1906 - 2006

PASADENA Water&Power

CELEBRATING 100 YEARS OF COMMUNITY-OWNED POWER

# ELECTRIC SERVICE REQUIREMENTS

# REGULATION 21

Adopted by Board Resolution 5950 on April 4, 1988.
Revised by Board Resolution 6308 on Feb. 27, 1990.
Revised by Council Resolution 8135 on July 1, 2002.
Revised by Council Resolution 8571 on March 27, 2006

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## I. Mailing List Request

To be placed on a mailing list to receive update sheets of these regulations, fill out the form below and mail to:

Regulation 21 Mailing List
Pasadena Water and Power Department
1055 E. Colorado Blvd., Suite 350
Pasadena, CA 91106-2327

Attn.: Bill Woods

DATE _____

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

## II. TELEPHONE NUMBERS

UTILITY SERVICE PLANNER……..(626) 744-4495

FOR OTHER INQUIRIES:

Electric Rates……(626)744-4451

Conservation of Energy……...(626)744-6970

Emergency Service (24 hour number)……..(626)744-4673

Inquiries Regarding Electric Bill……..(626)744-4403

Inspection by Water and Power of
Underground Conduits and Vaults (24 hour notice)……(626)744-4467

To obtain quadrant of Utility Pole For Pole Risers……..(626)744-4495

Inspection by Electrical Inspector of
Planning & Development Department For All New Wiring…(626)744-4200

Cell Sites……..(626)744-4187

## SCOPE AND PURPOSE

1. The Electric Service Requirements presented herein constitute the Rules, Regulations and Policies of the City of Pasadena Water and Power Department pertaining to electrical service connections. This book is issued for the guidance and assistance of property owners contemplating electrical upgrades to their service, as well as electrical contractors, engineers, architects and manufacturers engaged in the installation and design of electrical service wiring and equipment.

2. The provisions of the Electric Service Requirements are intended to be in accordance with the latest revisions of the following regulations, but are not intended to be a substitute for said regulations:

- General Order 95, Rules for Overhead Electric Line Construction
- General Order 128, Rules for Construction of Underground Electric Supply and Communication Systems
- National Electric Code
- Title 24 of the State of California
- Title 8 of the State of California
- Electric Utility Service Equipment Requirements Committee (EUSERC) drawings and guidelines
- Pasadena Municipal Code Chapter 13.04.125

3. Service installations must meet the minimum requirements of the above regulations. When the requirements of Regulation 21 are more stringent than the above regulations, Regulation 21 will apply.

4. For the purpose of these regulations, the customer or any other person, firm or corporation making a service wiring installation will be considered the electrical contractor. Additionally, the term customer, as used in this Regulation 21, shall also refer to, without limitation, the applicant, developer, property owner, electrical contractor, or any other authorized representative or agent, as the context may require. However, it is the customer who is solely and ultimately responsible for compliance with the regulations herein set forth.

5. Any unusual situations or questions that are not covered in these regulations shall be referred to the Water and Power Department for clarification through a Utility Service Planner, in advance of commencing construction.

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# I. CHARACTER OF SERVICE

## A. SERVICE CONDITIONS

### 1. GENERAL

a. Customer shall contact a Department Utility Service Planner well in advance of all new and remodeled electrical installations involving a change in the service facilities. The character of service available at any particular location shall be obtained from a Department Utility Service Planner.

b. For 200 AMPs of 120/240 and 100 AMPs of 240 or under, the electrical customer shall make an appointment to meet with the Utility Service Planner at the job site to determine the type of service, point of termination and meter location(s). A breakdown of the electrical load, voltage, and size of main service must be furnished at that time.

c. It is the customer's responsibility to maintain the service entrance equipment in a safe and serviceable condition. The Department will maintain the service conductors from the pole or manhole to the customer's point of attachment. However, the customer is responsible for maintaining all underground conduits on the property and trimming any trees on the property, which interfere with overhead service wires.

d. If service has been disconnected due to storm damage, other natural causes, or non-payment of electric bill, the service will not be re-connected if the customer's service entrance equipment appears unsafe or is in violation of applicable electrical codes.

e. Commitments on costs or method of service made by the Department for any service installations must be reviewed by Department if more than 12 months have elapsed between meeting with the Department and start of construction.

f. It is the responsibility of the customer to determine if any new building construction places existing power facilities in conflict with any federal, state or local codes. Any relocation work by the

utility to maintain proper clearances will be at the expense of the customer.

g. All equipment and loads of the customer are subject to the rules, regulations and policies set forth herein. Services and all other related conditions are also subject to the provisions of other rules, regulations and policies. The customer shall be responsible for obtaining the approval of any other authority whose approval is required by law.

h. Any electrical work resulting in unmetered service requires Department authorization prior to the removal of the meter. Such authorization shall be for a period of sixty (60) calendar days. In the event that the unmetered service exceeds sixty (60) calendar days, a forty-eight (48) hour notification will be given and then the service will be disconnected until such time as improvements or repairs are completed and comply with all laws, ordinances, and regulations applicable thereto. For periods longer than sixty (60) days, or in cases where unmetered service is not practical, a temporary meter service shall be used. The customer should contact the Department Utility Service Planner for details.

2. REQUEST FOR SERVICE

a. Prior to the commencement of construction, customer shall submit a request for service. Upon request, the Department Utility Service Planner will provide a list of information to be furnished by the customer. Such a request for service constitutes an application and does not, in itself, require the Department to provide service.

b. The Department shall make the desired service installation within a reasonable period, provided that the customer requesting service has first met the following requirements:

1. All required information for service installation (referenced in Section I.A.2.a) has been provided to the Department. (In addition, where a new meter installation is requested, the appropriate new meter Service Application (provided by Municipal Services upon request) must be completed and provided to Municipal Services).

