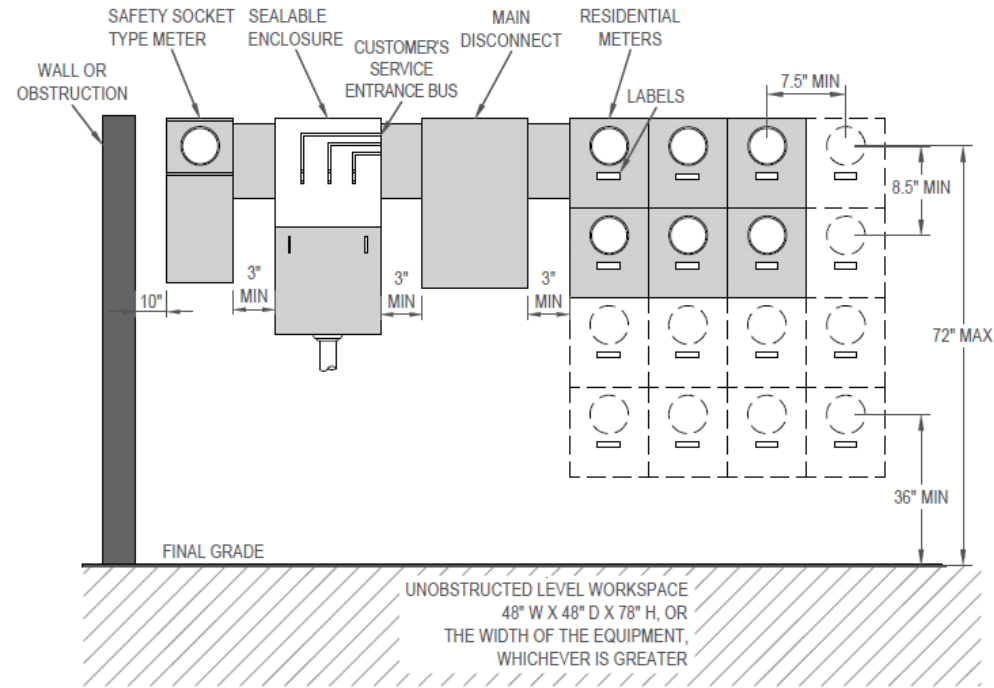


Figure 70. Meter Socket Installation for Underground and Overhead Multiple-Family Services (STD-D-6050)

8.2 Service Requirements

The following describes the basic service requirements for multiple-family service.

8.2.1 Labels

Obtain the necessary permits from the electrical Authority Having Jurisdiction (AHJ). An electrical label or permit must be displayed on the meter base

Multi-socket installations must be labeled at each meter socket with the address and/or unit number (as shown in [Figure 12](#)). Sites with multiple meters with different voltage require labeling on each termination section. See [Section 3.10.8.3](#) for all labeling requirements.

8.2.2 Water Mitigation

The customer is responsible for identifying potential surface and subgrade water flow that may let water enter the customer's electrical equipment.

8.2.3 Conduit

Conduit sweep and pull line requirements are described in [Section 6.3.2](#). Use factory bends, with no more than 270 degrees of total bends.

8.2.4 Meter Location

Provide a level 4' × 4' workspace in front of all PGE electrical equipment, or the width of the equipment if it is greater (see [Section 5.3.2](#)).

Locate meters so that the center of the lowest meter in a bank of meters is at least 36" from final grade. The highest meter in a bank of meters must be no more than 72" from the final grade, as shown in [Figure 70](#).

For grouped meters installed on a freestanding backstop (aka H-frame), refer to [Section 12.2](#) for post and support information.

8.2.5 Meter Socket

All meter sockets must be wired to breaker or disconnect position, or they must be permanently sealed by the manufacturer. If a blank position is required in a multi-meter pack, see [Section 3.10.2](#). PGE will install meters in all available meter sockets before energization.

A minimum 3" spacer is required between the disconnect or pull section and the meter socket panel, as shown in [Figure 70](#).

When single-phase power is provided from three-phase 208/120 V service, a three-phase main breaker is required at the service entrance.

The house meter must be the safety-socket type. Where the meter serves lighting only, a bypass or safety socket is not required, as shown in [Figure 70](#).

8.2.6 Additional Overhead Services Requirements

The customer must extend service entrance conductors from the service head to the PGE point of attachment; PGE will not extend conductors from the point of attachment to individual service heads. For overhead service figures to a residential service, see [Figure 65](#). For required clearances, see [Section 5](#).

8.2.7 Additional Underground Services Requirements

The conduit must be rigidly attached to the building and be straight and vertical to the sweep in the trench.

The service riser elbow must be backfilled with a minimum 4" depth of 3/4" minus crushed rock that is tamped to avoid soil settling.

For underground requirements, see [Section 6](#) and [Section 7.2](#).

8.2.7.1 Underground Service-terminating Arrangements

Follow the basic locational requirements for underground multiple-family service as described by the Electric Utility Service Equipment Requirement Committee (EUSERC) and National Electrical Code (NEC). Basic requirements include:

- The cable-pulling section must be sized for PGE service termination ampacity in accordance with EUSERC 343, and it must have bus extension drilled for landing lugs.
- EUSERC 347 requires that cross-busing installed below or behind a termination position must be fully insulated, or that a barrier must be installed.
- Refer to EUSERC 353 for minimum and maximum dimensions needed to meet spacing and stacking requirements.

8.2.7.2 Underground Service-terminating Arrangements for Two- and Three-Multi-meter Packs

For designs with a single line conductor or a single filled conduit, the customer must provide two 1/2" steel bolt terminations as outlined in EUSERC 342.

IMPORTANT: Most manufacturers require customers to procure an additional kit with a separate part number. Be sure to procure this kit and install it per the instructions.

For designs with greater than one line conductor or filled conduit, the customer must provide lugs that can accommodate the designed conductor size, typically up to 350 kcmil each.



Figure 71. Examples of Service Terminating Arrangements for Two- and Three Multi-meter Packs

[Figure 72](#) and [Figure 73](#) show typical service-terminating arrangements for:

- A two-meter socket module rated 0 to 200 A.
- A three-meter to six-meter socket module rated 201 to 600 A.

Table 27. Terminating Section Dimensions for Meter Socket Modules Rated 0 to 600 A (EUSERC 342)

Equipment Rating (amperes)	Minimum Dimension (inches)		
	W	X	Y
0 to 200	6.5	11	5.5
201 to 600	10.5	22	6
601 to 800	Consult PGE		

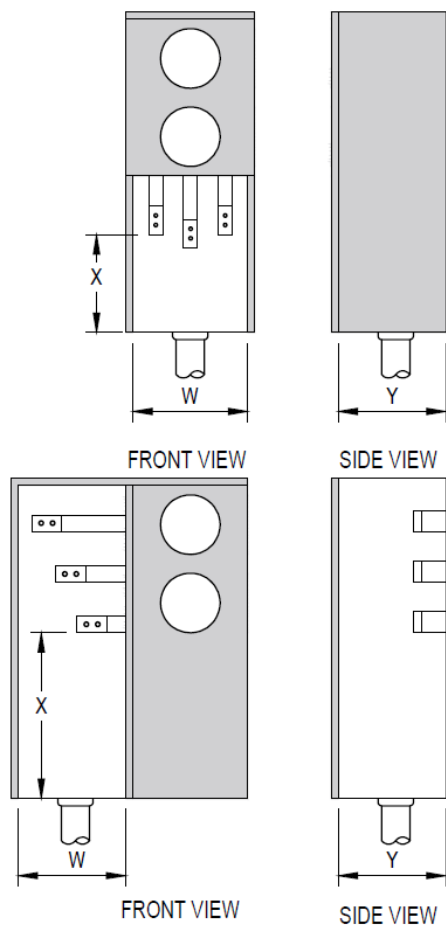


Figure 72. Service Terminating Arrangements for Two Meters Rated 0 to 200 A (EUSERC 342) - (STD-D-6060)

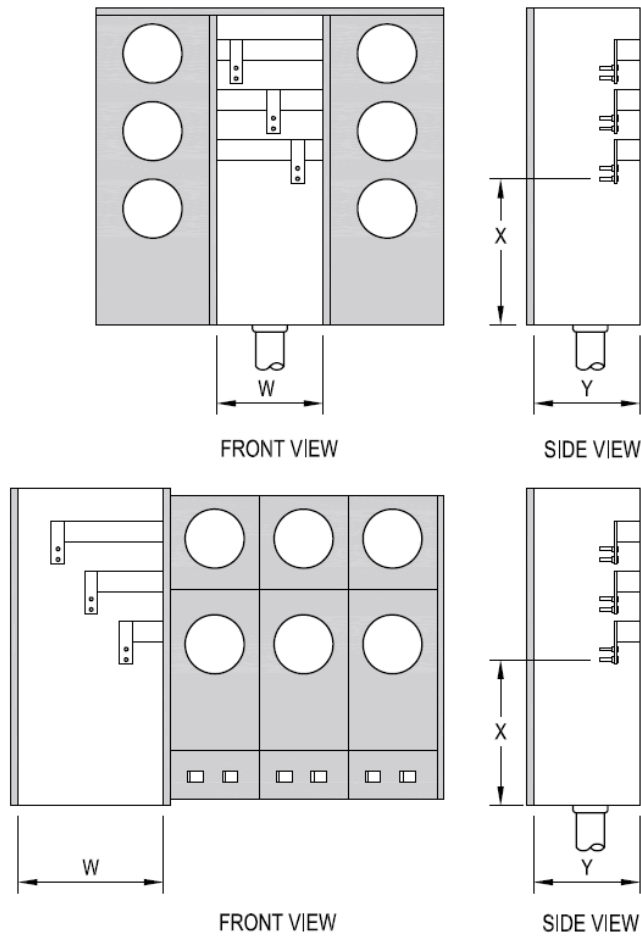


Figure 73. Service Terminating Arrangements for Three to Six Meters Rated 201 to 600 A - (STD-D-6062)

9 Manufactured and Mobile Home Services

Topics in this Section

- [Underground Service](#)
- [Overhead Service](#)

9.1 Underground Service

For requirements that apply to installation of underground secondary service, see [Section 6](#) and [Section 7](#).

9.1.1 Manufactured Homes

PGE will allow a customer's meter base on a manufactured home structure under the same requirements as single-family service if the home meets the following requirements:

- It occupies a private lot.
- It has a permanent foundation as defined by the local jurisdiction.
- If the local jurisdiction allows a second permanent meter for a residence on a property, PGE will allow a permanent post-mounted service. A PGE meter spot is required.

For more information, see the meter height and position requirements in [Section 5.2](#).

IMPORTANT: PGE must approve the location of a factory-installed meter socket before manufacture of the home. If the meter socket is incorrectly located, the customer is responsible for all modifications to relocate the meter to PGE requirements.

9.1.2 Mobile Homes

For underground service to a mobile home, the customer's service entrance must be on an approved pedestal or mounted on a wood post.

9.1.2.1 General Requirements

PGE specifies the location of the pedestal. Other applications for the pedestal must be approved by PGE.

The customer must furnish, install, and maintain the pedestal or wood post. The customer must also furnish and install the following:

- An underground-type meter socket enclosure
- A 6" × 6" pressure-treated or thermally treated post and hardware (for post service only).
- A conduit with a pull string.
- A utility easement.
- A trench for conductor and conduit.

[Figure 74](#) shows installation details for pedestal service, and [Figure 75](#) shows details for a post-mounted service.

The bottom of the enclosure containing the service equipment must be at least 24" above the finished grade.

For a meter that is subject to physical damage, the customer must install and maintain a barrier post or other suitable protection approved by PGE (see [Section 6.4.6](#)).

If the home is in a mobile home park, a permanent label showing the space number must be placed on the meter socket enclosure.

Locate PGE conductor trenches and conduits in mobile home parks away from—never underneath—the pad, foundation, or area provided for the manufactured home.

9.1.2.2 Installing a Pedestal Service

The following are required when installing a pedestal service to a mobile home (as shown in [Figure 74](#)):

- Additional corrosion-resistant protection must be provided to the bottom of the pedestal that contacts the soil. Use electroplate galvanizing under the paint or use paint with coal tar coating.
- The pedestal must be installed at least 7' away from the service pole.
- The bottom of the pedestal must be 18" to 24" below final grade.
- There must be at least a 6" clearance between the final grade and the bottom of the access door to PGE connections. The access door must have a sealable provision for PGE.
- The pedestal must not be placed in a location that makes the front pedestal door inaccessible for PGE connections. In addition, the metal seal that PGE uses to secure the door must remain accessible.
- The bottom of the access door must be at least 6" above final grade.
- Customer conduit must not be installed across the front of the PGE access door on a pedestal.
- The center of the meter must be at least 42" above final grade and no more than 72" above final grade.
- The electrical label or permit must be displayed on the meter socket.
- Two 0.125" × 1" × 1" steel angles must be driven into the ground on each side of the pedestal. Attach the steel angles to the side of the pedestal using 1/4" or larger bolts.
- Corrosion inhibitor must be used on all aluminum connections.

After approval, PGE will provide service to the meter pedestal compartment for a permanent mobile home. Each mobile home must have a separate pedestal compartment approved by PGE for termination of the PGE service lateral.

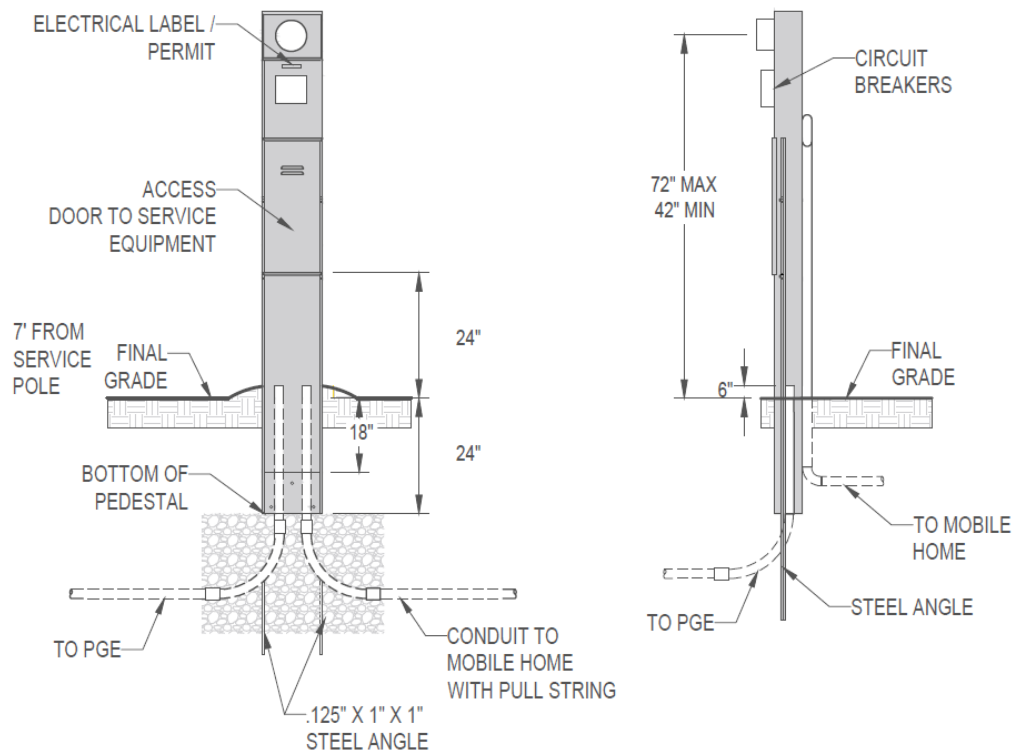


Figure 74. Underground Pedestal Installation Service for a Mobile Home (EUSERC 307) (STD-D-6100)

9.1.2.3 Installing a Post-Mounted Service

The wood post for a post-mounted underground service must measure at least 6" x 6" and be pressure-treated or thermally treated by the manufacturer using an approved American Wood Preservative Association standardized preservative. The use of railroad ties is not acceptable.

The following are required when installing a post-mounted service to a mobile home (as shown in [Figure 75](#)):

- The customer must install a minimum 6" x 6" pressure-treated wood post. Firmly tamp the earth around the post and mound the earth to accommodate settling.
- An electrical label or permit must be displayed on the meter socket.
- Use a strap to secure the conduit to the post.
- PGE will determine the exact location of the meter.
- The post must be installed at least 7' from the service pole.
- The bottom of the meter enclosure must be at least 24" above the final grade.
- For trench requirements, see [Section 6.2](#).

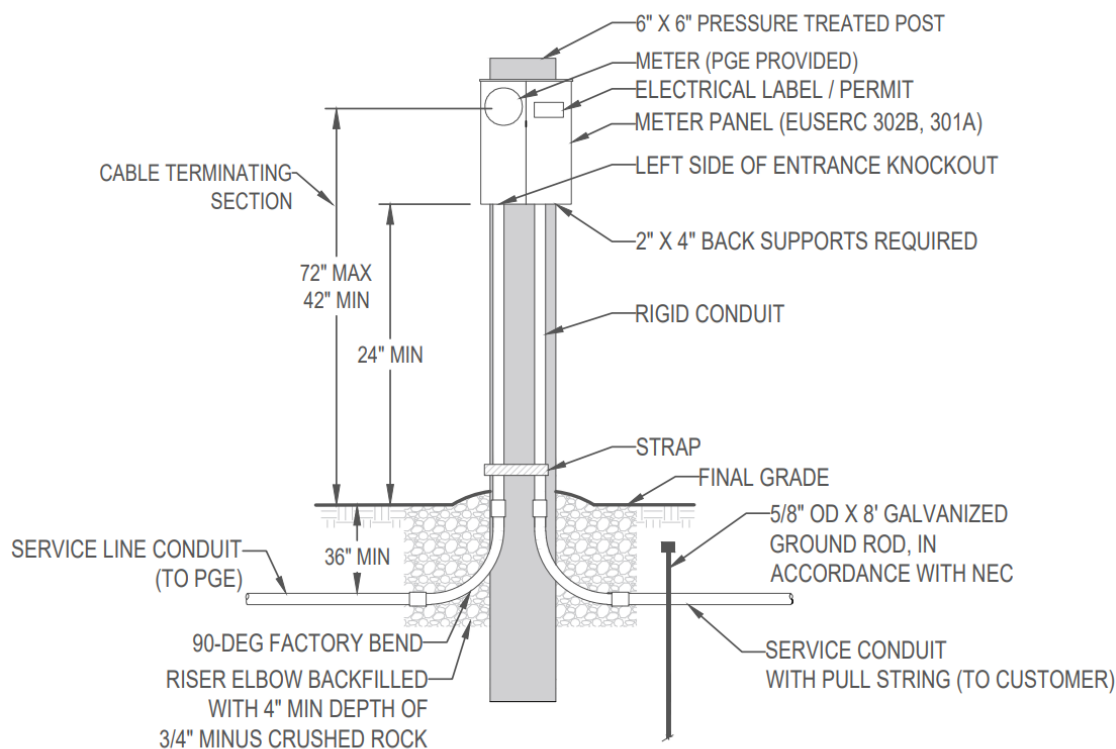


Figure 75. Underground Post-Mounted Service for a Mobile Home (STD-D-6105)

9.2 Overhead Service

PGE will supply new overhead service to any building or premises that is not located in an area that the local governmental jurisdiction and/or PGE has designated as an underground district restricted to underground service.

9.2.1 Manufactured Homes

PGE will provide overhead service to a manufactured home using the same requirements as a residential occupancy listed in [Section 7](#). The customer must make provisions for meter height and placement as described in [Section 5.2](#).

IMPORTANT: PGE must approve the location of a factory-installed meter socket before manufacture of the home. If the meter socket is incorrectly located, the customer is responsible for all modifications to relocate the meter to PGE requirements.

9.2.2 Mobile Homes

The customer must install the meter socket and service equipment on a wood pole. The pole must be pressure-treated or thermally treated by the manufacturer using an American Wood Preservative Association standardized preservative. The pole height must be tall enough to provide all required clearances for the PGE service drop and any telephone, cable, or other attachments. For more information, see [Section 5](#).

IMPORTANT: PGE will not energize the service if the customer-provided service pole is not safe to climb.

The following requirements apply to both overhead service to a mobile home with a customer underground service lateral (shown in [Figure 76](#)) or a customer overhead service drop (shown in [Figure 77](#)):

- The customer must provide and install a new PGE-approved pole that has a minimum length of 20' and a minimum diameter of 5.5" at the top. The pole must be pressure-treated or thermally treated by the manufacturer. (A 6" × 6" treated square post is an option.) The pole must be set at least 5' below the level of the ground with gravel backfill.
- If the service drop crosses a road or traffic area, the pole must have a minimum length of 24' and a minimum diameter of 5.5" at the top. The pole must be set at least 5' below the level of the ground with gravel backfill.
- A pole longer than 24' must be set more than 5' below the level of the ground. Consult PGE for the proper depth.
- A longer pole may be required to accommodate overhead communication lines. Contact the telephone utility and the cable company for their required clearances.
- An electrical label or permit must be displayed on the meter socket.
- The customer must provide a 3/8" eyebolt where the service attaches to the pole.
- The customer must provide the drip loop and a minimum 5/16" galvanized steel cable down guy and anchor.
 - The guy attachment must be at the height of the weatherhead.
 - Allow 24" of cable to create the drip loop.
- PGE will determine the exact location of the meter.

This additional requirement applies only to a mobile home with a customer overhead service drop.

- Install the pole at least 7' from the service pole.

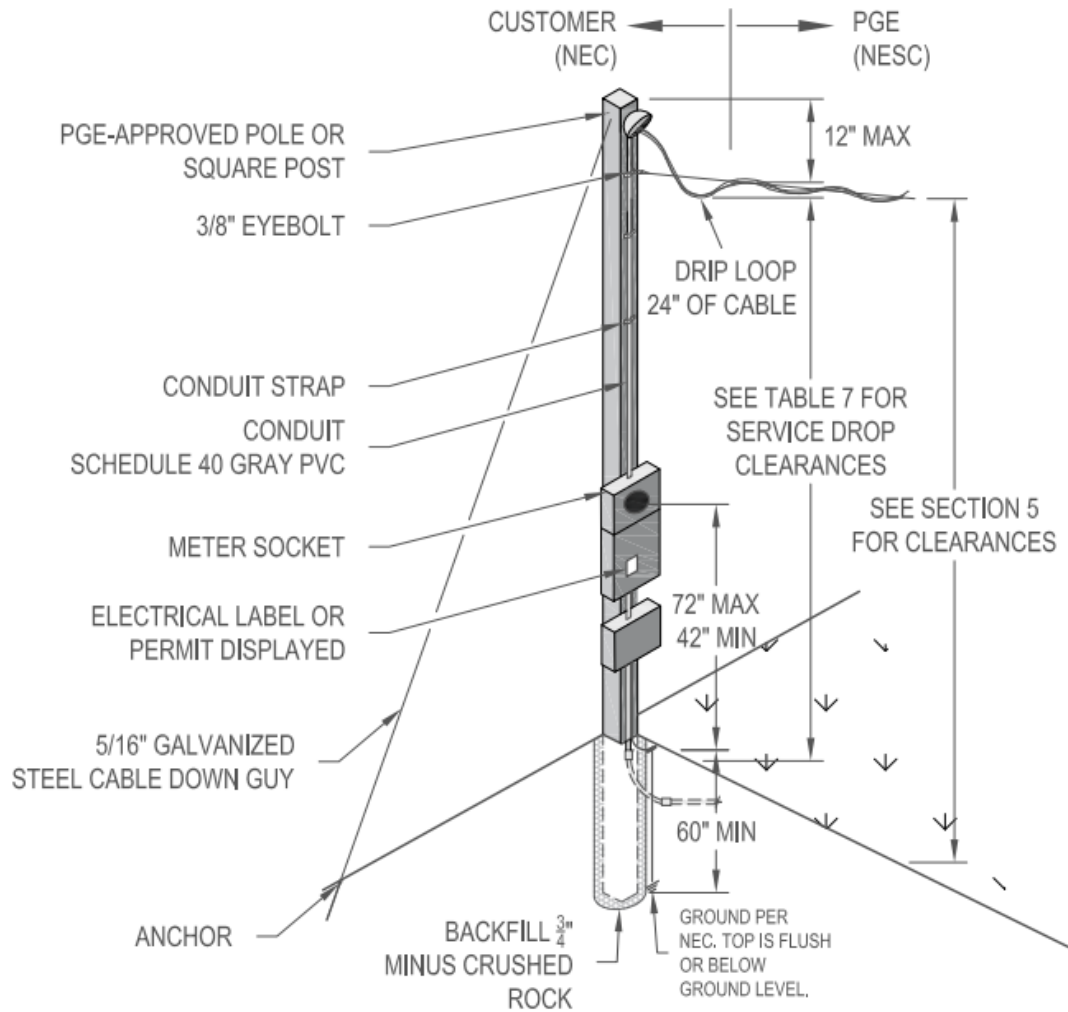


Figure 76. Overhead Service to a Mobile Home with a Customer Underground Service Lateral (STD-D-6110)

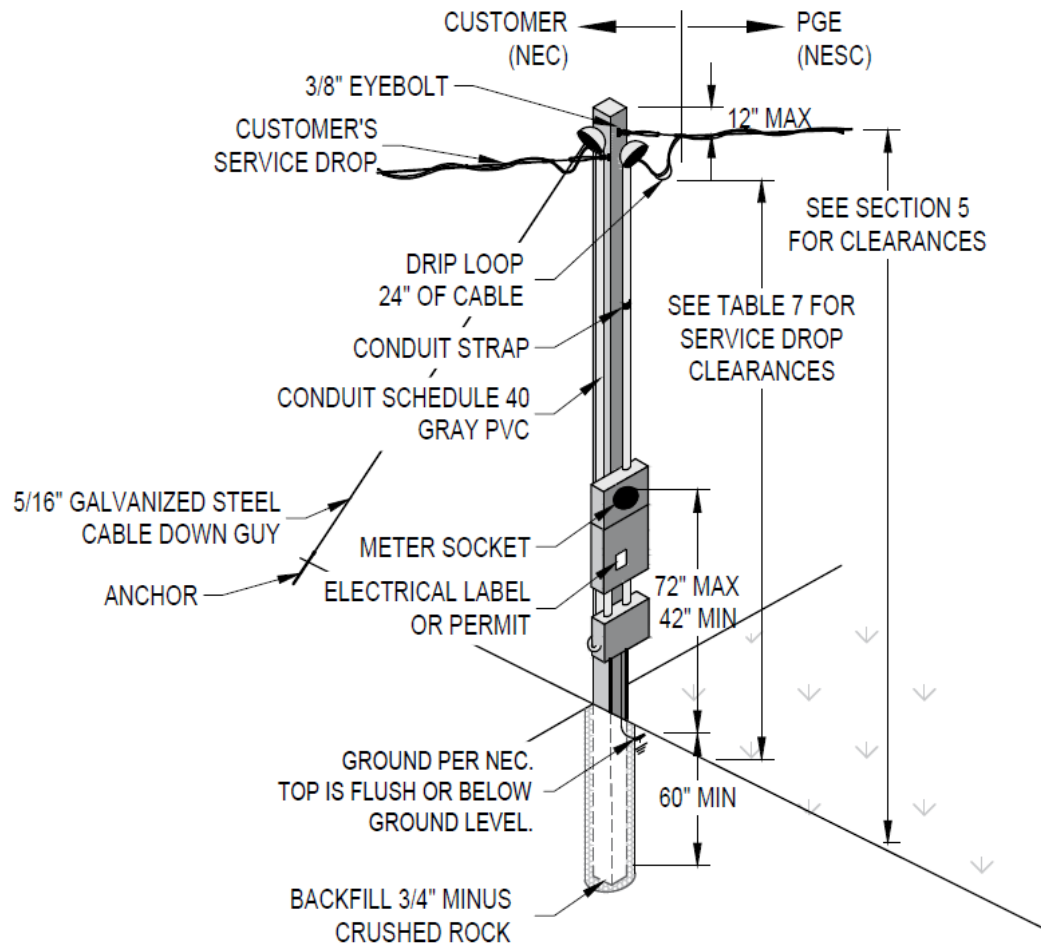


Figure 77. Overhead Service to a Mobile Home with a Customer Overhead Service Drop (STD-D-6115)

10 Commercial, Industrial, and Large Residential Services, 800 A or Lower

Topics in this Section

- [Basic Requirements](#)
- [Meter Location](#)
- [Direct-Connect Meter](#)
- [Termination Compartment Requirements](#)
- [Customer's Responsibility for Maintaining Switchboards](#)
- [Commercial Service, 0 to 800 A](#)
- [Current Transformer Metering, 800 A Maximum](#)

10.1 Basic Requirements

This section outlines PGE's requirements for commercial, industrial, and large residential services rated up to 800 A and less than 600 V. It includes both single-phase and three-phase services for self-contained and current transformer (CT) meters. For services exceeding 600 V, consult PGE Meter Services for applicable requirements and equipment.

