



**AGRICULTURAL OVERHEAD SERVICE 300 HP OR LESS**

**058087**

<b>Asset Type:</b> Electric Metering	<b>Function:</b> Design
<b>Issued by:</b> Carlos Araquistain (CJA8) <i>C. Araquistain</i>	<b>Date:</b> 04-15-11

**Rev. #09:** This document replaces PG&E Document 058087, Rev. #08. For a description of the changes, see Page 12.

**This document is also included in the following manual:**

- [Electric and Gas Service Requirements](#) (Greenbook)
- [Electric Meter Work Practices](#)

**Purpose and Scope**

This document establishes and illustrates the preferred methods of providing overhead agricultural service of 300 horsepower (hp) or less.

**General Information**

1. This document applies to agricultural loads rated 5 through 300 hp, provided all of the following conditions are met.
  - A. The service is overhead.
  - B. There is no suitable building, service pole or other PG&E-approved structure available for attaching the service conductors and mounting the metering equipment.
  - C. The load current does not exceed the ampere limitation of the service entrance equipment.

Conditions other than those listed above involve special requirements which are available at the local PG&E office.
2. Service Request: The customer should make application for service and verify the available service voltage with PG&E as far in advance of construction as possible. The customer should then notify his pump company of the available PG&E service voltage.
3. Available Service Voltage: Non-residential single-phase loads to a maximum of 7-1/2 hp shall be served at 120/240 V, single-phase, 3-wire. Three-phase motors of 5 hp, but less than 30 hp, will normally be served at 120/240 V, three-phase, 4-wire, but may be served at 120/208 V or 277/480 V at the customer's option and if capacity is available from existing facilities. Single or grouped three-phase motors of 30 hp to 50 hp can be served at 120/240 V, three-phase, 4-wire, if the customer has a combination of single and three-phase loads, otherwise they must be served at 120/208 or 277/480 V, three-phase, 4-wire. Single or grouped three-phase motors from 60 hp to 125 hp shall be served at 120/280 V or 277/480 V, three-phase, 4-wire. Single or grouped motors of 150 hp to 300 hp shall be served at 277/480 V, three-phase, 4-wire.
4. General Requirements: PG&E shall furnish and install the overhead service drop, meters and metering current transformers. Unless otherwise stated, all other materials shall be furnished, installed and maintained by the customer and shall comply with the requirements of PG&E. It shall be the responsibility of the customer to ascertain and comply with the requirements of governmental authorities having jurisdiction. In areas where no provision is made for inspection by local authorities, the applicable state regulations shall apply. Local ordinances may include wiring requirements in addition to those shown in this document or in the National Electrical Code (NEC). Consult inspection authorities for requirements, city or county permits, and inspections that may be required before service can be connected.
5. Clearances: All overhead conductors may not be in a vertical plane **any** closer than 10 feet from any wellhead.
6. Service Pole: When a service pole is required, it shall have a minimum length of 25 feet (set 4-1/2 feet in the ground) unless a longer pole is needed for required ground clearance or to accommodate additional PG&E equipment. The pole will be located at least 10 feet from the motor or load and in such a position that the overhead conductors and any required guy will not interfere with work done at the motor or load. A PG&E pole with high-voltage conductors (over 600 V) shall not be used as a service pole.

7. Service Entrance Conductor:

- A. The conductors shall be sized and installed in accordance with the applicable requirements of the NEC.
- B. A minimum of 18 inches of conductor shall be provided outside of the service head to make connection with PG&E's service drop.
- C. When the meter enclosures shown in Figure 9 through Figure 11 on Page 10 are used, the customer shall furnish and connect all line and load-side service entrance conductors.
- D. When metering equipment requiring a current transformer (Figure 12 on Page 11 through Figure 16 on Page 12) is used, the customer shall furnish lugs and connect conductors to the line and load sides of the current-transformer mounting base. The unmetered conductor may be cable, but shall be continuous and unspliced in the current-transformer cabinet and shall be located so as to not interfere with the current-transformer installation.

8. Service Entrance Conductor Covering for Service Poles.

- A. All wires between the service head and the meter shall be enclosed in any of the following:

- (1) galvanized rigid steel conduit
- (2) rigid aluminum conduit
- (3) electrical metallic tubing
- (4) intermediate metal
- (5) PVC plastic conduit having a minimum wall thickness of 0.15 inches (Schedule 40 for 2" PVC conduit or larger, Schedule 80 for 1-1/2" or smaller)

All fittings shall be raintight.

- B. If PVC plastic conduit is used, it need not be covered. If rigid steel or other approved metallic conduit is used, it shall be enclosed with either 1/4-inch thick fiber conduit, 1-1/2-inch thick wood covering or PVC "U" shaped moulding for a minimum distance of 8 feet below the lowest open service entrance conductor. The covering shall be strapped to the pole at intervals not greater than 3 feet (see Pages 7 and 8).