2. All relevant construction has been completed.

3. All charges to be paid to the Department have been received by the Department.

4. All necessary clearances for premise have been obtained from the building inspector and provided to the appropriate Department division.

c. Where all of the above requirements have been met, service installation, under normal working conditions, shall not exceed 14 business days for electric service not exceeding 200 AMPS, and 21 business days for electric service that requires a transformer vault or enclosure (see IV.A.1).

3. SINGLE-PHASE SERVICE

a. Single-phase service will normally be supplied at 120/240 volts through three wires. Loads shall be reasonably balanced between the two sides of the service with respect to the neutral wire.

b. The Department will serve a single premise up to 200 amperes from the public right-of-way. (See Section IV for services exceeding 200 amperes).

c. Main service switches shall not exceed 600 amperes (400 amperes in certain geographical areas where underground facilities are not available), unless approved by Department. Each main switch must have its own individual service termination enclosure (pull box).

4. THREE-PHASE SERVICE

   a. Three-phase service from the public right-of-way will be supplied at 240 volts through three wires, plus a ground conductor, is limited to 100 amperes.

   b. Three-phase, three-wire 240 volt service above 100 amperes, or three-phase, four-wire service at 120/208Y, 277/480Y or 2400/4160Y will be supplied where the type and size of load and area so warrant, and the customer provides space on the property for Department transformers (see Section IV). Contact Department for maximum service size at these voltages.

   c. The Department will not install three-phase services from the public right-of-way in any residential district. Residential customers with existing three-phase services may not add additional loads to their three-phase service.

The customer shall include single-phase detection and tripping capabilities in their motor protection scheme.

5. PRIMARY SERVICE

   a. The Department will supply service at primary voltages of 2400/4160Y or 17,000.

   b. Customers applying for primary service must have on file with the Department a schedule for maintenance of all high voltage equipment. Said schedule must include the name and phone number of the person in charge of electrical maintenance for the property, the company contracted to perform the periodic maintenance and the frequency that the high voltage circuit breakers and oil filled transformers are checked.

B. <u>LIGHTING LOADS</u>

1. Lighting loads, when provided from the public right-of-way, will be supplied at 120/240 volts.

2. Neon lamps, mercury vapor, gaseous tube, or other type lighting units shall have a power factor of not less than 90 percent.

C. MOTOR LOADS (Connected to services from public right-of-way).

1. Motors exceeding 15 horsepower must be connected to a three-phase service.

2. Motor loads less than 5 horsepower must be connected to a single-phase service. (Three-phase service is not allowed for motor loads of less than 5 horsepower).

3. Motor loads greater than 5 but less than 15 horsepower may be connected to either single-phase or three-phase service.

4. Motors connected to a single-phase service that exceeds 7-1/2 amperes full load current must be connected at 240 volts.

5. Motors connected to a single-phase service must not have a locked rotor current that exceeds 150 amperes. Customers operating motors with excessive locked rotor current that contribute undesirable voltage fluctuations shall be required to furnish and install electrical equipment to correct the voltage problem. Any related work to be performed on the City's electric distribution system for voltage correction shall be at the expense of the customer, as incurred by the Department.

6. Motors connected to a three-phase service shall include single-phasing detection and tripping capabilities in their motor protection scheme.

D. MISCELLANEOUS POWER LOADS

1. The Department may require that equipment such as welders, radio transmitters and x-ray equipment be operated through a separate power meter and service. The normal time interval of 15 minutes used for measuring demand may be shortened for meters serving x-ray or other intermittent loads. Customer shall pay the material cost of any special metering required.

2. Power equipment may be operated on the regular light meter if load characteristics do not cause objectionable voltage fluctuation in any service supplied by the Department.

E. AVAILABLE VOLTAGES

1. The following service voltages are available in Pasadena:

   120/240 single phase three-wire
   120/208 three-wire network
   120/208 three phase four-wire
   *240 three phase four-wire delta (availability is subject to Department's approval)
   **277/480 three phase four-wire
   2400/4160 three phase four-wire
   17,000 three phase three-wire

   *120/208 V exist and shall only be utilized upon Department's approval
   **480 V three-phase three-wire is available upon Department's approval

2. The tolerance of the above voltages will normally be held between the nominal voltages indicated above, and 5 percent below the nominal voltage. However, short-term voltage fluctuations exceeding these levels can occur as the result of normal systems operations. Voltages may occur outside the above-described limits for reasons including, but not limited to the following:

   a. Service interruptions due to circuit switching or weather

   b. Infrequent momentary fluctuations of short duration due to the starting currents of air conditioners and large motors

   c. Conditions beyond the control of the Department, such as fluctuations on the Southern California high voltage transmission grid

## II. OVERHEAD SERVICE CONNECTIONS

A. OVERHEAD SERVICE

1. Overhead service will not be supplied to any building or premise located in an underground utility district.

2. In any area of the City where both aerial and fully developed underground facilities are maintained, any new customer, or any existing customer making a change to his electric service shall be required to connect to the City's underground system unless the General Manager of the Department determines that both of the following conditions exist:

    a. that major overhead system components must remain on the customer's property were an underground service connection to be required (for example, a pole with a transformer); and

    b. that the overhead system has adequate existing capacity to accept the increase in load.

3. If the General Manager determines that both of the above conditions exist, the customer may continue to take electric service on the overhead system, provided that the customer signs a written acknowledgment and agreement. Said agreement must stipulate that, at such time as the existing overhead system must be upgraded, the customer shall convert to service from the underground system within sixty (60) days notice to do so by the Department and pay the Department whatever conversion cost is authorized by these Regulations. The exemption from mandatory connection to the City's underground system provided by this Paragraph shall apply only to the customer who requests and receives such exemption and shall not benefit successors in interest to the customer's property.

4. New service locations and upgrades shall be obtained by contacting the Department's Utility Service Planner before any work is started. Any change in service location also requires prior approval of the Department.

B. SERVICE DROPS

1. The Department will furnish and install a single span of service drop wires from a pole to an approved permanent support on the customer's premises.

2. This support shall be of a type and so located that the wires may be installed in compliance with all applicable laws including General Order 95 of the California Public Utilities Commission rules regarding clearances.