Large residential services are:

- Single-residential services over 320 A continuous.
- All three-phase residential services.

Direct-connect metering is required for single-phase services at 400 A (320 A continuous) or lower, or three-phase services at 200 A or lower (see [Section 10.3](#)). CT metering is required for single-phase services over 320 A and three-phase services over 200 A (see [Section 10.7](#)).

PGE requires 24/7 access to utility equipment. See [Section 5.5.3](#) for Drivable and Accessible Surface requirements.

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 [Section 5.6.8](#)).

Before power is connected, all 480 V services, multi-socket installations, structures with multiple service, and services with customer generation must be permanently and visibly labeled as such (see [Section 3.10.8](#)).

IMPORTANT: Customers must coordinate their service requirements with PGE. They will be required to provide drawings of metering equipment for review and should wait for approval before purchasing or installation of equipment.

10.2 Meter Location

For the purposes of safety, accessibility, maintenance, and power quality, metering equipment is located close to PGE transformation (see [Section 5.2](#)).

All meters must comply with accessibility and location requirements in [Section 5](#). Externally mounted metering equipment, which is PGE's standard, must have a clear workspace in front of the meters that is 48" wide, 48" deep, and 78" high, or the width of the equipment, whichever is greater.

Meter sockets, terminal cabinets, current transformer cabinets, and transformers must be located away from landscape irrigation sprinklers.

When meter equipment is in electrical equipment rooms, see [Section 13](#) for detailed requirements.

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 A maximum (320 A continuous) or lower, or
- The ampacity of a three-phase service is 200 A continuous or lower.

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 A or lower, 120/240 V, or 240/480 V. Contact PGE for further information.

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

Table 28. Direct-Connect Meter Socket Requirements

Type of Service	Socket Type
120/240 V, single-phase, 3-wire or 240/480V, single-phase, 3 wire	4-jaw
120/208 V, single-phase, 3-wire (contact PGE for information)	5-jaw
208/120 V, three-phase, 4-wire	7-jaw
480/277 V, three-phase, 4-wire	
240/120 V, three-phase, 4-wire or 480/240 V, three-phase, 4-wire	

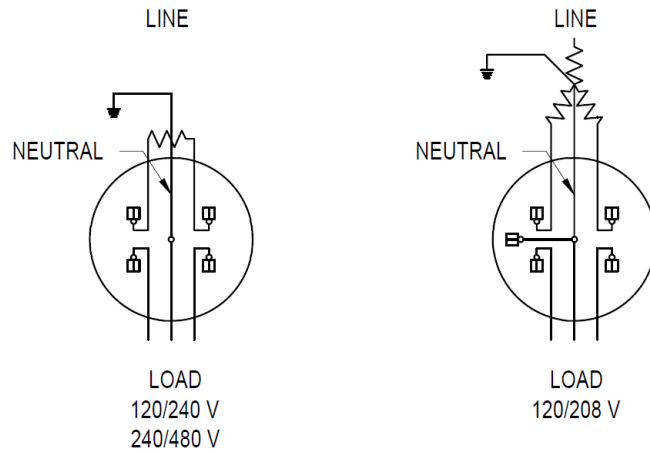


Figure 78. Direct-Connect Meter Sockets, Single-Phase, 3-Wire Service (STD-D-6200)

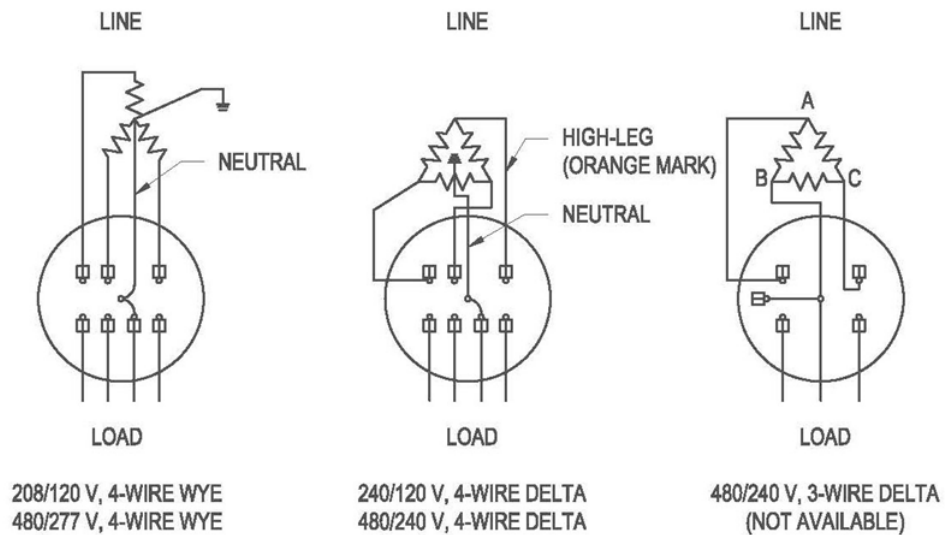


Figure 79. Direct-Connect Meter Sockets, Three-Phase Service (STD-D-6204)

10.3.1 Direct-Connect Meter Safety Socket

IMPORTANT: Contact PGE before installing a direct-connect meter safety socket.

PGE requires the following 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.
- An EUSERC safety socket with a test link bypass is required for all 120/240 V services rated 100 A and 200 A, and for 480 V services rated up to and including 200 A.
- A manual link bypass is required for all 120/240 V, single-phase services with a nominal rating of 400 A (320 A continuous).
- No safety socket is required for service equipment rated 200 A or lower for the following dedicated uses:
 - Temporary construction
 - Single-family well-pumps, residential gates, residential outdoor lighting, residential barns, and residential outbuildings.

NOTE: Shared pumps and gates must have safety sockets.

NOTE: 120 V and single-phase 480 V temporary services are no longer offered.

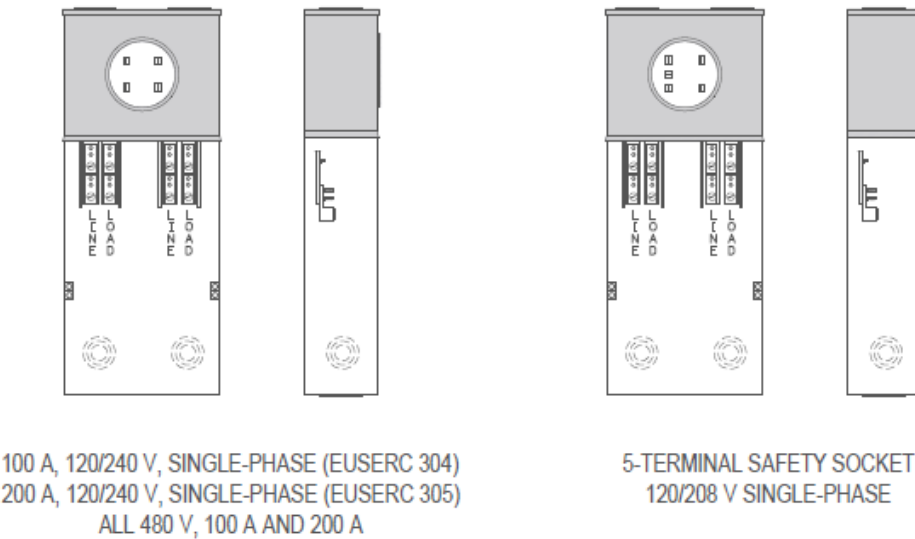


Figure 80. Commercial and Large Residential Single-Phase, Direct-Connect Meter Safety Sockets (STD-D-6206)

10.4 Termination Compartment Requirements

All compartments for termination of PGE service laterals must be located—and made accessible—on an entry level or main floor, 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. Customer-owned devices such as limiters or fuses must not be installed 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. For more information, see EUSERC 343 in [Table 35](#).

PGE requires the following when installing a pull box with terminating facilities:

- [Table 35](#) lists the minimum dimensions for pull boxes with terminating facilities (EUSERC 343). The following dimensions are for the PGE portion of the pull box only.
- The cable-pulling section must be sized for PGE service termination in accordance with EUSERC 342 and 343 and must have a bus extension drilled for landing lugs.
- The NEC requires a main disconnect when more than six services are connected (see [Section 8.2.6](#)). When the sum of the distribution section ampacities exceeds that of the pulling section ampacities, the customer must provide NEC-approved load calculations.
- The termination compartment for a large residential (0 to 800 A) modular metering section must meet size requirements shown in [Table 22](#).
- PGE will not terminate directly on the customer breaker.
- [Figure 24](#) shows the 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 must be anchored to prevent turning.
- Customer service entrance conductors must exit above the lugs.
- Cable entry through the back of the pulling section is not allowed.

Table 29. Minimum Dimensions for Pull Boxes with Terminating Facilities (EUSERC 343)

Total Service (amperes)	Dimensions (inches)			
	W	X	Y	D
	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

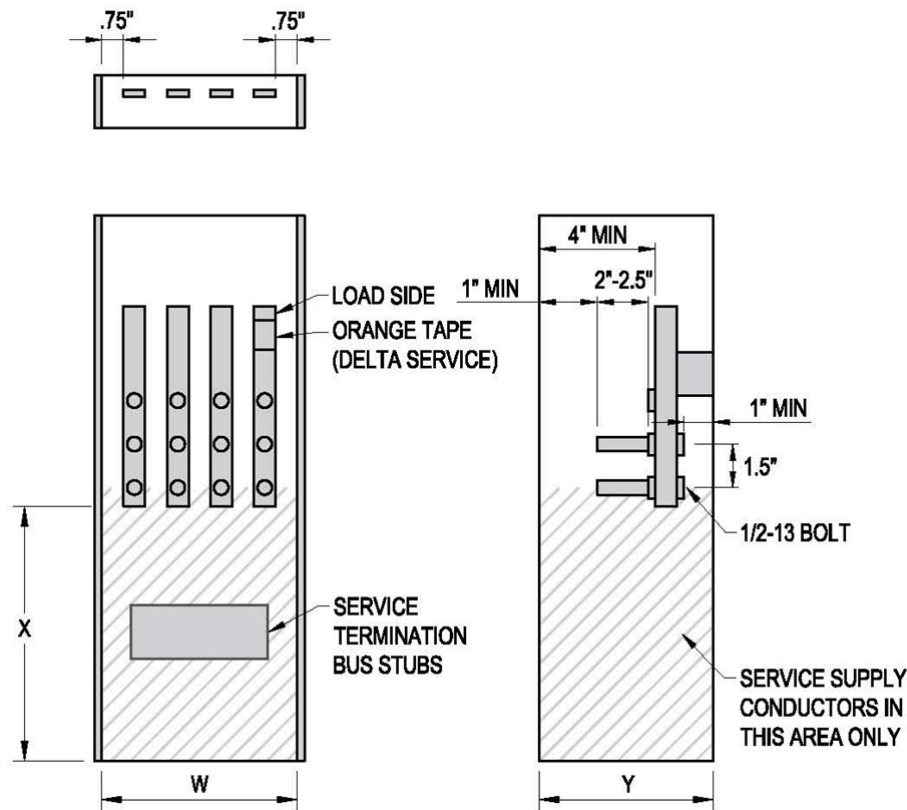


Figure 81. Pull Box with Terminating Facilities, 0 to 600 V, 0 to 1200 A (EUSERC 343, 347) (STD-D-6209)

10.5 Customer’s Responsibility for Maintaining Switchboards

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

To ensure that bolted connections have a long service life, there must 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 30](#).

NOTE: For setscrew connections, torque to manufacturer recommendations.

Table 30. 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

10.6 Commercial Service, 0 to 800 A

The following basic requirements exist for all commercial services of 0 to 800 A in addition to those in the following subsections:

- The NEC requires a main disconnect when more than six services are connected (see [Section 8.1.1](#)). When the sum of the distribution section ampacity ratings exceeds that of the pulling section ampacity ratings, the customer must provide NEC-approved load calculations.
- Meters and equipment must be accessible during normal working hours for meter reading and testing. If a lockbox is needed, it must be installed outside the meter room before power can be connected, each multiple-meter service must have a permanently engraved metal or hard plastic label with letters at least 3/8" high to identify the customer's service address, as shown in [Figure 13](#).
- If a cross bus is installed below or behind a terminating position, the cross bus must be fully insulated and barricaded (EUSERC 347).
- A 3.5"± 0.5" thick concrete housekeeping pad is required for all commercial pedestals and switchboards (freestanding) regardless of the substrate. Housekeeping pads on top of asphalt or concrete should extend 2" beyond the equipment on all sides. Housekeeping pads on top of gravel, landscaping, or other substrate should extend 48" minimum in front of any cabinet.

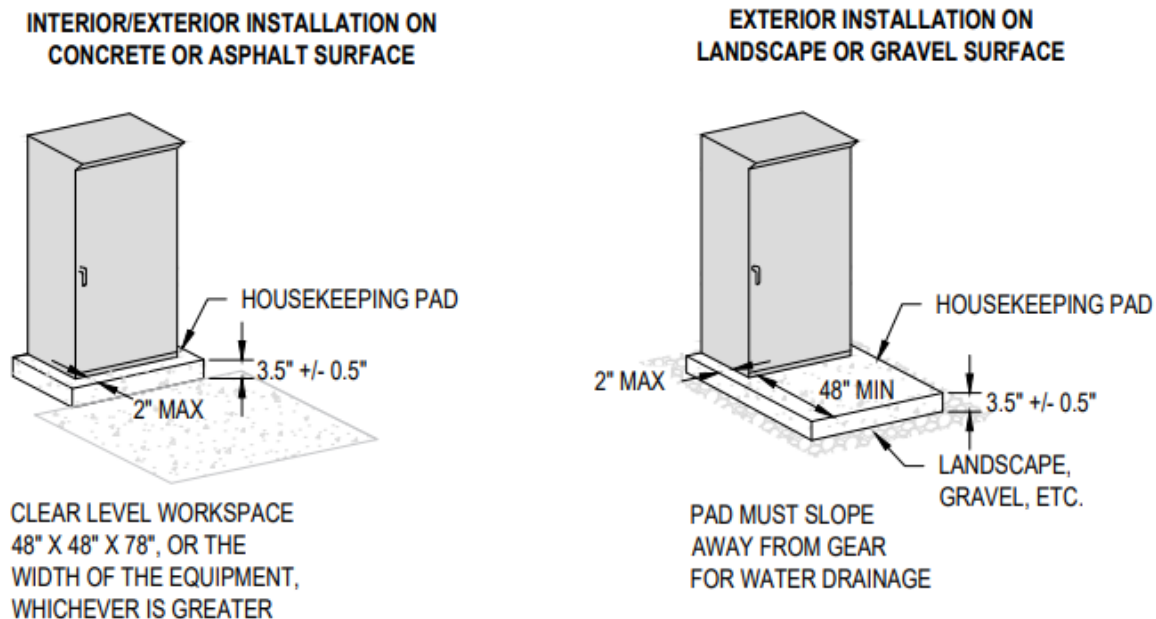


Figure 82. Housekeeping Pads (STD-D-6246)

10.6.1 Commercial Pedestal, 0 to 200 A

PGE requires the following, in addition to those in [Section 10.6](#), when installing a 0 to 200 A commercial pedestal:

- The barrier between the meter section and the pull section must extend to the edge of the test block barrier.
- The meter socket enclosure must be hinged to allow front, sides, and back to be rotated back or laterally as a single unit to expose the meter socket and test bypass sections.
- Refer to EUSERC 308 for additional requirements.

Table 31. Minimum Dimensions for Pedestals

Service	A (inches)	W (inches)
Single-phase	16	10.5
Three-phase	16	12.5

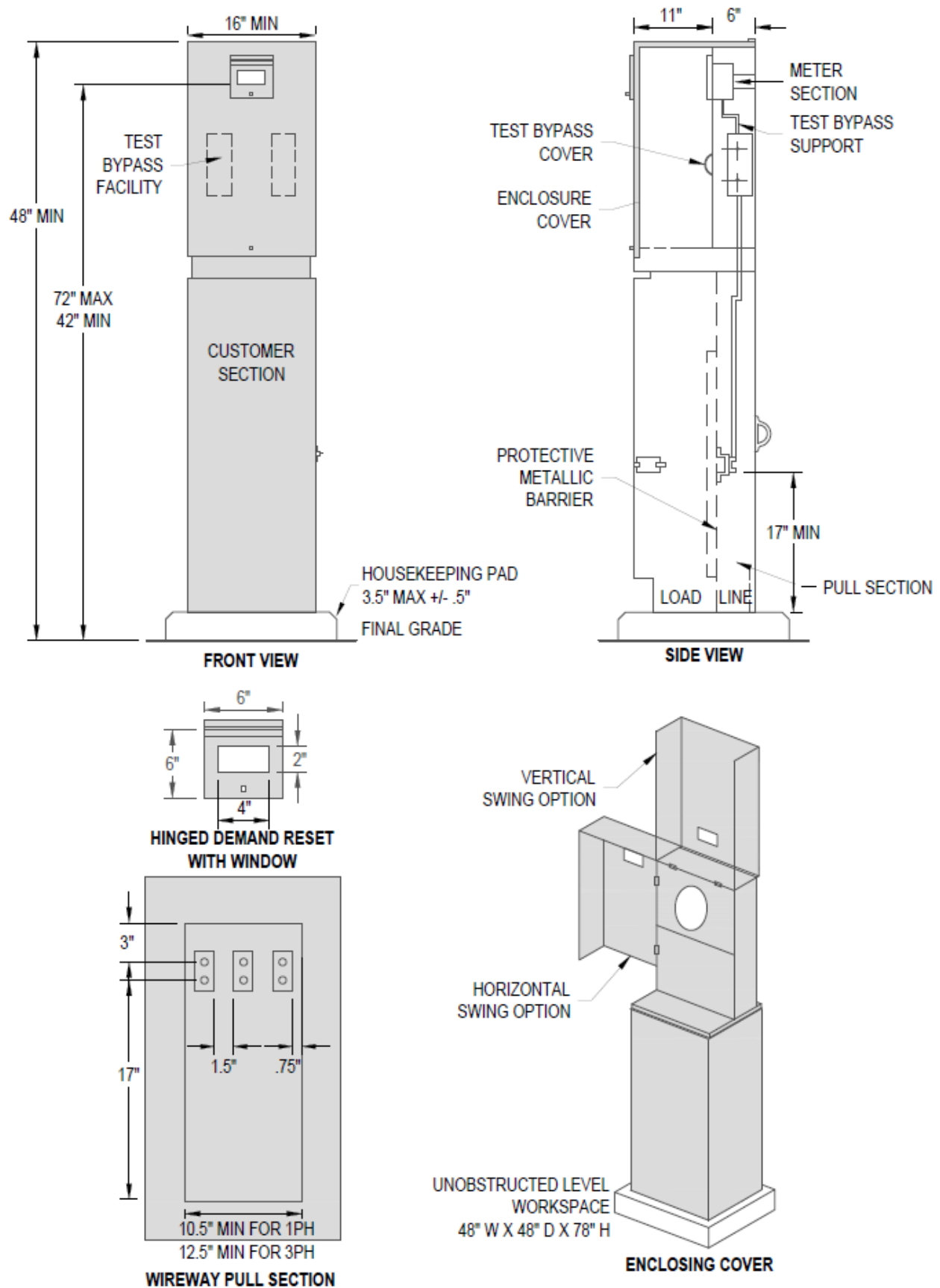


Figure 83. Commercial Pedestal, 0 to 200 A (EUSERC 308) (STD-D-6210)

10.6.2 Commercial Pedestal, 400 to 800 A

PGE requires the following, in addition to those in [Section 10.6](#), when installing a 400 to 800 A commercial pedestal:

- Refer to EUSERC 310 for additional requirements.

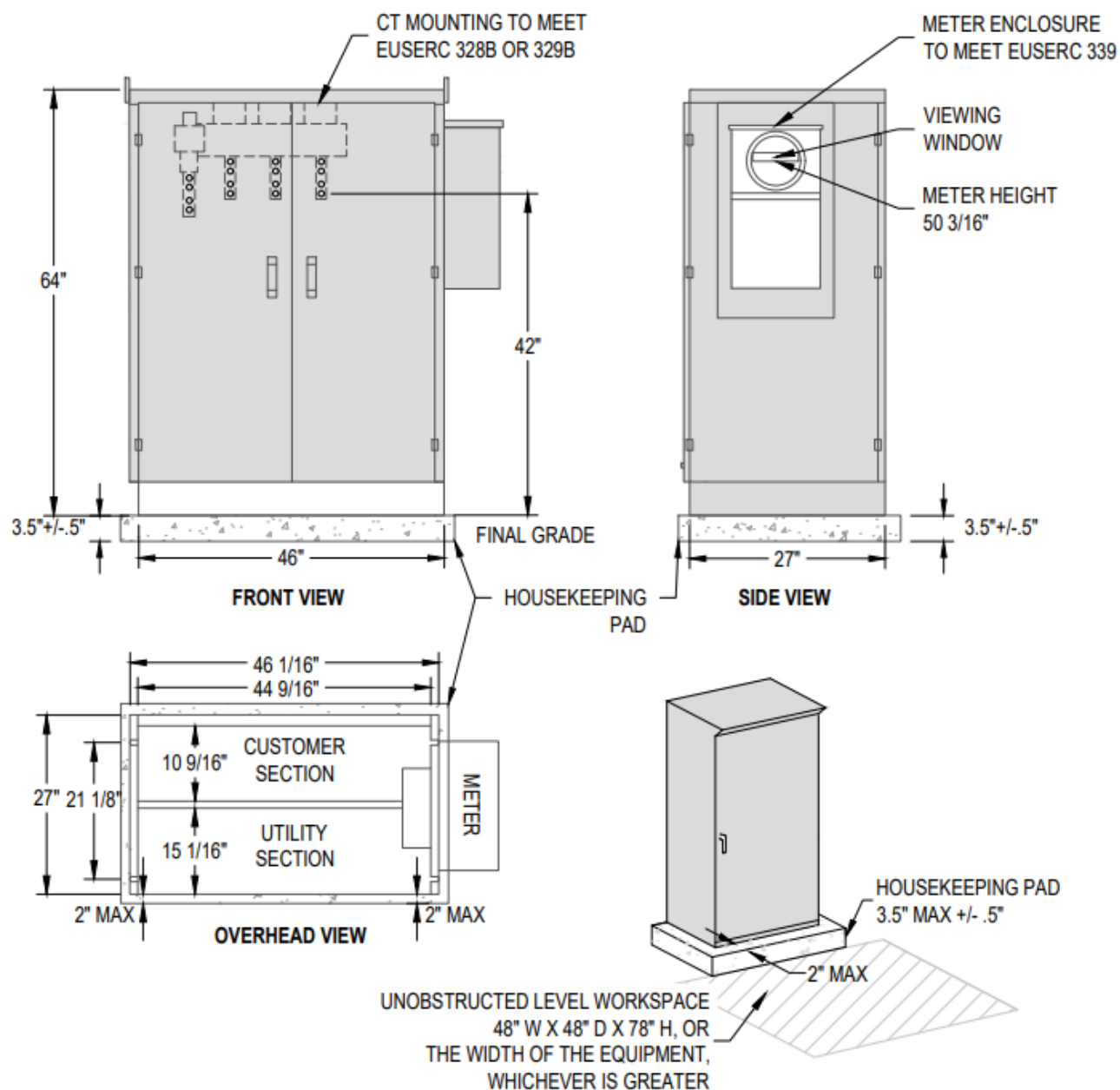


Figure 84. Commercial Pedestal, 400 to 800 A (EUSERC 310) (STD-D-6212)

NOTE: Housekeeping pads on top of gravel, landscaping, or other substrate should extend 48" minimum in front of any cabinet.

10.6.3 Commercial Three-phase, Direct-Connect Meter Safety Socket

PGE requires the following, in addition to those listed in [Section 10.6](#), when installing a commercial three-phase, direct-connect meter safety socket:

- The socket must be an 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 A, direct-connect meter socket is not approved for commercial use.
- For a 4-wire delta service, the high-leg (wild-leg) 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.