9. Grounding: The customer shall be responsible for bonding and grounding all exposed, non-current-carrying metal parts. Bonding and grounding shall be in accordance with the NEC and local ordinances, except that the grounding wire shall be protected against physical damage by rigid steel conduit or armored copper ground wire shall be used.

10. Metering Requirements:

- A. The arrangement of service equipment shall place the meter and current-transformer cabinet (if required) on the source side of the customer's service switch or breaker.
- B. 150 hp or less: The customer shall provide and install a self-contained, meter socket enclosure, approved by PG&E, for the available service voltage, in accordance with Table 1 on Page 5 and Figure 9 through Figure 11 on Page 10.
- C. 150 hp through 300 hp: The customer shall provide and install a PG&E-approved combination meter and current-transformer cabinet in accordance with Table 1 on Page 5 and as shown in Figure 13 and Figure 14 on Page 12, or, as an option, the current-transformer cabinet and separate transformer-rated meter safety-socket box as shown in Figure 15 and Figure 16 on Page 12.

11. Customer's Control Equipment:

- A. Customer's switch and motor control equipment shall be of proper horsepower and voltage rating and, when exposed to weather, shall be weatherproof.
- B. The customer's control equipment shall include three overcurrent units, one in each phase, for protection of each three-phase motor or as otherwise specified in Article 430 of the NEC. Consideration should also be given to installing open-phase and reverse-phase protection.
- C. Customer's switch and motor control cover shall be effectively locked or sealed if the enclosure contains accessible electrically energized parts.
- D. When a service pole without an adjacent panel board is used, the customer's switch and motor control equipment may be installed as shown on Pages 7 and 8. One side of the pole must be kept clear for climbing.

**Agricultural Overhead Service 300 hp or Less**

12. Services to Three-Phase Pumps:

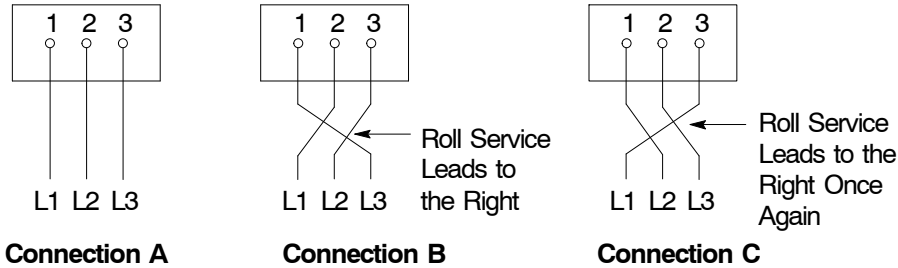
A. When three-phase service is established to a pump, PG&E's crew will assist in checking for satisfactory pump motor performance if the customer or his representative is present. The construction crew should take "Clamp-on" ammeter readings at the service head, or the customer or his representative can take them at the motor control box. If the reading on the "high" phase is more than 10% higher the reading on the "low" phase, then the phases should be rolled to get the readings as close as possible (see Figure 1 below). The set of readings that gives the lowest difference is the connection that should be retained. It is possible that none of the other readings will be any better. Use the ["Motor Data Sheet"](#), to record all readings.

- (1) Starting and stopping of the pump should be done only by the customer or his representative. Connections can be changed at the transformer pole or service pole by PG&E's crew or at the motor control box by the customer or his representative.
- (2) On 240 V, 3-wire services where one phase conductor is grounded, all rolling of leads must be done on the customer's motor leads (at the motor control box), not on PG&E's service leads.
- (3) Example

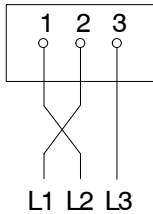
Once water was flowing satisfactorily from the pump, the following ammeter readings were taken:

<u>Connection</u>	<u>Amperes</u>		
	<u>L1</u>	<u>L2</u>	<u>L3</u>
A = Original Readings	60	61	67
B = Second Set of Readings	60	62	63
C = Third Set of Readsings	59	62	66

Conclusion: Connection B should be used.



**Figure 1**  
**Rolling Leads**  
**(maintains same rotation)**



**Figure 2**  
**Interchanging Leads Reverses Rotation**  
**(for information only)**

13. 480 V Service: Voltage stabilizer, when required, will be furnished and installed by PG&E. Refer to [Document 052497](#).