3. Number Permitted – Department will not install more than one service drop for the same voltage and phase classification for any one building or group of buildings on a single premise. Separate services will be installed only where required by law or for the operating convenience of the Department.

4. Maximum Length – The maximum length of a span of drop wires shall not exceed 100 feet (75 feet for temporary construction power posts) except as permitted by the Department.

5. Termination – Customer shall provide a suitable anchorage adjacent to the service head that will permit installation of the service drops in accordance with General order 95 or Title 24 of the State Building Code.

C. SERVICE HEAD LOCATION

1. Service heads shall be located on exteriors of structures so that only one point of attachment is required for the service drop.

2. Service heads for single-phase and three- phase should be located as close together as practicable.

3. All service heads shall be located at the closest and most practical point to the utility pole from which service is to be supplied.

4. The service head shall be located a minimum of 12 inches higher than the service drop anchorage. Service entrance conductors shall not be less than 10 feet nor more than 30 feet above exterior building grade.

5. Service heads shall not be located on any walls or building members, which face and are less than 2 feet from a common property line.

6. A radial distance of not less than 3 feet shall be maintained from the service head, service entrance conductors and service drops to any open load conductors or yard wiring. Conduit from the service head to the meter panel must be located on exterior of building.

D. POSTS AND ATTACHMENTS ON BUILDINGS OR STRUCTURES

1. Standard service attachment brackets will be supplied by the Department and installed by the customer.

2. Where a structure is necessary to maintain the required service drop clearances it shall be installed and properly maintained at the expense of the customer.

3. Service entrance conduit ("Periscope").

   a. The periscope conduit between the service section and the service head shall be one continuous conduit with no couplings (unistrut required), unless approved by the Department. The last 10' must be one continuous G.I.P. conduit.

   b. Minimum periscope size shall be 1-1/2 inches in diameter for periscopes where the service conductor attachment is less than 40 inches above.the roof flashing or last support. Larger distances require larger conduits in accordance with drawing 8-L-1360. (See Department Utility Service Planner for drawing 8-L-1360).

   c. Periscope material must be rigid steel conduit (G.S.C. or G.I.P.) and may not be intermediate conduit.

E. CLEARANCES ON NEW BUILDING CONSTRUCTION

1. Swimming Pools – Electric service terminations on new building construction shall be located so the service drop will not pass over any swimming pool or less than 18 feet radially from the water's edge. Customers subsequently installing swimming pools may have to relocate service termination in order to comply with these regulations. Pools may not be installed under a utility pole line or within 5 feet measured horizontally from the closest conductors on a pole line.

2. No walls or fences of any type shall be erected within a three (3) foot radius of any power utility pole without the express written permission of the Department.

3. No building or other structure shall be erected within five (5) feet from the face of the pole and eight (8) feet of any low voltage overhead conductors, or within twelve (12) feet of any high voltage overhead conductors.

## III. UNDERGROUND SERVICE CONNECTIONS

A. UNDERGROUND SERVICE

1. Prior to any work being started, customer shall obtain the approval of the Department by contacting the Department's Utility Service Planner (see Telephone Number sheet). In addition, any change in service shall also require the prior approval of the Department.

2. Separate service conduits will be required for single-phase and three-phase services.

3. Department will not install more than one service for the same voltage and phase classification for any one building or group of buildings on a single premises except where required by law or for the operating convenience of the Department.

B. CONDUIT INSTALLATION – PUBLIC RIGHT-OF-WAY

1. In an existing underground area, the Department will install a service conduit from the Department's system to a point at the nearest property line under either of the following conditions:

    a. No service conduit to the property presently exists.

    b. The existing conduit to the property is undersized or unusable.

C. CONDUIT INSTALLATIONS FROM UNDERGROUND SYSTEMS

1. Customers shall furnish and install, at their expense, all conduits from a point at the nearest property line, designated by the Department, to the service terminating pull box. In addition, customers, at their expense, are required to extend the conduit from the property line to the customer service panel, and may be required to furnish and install additional conduit for future fiber optic connections.

2. Conduit size

    a. Conduits for single-family and multi-family residential service shall be 3 inch for services not to exceed 200 AMPS.

b. Conduits for commercial service shall be 4 or 5 inch, and must be concrete encased.

3. Conduit installed underground on private or public property shall be PVC schedule 40 and concrete encased. Exposed conduits, including sweeps, shall be PVC schedule 80.

4. Encasement of a conduit in a 3 inch concrete envelope is required in all instances, except for single-family and multi-family residential installations of 0 – 200 AMPS on private property and for special installations where rigid steel conduit has been approved. Concrete shall be 3-1/2 sack mix and shall be secured with spacers to insure conduits will not float and will maintain 1-1/2 inch spacing between conduits while concrete is poured. Where a primary conduit passes under or through a building, concrete encasement shall require the use of red dye.

5. Concrete encasement of conduits on private property for single-family residential service is not required, except for those areas where the conduit passes under or through a building foundation where encasement is required for at least a three-foot distance on either side of the foundation.

6. Conduit bends (sweeps) – For conduit not exceeding 4 inches in diameter, the minimum radius of any bend shall be 3 feet. For conduits of a diameter of 5 inches or greater, the minimum radius shall be 4 feet. There shall not be more than the equivalent of two 90-degree bends in any one run of service conduit. The Department will require the installation of splicing boxes in any run where the number of bends would otherwise exceed two.

7. Isolated sections of steel conduit installed in a non-metallic conduit run are not permitted, except at pole riser terminations and areas where conditions prohibit the use of non-metallic conduit. Ground rods are required at each end of a metallic conduit run.

8. Depth of Conduit – On private property, all primary and secondary conduits must have a minimum cover of 36 inches to top of conduit under permanent finished grade, regardless of voltage. In the public right-of-way, regardless of voltage, a minimum cover of 42 inches under gutter flow line, street or sidewalk is required. There must be no abrupt changes in grade (see above rule 6 regarding conduit bends).