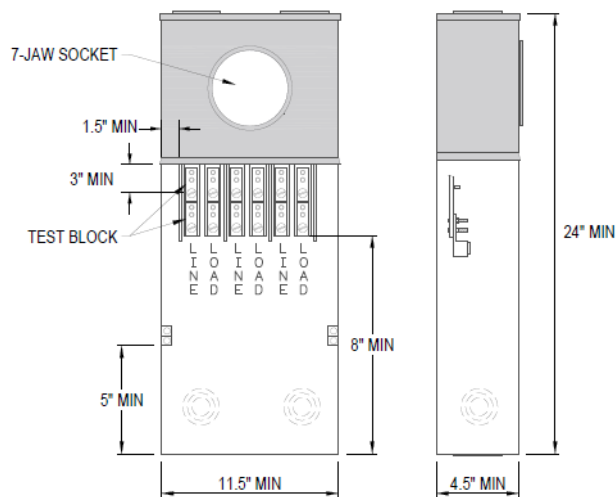


Figure 85. 100 A Commercial, Three-Phase, Direct-Connect Meter Safety Socket (EUSERC 304) (STD-D-6214)

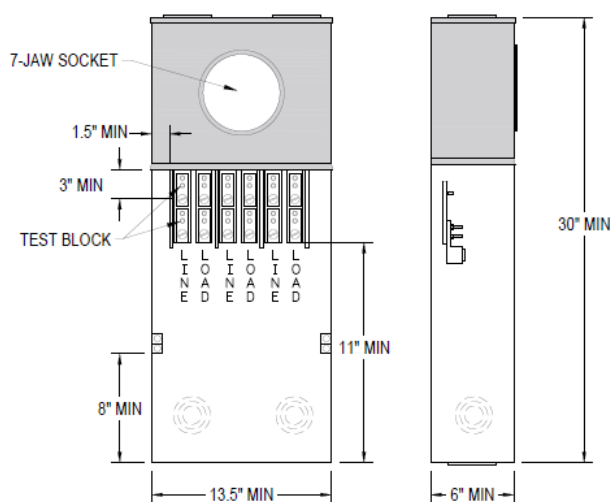


Figure 86. 200 A Commercial, Three-Phase, Direct-Connect Meter Safety Socket (EUSERC 305)-(STD-D-6216)

10.6.4 Commercial Ganged Meter Sockets

PGE requires the following, in addition to those listed in [Section 10.6](#), when installing commercial ganged meter sockets:

- PGE terminates service conductors only in the cable pulling section on bus extensions—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 the bus extension drilled for landing lugs.

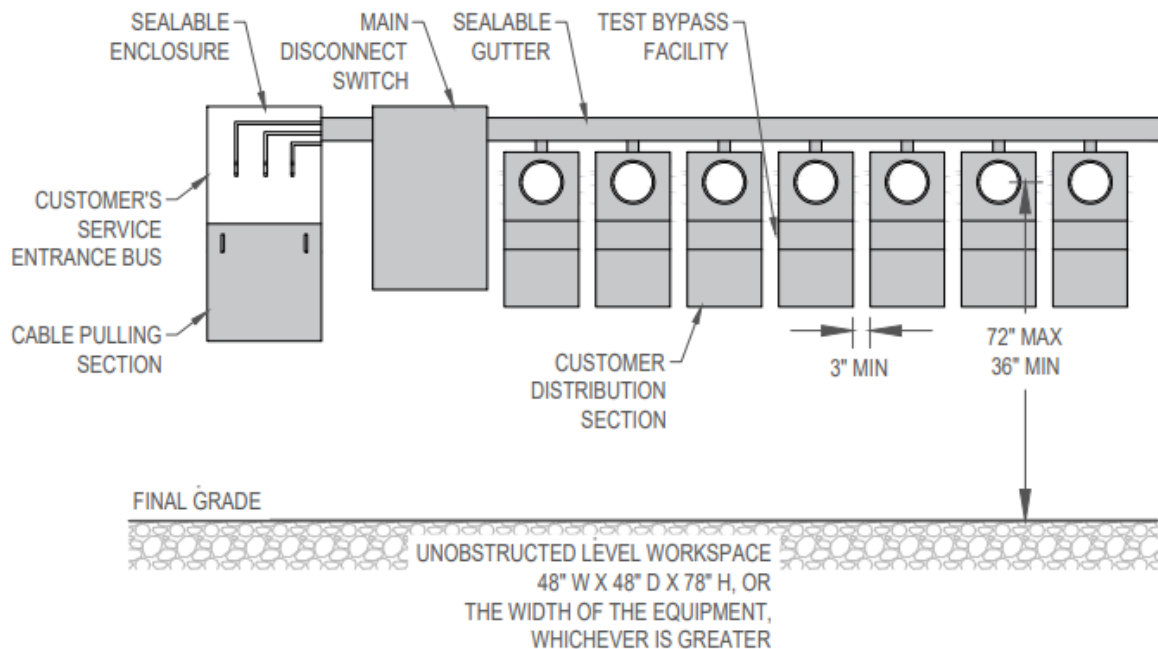


Figure 87. Commercial Ganged Meter Sockets (STD-D-6220)

10.6.5 Commercial Module Meter Sockets

PGE requires the following, in addition to those in [Section 10.6](#), when installing commercial ganged meter sockets:

- A minimum 3" spacer between the pull section and the meter socket panel.

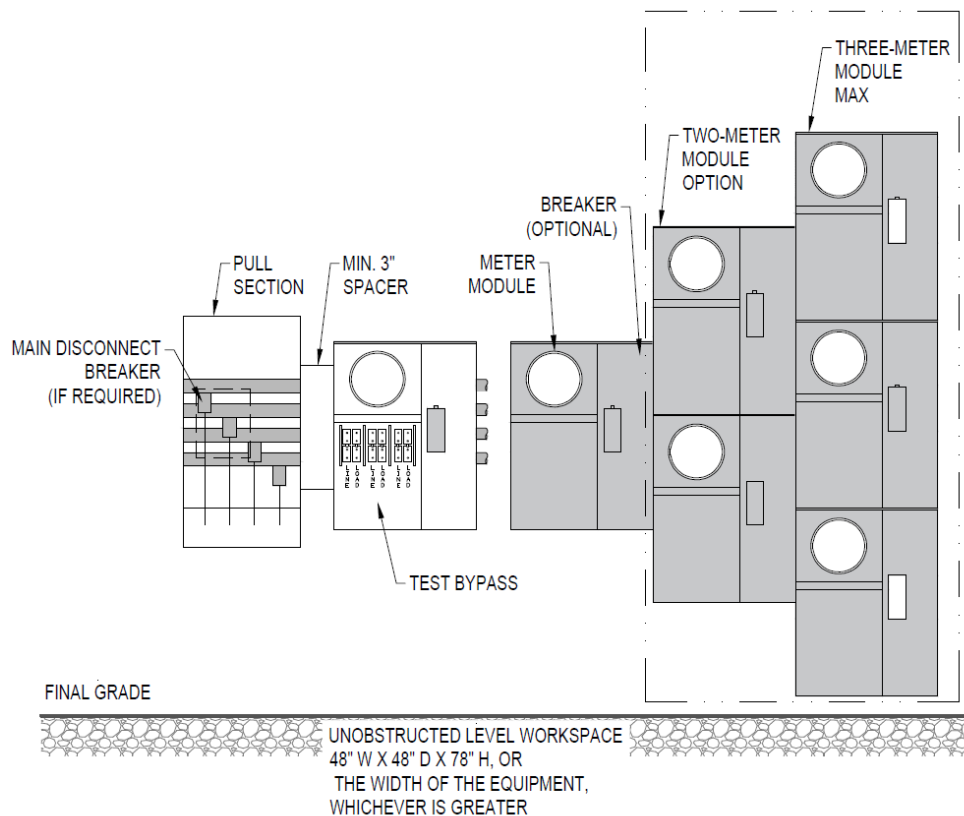


Figure 88. Commercial Module Meter Sockets (EUSERC 304, 305, 347) (STD-D-6222)

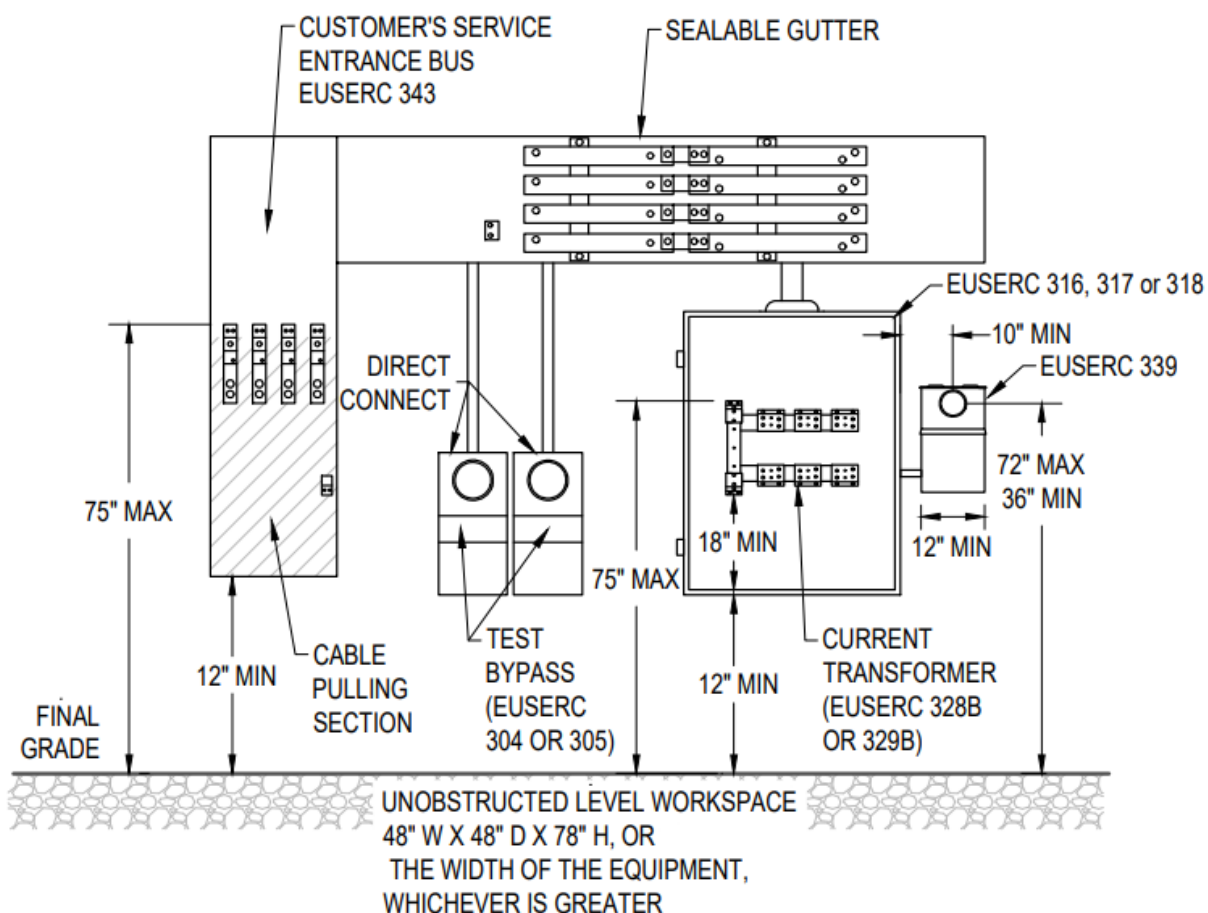


Figure 89. Typical Double-Stacked Module Meter Sockets

10.6.6 Combination Current Transformer/Direct-Connect Wall-Mount Metering

PGE requires the following, in addition to those in [Section 10.6](#), when installing a combination CT/direct-connect wall-mount metering 800 A or smaller:

- Bonding jumpers around knockouts.
- The pull section rated at the sum of the service maximum ampacities.



**Figure 90. Combination Current Transformer/Direct-Connect, Wall-Mount Metering, 0 to 800 A
(STD-D-6226)**

10.7 Current Transformer Metering, 800 A Maximum

PGE prefers switchboard metering, but it is not required for services of 800 A or lower. Current transformer (CT) metering is required when a three-phase service exceeds 200 A, or when a single-phase 120/240 V service exceeds 400 A (320 A continuous). For services over 800 A, see [Section 11](#). The CT cabinet and meter must be mounted outside the building as described in [Section 5.2](#). Consult PGE for current transformer installation specifications.

IMPORTANT: To prevent water drainage into the customer's equipment, do not locate PGE equipment, transformers, and vaults higher than the CT cabinet.

The customer must provide and install:

- A weathertight NEMA 3R-rated metallic CT cabinet that is securely mounted on a rigid surface. The doors are to be hinged and capable of being sealed (see [Section 10.7.3](#)). For installations where both the line and load sides are coming in and going out underground or overhead, the cabinet must be at least 48" wide × 48" high × 11" deep.
- EUSERC-approved CT mounting bases rated 50,000 A fault duty. Fault currents over 50,000 A must have switchboard 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" diameter barrier post, which is required where metering equipment is installed in an area with vehicle traffic. For more information, see [Section 5.6.8](#).
- 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).

10.7.1 Current Transformer Metering, Post-Mounted

PGE requires the following, in addition to those listed in [Section 10.7](#), when installing post-mounted current transformer metering:

- The current transformer cabinet must have two factory-installed, 24" × 48" hinged doors with handles in the center.

IMPORTANT: The cabinet must be installed at least 12" above the final grade.

- The meter must be mounted so that it does not interfere with the opening of the cabinet doors.

IMPORTANT: For a 4-wire delta service, the high-leg (wild-leg) terminal must be located on the right side and identified by an orange mark.

- The configuration shown in [Figure 78](#) can be used as a wall mount if clearance allows.

- The customer must provide 3" galvanized, rigid steel pipe supports with caps or 6" x 6" pressure-treated wood posts. For temporary CT services installed on freestanding backstops (aka H-frame), refer to section 12.4 for post and support information.
- The customer must provide the conduit and the sweep with a 36" minimum radius.
- The meter socket must be mounted on the side of the compartment.
- There must be a 1- to 3" space between the cabinet and the meter enclosure.
- The customer must provide 24" of concrete backfill.

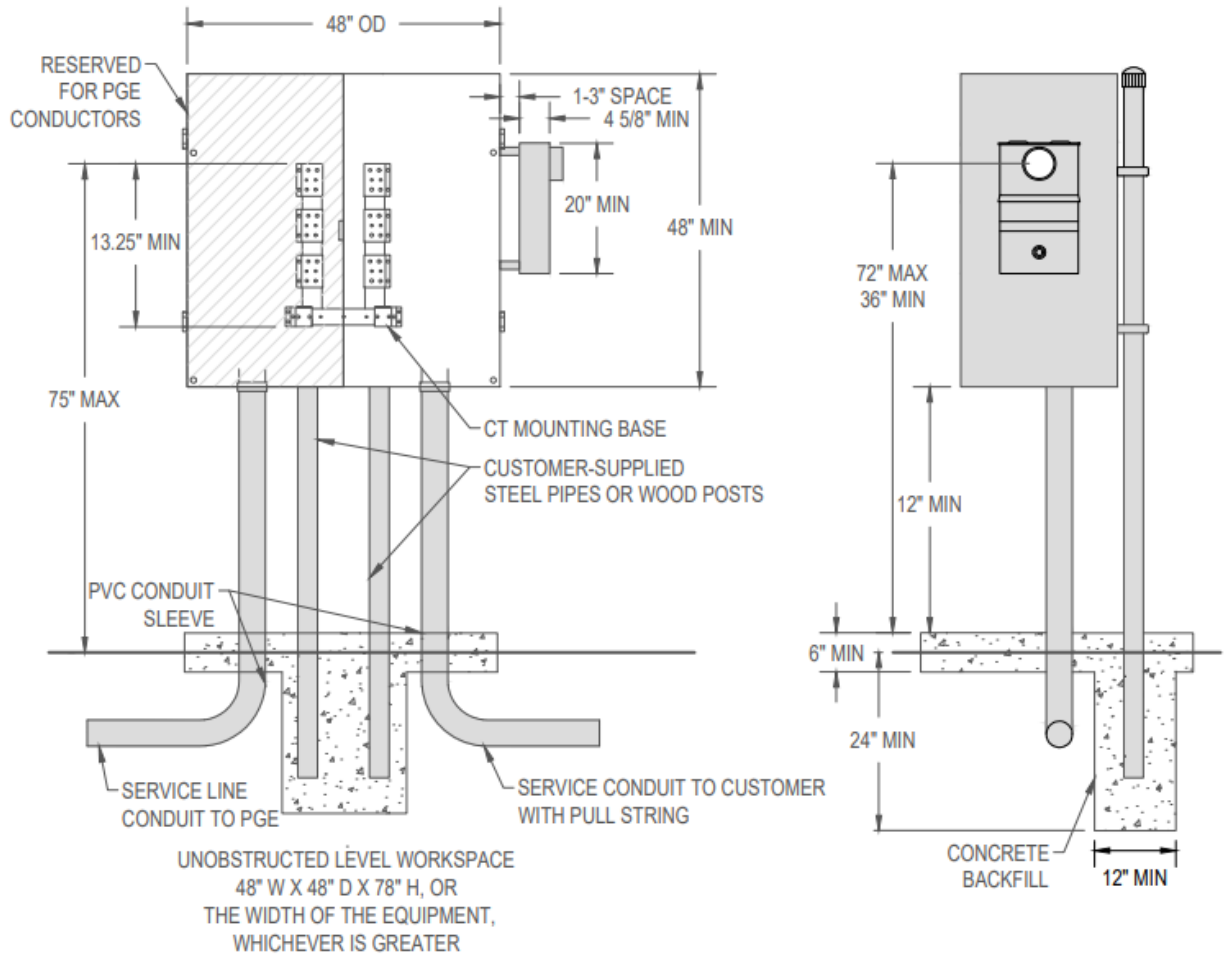


Figure 91. Current Transformer Metering, Post Mounted, 600 V, 800 A Maximum (STD-D-6230)

10.7.2 Current Transformer Metering, Wall-Mounted

PGE requires the following, in addition to those listed in [Section 10.7](#), 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 does not allow customer conductors or conduit in PGE terminating and pull spaces.
- For a 4-wire delta service, the high-leg (wild-leg) 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 meter socket may be located to the right or to the left side of the CT enclosure based on load side conductors.
- The cabinet must be at least 12" above the final grade.
- For clearances, see [Section 5.2](#).

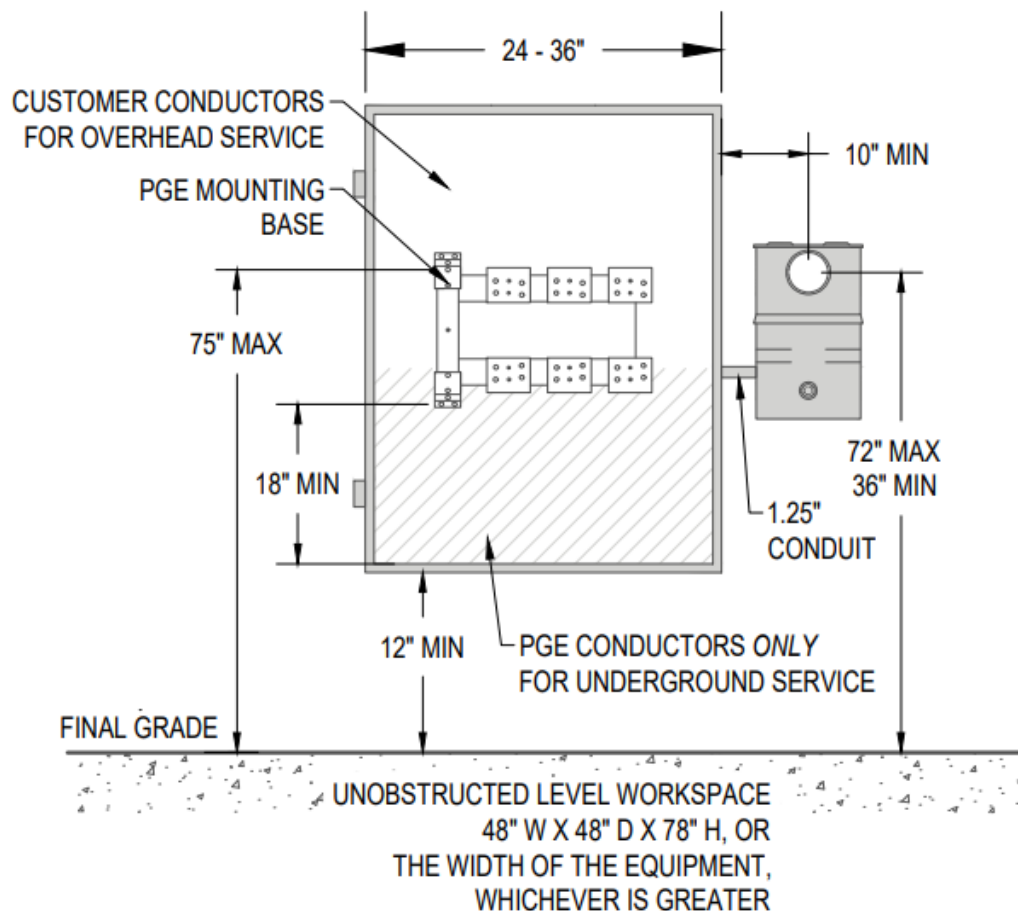


Figure 92. Current Transformer Metering, Horizontal, Wall Mounted, 600 V, 800 A Maximum (EUSERC 329B) (STD-D-6232)



Figure 93. Typical Horizontal Current Transformer Metering Installation



Figure 94. Typical Vertical Current Transformer Metering Installation

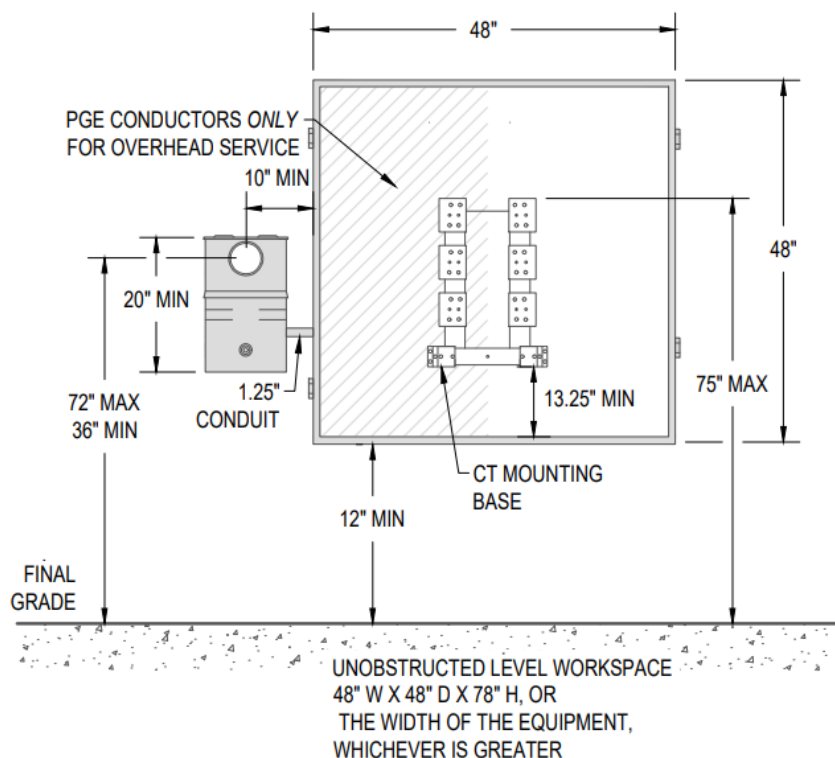


Figure 95. Current Transformer Metering, Vertical, Line and Load Same Side, 600 V, 800 A Maximum (EUSERC 329B) - (STD-D-6234)

10.7.3 Current Transformer Cabinet

PGE requires the following when installing a CT cabinet:

- Only conductors associated with a single meter are permitted in the CT cabinet. For other underground services, a separate terminating pull box will be provided for a PGE service lateral. [Table 31](#) shows minimum dimensions for pull boxes with terminating facilities.

NOTE: Do not make any connections in a CT enclosure to supply another meter. This also applies to the installation of monitoring equipment.

- Customer conductors must exit the enclosure on the load side of the current transformers. Customer conductors are not 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 at least 12" above the final grade.
- The top of the CT mounting bracket must not be more than 75" above floor level. The cover must have factory-installed hinges for side opening with sealing provisions, and the hinges must be able to hold the cover in the open position at 90 degrees or more.
- A clear workspace is required in front of the CT cabinet, as shown in [Figure 26](#). The hinged door must open in the direction opposite to the room door so that room ingress or egress is not blocked. The cabinet must be on the main or entry level floor.
- For overhead service, the customer must provide connectors, terminate line, and load-side service conductors in all CT compartments, and they must connect conductors to the line and load sides of the EUSERC-approved mounting base. Line-side and load-side terminations on CT landing pads require two bolts per connector.
- For underground service, the customer must provide a EUSERC-approved CT mounting base for installation in a CT cabinet.
- On the front of the CT cabinet, place a label that reads: "Do Not Break Seal, No Fuses Inside."

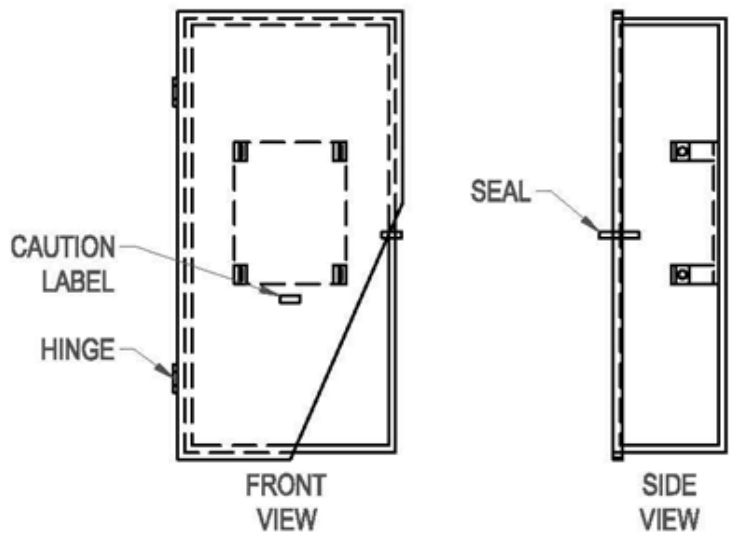


Figure 96. Current Transformer Cabinet, 800 A Maximum, 0 to 600 V (EUSERC 316, 317, 318) (STD-D-6236)

Table 32. Current Transformer Cabinet Minimum Dimensions

Type of Service	EUSERC Drawing	Minimum Exterior Cabinet Dimensions (inches)			CT Mounting Base
		Width	Height	Depth	
Single-phase, 3-wire, 401 to 800 A	No. 317	24	48	11	EUSERC 328B
Three-phase, 4-wire, 201 to 800 A	No. 318	36	48	11	EUSERC 329B
Above 800 A	See Section 11				
Line/load on same side of cabinet	—	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. PGE requires the following when installing conduit:

- To protect metering conductors and ensure bonding of metal parts, at least 1.25" of rigid steel or Intermediate Metal Conduit (IMC) is required, along with proper fittings and bushings.
- Schedule 40 PVC (Polyvinyl Chloride) may be allowed when a bonding lug is provided in both the CT cabinet and meter socket. Electrical Metallic Tubing (EMT) conduit is allowed for runs of less than 10'.
- For standard installation, conduit must be long enough to ensure that there is at least 10" 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. Alternate locations must have prior written PGE approval and require the following guidelines:

- Conduit runs must be 50' or less and have no more than three bends totaling more than 270 degrees, and no single bend may exceed 90 degrees.
- Pull lines are required in all conduits as specified in [Section 6.3.4](#).
- When CT metering conduit dead-ends on the back of a CT cabinet, use PVC flexible non-metallic 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, making sure to reserve a space below the socket for a PGE test switch that has a length of 9.5".