References	Location	Document
<a href="#">Dead-End Attachments for Service and Streetlight</a>		
<a href="#">Drop Cables</a> .....	<a href="#">ELS</a> .....	<a href="#">015009</a>
<a href="#">Spool and Clevis-Type Insulators–Distribution Lines</a> ..	<a href="#">OH: Conductors</a> .....	<a href="#">022439</a>
<a href="#">Requirements for Customer-Owned Poles</a> .....	<a href="#">OH: Services/Greenbook</a> .....	<a href="#">025055</a>
<a href="#">Dead-End and Angle Attachments for Aluminum</a>		
<a href="#">Conductors - Distribution Lines</a> .....	<a href="#">OH: Conductors</a> .....	<a href="#">028851</a>
<a href="#">Voltage Stabilizer for 480 Volt, Three-Phase, 3-Wire</a>		
<a href="#">Ungrounded Service</a> .....	<a href="#">OH: Meters</a> .....	<a href="#">052497</a>
<a href="#">Agricultural Underground Service 150 HP or Less</a> .....	<a href="#">UG-1: Services/Greenbook</a> .....	<a href="#">054619</a>
<a href="#">Cable and Accessories for Secondary Aerial Cable</a>		
<a href="#">Construction</a> .....	<a href="#">OH: Framing</a> .....	<a href="#">057876</a>
<a href="#">Miscellaneous Hardware for Overhead Line</a>		
<a href="#">Construction</a> .....	<a href="#">OH: Framing</a> .....	<a href="#">058778</a>
<a href="#">Conductors for Overhead Lines</a> .....	<a href="#">OH: Conductors</a> .....	<a href="#">059626</a>
<a href="#">Overhead and Underground Panel Board</a>		
<a href="#">Construction</a> .....	<a href="#">OH-Services/UG-1: Services</a> .....	<a href="#">065374</a>
<a href="#">Fired Wedge Connectors for Primary and Secondary</a>		
<a href="#">Distribution Lines</a> .....	<a href="#">OH: Conductors</a> .....	<a href="#">066194</a>

## Agricultural Overhead Service 300 hp or Less

Table 1 Customer's Metering Equipment Requirements <sup>1</sup>

Service Voltage <sup>2</sup>	Maximum hp <sup>3</sup> Single or Grouped Motors	Metering Equipment Max. Continuous Duty Ampacity (amps)	Type Meter Equipment Required	Refer to
120/240 V Single-Phase, Non-Residential, 3-Wire	7-1/2 hp Single	100	Self-Contained 4-Jaw Bused Safety-Socket Meter Box	Figure 9 Page 10
240 V Delta Three-Phase, 3-Wire <sup>4</sup>	30 hp Single or Grouped	100	Self-Contained 5-Jaw Bused Safety-Socket Meter Box	Figure 10 Page 10
	60 hp Single or Grouped	200		
240/120 V Delta Three-Phase, 4-Wire	30 hp Single or Grouped	100	Self-Contained 7-Jaw Bused Safety-Socket Meter Box	Figure 11 Page 10
	50 hp Single or Grouped	200		
480 V Delta Three-Phase, 3 Wire <sup>5</sup>	60 hp Single or Grouped	100	Self-Contained 5-Jaw Bused Safety-Socket Meter Box	Figure 10 Page 10
	125 hp Single or Grouped	200		
	150 hp Single or Grouped	400	Combination Meter, Current-Transformer and Service Termination Cabinet With 8-Jaw Socket and CT Mounting Base	Figure 12 Page 11
	300 hp Single or Grouped	400	Combination Meter and Current-Transformer Cabinet Current-Transformer Cabinet and Transformer-Rated Meter Box	Figure 13 Figure 15 and Figure 16 Page 12
277/480 V Wye Three-Phase, 4-Wire	60 hp Single or Grouped	100	Self-Contained 7-Jaw Bused Safety-Socket Meter Box	Figure 11 Page 10
	125 hp Single or Grouped	200		
	150 hp Single or Grouped	400	Combination Meter, Current-Transformer and Service Termination Cabinet With 13-Jaw Socket and CT Mounting Base	Figure 12 Page 11
	300 hp Single or Grouped	400	Combination Meter and Current-Transformer Cabinet Current-Transformer Cabinet and Transformer-Rated Meter Box	Figure 14 Figure 15 and Figure 16 Page 12

<sup>1</sup> For meter equipment illustration, see Pages 10 through 12.<sup>2</sup> See Note 3 on Page 1 for available service voltages.<sup>3</sup> Maximum horsepower for single and grouped motors is based on the actual running load and not the nameplate. Refer to National Electrical Code for Motor Circuit Conductors, Article 430, Part M.<sup>4</sup> Limited availability, consult PG&E.<sup>5</sup> 480 V Delta is not available for new services.

