CHAPTER 11

Metering

Meters are required on the customer's premises for all Seattle City Light (SCL) electrical services so the Utility can accurately determine customer usage for accurate billing and for maintaining appropriate distribution to our customers.

SCL provides and installs all electrical meters into customer-installed meter bases. This chapter will describe the requirements for meter equipment and installations.

SCL's Technical Metering Unit will provide the customer with specific information on metering requirements for individual projects after they have reviewed plans submitted by the customer. Prints or drawings of the metering equipment are required when the equipment is to be installed in switchgear. The drawings need to show the sequence of compartments, dimensions of the gear and manufacturer information. Drawings shall also be submitted for customer-designed pedestals or other structures on which the customer is proposing to mount metering or service entrance equipment.

Meter Sockets: Construction Guidelines

All services shall be metered in accordance with the Electrical Utility Service Equipment Requirements Committee (EUSERC) Standards. Refer to http://www.euserc.com/ for further information.

While SCL provides and installs the meter, the customer is responsible for providing and constructing the meter socket and current transformer equipment, if applicable. All meter sockets and enclosures shall meet ANSI C12 and ANSI/UL414 Standards for Meter Sockets. See Appendix 2 at the end of this manual.

SCL does not allow automatic or lever type circuit closing devices.

Only metering taps are allowed in meter sockets. Examples of metering taps are the 5th and 7th terminal connections to the neutral and a 5th terminal connection to the unmetered leg as in existing three phase, three- wire services.

The line side conductors are connected to the top terminals of the meter socket. The load side conductors are connected to the bottom terminals.

Unused threaded or knockout openings must be closed with an approved plug locked in place from the inside. Metering equipment enclosures shall be weatherproof if they are located outside.

Meter rings will be provided by Seattle City Light.

Temporary Totalization Metering

At City Light's discretion, Temporary Totalized Metering is required prior to energizing the facility. This will include, but not be limited to, all facilities which require a high voltage vault. The temporary totalized metering equipment will be provided by City Light, and all metered consumption will be billed in the accordance with the appropriate rate schedule.

Once the facility is ready for permanent meter installation, it is the responsibility of the property owner to contact City Light, and ensure that all metering facilities are prepared according to City Light's specifications. Failure to abide by City Light specifications may result in additional trip charges and installation delays.

Communication Provisions for Large Metered Loads are in no way altered or impacted by the requirements of the Temporary Totalized Meter specifications.

Metering Voltages

All services shall be metered at the service voltage. The exception would be 480Y/277 volt three-phase services transformed to 120/208 volts or 120/240 volts for distribution in multi-unit buildings.

All high voltage services, 601 volts and above, shall be metered at the service voltage in accordance with the Electric Utility Service Equipment Requirements (EUSERC) standards.

Where voltages are over 600 volts, contact the Technical Metering Unit for high voltage metering requirements.

Service Entrance Conductors for Metered Loads

a. Unmetered service conductors and metered load conductors shall not be run in the same conduit, raceway, or wiring gutter.

b. Metering equipment and enclosures containing unmetered service conductors, wire troughs, and busing shall be sealable and lockable as determined by SCL.

c. Metered load conductors shall not pass through sealable sections, including transformer enclosures.

d. Service conductors shall be continuous from the service connection point to the meter socket or instrument transformer enclosure, or in a main disconnect for group installations. The conductors shall not pass through any junction box or "T" condulets. This does not prohibit the use of buses or wire troughs on the line side of multi-meter installations if the enclosures are locked and sealed.

Conductor Connections:

For Aluminum

An oxide inhibitor is used for all aluminum conductors and connections.
The meter socket shall have lugs approved for aluminum.

For Copper

When copper is used as conductor, meter terminals, and/or socket jaws, an oxide inhibitor must not be used.

Service Entrance Equipment Sequencing

For Single Meters Self-Contained:

a. The sequence of service equipment with self-contained metering shall first be meter socket and next the fused disconnect/circuit breaker. A switch cannot precede the meter except in certain multi-unit installations (described below).

b. Pedestal metering shall not contain the customer's main disconnect.

c. Residential services do not require block by-pass sockets, however they are strongly recommended.

d. General services require block by-pass sockets.

e. Please refer to SMC 21.49.020 Section B for definition of "General Service" and "Residential Service".