PGE requires the following when installing a CT meter socket enclosure:

- Verify the enclosure contains a mounting perch tapped for a test switch. PGE will install the test switch.
- Meter sockets with circuit closers and bypass clips are prohibited.
- The customer must cover and secure all unused openings.

[Figure 97](#) shows the dimensions of the enclosure; [Table 33](#) lists socket requirements.

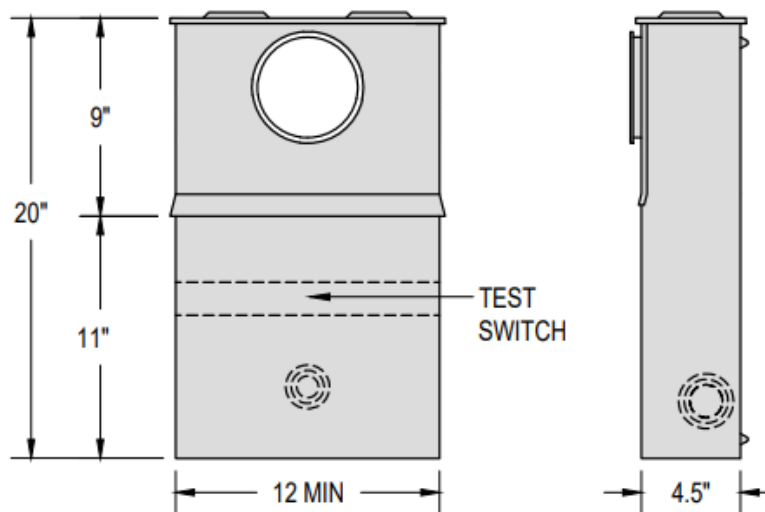


Figure 97. Current Transformer Meter Socket Enclosure (STD-D-6238)

Table 33. Current Transformer Meter Socket Requirements

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

10.7.6 Transformer Mounting Base, Single-phase and Three-phase

PGE requires the following when installing a single-phase or three-phase transformer mounting base in a CT cabinet:

- For an overhead service, the customer must furnish all lugs and connect conductors to the line and load terminals of the CT mounting base. For an underground service, the customer only needs to connect to the load side.
- The mounting base for the CT must meet ratings for available fault current (50,000 A maximum). It accepts bar-type current transformers only.
- Line-side 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.
- For a single-phase mounting base only, use the clearances described in [Section 5.2](#).
- For a 4-wire delta service on a three-phase base only, the high-leg (wild-leg) terminal must be located on the right side and identified by an orange mark.

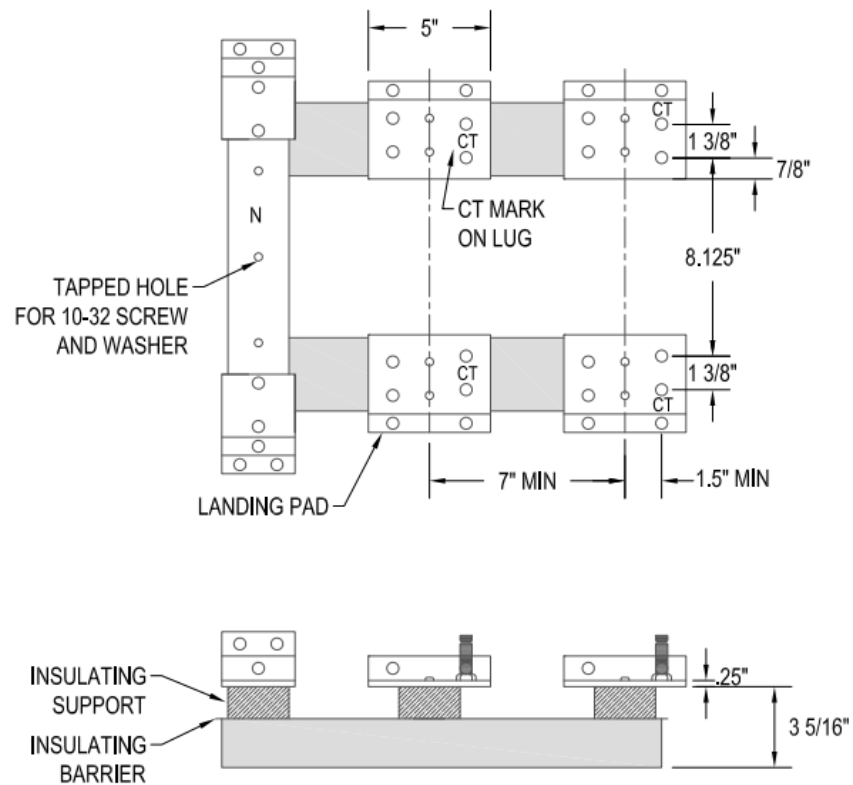


Figure 98. Transformer Mounting Base for Installation in a CT Cabinet, Single-Phase, 3-Wire, 800 A Maximum (EUSERC 328B) - STD-D-6240

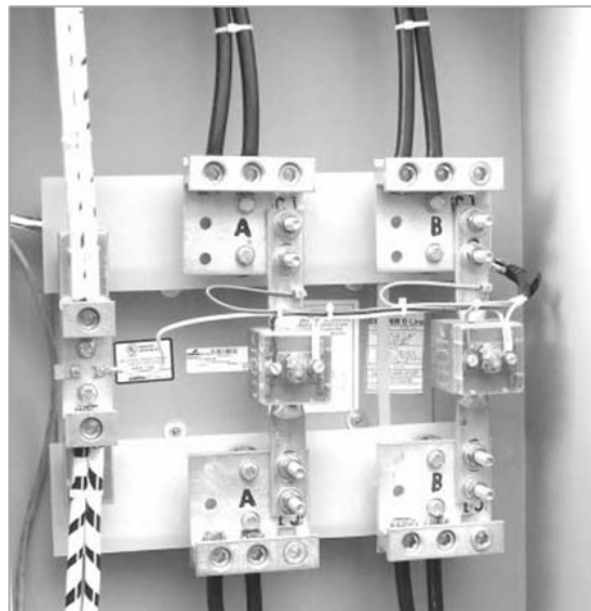


Figure 99. Typical Single-Phase CT Installation

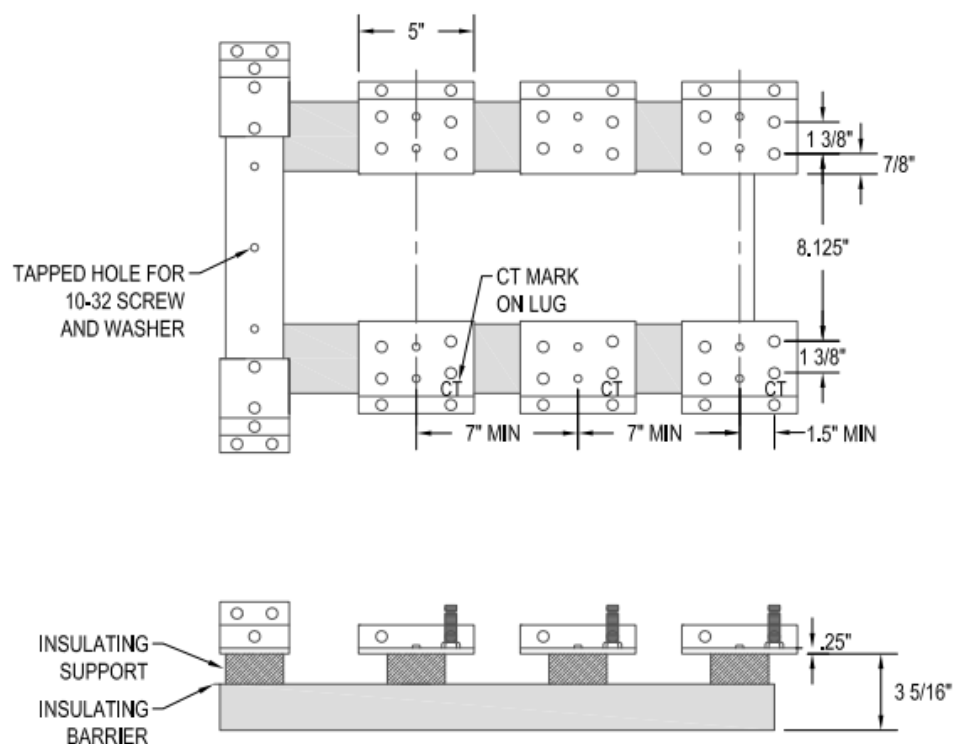


Figure 100. Transformer Mounting Base for Installation in a CT Cabinet, Three-Phase, 4-Wire, 800 A Maximum (EUSERC 329B) - STD-D-6242

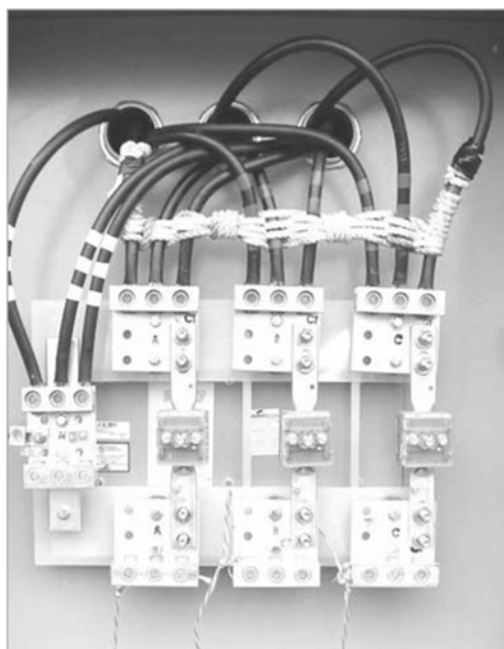


Figure 101. Typical Three-Phase CT Installation

NOTE: Electricians must follow both the CT manufacturer's instructions and the NEC code. If the manufacturer specifies lashing to separate conductors, PGE requires it, and the service will not be energized until it is in place.

11 Commercial, Industrial, and Large Residential Services, 801 A or Higher

Topics in this Section

- [Basic Requirements](#)
- [Meter Location](#)
- [Switchboard Metering](#)
- [Switchboard Current Transformer Compartment](#)

11.1 Basic Requirements

This section outlines PGE's requirements for commercial, industrial, and large residential services greater than 801 A and less than 600 V.

Large residential services are:

- Single-residential services over 320 A continuous.
- All three-phase residential services.

PGE requires 24/7 access to utility equipment. See [Section 5.5.3](#) for Drivable and Accessible Surface requirements.

Where meter equipment is installed in a location subject to vehicle traffic, the customer must install and maintain a PGE-approved barrier post (see [Figure 41](#) for barrier post dimensions).

Before power is connected, all 480 V services, multi-socket installations, structures with multiple service, and services with customer generation must be permanently and visibly labeled as such. See [Section 3.10.8](#) for labeling requirements.

IMPORTANT: All commercial, industrial, and large residential customers must coordinate their service requirements with PGE before purchase and installation of equipment. Customers must provide drawings of switchboards and obtain approval before purchasing or installing them. PGE requires 24/7 access to utility equipment.

11.2 Meter Location

IMPORTANT: PGE must confirm the location for all meters through an on-site visit.

For the purposes of safety, accessibility, maintenance, and power quality, metering equipment will be located close to PGE transformation (see [Section 5.2](#) for detailed requirements).

All meters must comply with the accessibility and location requirements in [Section 5](#). Externally mounted metering equipment, which is PGE's standard, must have a clear workspace in front of the meters that is 48" wide, 48" deep, and 78" high, or the width of the equipment, whichever is greater.

Additionally, all residential, commercial, and industrial customers, 801 A and higher require 8' clear working space in front of the termination sections for pulling in conductors. This clearance must be opposite the enclosure or within 30 degrees of vertical separation. Conduit in a room below ground level and/or underground service termination in a pull section with side/back conduit entry require a minimum 10' clear workspace (see [Section 11.3.8](#)).

Meter sockets, terminal cabinets, current transformer cabinets, and transformers must be located away from landscape irrigation sprinklers.

When meter equipment is in an electrical equipment room, see [Section 13](#) for detailed requirements.

11.3 Switchboard Metering

A EUSERC-approved switchboard metering section is required when the service entrance rating is greater than 800 A. The switchboard metering section may be used for three-phase services over 200A and single-phase service over 320 A.

The metering current transformer must be inside the current transformer (CT) compartment and rest on a reinforced concrete slab on grade. The meter and test switch may be mounted on the cover of the hinged compartment or located remotely. The area below the barrier in the CT compartment may be used as a main switch (or breaker) compartment, a load distribution compartment, or a bottom-fed terminating pull section. The metering compartment must be on the supply side of the main switch.

A 3.5"± 0.5" thick concrete housekeeping pad is required for all commercial pedestals and switchboards (freestanding) regardless of the substrate. Housekeeping pads on top of asphalt or concrete should extend 2" beyond the equipment on all sides. Housekeeping pads on top of gravel, landscaping, or other substrate should extend 48" minimum in front of any cabinet.

The following are required when installing indoor or outdoor switchboard metering.

- Meter panels must not be hinged to a filler panel.
- The neutral terminal must be permanently identified in clearly visible block lettering that reads: Neutral or N.
- Termination equipment must be marked with the phases and neutral. Customers must match the rotation to the first point of disconnect. Use a manufacturer provided labels, or if unavailable, a professionally created permanent label.
- For 240/120 V, three-phase, 4-wire services, the high-leg (wild-leg) terminal must be located on the right side and be permanently marked in orange by the manufacturer.
- Cable entry through the back of the cabinet generally does not meet PGE requirements due to minimum cable bend radius.
- Conduit must be 1" above the housekeeping pads with no swedge coupler installed.

11.3.1 Indoor Switchboard Metering

The following requirements apply, in addition to those listed in [Section 11.3](#), when installing indoor switchboard metering (EUSERC 325 and 326), such as shown in [Figure 102](#):

- Metering switchboards may not be installed indoors without prior approval from PGE.
- Indoor switchboards must be accessible for maintenance and meter reading. For more information, see [Section 5.2](#).
- For services up to 2000A, switchboard CT metering compartment or main disconnect may be located above termination/pull section (EUSERC 327) as shown in [Figure 103](#).
- When installing indoor switchboard metering, the customer must install a 3.5" thick housekeeping pad with no more than 2" of concrete in front of any cabinet that contains PGE equipment. See [Figure 104](#) for details.

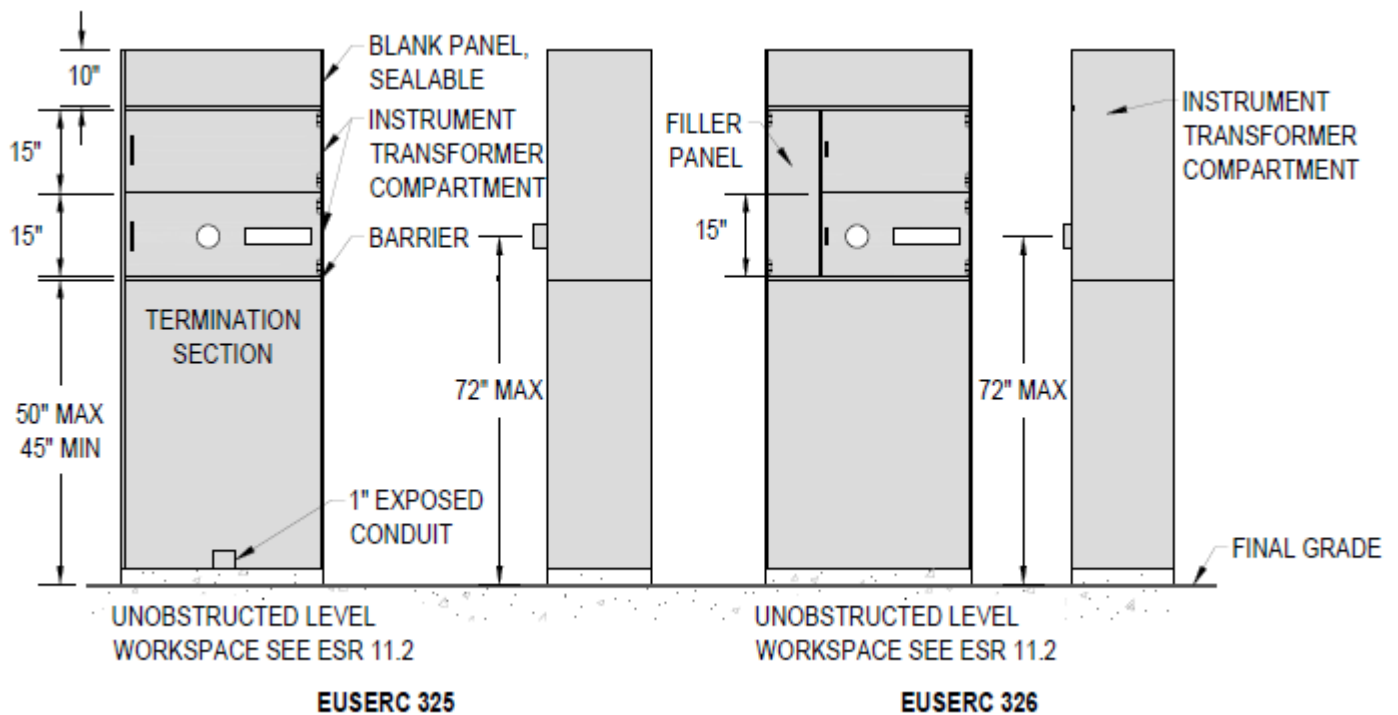


Figure 102. Switchboard Metering (EUSERC 325 and 326) (STD-D-6248)

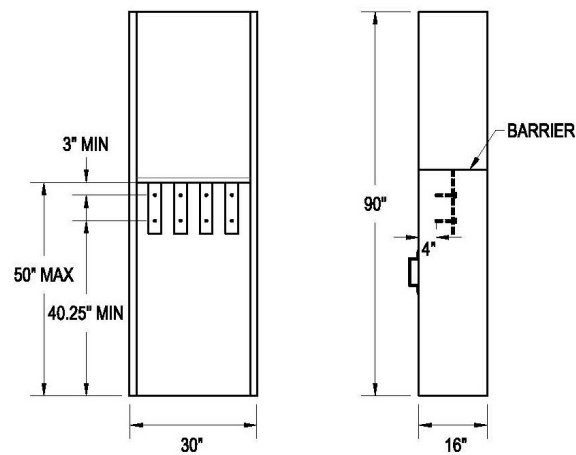


Figure 103. Termination Section of an Indoor Switchboard (EUSERC 327) (STD-D-6252)

Table 34. Width of Various Switchboard Ratings (EUSERC 327)

Total Service (Amperes)	W (Inches)	
	3-Wire	4-Wire
400 to 800	24	24
801 to 1200	24	30
1201 to 2000	30	35

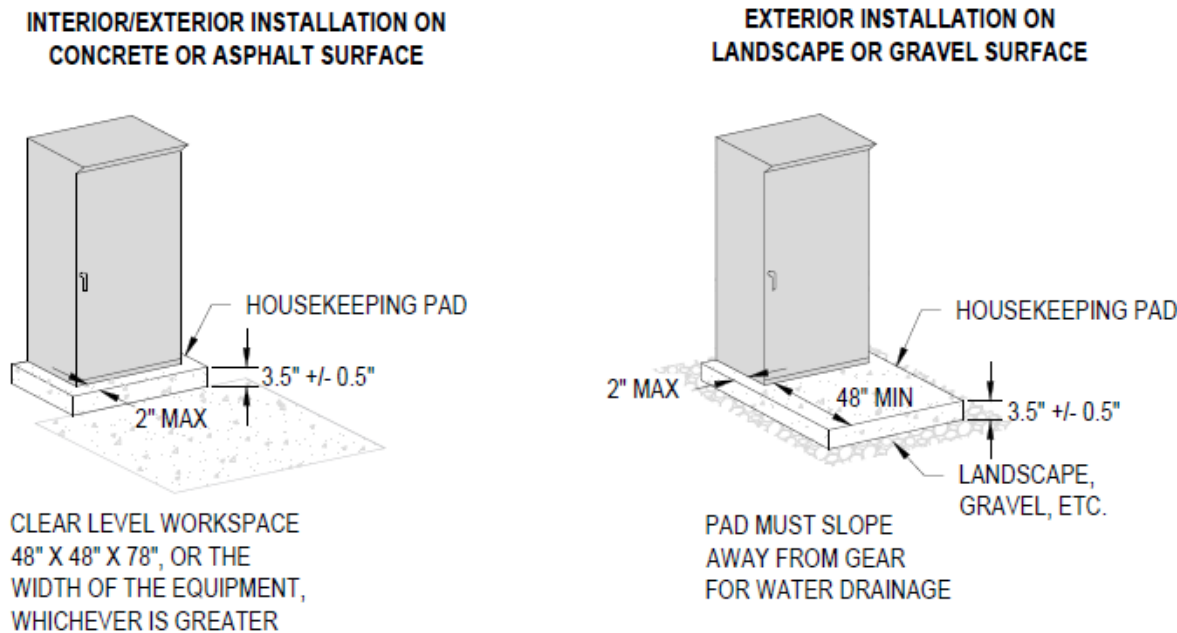


Figure 104. Housekeeping Pads (STD-D-6246)

NOTE: Services 801 A and higher require 8' clear working space in front of the termination sections for pulling in conductors.

11.3.2 Outdoor Switchboard Metering

The following requirements apply, in addition to those listed in [Section 11.2](#), when installing outdoor switchboard metering (EUSERC 354):

- Exterior doors on outdoor switchboards must be sealable and must hold securely at a minimum of 90 degrees when open.
- PGE will only approve the outdoor switchboard with a single enclosure door that is constructed with a 4" spacer as shown in EUSERC 354.
- Side penetrations (as shown in [Figure 111](#)) are allowed only if the source vault is less than 30' from the penetration into the gear with no bends in the conduit run.
- When installing outdoor switchboard metering, the customer must install a housekeeping pad with a 48" concrete extension, unless an existing concrete or asphalt surface exists in front of any cabinet that contains PGE equipment. Drainage must slope away from the cabinet (see [Figure 105](#)).
- Barrier posts are required if the switchboard is exposed to vehicular traffic. For more information, see [Section 5.6.8](#).

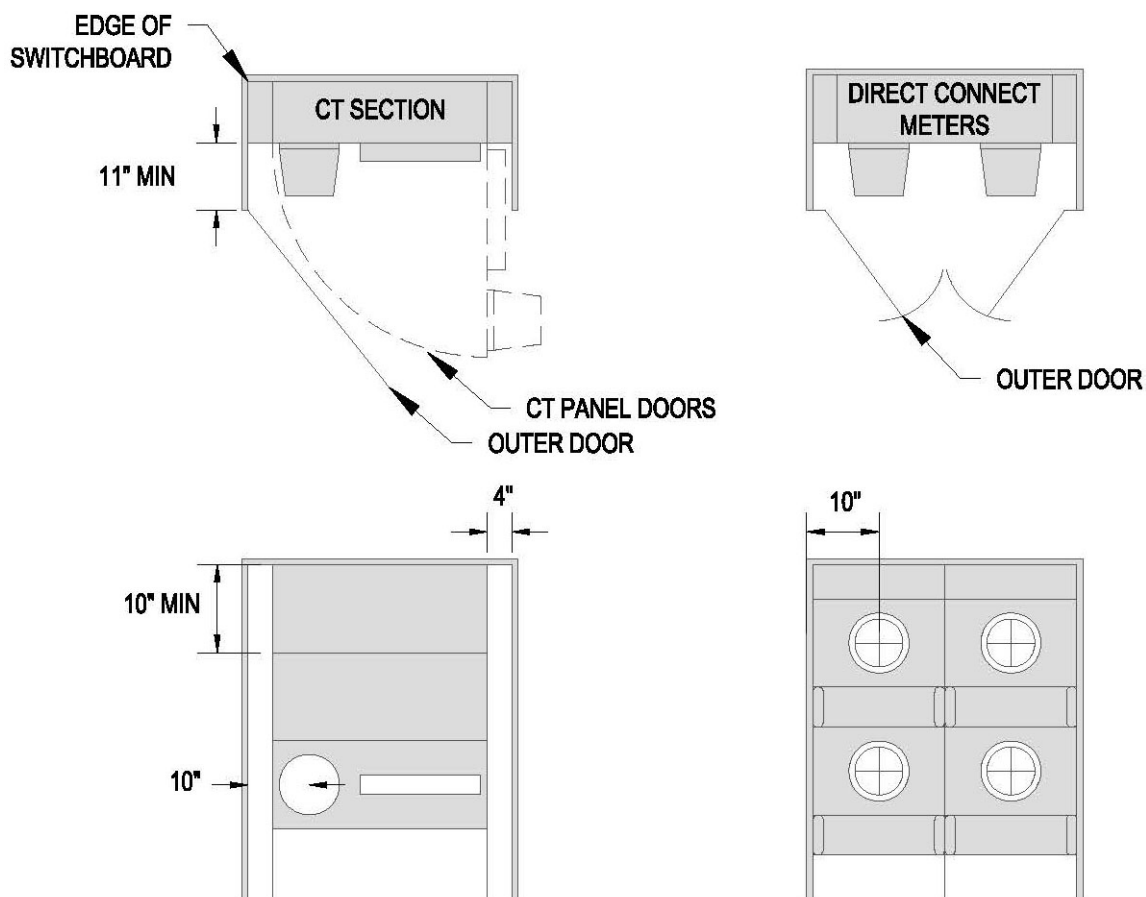


Figure 105. Outdoor Switchboard Metering (EUSERC 354) - (STD-D-6254)

11.3.3 Switchboard Service Termination

The following lists basic requirements for switchboard service termination:

- The customer must provide the switchboard service section, instrument transformer mounting base, panels, meter socket, and provisions for a test switch.
- The meter and test switch are to be owned, provided, and installed by PGE in the customer-owned metering compartment. PGE will provide window-type or doughnut-type current transformers for switchboards, but these CTs must be installed and secured by the customer.
- In switchboards, the clear opening in the termination/pull section must allow for PGE's clearances between every conduit and from the conduit to the steel channel within the cabinet (see [Section 6](#)).
- For 4-wire delta services, the high-leg (wild-leg) terminal must be located on the right side and identified by an orange mark. This identification must be consistent on the equipment for all metering and PGE termination points.
- For underground service, PGE will terminate the line-side service conductors using PGE-provided connectors on lug landings in the pull section.
- The locking method used by the customer on the metering enclosure must provide for independent access by PGE.
- Customer-owned conductors and devices (such as limiters and fuses) are not permitted in PGE sealed pull sections or metering compartments.