9. Conduit adapters to connect 4 inch conduits to the Department's 3-1/2 inch square vitrified tile service laterals will be furnished by the Department. Contact a Utility Service Planner. (See telephone numbers in front of book)

9. Maximum Run of Conduit – Department shall determine maximum allowable length of service conduit on private property that does not require an intermediate splicing box (nominally 200 feet).

10. Pull line in conduit – Each conduit must be provided with a non-spliced pull line of 3/16 inch polyethylene or equivalent in all conduit runs where the customer has access to both ends.

11. Easements – Where conduits pass through property other than the premises to be served, the customer shall obtain, at no cost to the Department, an easement from the owner of such property. The Department may also require that the customer furnish an easement for the conduits and appurtenances on the service premise. Conduits installed in easements must be concrete encased.

12. An inspection by Water and Power shall be required on private property before backfilling of any excavation, or encasing of any conduits. (See Telephone Numbers in front of book).

D. <u>UNDERGROUND SERVICE FROM OVERHEAD POLE LINE</u>

1. Rear Property

   a. Customer shall furnish and install all conduits from the Department's service pole to the customer's terminating facilities.

      i. The conduit sweep at the base of the pole must be PVC schedule 80 and must be stubbed up eight (8) inches from the pole. Rigid zinc coated steel conduit with an associated ground rod may be substituted where approved in advance by the Department.
      ii. Customer shall not install any underground conduit until the Department has designated the proper quadrant on the pole in which the conduit is to rise.

2. Public Right-Of-Way

a. The Department will install all conduits to the nearest property line. The cost of labor and materials will be charged to the customer, as incurred by the Department.

E. TERMINATING PULL SECTIONS AT SERVICE ENTRANCE EQUIPMENT

1. Location and access

a. All terminating pull boxes shall be readily and permanently accessible to the Department's employees for installation and maintenance of service conductors. Access must be through walking space acceptable to the Department, at least 7 feet high and 3 feet wide.

b. Residential service terminating pull boxes, meter sections, and main disconnect shall be located outside the building at a point designated by the Department.

c. Minimum clear unobstructed working space directly in front of any terminating pull box shall be 3 feet wide, 3 feet deep and 7 feet high as measured from the level standing surface.

d. Bottoms of terminating pull boxes shall be not less than 6 inches or more than 5 feet above standing surface, and shall not extend over any driveway, walk or public way.

e. Terminating pull boxes in an exposed location shall be weatherproof.

f. When the service conduit enters the end of terminating pull box, the opposite end shall not be less than 2 feet from an adjacent wall, ceiling or other obstruction. An obstruction is any projection that extends more than the depth of the box, extending from the surface on which the box is mounted.

g. Service entrance conductors shall not pass through or under a building, unless in a conduit encased with 3 inches of concrete.

h. When the customer desires to lock the access to the service entrance equipment, the customer must provide dual lock capability that can accept a City padlock with 5/16" hasp.

2. Terminating Pull Boxes

    a. All terminating pull boxes shall be sized per EUSERC drawing 343, have landing lugs per EUSERC drawing 347, and sealable covers. (See Department Utility Service Planner for EUSERC drawing 343).

    b. Service conduits shall normally enter a terminating pull box from the bottom. The Department may require larger pull boxes in installations where conduits enter from the back or side.

    c. Each terminating pull box shall service only one main switch/meter-group combination. Where multiple meters are grouped at a single location, only one service wiring raceway or bus shall leave the terminating pull section.

    d. Where more than one terminating pull section or group of meters is installed on a premise, each pull box or service raceway shall be permanently identified to indicate the portion of the premises or building being served.

    e. If, subsequent to initial installation, additional metering equipment becomes necessary, consult Department for requirements.

    f. The main service disconnect switch(s) must be located immediately adjacent to the meter(s), and may not be separated by any walls or other partitions.

3. Underground Service Pedestals

    a. Underground Service Pedestals may be used only when approved by the Department for a specific location.

    b. The approximate size of pedestals shall be 12 inches by 14 inches by 48 inches in height. Mobile home type pedestals will not be acceptable.

    c. The base must be mounted on a concrete slab.

    d. At least 3 feet of clearance must be maintained on all sides of pedestal.

e. When being served by a power pole, eight (8) feet of clearance must be maintained from the face of the pole.

## IV. TRANSFORMER ENCLOSURES/VAULTS ON PRIVATE PROPERTY

### A. GENERAL

1. Installation of a vault/enclosure shall be required, at the vault owner's expense, for any single-phase service that exceeds 200 amperes or any three-phase service that exceeds 100 amperes.

2. The design and installation must conform to all state and federal codes and regulations.

3. The Department must have unobstructed ingress and egress to conduct inspections of the vault/enclosure or maintenance on the electrical equipment located in the vault/enclosure[1]. No structures or other obstructions are to be placed on, over or in front of any transformer vaults or enclosures.

    a. Shrubs, trees, or other plantings, encroaching on vaults/enclosures, are subject to trimming, at the customer's expense, in order to permit ready access.

    b. Maintenance and repair of the vault/enclosure remains the sole responsibility of the vault owner. The vault owner shall make the vault freely accessible to department employees or contractors, and properly maintain the vault/enclosure at all times, so that the Department's staff may operate safely and electrical equipment will function efficiently. Appropriate signs shall be on display to warn the public of the high voltage equipment that is located in the vault/enclosure. The exterior of the vault/enclosure shall always be maintained in a condition that will not cause any safety hazard to the public. Upon notification by the Department that a vault/enclosure is deemed unsafe, the vault owner shall take appropriate action within 10 business days. If, after the 10 days have passed, the vault owner has not taken appropriate action to remedy the issue, the Department shall do the necessary work to bring the vault/enclosure to a safe standard. The vault owner shall be responsible to pay all expenses for such work, as incurred by the Department[2].