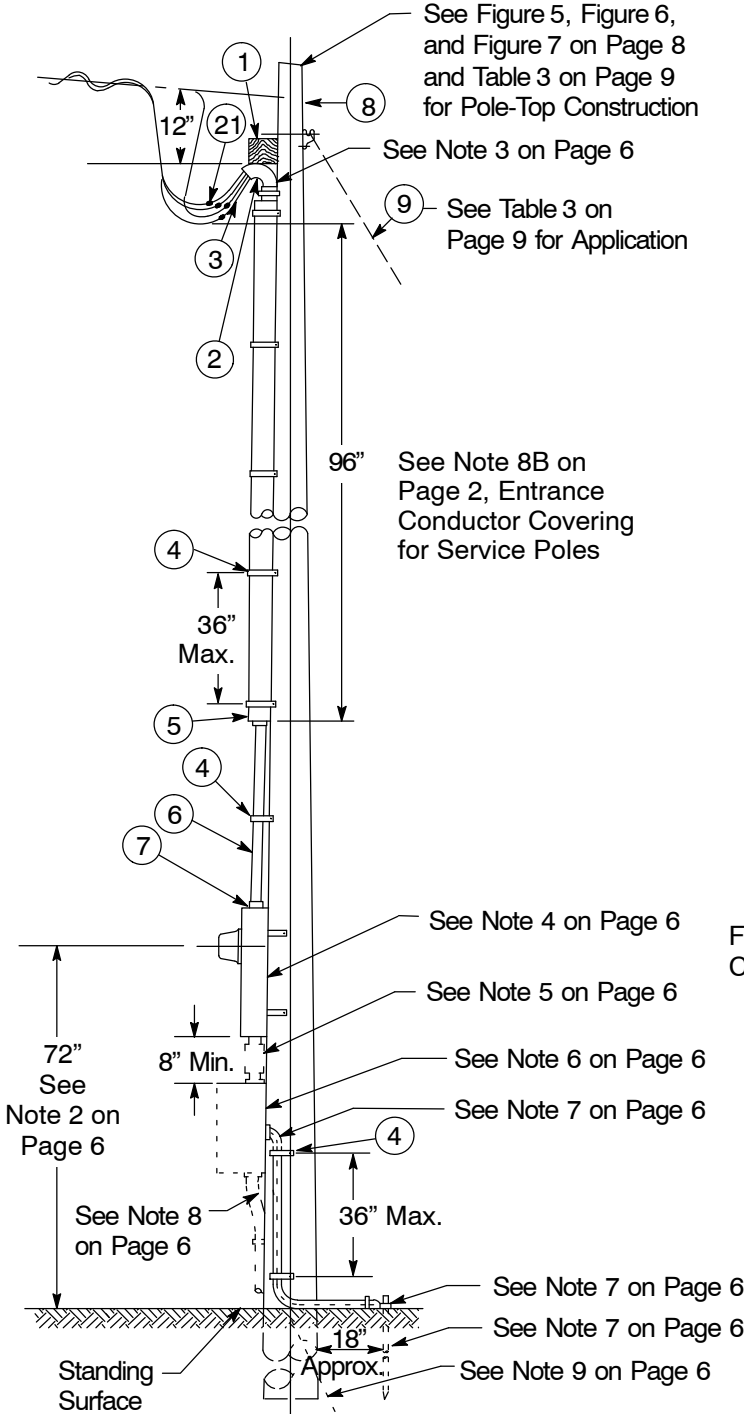
## ***Pole Construction***

### **Notes**

1. Omit wood block (see Table 2, Item 1 on Page 7) and conduit covering (see Table 2, Item 5 on Page 7) when PVC service conduit is used. Exception: Wood block is required when service weatherhead is metallic and the neutral service entrance conductor is uninsulated.
2. When the service conduit (see Table 2, Item 6 on Page 7), is metallic or minimum 2-1/2 inch diameter PVC Schedule 80, the enclosure height may be reduced as permitted by [G.O. 95](#) to allow 48 inches minimum meter height from a level standing surface to the center line of the meter.
3. The customer shall extend the service weatherhead to within 18 inches of the pole top unless otherwise instructed by PG&E (see Note 7A on Page 2).
4. For notes and details pertaining to metering equipment, see Note 10 on Page 2.
5. Voltage stabilizer, when required, will be furnished and installed by PG&E. Refer to [Document 052497](#).
6. For notes and details pertaining to customer's service disconnect and motor control equipment, see Note 11 on Page 2.
7. For ground requirements, refer to Note 9 on Page 2.
8. Customer's conductors installed in conduit must be in rigid steel conduit, or 2-1/2 inch minimum diameter Schedule 80 PVC plastic on surface of pole.
9. Alternate location for the ground rod to reduce exposure to agricultural equipment.