11.3.3.1 EUSERC Requirements

The following EUSERC requirements apply to switchboard service termination:

- Terminating bolts must be secured in place and must be provided with nuts, flat washer, and a spring washer. All these parts must be plated to prevent corrosion. Bus bars are required from the pull section into the service section.
- PGE requires a clear workspace in front of a switchboard that is 78" high, at least 48" wide, and 48" deep, or the width of the equipment, whichever is greater.
- Bonding must meet Oregon Electrical Specialty Code (OESC) requirements. Lugs for terminating the customer's bonding wire (or other bonding conductors) must be located outside the sealable section and must be designed to readily permit the customer's neutral system to be isolated from the PGE neutral when necessary.
- All removable panels and covers to the compartments used for terminating or routing conductors must have sealing provisions.

- All pull and termination sections must have full-front access. Cover panels must be removable and sealable. The panels must be provided with two lifting handles, and they cannot have an area greater than 9 square feet.
- When self-contained meter sockets are installed in switchboards, they must be wired by the switchboard manufacturer.

11.3.4 Pull Box with Terminating Facilities, 0 to 600 V, 0 to 1200 A

See [Figure 24](#) for meter clearances for multiple-meter installations.

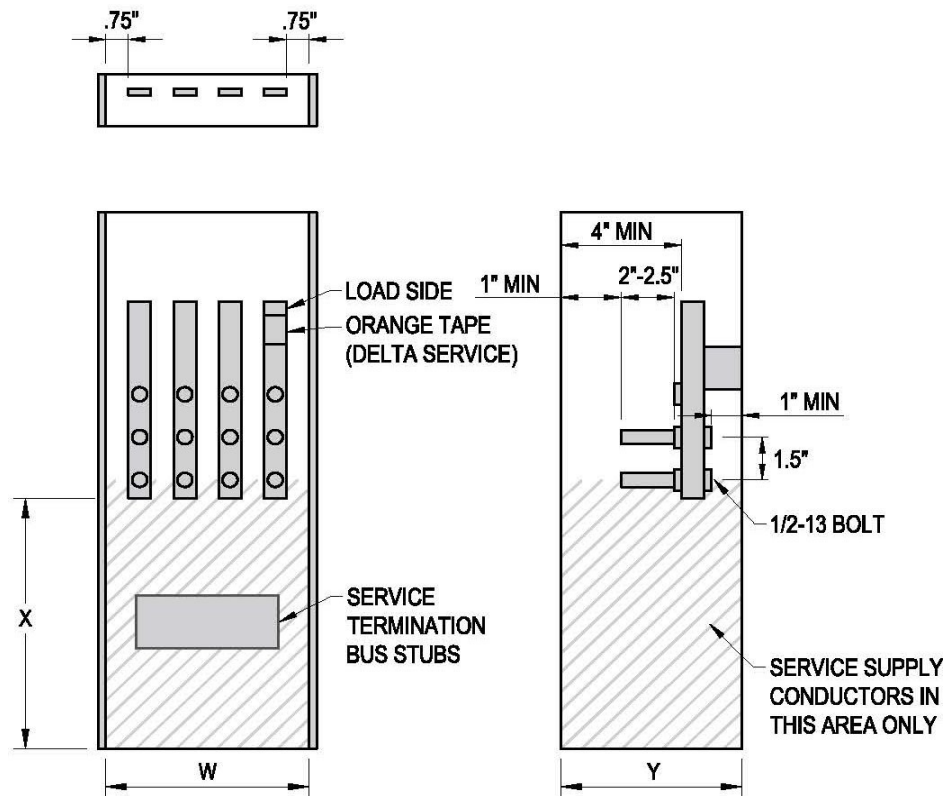


Figure 106. Pull Box with Terminating Facilities 0 to 600 V, 0 to 1200 A (EUSERC 343/343A, 347) (STD-D-6209)

Table 35. Minimum Dimensions for Pull Boxes with Terminating Facilities (EUSERC 343/343A)

Total Service (Amperes)	W (Inches)		X (Inches)	Y (Inches)
	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
801 to 1200	22.5	30	26	11

11.3.5 Commercial Multiple-Metering, Floor-Mounted Switchboard

NOTE: Commercial multiple metering can include any combination of direct-connect and CT-rated meters.

The following are required when installing commercial multiple metering, floor-mounted switchboards, such as shown in [Figure 108](#):

- All removable panels and covers to compartments used for metering must be sealable.
- Metering conductors must not pass through adjacent metering compartments except in enclosed wireways.
- For 4-wire delta services, the high-leg (wild-leg) terminal must be located on the right side and identified by an orange mark. This identification must be consistent on the equipment for all metering and PGE termination points.
- Test blocks with rigid insulating barriers must be furnished, installed, and wired or bused to the meter sockets. Cover panels for the test blocks must be sealable and fitted with a lifting handle.
- Meter panels must be removable, but it must not be possible to remove them when the meter is in place.
- Before power is connected, each metered service must have a permanently engraved metal or hard plastic label with letters at least 3/8" high that identifies the customer's service address. [Figure 12](#) shows an example label.
- All 480 V services, multi-socket installations, structures with multiple services, and services with customer generation must be permanently and visibly labeled as such (see [Section 3.10.8](#) for labeling requirements).

NOTE: Each meter socket and associated disconnect must be correctly labeled as to the unit, suite, or space number.

- For pull section details when used on underground services, see [Figure 107](#) (or refer to EUSERC 345) and [Table 36](#).
- All metering switchboards must have a 3.5" +/- .5" thick housekeeping pad placed on top of an existing floor, slab, gravel, landscaping, or other substrate. If the customer team desires a thicker pad, the maximum that may be exposed is 4"; the remaining must be below-grade.
- If a freestanding unit can expand beyond six-meter sockets to accommodate load growth, the initial installation must include a main disconnect.
- For meter stacks downstream of switchboard:
 - A main disconnect must be in front of all metered branches containing more than six meters in the same location as the meter bank.
 - The meter center disconnect may be located on the switchboard if the meter center is co-located with the switchboard.

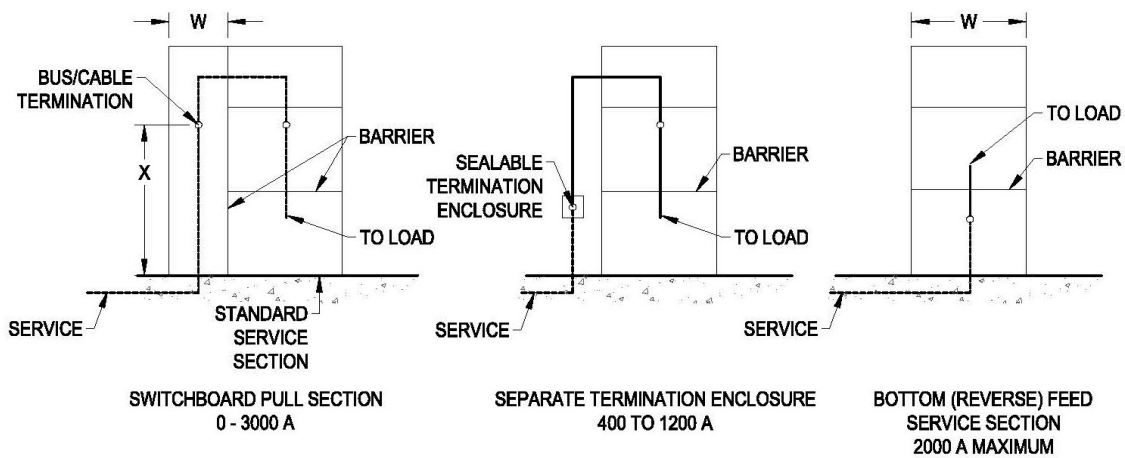


Figure 107. Underground Service Termination Switchboard Service Section, 400 to 3000 A, 0 to 600 V (EUSERC 345) (STD-D-6258)

Table 36. Minimum Pull Section Dimensions (applies to [Figure 105](#) only)

Switchboard Rating (Amperes)	Minimum Width W (Inches)		Minimum Height X (Inches)
	3-Wire	4-Wire	
200 to 800	24	24	42
801 to 1200	24	30	
1201 to 2000	30	35	
2001 to 3000*	—	42	60

* Consult PGE for services higher than 2000 A.

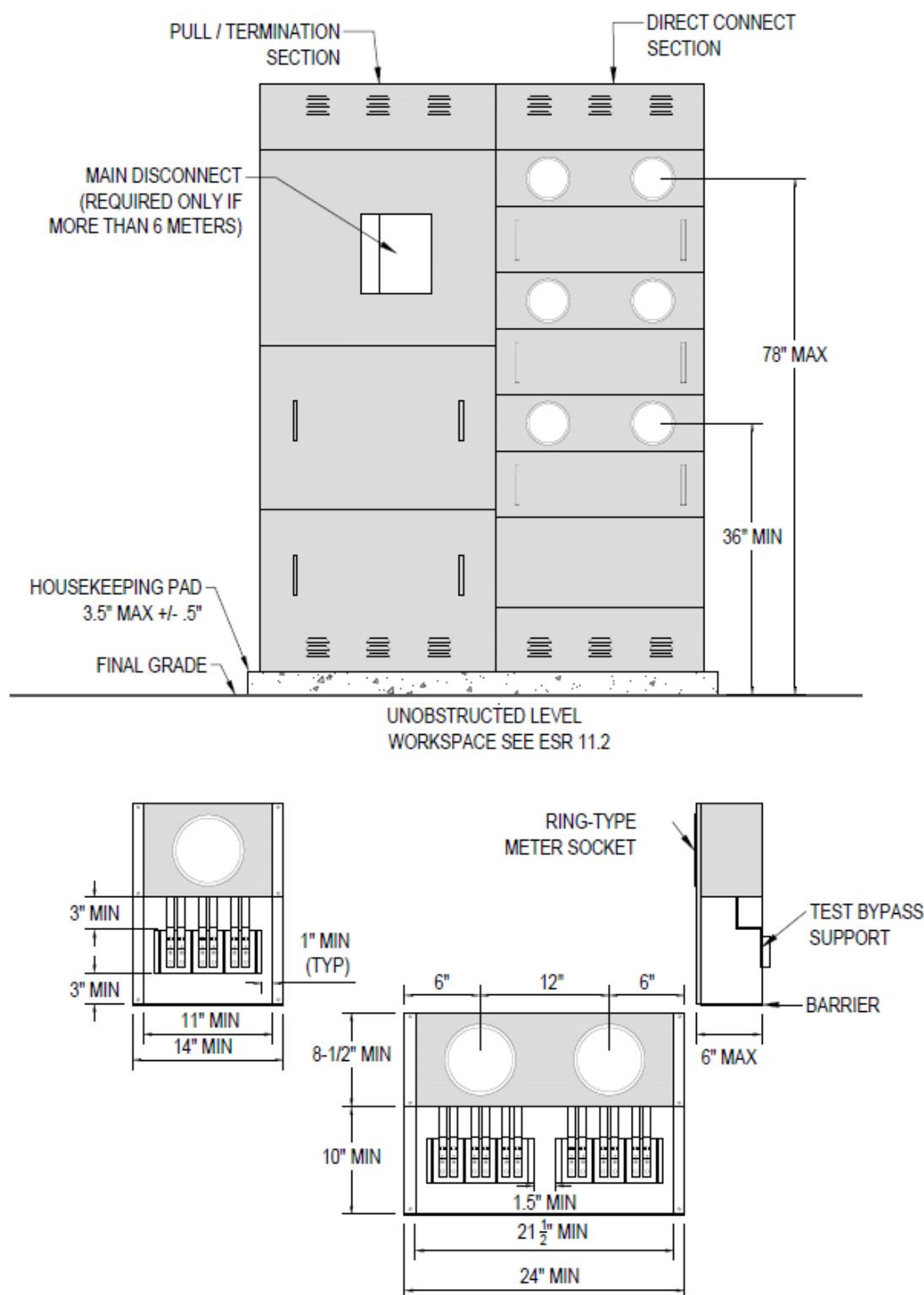


Figure 108. Commercial Multiple Metering Floor-Mounted Switchboard, 1201 A and Higher (EUSERC 306, 345) (STD-D-6256)

11.3.6 Mixed-use Multiple-metering, Floor-mounted Switchboard

NOTE: Mixed-use multiple-metering can include any combination of direct-connect meters, CT-rated meters, and residential meter stacks.

The following are required when installing mixed-use multiple metering, floor mounted switchboards, as shown in [Figure 109](#):

- For meters installed on the switchboard, the requirements listed in [Section 11.3.5](#) must be met.
- For meter stacks downstream of the switchboard:
 - A main disconnect must be in front of all metered branches containing more than six meters.
 - When customers do not have six meters, but the meter bank is in a separate electrical room, PGE requires a disconnect installed in front of the meter bank in the same location.

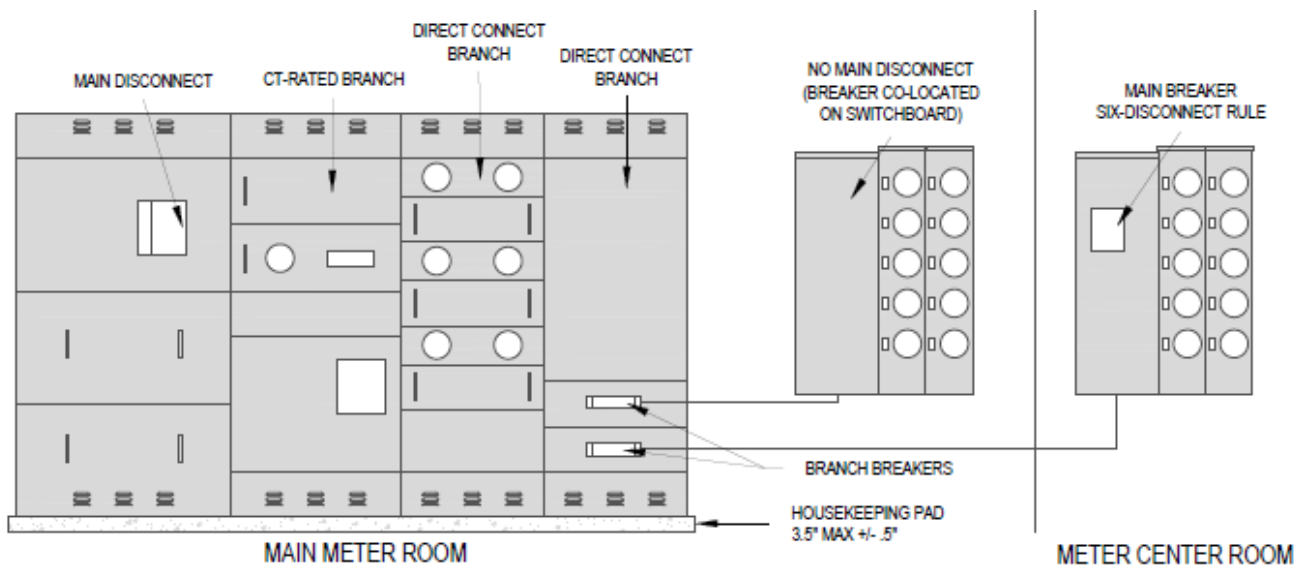


Figure 109. Mixed-Use Multiple Metering with Direct-Connect Meters, CT-Rated Meters, and Residential Meter Stacks (STD-D-6260)

11.3.7 Underground Service Termination Switchboard Service Section, 400 to 3000 A, 0 to 600 V

The following are required when installing an underground service termination switchboard service section, 400 to 3000 A and 0 to 600 V (EUSERC 345):

- A switchboard pull section, a separate termination enclosure, or a bottom-feed service section must be provided for all switchboard underground services.
- Bus bars with provisions for termination lugs (in accordance with EUSERC 347) are required from the pull section into the service section when the main switch is rated higher than 800 A, or when multiple metering is to be supplied.

- The minimum dimensions in [Figure 107](#) are for vertical entry at the top or bottom only. Side or rear entry of the service cable into the pull section may require a greater dimension than that shown in [Table 36](#).
- The customer must provide a drawing with the dimensions of the proposed service equipment.
- A minimum 8' clear workspace is required in front of the pull section and opposite the direction of cable entry.
- Consult PGE for services higher than 2000 A.
- Refer to EUSERC 347 for bus/cable termination.
- Refer to EUSERC 343 for sealable termination enclosure.

11.3.8 Underground Service Termination in a Pull Section with Side/Back Conduit Entry and/or Conduit in a Room Below Ground Level

The following are required when installing an underground service termination in a pull section below the ground level:

- The cover panels on the pull and wireway sections must be a two-piece design of equal size panels with two lifting handles. The cover panels must be removable and sealable.
- The minimum access dimensions—W1 and W2—are measured between the inside edges of the left-side and right-side return flanges.
- The pull section and termination section shown in [Figure 110](#) and [Figure 111](#) are reserved for PGE supply conductors. No conduits or customer wiring is to be installed in—or routed through—this area.
- There must be at least a 4" clearance between any energized part and a removable cover panel.
- The customer must provide a Unistrut cable support bracket. Consult PGE.
- A minimum 10' clear workspace is required in front of the pull section and opposite the direction of the cable entry.
- Water may intrude into service conduits, the pull section, and termination section if the source side of PGE facilities (such as a transformer vault) is at a higher elevation than the pull and termination sections.
- When water intrusion can reasonably be expected, the customer must provide a means to prevent water from accumulating in the pull and termination sections. This can be done by providing a water collection system—a concrete well, for example—under the pull and termination sections along with a gravity drain or sump pump to remove any standing water. [Figure 112](#) shows a pad drain for freestanding switchboard.

IMPORTANT: The figures in this section show underground service termination in a pull section below the ground level, 400 to 3000 A, 0 to 600 V (EUSERC 345, note 6).

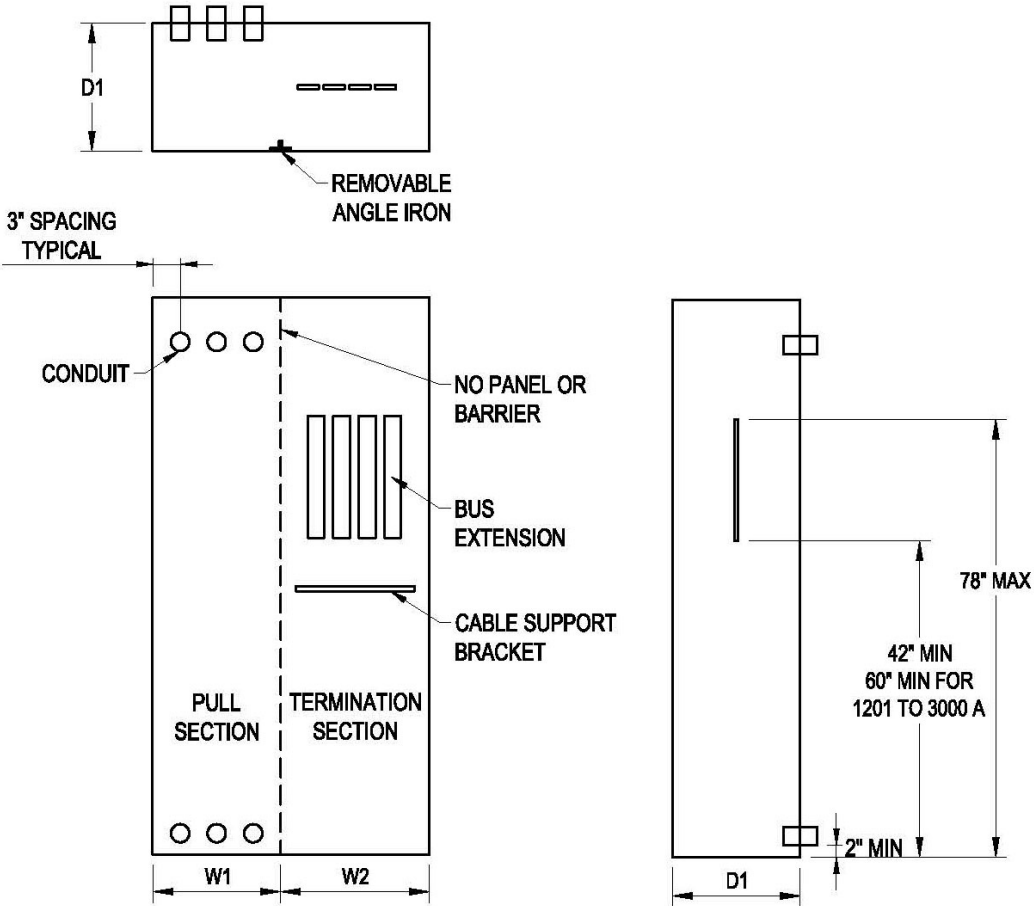


Figure 110. Underground Service Termination in a Pull Section Below Ground Level, Showing Pull Section with Back-Entry Conduits at the Top or Bottom (STD-D-6262)

Table 37. Minimum Pull Section Dimensions

Switchboard Rating (amperes)	Pull Section Width W1 (inches)		Wireway Width W2 (inches) (Outer Dia.)	Wireway Depth D1 (inches)
	Single-Phase, 3-Wire	Three-Phase, 4-Wire (Outer Dia.)		
401 to 800	24	24	24	24 (single-phase only) 30
801 to 1200	—	30	30	30
1201 to 3000	—	48	48	48

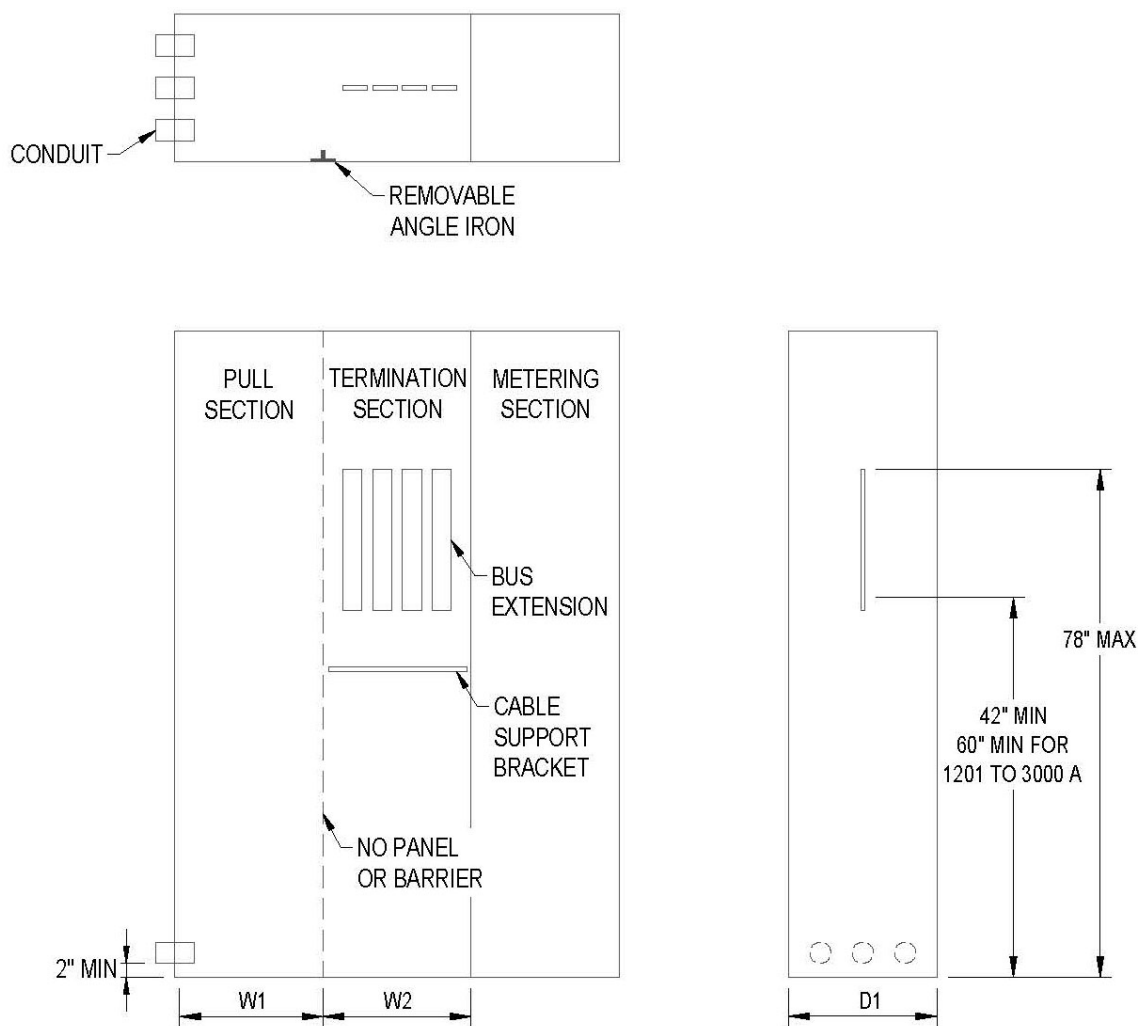


Figure 111. Underground Service Termination in a Pull Section Below Ground Level, Showing Pull Section with Side-Entry Conduits at the Bottom (STD-D-6264)

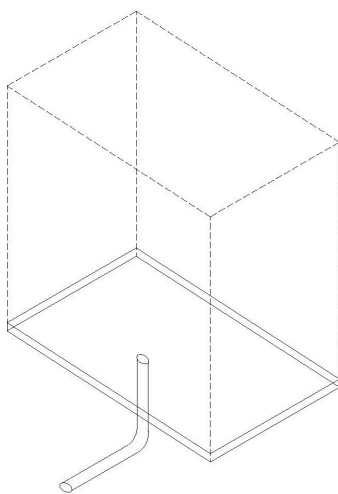


Figure 112. Pad Drain for Freestanding Switchboard (STD-D-6266)

11.3.9 Overhead Service Termination Switchboard Service Section (Top Hat)

IMPORTANT: Overhead above-switchboard service sections (top hats) require PGE's advance review and approval and may not be allowed.