[1] Pasadena Municipal Code Chapter 13.04.125
[2] Pasadena Municipal Code Chapter 13.04.125

4. Vault designs that are not installed within one year of Department approval must be reviewed by the Department prior to construction in order to verify that service requirements have not changed.

5. The vault owner will be responsible for the installation and maintenance of the vault/enclosure, high and low voltage conduits and venting ducts on private property.

6. The vault owner will be responsible for the initial installation of the vault blower/fan, in accordance with Department standards. The Department, at no cost to the vault owner, will do subsequent maintenance or replacement of ventilating equipment in the vault.

7. The Department will, at the expense of the vault owner, furnish and install all cables and equipment in the vault, except ventilating fan or blower (as shown in 6). The Department, at no cost to the customer, will do subsequent maintenance or replacement of all transformers, cables and equipment in the vault, including ventilating fan or blower.

8. Services of 1200 amperes or greater shall be bus terminated with a standard bus head in accordance with EUSERC drawing 349, unless otherwise approved. (See Department Utility Service Planner for EUSERC drawing 349).

9. No foreign pipes may pass through any vault or enclosure.

10. Any high voltage conduits between the Department's manhole and the customer's transformer vault, which pass through a building, must be encased in a 3-inch envelope of red concrete, and must have permanent signs attached indicating "High Voltage."

## V. METER INSTALLATIONS AND METERING EQUIPMENT

### A. GENERAL

1. Meter installations shall comply with the Department's rules and requirements (Regulation 21 and EUSERC), and with the rules and regulations of other inspection authorities having jurisdiction (State regulations and NEC).

2. The Department shall determine the location and method of installation of all metering equipment

3. The customer, at its expense, shall provide automatic meter reading (AMR) capacity whenever there is new construction, service upgrades, or major modifications of service requiring a new meter panel in order to allow the Department to remotely read a customer's meter. For purposes of these requirements, and in order to stay current with available technologies, any reference herein to AMR meter connections shall include, but not be limited to, telephone line connections. Customers should contact a Department Utility Service Planner in advance of construction to determine which AMR meter connection method is required.

4. Following the installation of the AMR meter, should the customer choose to contract with an energy service provider (ESP), other than the Department, the customer will be charged the published Direct Access Fee.

5. All materials, wiring methods and workmanship shall receive the approval of the Building Electrical Inspector and the Electrical Test Division before the Department will energize or install metering equipment.

6. Whenever any electrical wiring is installed, new metering equipment complying with these service requirements shall be used, except when in the opinion of the Department, the existing metering equipment is satisfactory and adequate to measure all power/energy to be supplied.

7. For each meter, the customer shall furnish and install a switch or other approved disconnecting means capable of being individually sealed in the open position. This disconnecting means shall be on the load side of the meter and shall control all the energy registered by that meter. For

commercial installations, the disconnecting means shall be capable of accepting a Department padlock with a 5/16 inch hasp.

8. All new or existing apartment houses with security entrances and meter rooms will be required to install a Department approved lock box at the front entrance of the building. All new commercial accounts with meter rooms will be required to install a Department approved lock box next to the meter room.

9. For the purpose of these requirements, an installation shall be considered a commercial installation whenever a meter registers the current supplied to any occupancy and where the Basic Electrical Regulations of the California Administrative Code (Title 8) apply.

10. For single-phase service, the maximum allowable ampere rating of a main service switch or circuit breaker for each service is 600 amperes. Where the load requires greater capacity, two or three services with "totalized metering" may be required. In certain areas of the City where underground facilities are not available, single-phase services may be limited to 400 amperes.

11. Three-phase temporary installations will require a kWh meter and test switch only.

12. Provisions for "future metering" positions on switchboards must be fully installed, including test facilities (if required), line side wiring, and meter sockets.

B. <u>METER TYPE</u>

1. All meters shall be "S" (socket) base type.

2. An AMR electric meter junction box shall be provided within 3 feet of the customer electric meter. This junction box shall be waterproof if in an external location, and contain either a standard RJ 11 connection or, where AMR capacity is provided via telephone, a standard telephone termination strip. This box shall have provisions for accepting an external connection in the future without degrading its waterproof specifications, and be able to be secured to prevent tampering.
3. As an alternative to the above, an AMR junction box connection can be provided within the meter panel as long as it does not interfere, obstruct, or impair clearances or the functionality of the panel. This internal

junction box must not conflict with any code regulations. Future AMR connections from the electric meter to the AMR junction box shall be made by the Department within the meter panel.

C. METER HEIGHT

1. Switchboards should be constructed so that the maximum height to the center line of any meter socket shall not be more than 72 inches (6 feet) above the bottom of the switchboard. Switchboards may be placed on a concrete slab of 3 inches maximum height. Total height from the level standing surface in front of the switchboard to the center line of the meter shall therefore not exceed 75 inches.

2. Other than switchboards – The center line of any meter socket shall not be more than 75 inches (6 feet 3 inches) above the level standing surface.

3. The minimum height to the centerline of all meters shall be not less than 48 inches above the standing surface when installed outdoors. If enclosed in a cabinet or installed indoors in a meter room, the minimum height may be reduced to 36 inches.

D. METER LOCATIONS

1. Sites where there are multiple meter locations grouped together, shall have a single AMR junction box mounted within three feet of the meter switchboard and have the capacity to contain connections for all the respective meters. This junction box shall be waterproof if in an external location and, where AMR capacity is provided via telephone, contain a standard telephone termination strip. This box shall have provisions for accepting external connections in the future without degrading its waterproof specifications, and be able to be secured to prevent tampering.

2. As an alternative, an AMR junction box connection can be provided within the meter panel as long as it does not interfere, obstruct, or impair clearances or the functionality of the panel. This internal junction box must not conflict with any code regulations. The Department shall make future AMR connections from the electric meter to the AMR junction box within the meter panel.

3. Where AMR capacity is provided via telephone, the telephone line provided to the AMR meter junction shall be connected in parallel to any active telephone line of the respective electric meter's bill paying customer.