MASTER METERING

SCL shall not supply electricity for any new service to a duplex or multiple dwelling building for the purpose of master metering the energy usage of the dwelling units, a central space heating system, or a central domestic water heating system. SCL will not supply electricity for any upgraded service to an existing duplex or multi-unit building for the purpose of master metering new central or individual space heating systems.

Master metering is required for boat moorages but prohibited for houseboats.

For Multi-Unit Installations:

a. A main disconnect may be installed ahead of the meters in multi-unit installations involving more than six individual sockets provided that all equipment ahead of the meters has sealing provisions.

b. In multiple meter socket installations, which have a switch or breaker ahead of the meters, the breaker shall be the common trip type i.e., must open or close all ungrounded conductors simultaneously. The breaker must be constructed to prevent being changed to a non-trip type.

Special Metering Requirements for Multi-Unit Buildings

a. Prior to meter installation all separately metered spaces and their meter sockets must be identified by final space or unit number, letter designation, and/or street address. If permanent numbering of the spaces is not practical before meter installation, the customer shall provide temporary identification. Please see Appendix 7: "Contractor's Pre-Installation Checklist Multi-Unit Metering" for more information.

b. All multi-unit buildings shall have at least one meter for each unit. Where common load exists, an additional house meter is required.

c. The sockets in meter banks shall be so arranged that the minimum vertical distance between socket centers is 9 inches and the minimum horizontal distance is 8 inches. Additional clearance requirements are described in Appendix 5.

d. Space checks are required for all new and rewired multi-unit buildings to verify socket-to-unit panel wiring.

e. All auxiliary dwelling units without separate metering, and/or units found to have mixed or common loads will be billed in the owner's name.

f. After the initial service installation, all additional space checks, address changes, and mixed-load checks will be charged to the owner or person making the request.

g. Load determination shall be based upon the greatest aggregate nameplate ratings of each fused disconnect or circuit breaker.

h. Where common load exists an additional house meter will be required.

Metering Equipment Location

a. Single meter sockets shall be installed in an accessible location outside the building. Multiple socket installations may be located inside the building.

b. SCL may post a Utility logo on the outside of meter room doors.

c. SCL shall inspect and approve the customer's choice of location for meter sockets and metering equipment. The location must be readily accessible without risk of bodily harm to SCL employees and free from vibration, corrosive atmosphere, and extreme temperatures.

d. Inside meter locations shall have sufficient lighting to read meters and maintain equipment.

e. The area around and access to all SCL equipment shall be free from vegetation.

f. Meter rooms shall be for the sole purpose of electrical switchgear and metering equipment. Under no circumstances shall gasoline, diesel fuel, propane, paints, or any other noxious or hazardous materials be stored in a meter room.

g. Metering equipment shall not be installed over stairs, stairwells, steps, or public walkways. If mounted on a balcony or platform, a permanent stairway to the area is required. Ship's ladders are not allowed.

h. Meter locations must not be under or over any structure which might be enclosed or removed in the future, such as a porch, deck, carport, or stairway.

i. The number of meter centers in apartment buildings shall not exceed one for every three floors.

j. All current transformer enclosures will be installed in an accessible location outside the building or in an approved electric meter room. For residential services the enclosures shall be outdoors and accessible during normal Utility working hours.

Meter Height

The meter height is measured from grade or the floor to the center of the meter.

All sockets shall be mounted plumb and securely fastened.

Table 11-1 Meter Height Requirements

Type of installation	Minimum height	Maximum height
Single meter socket Self-contained	5 feet	7 feet
Multi-Unit Installations	2 feet	7 feet
Current Transformer-rated Sockets	5 feet	6 feet
Pedestal Socket	3 feet	5 feet

Access to Metering Equipment

a. SCL reserves the right to access the customer's premises during normal business hours (Monday through Friday, 8 AM to 4 PM) for meter reading, testing, installation, removal, inspection, and/or maintenance of SCL's equipment.

b. Access shall not be blocked by either permanent or portable materials.

c. Any fenced or enclosed area shall be made accessible with a double locked padlock and/or a key box. Where metering equipment is located inside the building, SCL reserves the right to install a key box. The customer shall provide keys and/or key cards.

d. All metering equipment covers shall be readily accessible They may not be plastered, caulked, or built-in, in any way, so as to impede the opening of the meter cover or metering equipment covers including instrument transformer enclosure covers or doors.

e. All metering equipment doors shall open a minimum of 90° from the front of the enclosures. Outdoor equipment enclosure doors must have a hold open device.

f. The width of the working space shall be proficient to permit ready access to the metering equipment and in no case shall be less than 3 feet. The height of the working space shall be equal to the overall height of the metering equipment and in no case less than 7 feet, 1 inch. The working space shall extend at least 3 feet out from the face of the meter.

g. A level standing working space shall be provided and maintained in front of all meter equipment.