If PGE has reviewed and allowed the installation, follow the requirements in this section (as well as other site-specific requirements identified by PGE) when installing an overhead service termination switchboard service section, 0 to 600 V (EUSERC 348). [Figure 113](#) shows typical service section configurations.

- The service entrance conductors, cable, or bus bar must be furnished and installed by the customer as follows:
 - If the switchboard is served with bus or bar conductors, the conductors must enter through the top, or at the side or back in the upper 10" section.
 - When the switchboard is served with cable conductors, the conductors must enter the top of the switchboard only.
- An extension may be required when conduits enter from the side or rear.
- The direction of feed is from the top to bottom in the switchboard service section. Load conductors must exit below the metering compartment and may not be routed back through the current transformer compartment to exit the service section.
- Refer to EUSERC 325 and 326 for the requirements for the 90" service section.

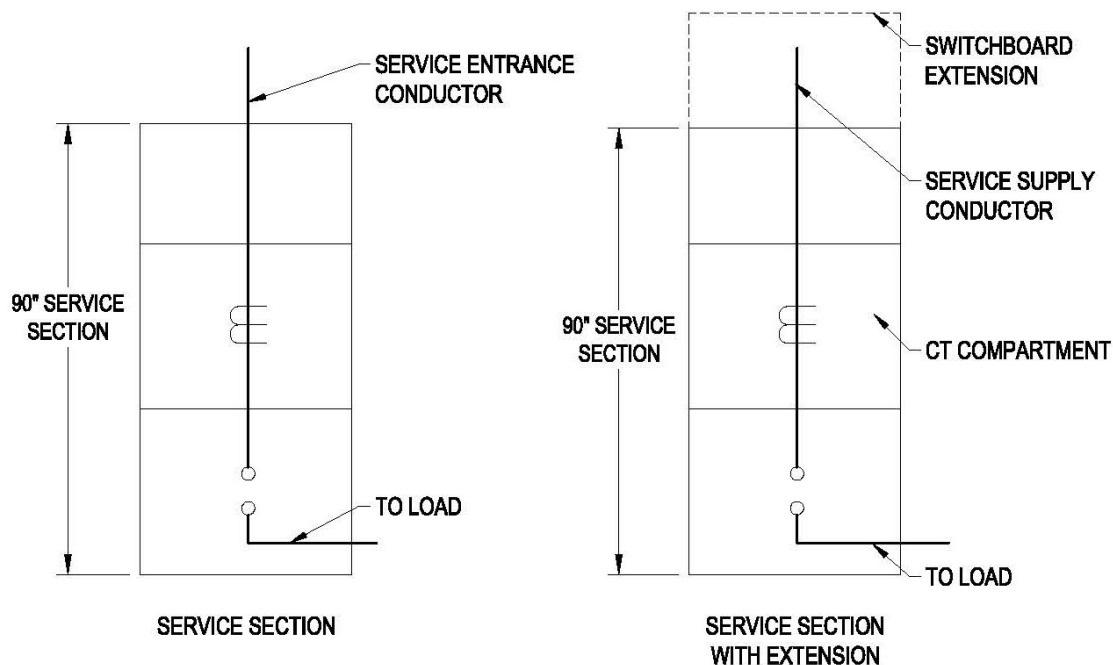


Figure 113. Overhead Service Termination Switchboard Service Section, 0 to 600 V (EUSERC 348) (STD-D-6268)

11.3.10 Switchboard with Remote Meter Enclosure

The following are required when installing a switchboard with remote meter enclosure (EUSERC 325 and 339):

- The service termination and metering equipment must be located outside, near the transformer. If PGE allows the service termination to be located inside the building, the metering enclosure must be located outside the building.
- The conduit in the switchboard section must be non-metallic tubing and must be terminated in the current transformer compartment in front of the current transformers. 90-degree sweeps (LBs or similar devices) are not permitted inside the enclosure.
- The neutral terminal must be permanently identified in clearly visible block lettering that reads: Neutral or N.
- For 240/120 V, three-phase, 4-wire service, the high-leg (wild-leg) terminal must be located on the right side and be permanently marked in orange by the manufacturer.
- If—in the opinion of PGE—the switchboard service section is inaccessible for meter testing and maintenance, the customer must provide direct access between the remote meter and the current transformer.
- The customer must provide and install the remote meter socket enclosure, the metering switchboard section, and 1.25" conduit for the metering secondary conductors. For more information, see [Section 10.7.4](#).

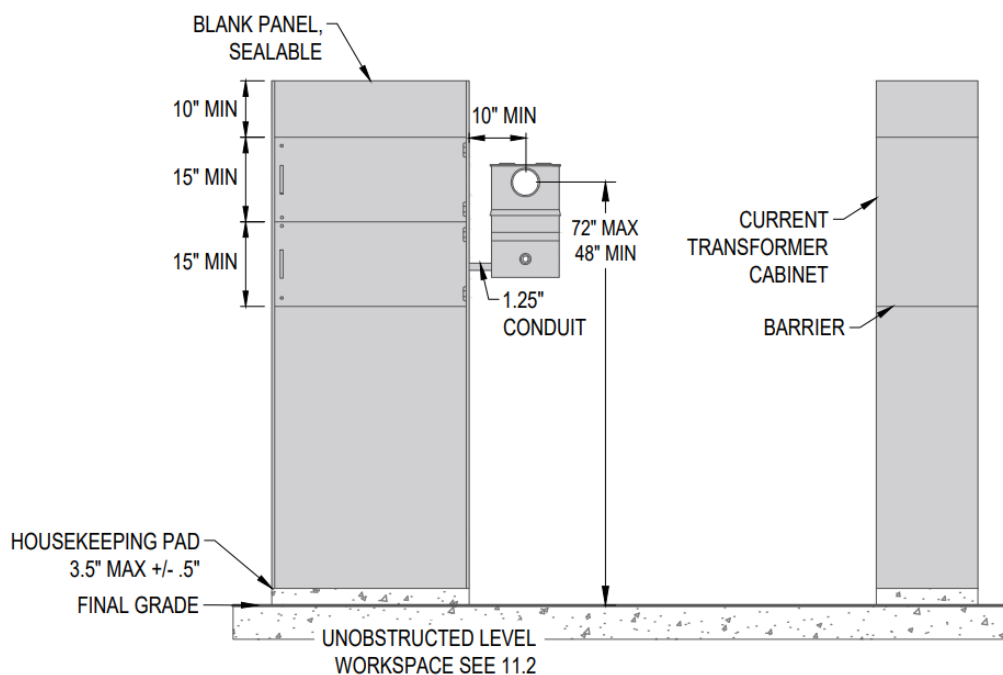


Figure 114. Switchboard with Remote Meter Enclosure (EUSERC 325, 339) (STD-D-6270)

11.4 Switchboard Current Transformer Compartment

The following lists the basic requirements when installing a CT compartment for switchboards:

- Set the direction of feed from the top or bottom. No other conductors must pass through this compartment.
- The dimensions are measured to the inside edge of the compartment access opening.

11.4.1 Switchboard Current Transformer Compartment, 0 to 1000 A, 0 to 600 V

The following requirements apply, in addition to those listed in [Section 11.2](#), when installing a CT compartment in a switchboard enclosure, 0 to 1000 A, 0 to 600 V, three-phase, 4-wire service (EUSERC 320):

- Bus arrangements and supports must be provided as shown in [Figure 115](#). The neutral bus may be located at either side.
- A clear, unobstructed workspace must be provided around the CT bus units from the barrier to the upper support bar.
- The barrier must be constructed of rigid insulating material that is resistant to electrical arc tracking. PGE provides and installs-low voltage CTs.

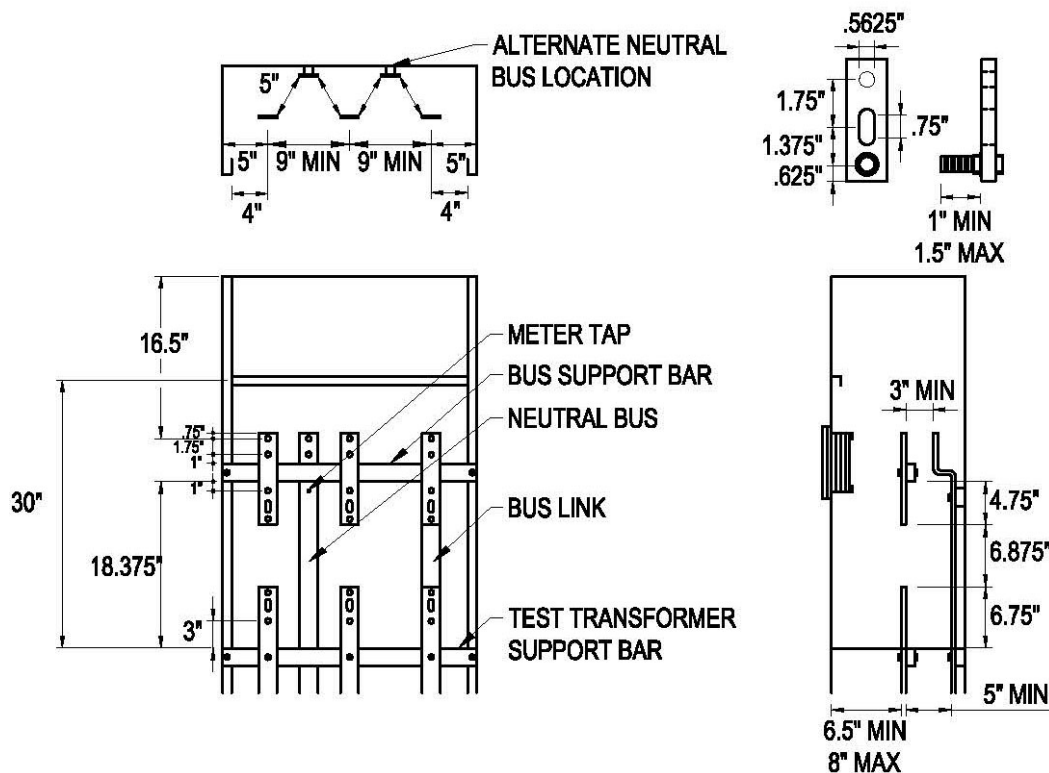


Figure 115. Switchboard Current Transformer Compartment, 0 to 1000 A, 0 to 600 V, Three-Phase, 4-Wire Service (EUSERC 320) (STD-D-6272)

11.4.2 Switchboard Current Transformer Compartment, 1001 to 3000 A, 0 to 600 V

The following requirements apply, in addition to those listed in [Section 11.2](#), when installing a CT compartment in a switchboard, 1001 to 3000 A, 0 to 600 V, three-phase, 4-wire service (EUSERC 322):

- Busways must remain in position when the removable section B is out.
- When horizontal-cross busways supply the service section phase buses, a neutral bus bar extension must be provided in the instrument transformer compartment above the lower CT bus support.
- The customer must install window-type CTs. PGE provides and installs low-voltage CTs.

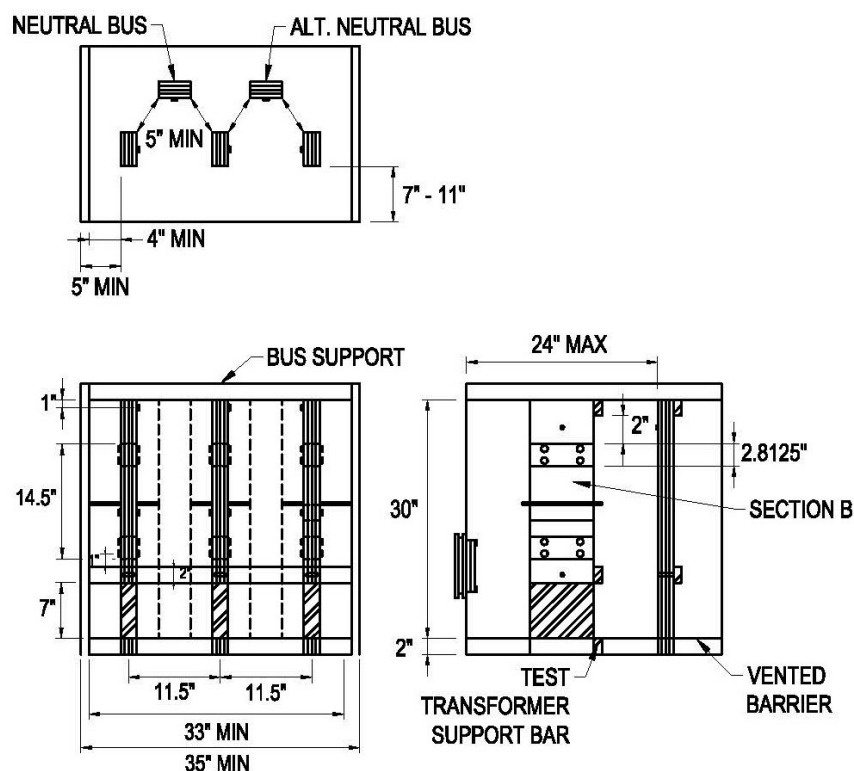


Figure 116. Switchboard Current Transformer Compartment, 1001 to 3000 A, 0 to 600 V, Three-phase, 4-Wire Service (EUSERC 322) (STD-D-6274)

12 Agricultural and Other Pole-mounted Services

Topics in this Section

- [Electric Vehicle Charging](#)
- [Irrigation Pumping Overhead Metering, Direct Connect](#)
- [Underground Irrigation Pumping Service Backstop \(aka H-Frame\) Options](#)
- [Meter Access Platform in a Flooded Area](#)
- [Freestanding Backstop Options for Multiple-Family Services and Temporary CT Services](#)
- [Marinas](#)

12.1 Electric Vehicle Charging

Consult PGE before installation or addition of Level 2 or Level 3 Electric Vehicle (EV) charging equipment. PGE will need to review the loading and infrastructure to determine whether upgrades are required for the addition of a Level 2 or 3 EV charger. If required, an approved Job Sketch will be provided to the customer.

The location of new or additional PGE meters or transformers to serve EV chargers must meet access and clearance requirements identified in [Section 5.2](#).

Table 38. EV Charging Level by Service Type

Level	Input Voltage	Type of Service	Meter Socket
Level 1	120 V	Residential or Commercial	See meter socket requirements for services in Table 10 .
Level 2	208 V or 240 V	Residential or Commercial	See meter socket requirements for services in Table 10 .
Level 3 (DC Fast Charging)	480 V	Commercial only	See meter socket requirements for services in Table 10 .

Starting in 2024, PGE accepts freestanding-commercial CT pedestals, 400 to 800 A (see [Section 10.6.2](#)).

The customer is responsible for the electric vehicle supply equipment (EVSE), metering and maintenance associated with this customer-owned equipment. Customers must be compliant with NEC codes, state, and all applicable local requirements.

12.2 Irrigation Pumping Overhead Metering, Direct Connect

The following are required when installing an irrigation pumping overhead metering, direct-connect service, such as that shown in [Figure 117](#).

IMPORTANT: PGE requires a direct-connect meter safety socket (see [Section 10.3.1](#)).

- The customer must install the service conductors from the pump termination section to the meter socket, and from the meter socket to the weatherhead.
- Consult PGE for platform requirements.
- For clearance information, see [Table 13](#).
- The pole provided by the customer must be pressure-treated or thermally treated by the manufacturer with an approved American Wood Preservatives Association standardized preservative.
- For pole height, class, and depth requirements, see [Section 3.11.3](#).
- PGE will bond the down guy to the service neutral and pole ground conductor.
- The down guy must be attached at the weatherhead height.
- The customer must provide and install a minimum 5/16" down guy to support the PGE overhead conductor.
- The customer is to provide and install an anchor.
- A 96" minimum must be maintained between the mounting studs.

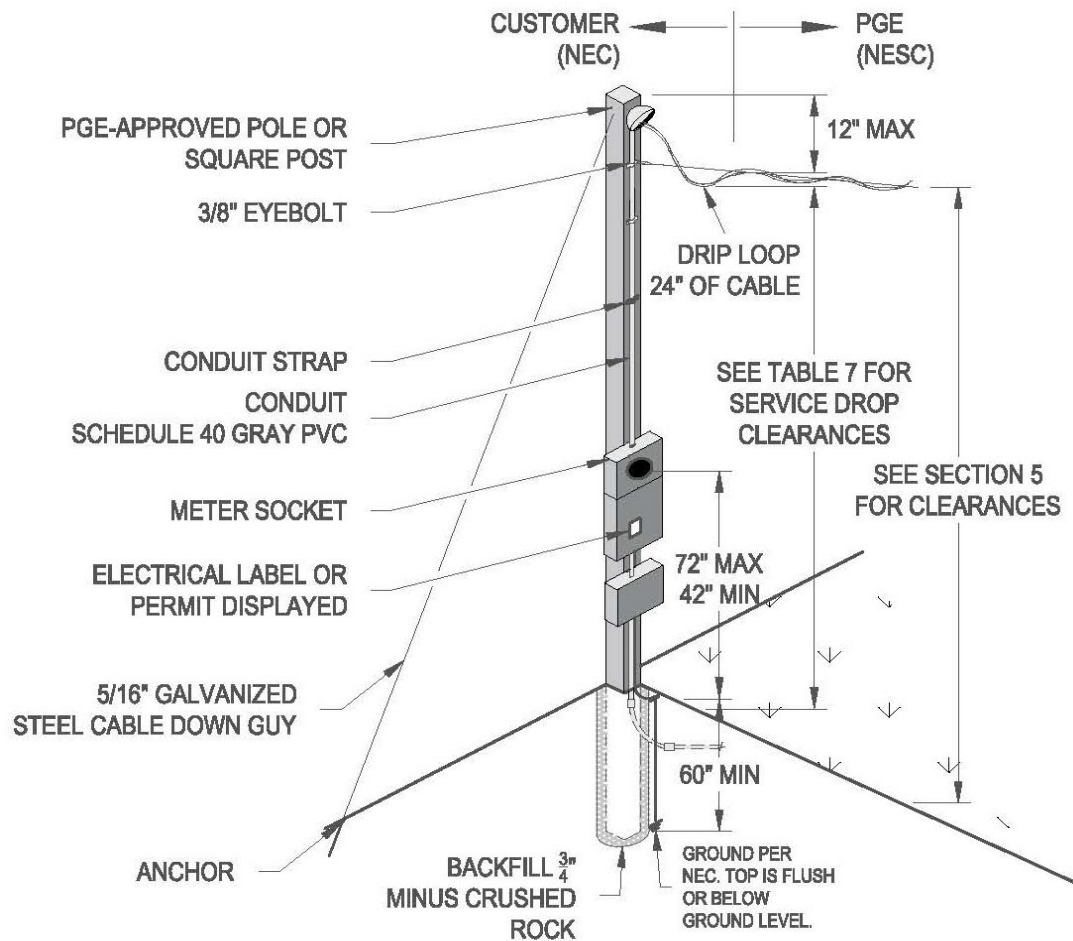


Figure 117. Irrigation Pumping Overhead Metering, Direct Connect (STD-D-6110)

12.3 Underground Irrigation Pumping Service Backstop (aka H-Frame) Options

The following are required when installing an underground irrigation pumping service backstop, such as the four examples shown in [Figure 118](#):

Table 39. Underground Irrigation Pumping Service Backstop Material Requirements

Material	Requirement
Wood	All wood posts and poles must be pressure treated or thermally treated by the manufacturer with an approved American Wood Preservatives Association standardized preservative.
Metal	All metal hardware must be galvanized or stainless steel. All metal pieces must be bonded to the ground conductor.

Table 40. Underground Irrigation Post and Pole Options

Material	Size
Wood post	4" x 6" minimum
Wood pole	6" diameter minimum
Steel post	2" x 2" galvanized steel

Table 41. Underground Irrigation Support Options

Material	Size
Wood supports	Wood that is 2" x 6" minimum
Steel sheets	1/8" to 3/8" galvanized steel
Unistrut	1 Unistrut to support the conduit. Multiple to support the metering equipment.

All posts and poles must be set as follows:

- 36" deep with concrete backfill, or
- 60" deep with no concrete backfill.

Additional requirements:

- All wood posts and poles must be capped.
- Both the meter and the disconnect switch must be bolted to the Unistrut.
- All metal pieces must be bonded to the ground conductor.
- PGE requires a 48" wide x 48" deep x 72" high clear, level workspace, or the width of the equipment, whichever is greater.

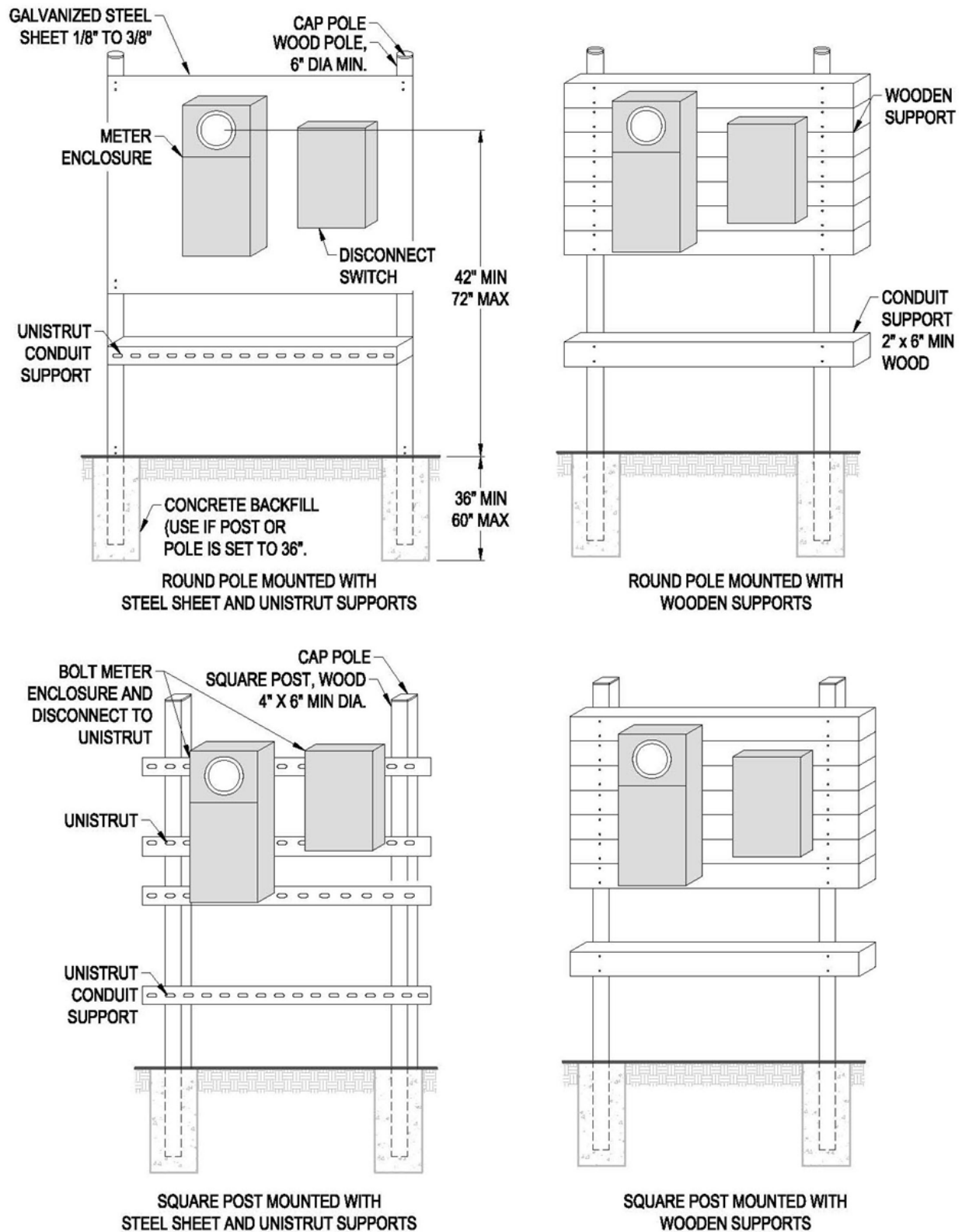


Figure 118. Underground Irrigation Pumping Service Backstop Options (STD-D-6286)

12.4 Meter Access Platform in a Flooded Area

The following are required when installing a meter access platform in a flood area, such as the typical customer-installed platform shown in [Figure 119](#).

- PGE requires a clear workspace in front of metering equipment. This workspace must be 78" high, at least 48" wide, and 48" deep.
- PGE and the customer determine when a platform is required and where it will be located. PGE must approve the platform before installation.

NOTE: Contact PGE for variations in platform requirements.

- All lumber used to make a platform must be pressure-treated. The customer must pay the cost of construction and must maintain the structural strength of the platform to allow future access.
- The customer is responsible for obtaining permits and use of land associated with a meter access platform.
- The pole must be furnished and installed by the customer.
- The stair run varies with the height of the platform. The handrail stanchions must be equally spaced.
- The customer must ensure that the minimum electrical clearances are maintained from the platform to the service attachment. See [Table 14](#) for required clearances.

IMPORTANT: PGE will notify the customer if a hazardous situation exists with a meter access platform. The customer has 60 days to repair the safety or maintenance issue involved. If repairs are not made by the end of this time, the customer's service will be subject to disconnection.