4. Residences – Meter sockets shall be located on (or in) external walls so that meters will be accessible for reading or testing without entering the building. Future building modifications or changes shall not make meters inaccessible from the same property.

5. Commercial/industrial – Customers must consult Department for approved locations.

E. PROHIBITED METER LOCATIONS

1. No meter socket or service equipment shall be installed in any locations not readily accessible from the same property during normal business hours. If the meters are to be located in a separately locked utility room, the Department must be supplied a key to that room.

2. No meter socket or service equipment shall be located:

   a. In any place where moisture, fumes or dust are present.

   b. In any elevator shaft or hatchway.

   c. In any room containing elevator equipment.

   d. In any substation or transformers vault, unless such meter is in an enclosure, which is effectively screened from the high voltage compartment and contains no bare or exposed energized parts.

   e. Behind a switchboard having bare and exposed live energized parts, unless such meter is located at least 5 feet from such parts and is effectively screened.

   f. In any projection room.

   g. In any location that is hazardous, as determined by the Department or the inspection authorities.

   h. In any attic or place not readily accessible.

i. In any enclosed show window or one having a bulkhead or raised platform.

j. In any restroom, bathroom, laundry room or shower rooms.

k. Directly over any stove or plumbing fixtures.

l. Directly over any stairway, ramps or steps.

m. On any balcony or mezzanine floor unless the balcony or mezzanine floor has clear stairways of normal tread and rise.

n. On any surface subject to excessive vibration as determined by the Department.

o. On or recessed in the exterior of any wall or structure located so that less than 3 feet clearance is provided in front of all metering equipment and its enclosing cabinets from property lines, public thoroughfares, alleys, driveways and walks.

p. In an unlighted enclosed area.

q. In any commercial occupancy which the meter does not serve.

r. In any carport.

s. In any patio area that could later be enclosed, thus preventing accessibility to meter and weatherhead.

t. Within 2 feet of any gas meter.

F.

METER SOCKETS

1. General Requirements:

    a. All meter sockets shall be furnished, installed and wired by the customer in a true vertical position. Sockets mounted in walls exposed to the weather shall be designed for waterproof mounting and shall be installed in a manner that will prevent water from entering the walls of the building.

    b. Sockets shall not be flush mounted, but shall be semi-flush or surface mounted with not more than two sockets mounted on any one cover plate.

    c. New meter installations with more than two meter sockets must be installed in a factory-assembled unit and wired with factory color-coded conductors at socket terminals and at switch or circuit breaker.

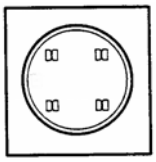
    d. Sockets on multiple meter installations must be removable without interrupting main bus continuity.

    e. Test switches for transformer metering will be furnished and installed by the Department when required.

2. Meter Socket Clip Requirements:

    a. The chart on the following page provides the Department meter socket clip requirements:

| Type of Service | Number of Wire | Maximum Allowable AMPS | Number of Socket Clips | |
|---|---|---|---|---|
| | | | Self Contained Sockets | Transformer-Rated Sockets |
| 1-Phase | | | | |
| *120 volt | 2 | 50 | 4 | N/A |
| 120/240 volts | 3 | 100 | 4 | 6 |
| 120/240 volts HD | 3 | 200 | 4 | |
| | | | | |
| Network | | | | |
| 120/208 volts | 3 | 200 | 5 | N/A |
| | | | | |
| 3-Phase | | | | |
| 240 volts | 3 | 100 | 7 | 8 |
| 240 volts HD | 3 | 200 | 7 | |
| 120/208 volts Wye | 4 | 200 | 7 | 13 |
| 480 volts Delta | 3 | 200 | 5 | 8 |
| 277/480 volts Wye | 4 | 200 | 7 | 13 |
| 2400 volts Delta | 3 | | N/A | 8 |
| 2400/4160 volts Wye | 4 | | N/A | 13 |
| 17000 volts Wye | 3 | | N/A | 8 |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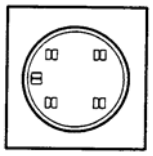
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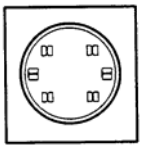
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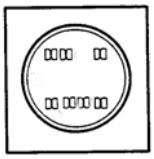
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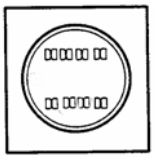
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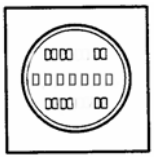
13 clip

b. No sockets shall be equipped with circuit-closing devices or bypasses.

* Not available for new service requests.

3. Meter Socket Installations

   a. Customer shall connect conductors to binding posts in the socket for self-contained meters.

   b. For residential self-contained single-phase meter installations, any approved meter socket not exceeding No. 1 AWG wire may be used. Heavy duty approved meter sockets shall be used where wire size exceeds No. 1 AWG, but is not larger than 3/0 AWG; the meter switch rating is not over 200 amperes; service conduit is not greater than 3 inches.

   c. All residential underground combination pull boxes and meter terminating enclosures, when installed semi-flush in any portion of the building, shall be capable of accommodating heavy duty sockets.

   d. For all commercial self-contained meter installations, a safety socket box shall be used. Heavy duty approved safety socket boxes (EUSERC drawing 305) shall be used when wire size exceeds No. 1 AWG, but is not larger than 250 kcmil and the meter switch rating is not over 200 amperes.

4. Exceptions:

   a. Safety socket boxes are not required for house light service in multiple-family residential occupancies provided meter switches do not exceed 200 amperes, and each individual occupancy is separately metered. This includes miscellaneous service for laundry rooms, garages, halls, exits, and similar non-commercial uses on the premises.

   b. When service is supplied to a signboard, for lighting only, or parking lot lighting, and the meter switch does not exceed 100 amperes, it may be installed as required for a separately metered single occupancy residential installation. Consult the Department when signboards have motor-driven equipment.

G.