**Agricultural Overhead Service 300 hp or Less**

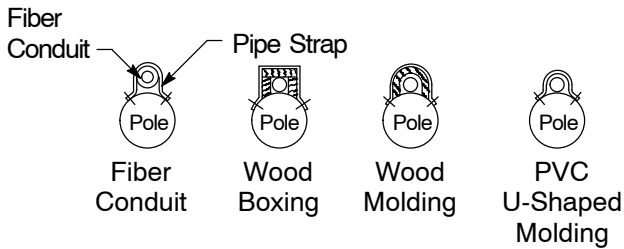
**Pole Construction (continued)**



**Figure 3**  
**Pole Construction for Agricultural Overhead**  
**Service 300 hp or Less**

**Table 2 Material to be Furnished and Installed by Customer**

Item	Description
1	Wood Block 4" x 4" x 6" Long Securely Nailed to Pole (may be two 2" x 4" x 6" wood blocks nailed together) (see Note 1 on Page 6)
2	Conduit Entrance Cap or Service Weatherhead
3	Service Entrance Conductors (see Note 7A on Page 2)
4	Pipe Strap or Plumbers Tape, Heavy Duty, Galvanized
5	Covering, Wood, Fiber Conduit or PVC "U"-Shaped Moulding (see Note 8B on Page 2 and Note 1 on Page 6)
6	Service Conduit (see Note 7 on Page 2)
7	Meter Socket or Current-Transformer Enclosure (see Pages 10 through 12)
8	Wood Pole, as Required (25 ft. minimum)
9	Guy Material, as Required

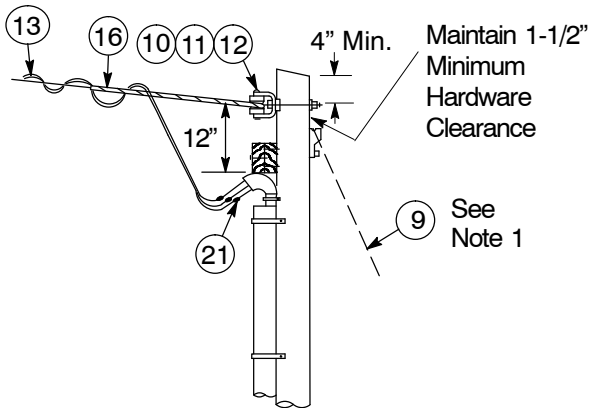


**Figure 4**  
**Methods Of Covering Metallic Conduits**  
**(see Note 8B on Page 2)**

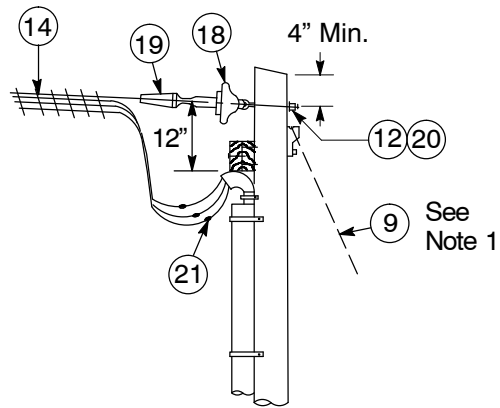
**Pole-Top Construction**

**Notes**

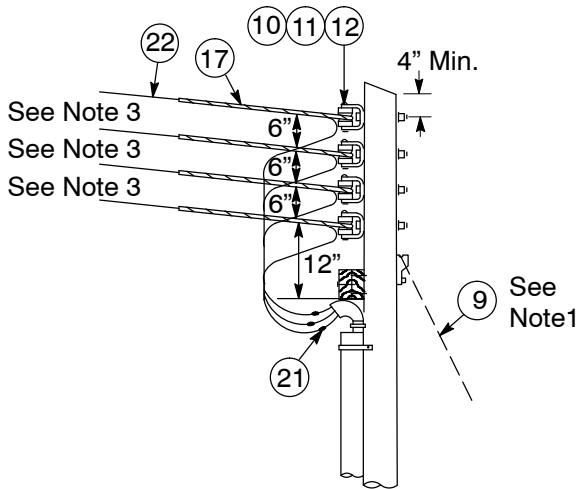
1. See Table 3 on Page 9 for down guy requirements.
2. When a neutral conductor is required inside the molding, replace the bare neutral with the required length of insulated conductor.
3. Increase conductor spacing to 8 inches for spans of 151-200 feet, and 12 inches for spans of 201-330 feet.



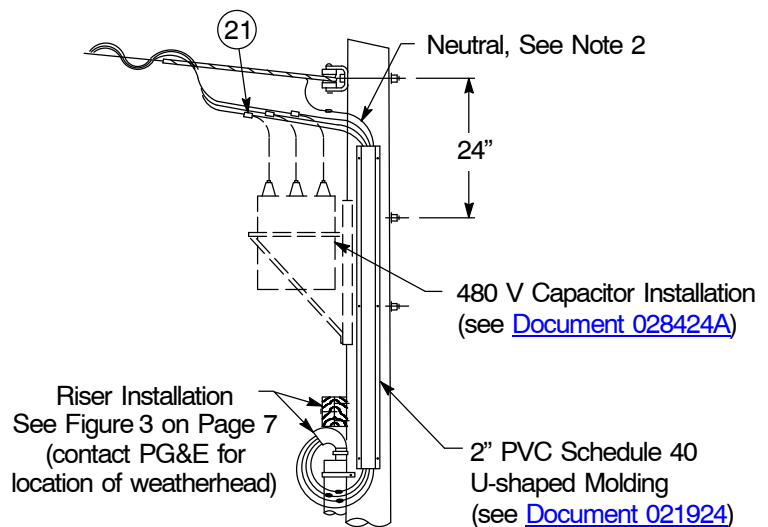
**Figure 5**  
**Service Drop Cable Installation**