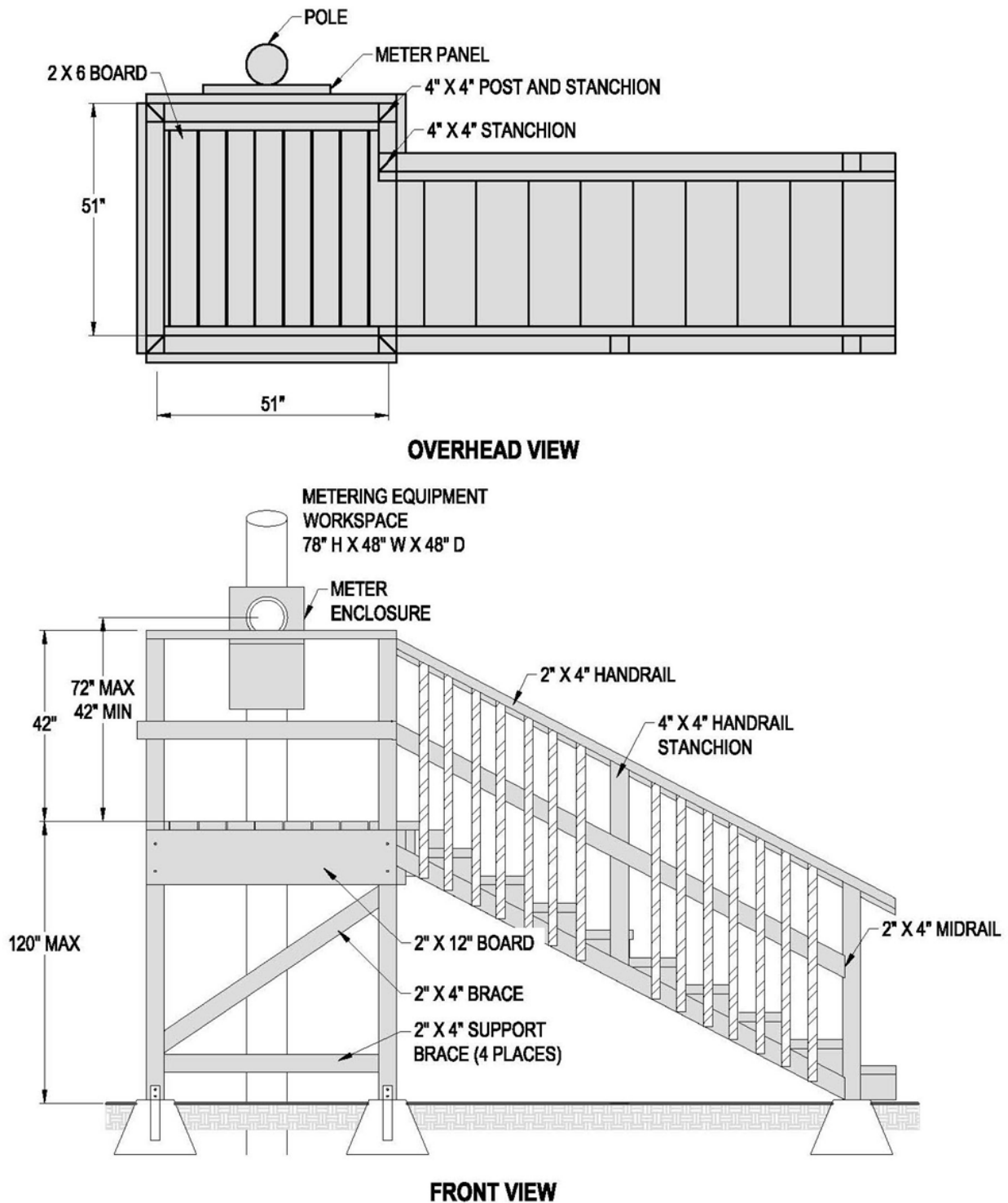


Figure 119. Typical Meter Access Platform (STD-D-6284)

12.5 Freestanding Backstop Options for Multiple-Family Services and Temporary CT Services

Customers are responsible for the structural design of freestanding post-mounted backstop to ensure they meet the following three requirements:

1. The structure can support the weight of the electrical equipment.
2. The structure is structurally sound.
3. It is a permanent structure.

Customers are responsible for procuring and maintain all required materials for the post-mounted backstop.

PGE will supply the meters for the services, as well as the electrical design for the electric service up to the point of demarcation.

IMPORTANT: The following backstop requirements are only for multi-socket or temporary CT service applications. For permanent CT service, refer to [Section 10.7.1](#).

Table 42. Freestanding Material Requirements

Material	Requirement
Wood	All wood posts and poles must be pressure treated or thermally treated by the manufacturer with an approved American Wood Preservatives Association standardized preservative.
Metal	All metal hardware must be galvanized or stainless steel. All metal pieces must be bonded to the ground conductor.
Concrete or other material	PGE is open to other materials such that they meet the three customer requirements above.

Table 43. Freestanding Post and Pole Options

Material	Size
Wood post	4" x 6" minimum
Wood pole	6" diameter minimum
Steel post	2" x 2" galvanized steel

Table 44. Horizontal Supports Used between Posts/Poles in Table 5

Material	Size
Wood supports	Wood that is 2" x 6" minimum
Steel sheets	1/8" to 3/8" galvanized steel
Unistrut	# of Unistrut

All posts and poles must be set as follows:

- 36" deep with concrete backfill
- Or 60" deep with no concrete backfill
- Generally, PGE requires poles to be set 10% of the pole length plus 2' below ground level.
- Freestanding backstops with overhead services require guying and other requirements (see [Section 3.11.3](#)).

Additional requirements:

- All wood posts and poles must be capped.
- Both the meter and the disconnect switch must be bolted to the Unistrut.
- All metal pieces must be bonded to the ground conductor.
- PGE requires a 48" wide x 48" deep x 72" high clear, level workspace, or the width of the equipment, whichever is greater.

NOTE: Barrier posts may be required if the freestanding backstop is within 5' of a drivable surface. See [Section 5.6.8](#) for placement and clearance requirements, as well as installation requirements.



Figure 120. Freestanding Backstop

12.6 Marinas

PGE requires metering equipment to be located on land in a readily accessible location above the flood plain (see [Section 3.10.1](#) and [Section 5.2](#)). Equipment adjacent to bodies of water must be kept at least 5' from the edge of any body of water or water feature. Additional clearances or encasements may be required to proactively address water changes due to erosion and/or shifting riverbeds.

New marinas must consult PGE to select the meter location. For existing marinas, rewired or relocated meters must meet the requirements as detailed in [Section 3.5](#).

The meter mounting structure must be constructed of materials suitable for the environment that meet EUSERC requirements.

13 Electrical Equipment Rooms and Interior Installations

Topics in this Section

- [General Requirements](#)
- [Egress Doors](#)
- [Room Access \(Keys and Lockboxes\)](#)
- [Room Walls, Floors, and Elevation](#)
- [Workspace Requirements for Electrical Equipment Rooms](#)
- [Interior Installation without a Dedicated Electrical Room](#)
- [Installation Not Located on the Exterior of the Building](#)
- [Meter Center Rooms without PGE Cable Termination](#)

13.1 General Requirements

An electrical equipment room containing PGE meter(s), instrument transformer(s), and/or cable termination is permitted only when a customer demonstrates to PGE that no acceptable outdoor alternative exists; submit proposals for electrical rooms only when extenuating circumstances make outdoor service equipment impractical or unfeasible. PGE will review all electrical room plans and request equipment specifications. If planned layouts or installation create a change from the preliminary approval, PGE will need to re-review the plans.

Electrical room must be limited to electrical and controls equipment. Only PGE and customer electrical equipment related to a service, required telecommunications equipment, conduit, security, and fire alarm systems are permitted in the room. If customers plan to integrate power storage or generation in an electrical room, PGE will need to review and approve the proposal. Sprinklers in compliance with NEC regulations, preferably outside the dedicated electrical space, are allowed in the electrical room. Fire risers, or any valved piping, must be placed in separate room(s) or may be considered isolated through use of a wing wall. Consult PGE when valved piping is proposed inside electrical rooms.

The PGE electrical equipment room must be located on an outside wall at the ground level and the door must open to the outside of the building.

In addition to the requirements described above, the following must also be met:

- The metering equipment location must be accessible to PGE employees for 24 hours a day, 7 days a week for reading, testing, and replacing meters.
- The electrical room must not be used for storage. It may contain PGE, customer-owned electrical, telecommunications, and/or security and fire alarm equipment only.
- No elevation changes are permitted within the electrical equipment room.
- Windows are not permitted in electrical equipment rooms.
- The room must be illuminated.

- At a minimum, the room's walls must be finished with drywall and taped. Fire-rated plywood may be acceptable but requires a submittal to PGE for review and approval and must be equal to or better than finished and taped drywall.
- Enclosure(s) containing PGE instrument transformers and all switchboard enclosures must rest on a reinforced concrete slab on grade.
- If applicable, all PGE metering equipment must be installed in accordance with local jurisdiction floodplain requirements.
- Customers are responsible for providing a means of communication path to PGE's AMI network. Since steel and concrete buildings pose communication path challenges, PGE may require the installation of a conduit path from the electrical room to the exterior of the building.

13.2 Egress Doors

All doors leading out of electrical equipment rooms (egress doors) must meet these requirements:

- Egress doors must be at least 36" wide and 78" high.
- Egress doors must swing outward and be equipped with panic hardware. This requirement must be met before service will be provided.
- At least 36" of clear space is required in front, back, and to the sides of an egress door.
- Egress doors must be constructed of metal and meet the fire rating required by the local jurisdiction. Windows are not permitted on egress doors.
- A minimum 48" × 48" clear, level landing is required outside of electrical room doors.

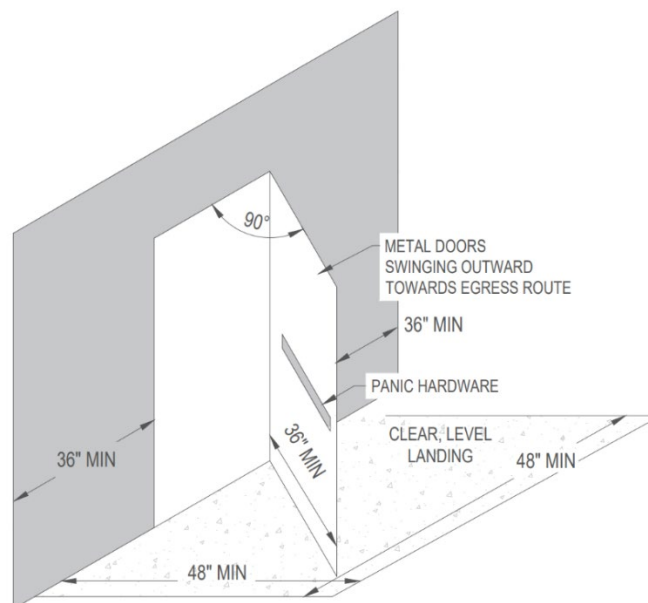


Figure 121. Egress doors (STD-D-6288)

Electrical Equipment Room Checklist

Room Location and Access Door

- ☐ The electrical room must be on an outside wall at the ground floor. The door must open to the outside of the building. Consult with a PGE Design Project manager if this requirement cannot be met.
- ☐ The door must have a keypad installed or be keyed for a PGE lock, or a door key must be provided and stored in a PGE-provided lockbox. See [Section 13.3](#).
- ☐ The metal door must be installed, open outward, and be equipped with a panic bar before receiving electric service. See [Section 13.2](#).
- ☐ The door must be at least 36" wide x 78" high. See [Section 13.2](#).
- ☐ There must be 36" of clear space in front, back, and to the sides of the access door.
- ☐ PGE has approved the electrical equipment room and layout.

Workspace

- ☐ Clear space in front of electrical cabinets with doors must meet minimum clearance requirements based on equipment placement. See [Section 13.2](#).
- ☐ PGE requires a clear workspace in front of a switch that is 78" high, at least 48" wide, and 48" deep, or the width of the equipment, whichever is greater.
- ☐ There must be 4' of working clearance between a three-phase transformer pad or vault edge and any aboveground obstacle or facility (such as a transformer, switchboard, or obstacle wall).
- ☐ No elevation changes are permitted within the electrical equipment room.

Storage

- ☐ The electrical room must not be used for storage.
- ☐ Only PGE and customer electrical equipment, telecommunications equipment, required conduit, and security and fire alarm systems are permitted in the room. Plans to integrate power storage or generation must be reviewed and approved. See [Section 13.1](#).
- ☐ Electrical Panels, Switchboards, Transformers, and CT Cabinets
- ☐ Review and approval by PGE engineer, Design Project Manager, and/or Meter Services.
- ☐ The metering current transformer must rest on a reinforced concrete slab on grade.

Miscellaneous

- ☐ The electrical room must be illuminated. See [Section 13.1](#).
- ☐ At a minimum, the walls must be finished with dry wall and taped. Concrete walls are permitted as well. See [Section 13.4](#).
- ☐ The switchboard and metering equipment must be installed in accordance with the floodplain requirements of the local jurisdictions, if applicable. See [Section 13.4](#).

13.3 Room Access (Keys and Lockboxes)

Where PGE equipment resides within a building, access must be provided to allow ready 24/7 access to the PGE equipment. PGE prefers keyed access. Customers must provide a *single* key, card, or FOB, with an on-site lockbox, to access the equipment. Entrances requiring the download of an app are prohibited.

If a site has multiple electrical equipment rooms, then customers must provide a single key to open all the rooms.

A room is considered accessible only if one or more of the following is true:

- A keypad is installed, and the access code provided to PGE.
- The access door is keyed for a PGE lock.
- The room is equipped with a PGE-provided lockbox that contains a key to the door of the PGE electrical equipment room(s).

Lockboxes must be installed a minimum 9' above grade, within 10' of the door and in clear sight. Space is required directly in front of the lockbox for a ladder.

NOTE: PGE will provide the bottom portion of the lockbox to the electrician or customer at the time of the initial inspection. The customer is then responsible for the installation. PGE will install the top portion of the lockbox after the final inspection is complete.

NOTE: Access is required for approval of service to occur.

IMPORTANT: Customers must contact PGE when any key changes occur.

13.4 Room Walls, Floors, and Elevation

The following apply to all electrical rooms with PGE equipment:

- Any room that contains PGE electrical equipment must be illuminated and accessible to PGE personnel.
- Windows are not permitted in electrical equipment rooms.
- At a minimum, the room's walls must be finished with drywall and taped. The walls must be sheet-rocked and taped, and the ceiling must meet the requirements of local and state building codes and fire codes.
- Consult PGE and the local jurisdiction for fire ratings for zoning. Customers are responsible for recognizing and mitigating potential surface and subgrade water flows (see [Section 5.6.7](#)).
- Floors must be concrete. Enclosures that contain PGE instrument transformers and all switchboard enclosures must rest on a **housekeeping pad**.
- No elevation changes are permitted within an electrical equipment room.

13.5 Workspace Requirements for Electrical Equipment Rooms

13.5.1 Workspace Entrance Requirements for Electrical Equipment Rooms

In addition to the general requirements in [Section 13.1](#), the following workspace entrance requirements apply to all electrical equipment rooms with PGE equipment:

- Access to workspace around the electrical equipment must be provided by at least one entrance that is of sufficient size, and which offers a continuous and unobstructed exit.
- For equipment rated 1200 A or more that contains overcurrent devices, switching devices, or control devices, there must be one entrance that is at least 36" wide and 78" high at each end of the workspace.
- A single entrance is permitted where the depth of the workspace is twice that required by NEC Table 110.26(A)(1) or PGE specifications—whichever is greater. In these cases, the minimum clear distance from the nearest edge of the entrance must be at least the minimum specified in Table 110.26(A)(1) or PGE specifications—whichever is greater—for equipment operating at that voltage and in that condition.

Follow the workspace requirements in [Section 13.5.2](#) through [Section 13.5.2.2](#) for PGE electrical equipment rooms that have one or two enclosures.

Table 45. Workspace Requirements for an Enclosure

If this...	And this...	Then...
The enclosure is 600 V or less to ground.	There is an entrance to and egress from each end of the workspace in front of the enclosure.	There must be at least 48" in front of the enclosure. —and— There must be at least 48" between the front of the enclosure and the closest doorway opening.
	There is a single entrance to and egress from the workspace in front of the enclosure.	There must be at least 96" in front of enclosure. —and— There must be at least 48" between front of enclosure and closest doorway opening.

IMPORTANT: Workspace will be measured from the front of the enclosure horizontally outward.

- PGE line crews requires 8' of working clearance in front of termination sections to pull in conductors for at grade installations. This clearance can be achieved using a door that is opposite the enclosure or within 30 degrees of vertical separation.
- An exterior door located opposite the termination section could be opened to achieve an 8' clearance if the following are true:
 - The door(s) must open to the exterior of the building.

- The door(s) must be able to be locked in the open position.
- The clearance cannot be achieved via a door that is not opposite the enclosure or within 30 degrees of the vertical separation.

For below-grade installations, refer to [Section 11.3.8](#) for working clearance requirements.

13.5.2 Electrical Equipment Rooms with One Enclosure

13.5.2.1 One-Enclosure Rooms with Two or More Entrances to the Workspace and One Door

The following workspace requirements, in addition to those in [Section 13.1](#), apply to PGE electrical rooms that have one enclosure with two or more entrances to the workspace and one door, as shown in [Figure 122](#).

- There must be at least 48" between the front of the enclosure and the closest doorway opening when the equipment in the enclosure is 600 V or less to ground.
- There must be at least 48" between the front of the enclosure and a wall or obstruction when the equipment in the enclosure is 600 V or less to ground.
- The doorway width must be at least 36".
- For an enclosure with a workspace with two or more entrances and one door, 8' of clearance is required in front of the termination section.

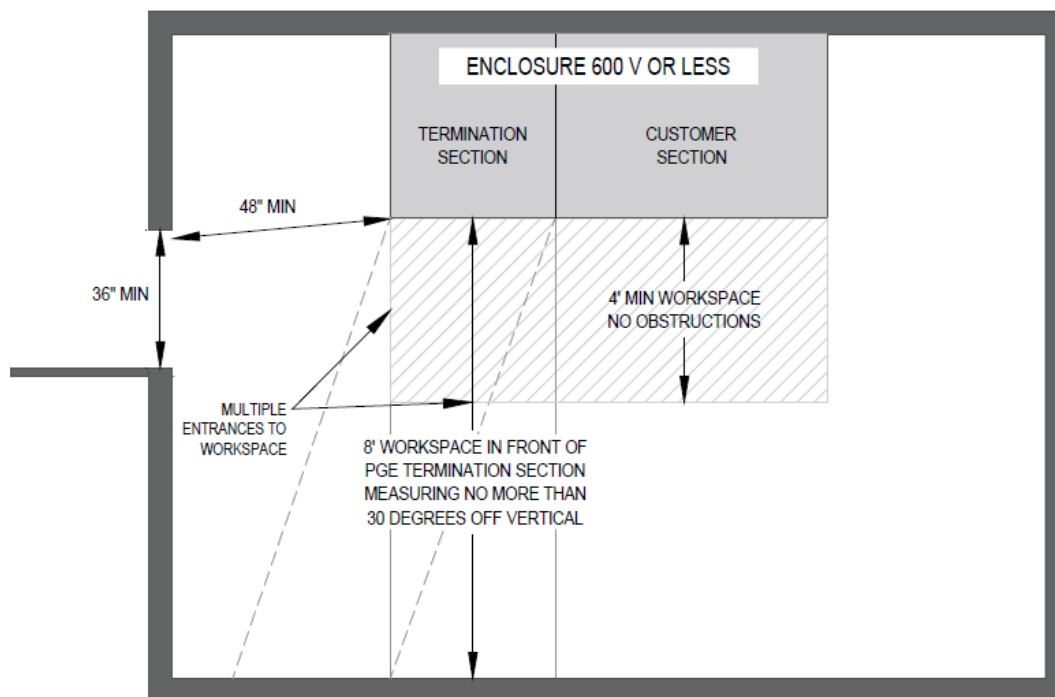


Figure 122. One-Enclosure Room with Two or More Entrances (STD-D-6290)

NOTE: [Figure 122](#) shows PGE's required termination clearance, not the required location for the termination section.

13.5.2.2 One-Enclosure Rooms with One Entrance to the Workspace and One Door

The following workspace requirements, in addition to those in [Section 13.1](#), apply to PGE electrical equipment rooms that have one enclosure with one entrance to the workspace and one door, as shown in [Figure 123](#).

- There must be at least 48" between the front of the enclosure and the closest doorway opening when the equipment in the enclosure is 600 V or less to ground.
- There must be at least 96" between the front of the enclosure and a wall or obstruction when the equipment in the enclosure is 600 V or less to ground.
- The doorway width must be at least 36".
- For an enclosure with a workspace with one entrance and one door, 8' of clearance is required in front of the termination section.

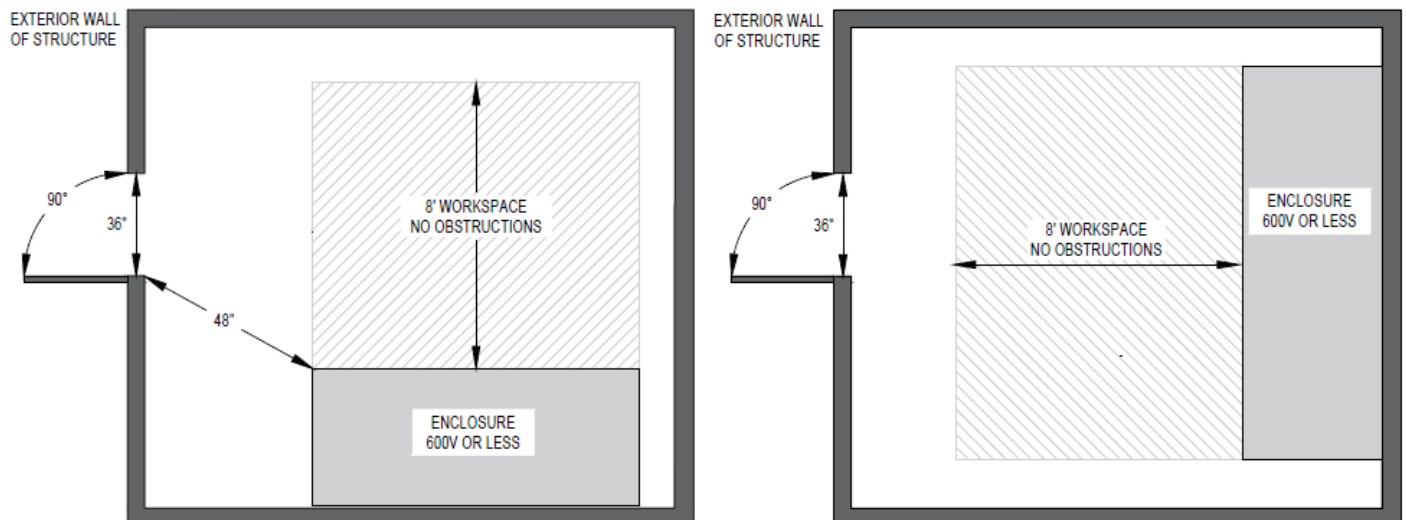


Figure 123. One-Enclosure Room with One Entrance to the Workspace and One Door (STD-D-6292)

13.5.3 Electrical Equipment Rooms with Two Enclosures

13.5.3.1 Two-Enclosure Rooms with One Entrance to the Workspace and One Door

The following workspace requirements, in addition to those in [Section 13.1](#), apply to PGE electrical equipment rooms that have two enclosures with one entrance to the workspace and one door, as shown in [Figure 124](#).

- There must be at least 48" between the front of the enclosure and the closest doorway opening when the equipment in the enclosure is 600 V or less to ground.
- There must be at least 96" between the front of the enclosure and a wall or obstruction when the equipment in the enclosure is 600 V or less to ground.
- The doorway width must be at least 36".

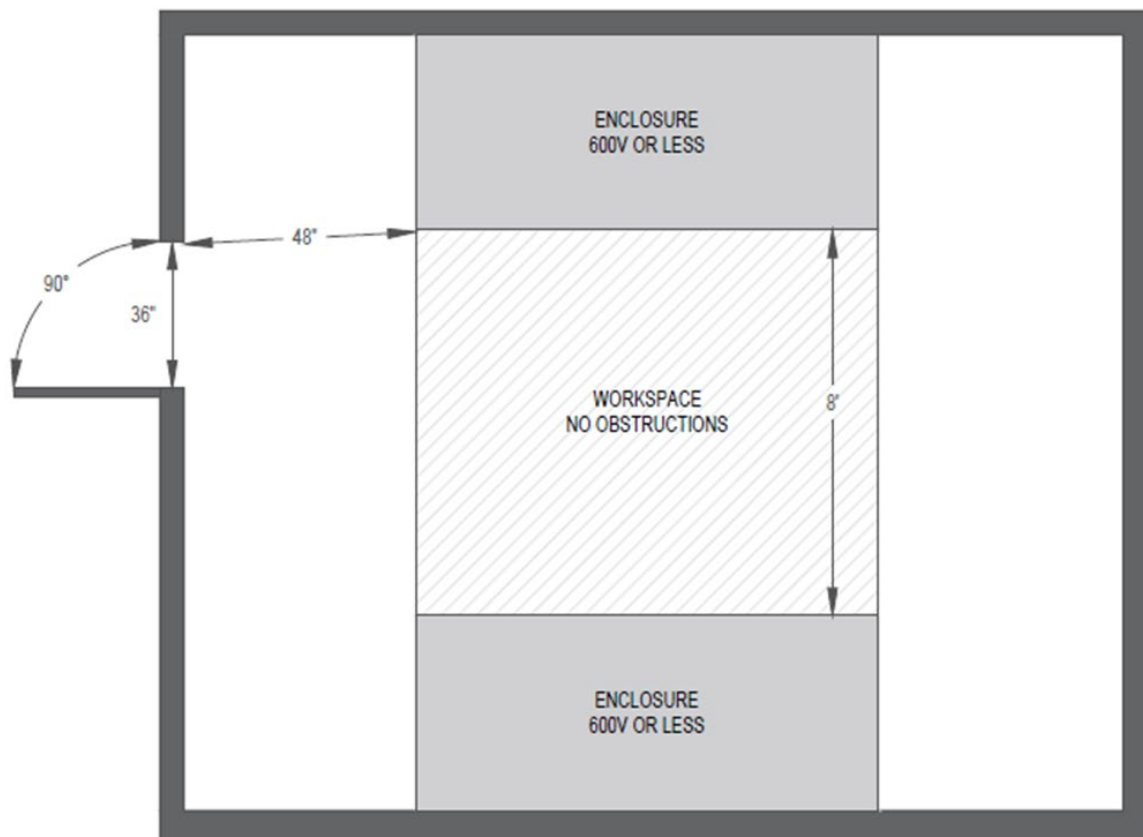


Figure 124. Two-Enclosure Room with One Entrance to the Workspace and One Door (STD-D-6294)

NOTE: [Figure 124](#) shows PGE's required termination clearance, not the required location for the termination section.

13.5.3.2 Two-Enclosure Rooms with Two Entrances to the Workspace and Two Doors

The following workspace requirements, in addition to those in [Section 13.1](#), apply to PGE electrical equipment rooms that have two enclosures with two entrances to the workspace and two doors, as shown in [Figure 125](#).

- There must be at least 48" between enclosures when the equipment in the enclosures is 600 V or less to ground.
- There must be at least 48" between the front of the enclosure and the closest doorway opening when the equipment in the enclosure is 600 V or less to ground.
- The doorway width must be at least 36".
- For a room with two enclosures with two entrances and two doors, 8' of clearance is required in front of the termination section.