MULTIPLE SERVICE METERING – "TOTALIZING METERS"

1. When one meter registers the kilowatt hours of more than one service, a separate instrument transformer compartment will be required for each service. A separate service wiring raceway shall be brought to an approved location for each service. Services to be totalized on one meter shall be of equal size with load balanced within 20 percent. Service sections shall be in the same room connected by a 1-1/2 inch rigid metal conduit, not to exceed 15 feet.

## VI. METERING INSTALLATIONS 0 – 600 VOLTS (OTHER THAN SWITCHBOARDS)

A. GENERAL

1. A meter installation other than a switchboard (often referred to as an EXO installation) is any assembled service wiring installation, which does not employ a manufactured switchboard.

2. Service Wiring Raceway Defined:

   a. Overhead – Service wiring enclosure from the service head to the meter socket.

   b. Underground – Where a terminating pull box is used on an underground service, the wiring raceway from such box to the meter socket is the service wiring raceway. Where a combination terminating pull box is used for an underground residential service, the wiring enclosure from such a box to the meter switch or breaker is the service wiring raceway.

   c. All openings in service wiring raceways shall be sealable and accessible to the Department.

   d. Any service entrance equipment that is contained in a locked cabinet or other enclosure must be provided with a means of accepting a Department padlock with 5/16 inch hasp. This padlock is in addition to any lock provided for the customer and/or tenants so that either lock will allow access to the equipment.

B. METER SPACE

1. Recessed Enclosed Meters:

   a. The total inside dimensions for all recessed enclosed meters, with the exception of four-wire wye meters, shall be a minimum of 9 inches and a maximum of 11 inches from the face of the socket to the door or face of the enclosure. Four-wire wye meters shall have a minimum dimension of 13 inches from the face of the socket to the door or face of the enclosure.
   b. All safety socket boxes shall have a minimum clearance of 1 inch on the sides of the box and 3 inches below and above the box. All

clearances must be measured from horizontal or vertical plane extending from the front opening to the back of the recess. If a door is to be installed enclosing the recess, the total depth of recess shall be the depth of the box and socket ring plus 9 inches.

c. If the enclosure is to be covered, it shall be with a side hinged door. Contact the Department if sliding doors are desired. The cover shall not be fastened shut with nails or screws.

2. Working Space in Front of Meter

a. A clear, unobstructed working space shall be maintained in front of the meter for a minimum distance of 3 feet wide, 3 feet deep and 7 feet high measured vertically from the standing surface in front of the meter face. The standing surface must be level, or if outdoors, must gently slope away from the electrical equipment to promote proper drainage.

b. The working space must be entirely on the property where the service is located.

C. MULTIPLE METER INSTALLATIONS

1. The Department shall require manufacturer drawings for all multiple residential and small commercial or industrial metering equipment prior to installation for approval. (See Section VII. A. 4, a, b, c, d, e.)

2. Where multiple meters are installed, their vertical center shall be a minimum of 8-1/2 inches apart; their horizontal center shall be a minimum of 7-1/2 inches apart for single-phase meters. Safety socket boxes shall have a minimum space of ½ inch between boxes, horizontal and vertical. All meters must be installed to comply with EUSERC drawings 353, 352, and Pasadena drawing 8-L-1362.

3. Sealable pull boxes and gutters shall be used for all multiple meter installations.

4. When more than one meter is to be installed, the customer must provide placards at each meter, sub main and unit entrance, indicating the address or unit number served by that meter.

## VII. SWITCHBOARD METER INSTALLATION – 0 – 600 VOLTS

A. GENERAL

1. The requirements of this Section are in addition to those described in Section VI above.

2. Customer will be required to consult the Department regarding all switchboard installations of meter and accessory equipment. The Department shall be contacted for any metering changes on existing switchboards.

3. Switchboards with instrument transformer compartments are required for all installations rated over 200 amperes.

4. Prior to fabrication of any transformer rated switchboard, the customer shall submit at least three copies of a drawing of the service switchgear to the Department for approval. The drawing must include the following:

    a. Job name and address, contractor's name, telephone number and address, manufacturer's name, telephone number and address

    b. Voltage, current, and short circuit withstand rating

    c. Bill of Materials, including number of poles and current rating of components

    d. Front view of switchboard, including dimensions and location of all components listed on Bill of Materials

    e. Statement that construction and labeling is in accordance with Underwriters Laboratories and other EUSERC and Pasadena requirements

5. Switchboards must meet the current EUSERC requirements that are accepted by the City of Pasadena in addition to any requirements of this Section

    a. A service section is a section of the switchboard for the meter service switch or breaker, the instrument transformer compartment, a panel for meter and test switch, and for the entrance of the service conductors.

b. For underground services, a separate terminating and pulling section (EUSERC drawing 345) will be required except where a separate pull box is installed. The opening shall have a rolled edge with an inside radius of not less than ½ inch.

c. Indoor or rain-tight service sections with enclosed meter panels shall comply with the detailed requirements of applicable EUSERC drawings.

6. Where any underground pull sections or switchboard service sections have parts that can be removed that will give access to the service conductors before they leave the instrument transformer compartment, such removable parts shall be made sealable.

7. Raceways used for meter secondary wiring shall be sealable.

8. All switchboards shall be bussed.

B. METER TYPE AND HEIGHT

1. All switchboard meters shall be "S" (socket) base type.

2. The center line of the meter socket shall not be more than 72-1/2 inches, or less than 52-1/2 inches for watt-hour / RKVAH meters.

C. METERS – SELF CONTAINED

1. Self-contained meters on switchboards shall have a sealable removable panel exposing safety test blocks.

2. Maximum meter service switch or breaker rating shall not be greater than 320 amperes and service conductors not greater than 250 kcmil.

3. When more than one meter is to be installed, permanent markings must be provided by the customer at each meter, sub main, and unit entrance, indicating the address or apartment number serviced by that meter.

4. All residential service 320 class, 400 AMP combination meter assembly panels require a 400 AMP disconnect and are subject to final inspection by the Department. The customer must receive Department approval prior to any installation.