**Figure 6**  
**Aerial Cable Installation**



**Figure 7**  
**Open Wire Cable Installation**



**Figure 8**  
**Pole-Top Construction for Installation of 480 V  
Capacitor Bank or Other PG&E Equipment**

***Pole-Top Construction (continued)***

**Table 3 Conductor Application**

Cable Data <sup>1</sup>				Construction	
Load (amps)	Span (feet)	Slack Span	Full Tension Span	Down Guy Requirement	Pole-Top Construction
75 or Less	10-150	1/0 Service Drop	-	2	Figure 5 Page 8
	Over 150	-	1/0 Aerial, ACSR or AWAC	Yes	Figure 6 Page 8
Above 75 to 214	10-80	4/0 Service Drop	-	2	Figure 5 Page 8
	Over 80	-	4/0 Aerial, ACSR or AWAC	Yes	Figure 6 Page 8
Above 214 to 400	10-80	397.5 WP Al Open Wire	-	2	Figure 7 Page 8
	Over 80	-	397.5 WP Al Open Wire	Yes	Figure 7 Page 8

<sup>1</sup> Larger cable may be required if voltage drop requirements are not met.

<sup>2</sup> A down guy is required if construction crosses the street or thoroughfare, or if the pole is not in reasonably firm soil.

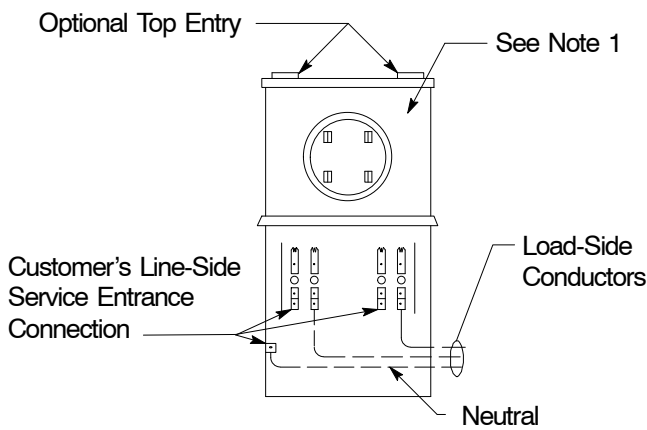
**Table 4 Material to be Furnished and Installed by PG&E**

Item	Description	Document
10	Insulator, Spool and Clevis-Type	<a href="#">022439</a>
11	Bolt, Machine, 5/8" x Length (as required)	<a href="#">058778</a>
12	Washer, 2-1/4", Square, 5/8" Bolt Size	
13	Cable, Service Drop, 1/0 or 4/0 (as required)	<a href="#">059626</a>
14	Cable, Aerial, 1/0 or 4/0 (as required)	<a href="#">057876</a>
15	Watt-Hour Meter, Current Transformer, Test Block, Test Switch (see Note 9 on Page 2)	-
16	Preformed Grip, Service Cable	<a href="#">028851</a>
17	Preformed Grip, WP Aluminum	<a href="#">028851</a>
18	Insulator, Suspension, Clevis-Type	<a href="#">057876</a>
19	Dead End, Automatic, Clevis-Type	
20	Eyebolt, 5/8" Diameter x Length (as required)	<a href="#">058778</a>
21	Connector, Fired Wedge (size as required)	<a href="#">066194</a>
22	Cable, 397.5 kcmil WP Aluminum (as required)	<a href="#">059626</a>