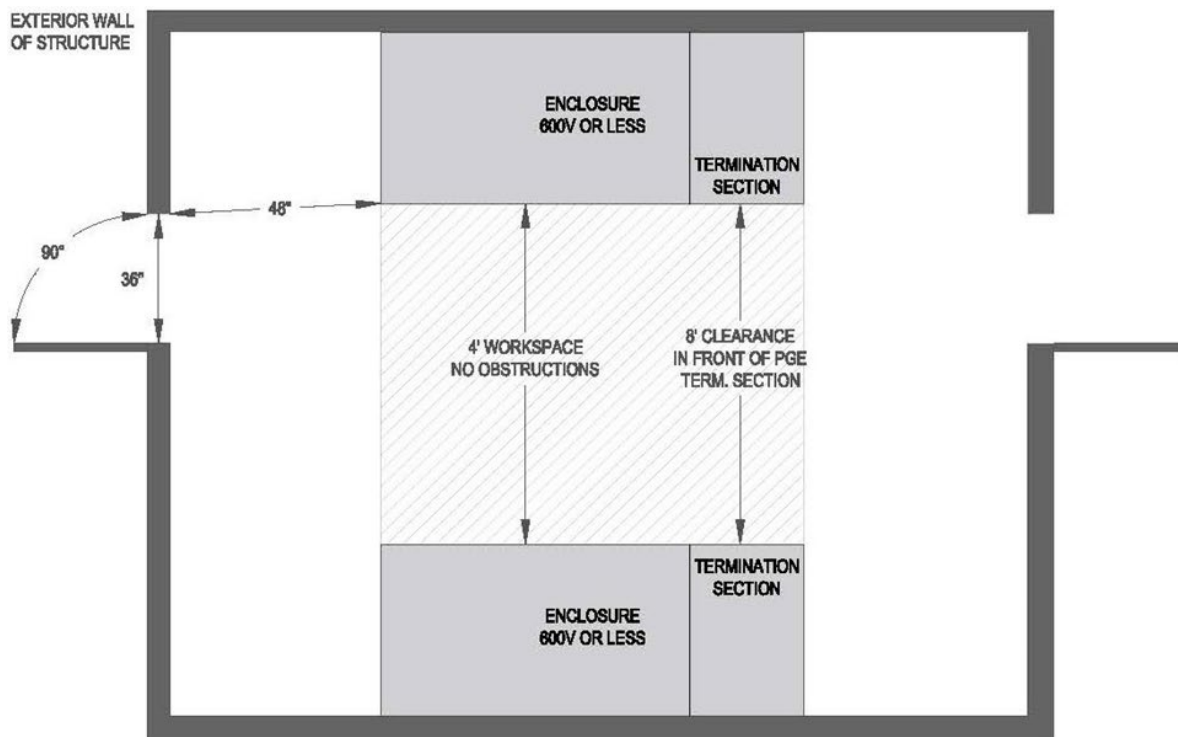


Figure 125. Two-Enclosure Room with Two Entrances to the Workspace and Two Doors (STD-D-6296)

NOTE: [Figure 125](#) shows PGE's required termination clearance, not the required location for the termination section.

13.5.3.3 Two-Enclosure Rooms with Two Doors, 2000 A or Greater

Any electrical room with two services 2,000 A each or greater requires two egress doors.

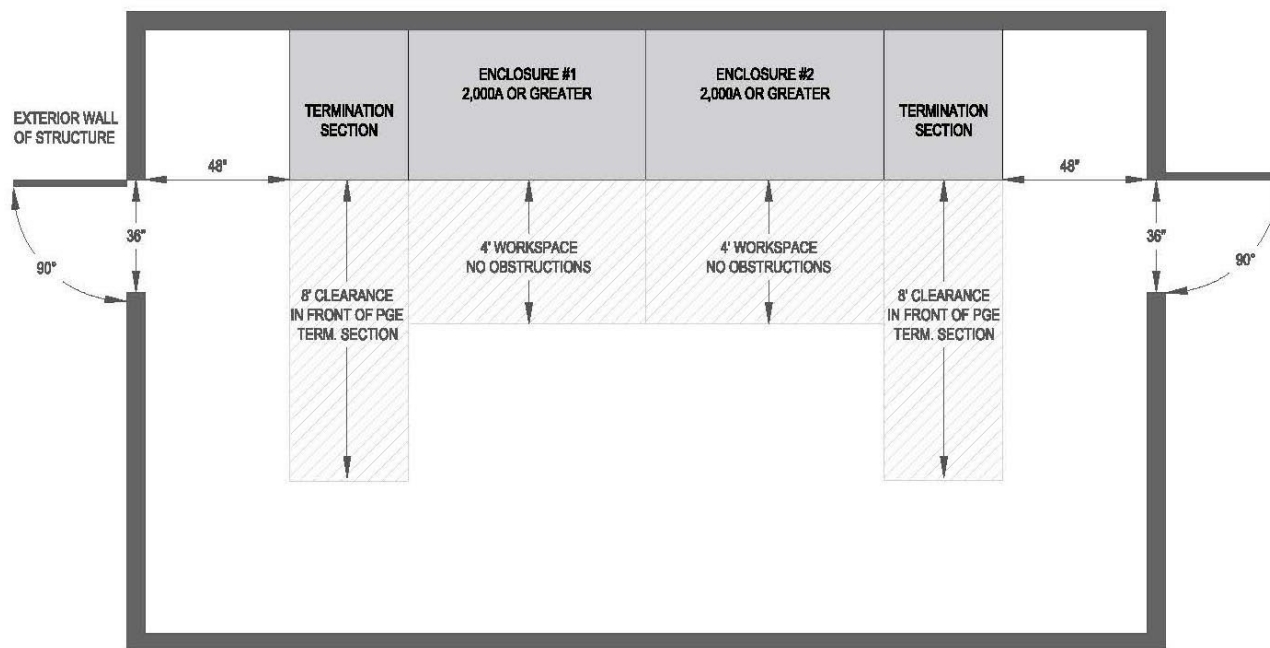


Figure 126. Two-Enclosure Room with Two Doors, 2000 A or Greater

13.6 Interior Installation without a Dedicated Electrical Room

Wherever possible, PGE equipment will be installed in a dedicated electrical room. When PGE approves an indoor location, these locations must be safe, convenient, and/or readily accessible. If the equipment cannot be installed in a dedicated room, the following requirements must be met:

- Equipment must be located near an egress door with direct access to the exterior, as determined by PGE. The door must meet the requirements in [Section 13.3](#).
- Equipment must be isolated and separated from any plumbing that contains flanges and/or valves.
- Where equipment is exposed to vehicular or forklift traffic, barrier posts are required according to the requirements in [Section 5.6.8](#).
- Any room that contains PGE electrical equipment must be illuminated and accessible to PGE personnel.
- Indoor meters cannot be in a show window, closet, bathroom, over a sink or laundry tub.
- PGE will install service connections to customer's metering equipment only at the main or entry floor level.

13.7 Installation Not Located on the Exterior of the Building

An electrical room located below grade will require an exception from PGE's Metering Department. PGE will not terminate service cables above the ground level.

Every door in the path of egress from the PGE electrical room to the exterior of the building must meet requirements listed in [Section 13.2](#).

13.8 Meter Center Rooms without PGE Cable Termination

PGE prefers that meter centers be collocated in the main PGE electrical equipment room where PGE conductors are terminated. If meter centers are not collocated in this room, meter center rooms must adhere to the workspace requirements listed in [Section 13.2](#).

All meter center rooms are required to have a disconnect located within them (see [Section 13.2](#) for egress door requirements).

14 Streetlights

Topics in this Section

- [Customer Process for Streetlights and/or Area Lighting](#)
- [Types of Streetlight Design](#)
- [Area Lighting](#)
- [Streetlight Requirements](#)

14.1 Customer Process for Streetlights and/or Area Lighting

IMPORTANT: Obtain your PGE Streetlights Job Sketch in the early stages of your project. Streetlights must be designed and built in parallel with the design and construction of new or upgraded electric services. This makes it easier to meet required clearances and reduces customer costs for trenching.

1. Submit a request to PGE for new or upgraded electric service by calling Service Coordinators at 503-323-6700 or entering a digital request in PowerPartner.
2. Discuss streetlights with your municipality and obtain a streetlight design layout stamped **Approved** by the municipality or county.
3. Submit a request to PGE for streetlights and/or area lights.
4. Obtain an approved PGE Job Sketch for New/Upgraded Service and obtain PGE Job Sketch for Streetlights.
5. Schedule an on-site preconstruction meeting with the PGE Field Construction Inspector before trenching, as required for all projects 401A and greater.
 - a. PGE must approve all conduit routes prior to installation by the Customer.
6. The customer is responsible for all trench excavation and backfilling, compaction, road crossings, conduits, elbows, vaults, junction boxes, landscape restoration, associated permits and any other requirements to complete the construction for streetlight service, as well as a new or upgraded electric service.
7. PGE must inspect all customer-installed conduit before backfilling. The Customer is responsible for contacting their PGE inspector to request inspection.
8. The line extension charge must be paid in full prior to any streetlight installations.
9. The customer is required to install the pole base, concrete footings if required, and barrier posts if required.
10. The Customer must request a final inspection by PGE for junction box installation, streetlights, and new service, if applicable. Customers may need to contact PGE twice if the service and streetlights are completed at different times.

14.2 Types of Streetlight Design

Streetlight designs are one of the following:

- Option A: PGE owns and maintains.
- Option B: Customer owns, PGE maintains.
- Option C: Customer owns and maintains.

Your municipality is critical in selecting the option for your project. Customers must provide the PGE Streetlighting Project Manager with a streetlight design layout stamped Approved by the municipality or county in whose jurisdiction it falls. The layout must include complete streetlight design details (pole and fixture specifications). Once PGE received this, we can develop the PGE Streetlights Job Sketch for you.

- For Option A and Option B, all streetlight materials maintained by PGE must be specified according to PGE's approved streetlighting equipment list. See the *PGE Streetlight Responsibility, Option A & B* handout on portlandgeneral.com.
- For Option C, the locations of demarcation points must be determined in consultation with the Streetlighting Project Manager. See the *PGE Streetlight Responsibility Option C* handout on portlandgeneral.com.

PGE's *Approved Street Lighting Equipment for New Installations* is available online on portlandgeneral.com.

Customers must be aware of the following often missed requirements:

- Install the bottom piece of streetlight poles and/or concrete footings for streetlights while the trench is open. All aluminum streetlight poles must be grounded in compliance with NESC 215C1. PGE will provide the materials for Option A streetlight bases and request that you install them.
- If an aluminum streetlight pole is being installed, install the PGE-provided ground rods. Refer to the Job Sketch for installation information.
- Facilities (including conduit, junction boxes, and streetlight poles) must not be located in bioswales or rain gardens, because PGE cannot restore them to their original design if repairs are required.

14.3 Area Lighting

PGE offers a convenient plan under which we own, install, and maintain the lights and poles on your commercial parking area or your home's yard. PGE has a variety of lighting options for you to choose from, including energy-saving LEDs. We will also help you avoid waste by determining the optimum number of lights you need.

There may be costs associated with the Area Light installations. Usually, customers pay a monthly fee and sign a minimum five-year contract. Contact our Service Coordinators, at 503-323-6700, to request more information on area lighting.

14.4 Streetlight Requirements

14.4.1 Duct Requirements

If no other PGE facilities are present, streetlight ducts must be installed at a minimum depth of 36". If PGE facilities (such as secondary or primary conduit) are present, the minimum depth is 48". For join-use trenches, the cover is usually greater due to the vertical height of factory sweeps (see the [Design and Construction Guide](#), 6.2.2, *Trench and Excavation Requirements*).

The approved streetlight duct sizes are 1", 2", and 3".

- Use a 1" duct from the junction box to the streetlight pole.
- The Streetlighting Project Manager will determine whether a 2" and/or 3" duct is needed between the transformer and the junction box at the design time.
- All Option C streetlight designs require a 3" duct from PGE's source to a demarcation location. All ducts, except for the 1" duct between the junction box and the pole, must contain a 500-pound pull line.

14.4.2 Elbow and Sweep Requirements

Long-sweep PVC elbows are acceptable for ducts up to 150' long with less than 180 degrees in bends. If a duct is more than 150' long or a conduit run contains more than 180 degrees in bends, elbows must be made of rigid steel or PGE-approved fiberglass. No single conduit run may have more than 270 degrees in bends. A 36" radius elbow is required for 1-4" conduit. A 60" radius elbow is required for 5-6" elbow. Five-foot straight sections must separate conduit elbows.

14.4.3 Junction Box Requirements

Install junction boxes at final grade level, with all duct elbows clustered at one end of the junction box. [Figure 127](#) shows the hard and soft surface installation.

Two junction box sizes are available for use:

- The smaller junction box—commonly called a 1324 box—measures 13" x 24" x 18". This box is used for streetlight circuits with one or two 2" conduits or one 3" conduit.
- The larger junction box—commonly called a 1730 box—measures 17" x 30" x 18". This box is used for streetlight circuits with three or four 2" conduits or two 3" conduits.

A list of PGE-approved junction boxes for use in terminating and fusing streetlight conductors is available upon request from the Streetlighting Project Manager.

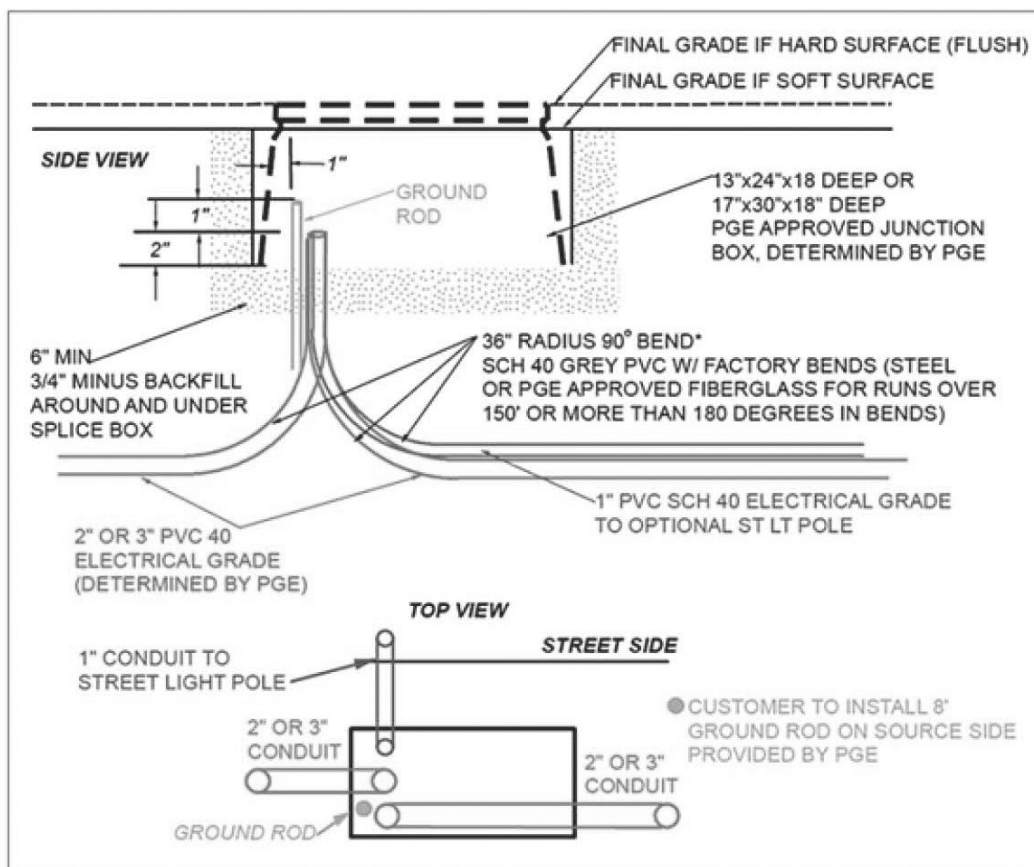


Figure 127. 1730 and 1324 Junction Box Layout

Appendix A Required Files for Service

The information in this appendix applies only to multiple-family and residential developments, commercial and industrial developments, and road improvement projects.

When requesting new service, upgraded service, or road improvement projects in the Portland General Electric (PGE) service territory, PGE requires that specific forms and files be submitted to PGE's Service Coordination team (Service.coordinators@pgn.com). The phone and fax numbers for Service Coordination can be found in [PGE Contact Information](#).

Process information for new single-family residential electrical service can be found in [Appendix B.1](#). Process information for multiple-family and residential electrical services can be found in [Appendix B.2](#).

1. Submit a request for service on the PowerPartner portal (<https://portlandgeneral.force.com/powerpartner/s/login/>) or call the Service Coordination team (Service.coordinators@pgn.com) to submit a request.
2. The Design Project Manager (DPM) assigned to your project will provide you with an email address. The format for PGE email addresses is:
 - `firstname.lastname@pgn.com`
3. Provide computer-aided drafting (CAD) files with civil engineering drawings of the site plan and profile with the footprint of the building and preferred locations of electric equipment. PGE accepts AutoCAD 2013 or later. PGE will use your files in the original survey coordinate system or datum; please specify this on the drawing. Updates to these files are requested at milestones in the project.
4. Include the same layers in the CAD files as are shown on the site plan and profile hard copy. The minimum layers needed are:

▪ Survey control points ▪ Lot lines ▪ Street names ▪ Curbs ▪ Centerlines of streets and roadways ▪ Stationing	▪ Existing and future street right of way ▪ Lot numbers ▪ Building footprints ▪ Sidewalks ▪ Easements ▪ Existing electrical facility locations
--	---
5. Ensure your data meets the following requirements:
 - If survey control points are not available in CAD format, PGE software will accept these points in text or Excel file format.
 - If you use nonstandard file and layer naming conventions, provide guidelines for reference.
 - If your data contains attachments—such as aerial imagery—either provide the attachments or delete the files from your reference before submittal.

- If you send a file that is 90% complete, and later send a file that is 93% complete, it is critical that you let PGE know what has changed. Itemize in an email or on the CAD drawing all data that has changed.
 - If you send multiple files, provide a description of what is included in each file.
 - Manufacturer specifications should not be included in the drawing package. They must be submitted separately.
6. Submit your files via email. Zipped files are acceptable, but executable (*.exe) files are not.
- NOTE:** Contact your PGE Project Manager for approved file transfer methods if your files are too large to transfer using e-mail.
7. For road construction projects, specify the datum of the file sent. PGE uses North Oregon State Plane (NAD83, international ft.). If there is a local datum plane (LDP), provide the conversion factor.
8. On occasion, PGE may request a hard copy of the full set of drawings, along with a cover letter. If requested, send the drawing to the appropriate PGE Regional Design Center:

Table 46. Regional Design Centers

Location	Street Address	City	ZIP Code
Gresham	1705 E Burnside St.	Gresham	97030
Portland	3700 SE 17th Ave.	Portland	97202
Southern	4245 Kale St.	Salem	97305
Western	2213 SW 153rd Drive	Beaverton	97003

A.1 Updates to Your Drawing Package

PGE needs to be able to easily see what has changed in your drawing package. If you send a file that is 90% complete and later send a file that is 93% complete, it is critical that you let PGE know what changed in the second file.

- In your email, itemize all data that has changed.
- In the drawing, indicate where revision has changed using the cloud method, or place revision numbers next to affected portions of the drawing.

IMPORTANT: Non-itemized changes may result in inaccurate reviews or gear approval which, upon discovery, may require re-review and different gear at the customer's expense.

Appendix B Single-Family and Multiple-Family Service

B.1 Obtaining New Single-Family Residential Electric Service

B.1.1 Customer Responsibilities

1. Obtain building and electrical permits from the appropriate city, county, or other jurisdiction. Obtain easements and tree-trimming permits if required.
2. Complete a Request for Single-Family Residential Service on the PowerPartner portal (<https://portlandgeneral.force.com/powerpartner/s/login/>).
3. Provide a hard copy of the scaled plot or site plan that was submitted for the building permit. New connected load data that is not accompanied by a site plan may delay initiation of service. [Figure 128](#) shows an example plot/site plan.
4. All pertinent documents, such as the signed Line Extension Cost Agreement, permits, or easements—as well as any money owed to PGE—must be received by PGE before the final inspection of your service by PGE and before a PGE line crew will be scheduled to connect your service.
5. Before digging a trench, contact the Design Project Manager (DPM) for design approval.
6. All costs associated with digging trenches, installing pads, vaults, conduit, handling road crossings, and permits are the responsibility of the customer.
7. Right-of-way excavation requires a permit. A PGE-approved contractor may be required. Contact the DPM for further information.
8. Arrange a preconstruction meeting between the excavation contractor and PGE at the job site.
9. Request an inspection by PGE and obtain PGE approval of the trench, conduit, and vault before backfilling.
10. After passing the appropriate municipal electrical inspection, request an inspection by PGE by contacting a Service Coordinator at 800-542-8818 or (in the Portland metro area) 503-323-6700.

IMPORTANT: PGE **will not** energize the service until all inspections have been performed.

11. Contact the Oregon Utility Notification Center (OUNC) for the location of underground utilities. Call 8-1-1 or 800-332-2344; or visit callbeforeyoudig.org. In the Portland metro area, call 503-246-6699.

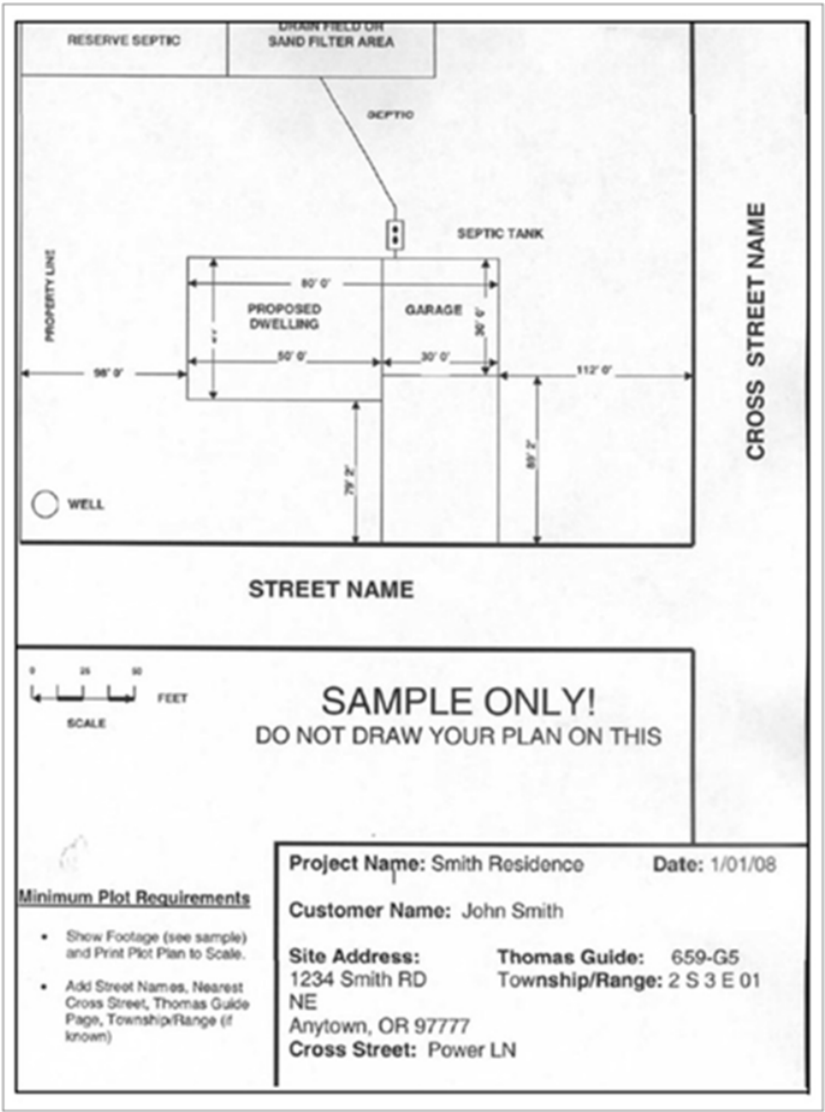


Figure 128. Example Plot/Site Plan

B.1.2 PGE Responsibilities

1. PGE will prepare an installation design and determine the customer costs owed to PGE (if any). Once all complete pre-design documents are received, PGE will provide the customer with a design commitment date.
2. PGE will inspect all electrical services, trenches, conduits, and vault systems.
3. PGE will schedule the connection of service after all customer responsibilities have been met.

B.2 Obtaining Multiple-Family and Residential Development Electric Service

B.2.1 Customer Responsibilities

1. Obtain building and electrical permits from the appropriate city, county, or other jurisdiction. Obtain easements and tree-trimming permits if required.
2. Complete the Request for Multi-family and Residential Development Service on the PowerPartner portal (<https://portlandgeneral.force.com/powerpartner/s/login/>).
3. Provide a hard copy of the scaled plot or site plan that was submitted for the building permit. The site plan must show the preferred ground level service and meter locations. Include the electrical room(s) and metering equipment specifications, if applicable. A full-size set of drawings and CAD files must be submitted. See [Appendix A](#).
4. If applicable, check the local jurisdiction for streetlight requirements.
5. All pertinent documents, such as the signed Line Extension Cost Agreement, permits, and easements—as well as any money owed to PGE—must be received by PGE before the final inspection of your service by PGE and before a PGE line crew will be scheduled to connect your service.
6. Before digging a trench, contact the Design Project Manager (DPM) for design approval.
7. All costs associated with digging trenches, installing pads, vaults, conduit, handling road crossings, and permits are the responsibility of the customer.
8. A PGE-approved contractor must perform right-of-way excavation. Contact the DPM for further information.
9. Arrange a preconstruction meeting between the excavation contractor and PGE at the job site.
10. Request an inspection by PGE and obtain PGE approval of the trench, conduit, and vault before backfilling.
11. After passing the appropriate municipal electrical inspection, request an inspection by PGE by contacting a Service Coordinator at 800-542-8818 or (in the Portland metro area) 503-323-6700.

IMPORTANT: PGE will not energize the service until all inspections have been performed.

12. Contact the Oregon Utility Notification Center (OUNC) for the location of underground utilities. Call 8-1-1 or 800-332-2344; or visit callbeforeyoudig.org. In the Portland metro area, call 503-246-6699.

B.2.2 PGE Responsibilities

1. PGE will prepare an installation design and determine the customer costs owed to PGE (if any). Once all complete pre-design documents are received, PGE will provide the customer with a design commitment date.
2. PGE will inspect all electrical services, trenches, conduits, and vault systems.
3. PGE will schedule the connection of service after all customer responsibilities have been met.