H. METERS – WITH INSTRUMENT TRANSFORMERS

1. Meter panels shall be drilled, tapped and slotted (EUSERC drawing 333) for the required number of meters and secondary test switches which the Department will furnish and install.

2. On all bussed instrument transformer compartment service sections, meters, instrument transformers and test switches will be furnished and installed by the Department.

3. Conductors shall not be rerouted through the instrument transformer compartment.

4. Each instrument transformer compartment shall be bussed with rectangular bus bar regardless of main service switch ampere rating.

5. All three-phase switchboards rated 400 amperes or more shall also have a RKVAH (reactive) meter.

6. Although not recommended by the Department, a fire alarm circuit may be connected ahead of the main switch and below the instrument transformer compartment.

## VIII. SWITCHBOARD METER INSTALLATIONS – 4160 VOLTS AND HIGHER

A. GENERAL

1. Each switchboard for service of 4160 volts or higher will be considered as being specially engineered. The customer shall submit at least 3 copies of a drawing of the service entrance, main breaker, meter section and a plot plan of the proposed switchboard to the Department for approval prior to fabrication.

2. Isolating disconnect switches shall precede the metering transformers and test section, except that lockable, draw out switchgear or air load break fused disconnects may be used in lieu of the isolating disconnect switches.

3. Instrument transformers and test section shall be similar to EUSERC drawing 403 for three-phase four-wire, or EUSERC drawing 402.

4. Direction of feed through the test section may be as shown in EUSERC drawing 402 or 403.

# IX. TEMPORARY CONSTRUCTION POWER

## A. GENERAL

1. Temporary construction power shall not serve a permanent installation, except for construction and testing purposes.

2. Temporary power conduits must be inspected by the Department prior to any backfilling.

3. The maximum length of span of overhead service drop wires shall not exceed 75 feet, except as permitted by the Department.

4. Customers may not use step-up or boost transformers without prior approval of the Department.

5. Unless special arrangements are made with the Department at time of application for service, temporary construction power installations may not exceed one year in duration and may be removed by the Department at the expiration of one year of service.

6. The Department will not energize any panel, nor set any meters in any meter group until the customer has removed all construction power backfeeds.

7. The customer shall pay the full cost of installation and removal of temporary service connections and related equipment as incurred by the Department. Prior to connecting any temporary service, the Department will require a deposit for the estimated full cost of all labor and unsalvageable materials, subject to billing or refund, to be used by the Department.

## X. COSTS TO CUSTOMERS FOR DEPARTMENT SUPPLIED EQUIPMENT

A. OVERHEAD SERVICE DROPS

1. For permanent service, the Department will furnish and install the service conductors between the utility pole and the customer's service entrance conductors at the weatherhead. For overhead services spanning less than 100 feet, there will be a flat charge in accordance with the Department's current fee schedule. If a mid-span or additional utility pole is required, additional fees shall be required.

2. If necessary, the Department will supply a terminating service bracket for installation by the customer.

B. UNDERGROUND SERVICE CONNECTIONS

1. The Department will install any necessary conduits in the street between the Department's manhole and the nearest property line.

2. If service conduit terminates at a utility pole, the Department will install the necessary conduits on the pole.

3. The Department will furnish and install the service conductors in the customer's supplied conduit between the Department's system and the customer's terminating pull box.

4. For single family residences, the customer shall pay fees associated with the costs for labor and material listed in 1), 2) and 3) above, as incurred by the Department in providing services, subject to billing or refund.

C. SERVICE CONNECTIONS FROM A TRANSFORMER VAULT OR ENCLOSURE ON CUSTOMER'S PROPERTY (conduits and vault/enclosure furnished and installed by customer).

1. The Department will furnish and install all transformers and associated protective equipment.

2. The Department will install any necessary conduits in the street between the Department's manhole and the nearest property line.

3. For services terminating at a utility pole, the Department will install the necessary conduits on the pole.

4. The Department will furnish and install all high voltage cable between the Department's street vault and the customer's vault, all high voltage connectors and supporting vault materials, and all low voltage cable between the customer's vault and the service entrance equipment.

5. The customer shall be responsible for labor and material cost of all the items described in 1, 2, 3, and 4 above, as incurred by the Department in providing services, subject to billing or refund.

    a. The above construction charges for electric service must be paid prior to work being done by the Department. For new customers, the City will also require a utility bill payment guarantee prior to the service being energized.

    b. All charges are adjusted periodically to reflect current labor and material costs. The costs are based on size of vault; size and length of conduits installed in the public right-of-way, along with size, number and length of high and low voltage cables.

D. <u>DEPARTMENT FACILITIES INTERFERING WITH NEW CONSTURCTION</u>

1. The cost of moving, removing or relocating the Department facilities, which interfere with a customer’s construction, will be borne by the customer, as incurred by the Department. This applies regardless of whether the interfering facilities are on the customer's property, an adjacent property, or the public right-of-way.

2. Should construction by a customer place the Department facilities in violation of clearances required by State or Federal codes, the City may place a hold on the customer's building permit until the violation is corrected.

3. The Department will require a deposit for the estimated cost of the relocation prior to starting the actual relocation.

4. The customer or property owner shall be responsible for the maintenance of any vault or transformer enclosure. All electrical equipment, including blowers and sump pumps, will be maintained by the Department.

E. NEW CONSTRUCTION OR UPGRADES TO EXISTING DISTRIBUTION INFRASTRUCTURE.

1. Should the Department find that the existing infrastructure is not adequate to serve any new development or project, and that a new distribution circuit is required to serve the new development or project, the full cost of constructing the new circuit will be the responsibility of the developer or property owner.
   a. A pro-rated cost will be charged to developers or property owners for any subsequent development or projects served by the new circuit.
   b. The pro-rated cost of construction would be refunded to the initial developer or property owner for all subsequent development that would be served by the new circuit.
2. Should the Department find that upgrades to an existing are required in order to serve a development or project, the full cost of completing the upgrades will be the responsibility of the developer or property owner.