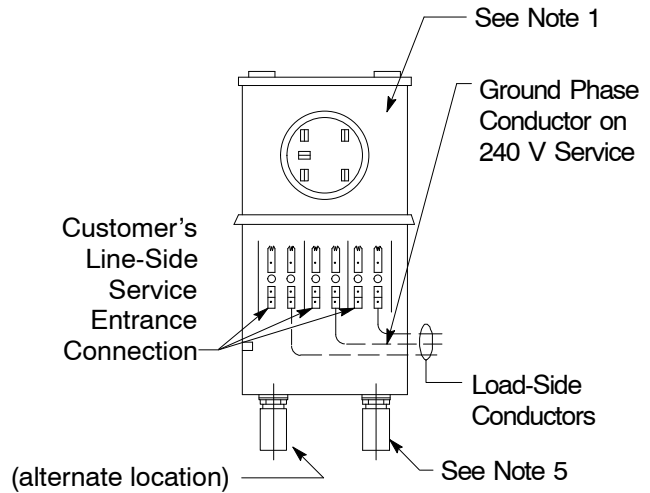
**Safety-Socket Meter Box**

**Notes**

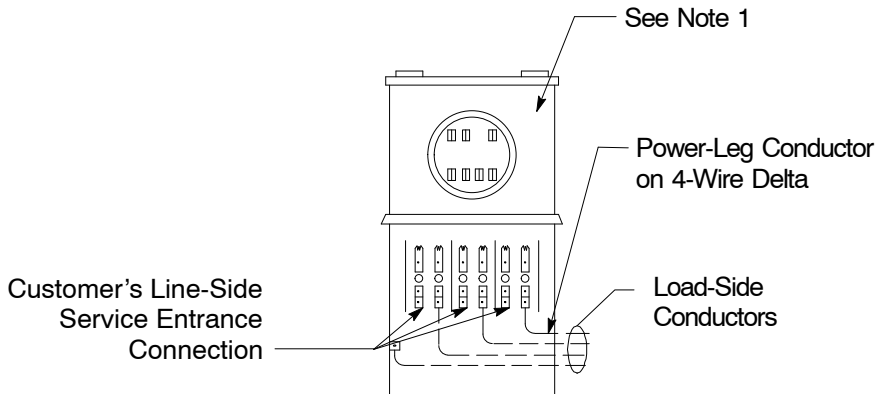
1. Refer to PG&E's [Electric and Gas Service Requirements](#) book for dimension and specification details.
2. Figure 11 is applicable to maximum of 125 hp pump (self-contained).
3. 240 V, three-phase, 3-wire service is available only when PG&E's transformers are of the overhead type The load is limited to three-phase motors (small 240 V, single-phase loads may be permissible in some locations), and in the future, other customers are not likely to be served from the transformer bank.
4. Figure 9 below shows a meter socket with test bypass facilities used for non-residential single-phase service, 120/240 V maximum of 7-1/2 hp. All three-phase services require bypass facilities.
5. Voltage stabilizer, required on 480 V ungrounded services, will be furnished and installed by PG&E. Refer to [Document 052497](#).



**Figure 9**  
120/240-V, Single-Phase, Self-Contained, 4-Jaw  
Based 0-200 Amp Safety-Socket Meter Box  
See Note 4

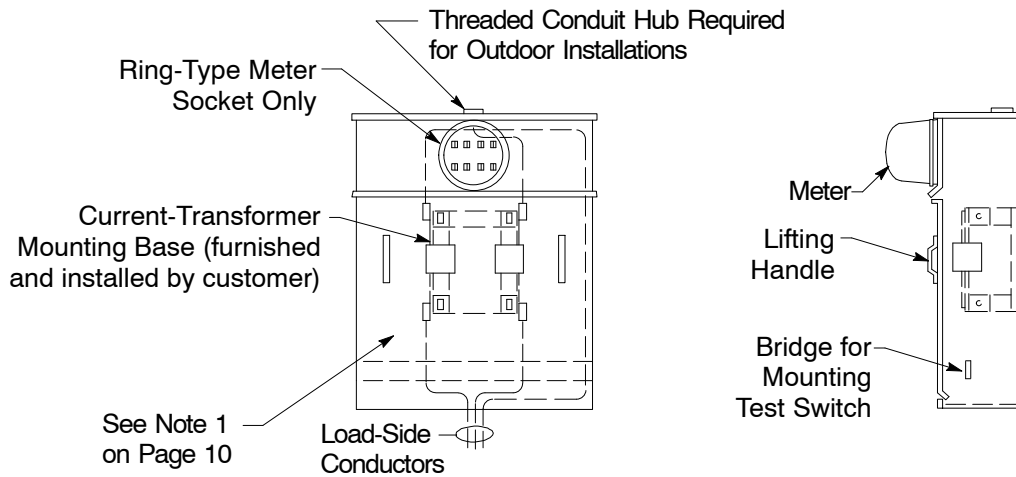


**Figure 10**  
240-V and 480-V, Three-Phase, 3-Wire,  
Self-Contained, 5-Jaw Based 0-200 Amp  
Safety-Socket Meter Box  
See Notes 1 and 3 and Footnote 5 on Page 5



**Figure 11**  
240/120-V, Three-Phase 4-Wire Delta or 480/277-V, Three-Phase, 4-Wire Wye  
Self-Contained 7-Jaw Based 0-200 Amp Safety-Socket Meter Box  
See Note 2

**Safety-Socket Meter Box (continued)**

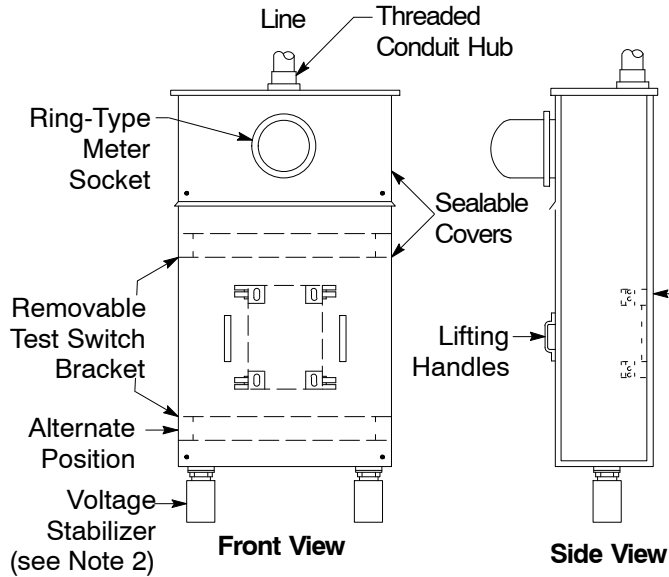


**Figure 12**  
**480 V or 240-V, Three-Phase, 3-Wire Delta**  
**240/120-V, Three-Phase, 4-Wire Delta**  
**or 480/277-V, Three-Phase, 4-Wire Wye, 400-Amp Service Combination Meter, and**  
**Current-Transformer Cabinet (three-phase, 3-wire service equipment is shown)**  
**See Note 3 on Page 10 and Footnote 5 on Page 5**

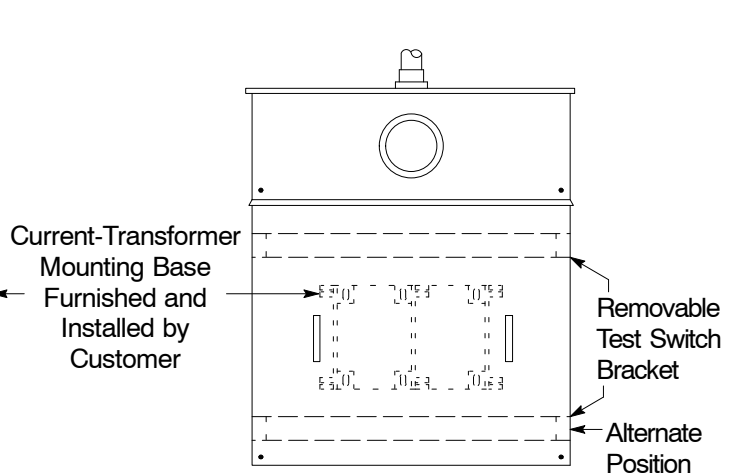
**Metering Equipment**

**Notes**

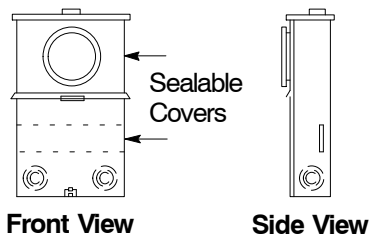
1. Refer to PG&E's [Electric and Gas Service Requirements](#) book for dimension and specification details.
2. Voltage stabilizer, when required, will be furnished and installed by PG&E. Refer to [Document 052497](#).



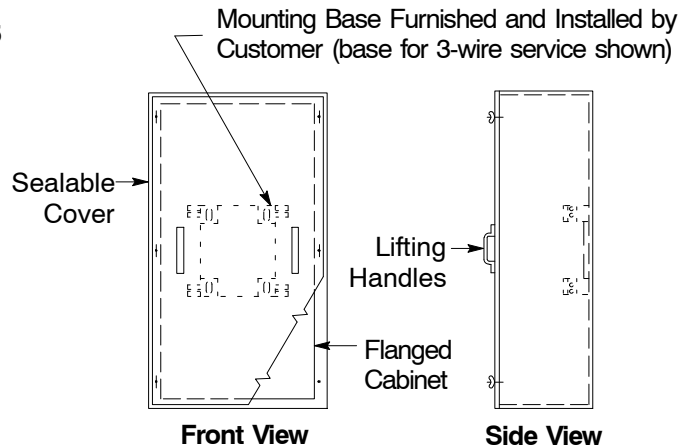
**Figure 13**  
**Combination Meter and Current-Transformer Cabinets**  
**0-400 Amp Rating**  
**For 480 V, 3Ø, 3-Wire**  
**or 240 V, 3Ø, 3-Wire**  
**See Note 3 on Page 10 and Footnote 5 on Page 5**



**Figure 14**  
**Combination Meter and**  
**Current-Transformer Cabinets**  
**0-400 Amp Rating**  
**For 227/480 V, 3Ø, 4-Wire Wye**  
**or 240/120 V, 3Ø, 4-Wire Delta**



**Figure 15**  
**Meter Box for Transformer-Rated Metering**  
**(see Note 1)**



**Figure 16**  
**Current-Transformer Cabinet**  
**0-400 Amp Rating**  
**(see Note 1)**

**Revision Notes**

Revision 09 has the following changes:

1. Updated Note 3 on Page 1, General Information.
2. Revised Table 1 on Page 5.