Protection of Metering Equipment

a. Where damage of metering equipment has or is likely to occur from vandalism, vehicles or other causes, SCL may require the customer to install protective devices such as bollards, barriers, or enclosures at the customer's expense.

b. Metering equipment enclosures installed in outside locations shall be weatherproof.

c. Pedestal metering equipment shall be sturdy enough for reasonable installation or removal of a meter without damage to the pedestal.

d. Indoor spaces housing metering equipment shall have the ambient air temperature maintained below 30 degree C (86F). The customer is responsible for cost of maintenance, repairs and replacement of meter equipment resulting from ambient temperature.

Ownership of Metering Equipment

SCL installs and maintains meters, instruments, transformers and associated equipment which are on the SCL side of the meter. The Utility has ownership of this equipment. The customer's equipment includes: meter sockets, enclosures, landing pads, lugs, conduit, and conductors. These are installed and maintained by the customer who is the owner of this equipment.

SCL shall determine the specific equipment requirements after reviewing customer plans.

Current Transformer-Rated Metering

Current transformers and/or voltage transformers are required on all services that exceed 225 amps. The two exceptions to this case are residential services with 400 amps services that use 320 metering and remote metering with services under 225 amps.

For residential installations, two connections shall be permitted on the load side of the current transformers. The customer shall provide and install SCL-approved terminal lugs. The conductors may be wired directly to the panels from the landing pads

All commercial transformer installations shall be wired from the landing pads to either an approved AIC rated bus gutter or to a common mainline switch. Commercial installations shall not have conductors going directly to the panels from the landing pads.

All transformer-rated meter sockets shall have test switch provisions.

Current Transformer Landing Pad Enclosures

Transformer enclosures shall contain only service conductors, metering equipment, and meter conductors. They shall not be used as a junction box, gutter, or raceway for the purpose of making taps.

> *Exception:* Taps shall be allowed on the load side of the customer's landing pads to accommodate emergency services, fire pumps, and/or elevator ventilation systems as allowed by local/national fire codes.

a. All services rated at 800 amps or less may use transformer landing pads. Landing pads shall be centrally mounted in the enclosure and the conductors will enter and leave near the corners.

b. Transformer enclosures for all services rated over 800 amps shall be installed in manufactured switchgear.

> *Exception:* Temporary services over 800 amps but under 1200 amps may use a UL-approved manufactured instrument transformer enclosure with applicable fault-current-rated busing.

c. The minimum size of enclosures shall be as follows:

Single phase: 24 inches wide x 48 inches high x 11 inches deep.

Three phase: 36 inches wide x 48 inches high x 11 inches deep.

Note: Larger current transformer enclosures may be necessary depending on the National Electric Code (NEC) requirements for conductor bends.

d. All landing pads shall be of heavy-duty type with minimum (AIC) fault duty rating of 50,000 amps rms symmetrical. They shall be UL labeled and built to EUSERC standards.

e. The cover of the transformer enclosure cans or switchgear shall be side-hinged, and have provisions for locks and seals. Hinges must be built so that they cannot be disassembled from the outside of the enclosure. All metering equipment doors shall open a minimum of 90˚ from the front of the enclosures. The socket associated with the transformers may be mounted on the enclosure door. See current EUSERC requirements.

f. The top of transformer enclosure shall not be higher than 8 feet and the bottom shall not be lower than 6 inches from the finished grade or floor.

g. Connection to the grounded service conductor (neutral) shall not be used to bond current transformer enclosures.

Secondary Wiring for Transformer-Rated Meters

a. The customer shall provide a 1-inch minimum conduit between the transformer enclosure and the meter socket.

b. Junction boxes and condulets are not allowed in metering secondary runs.

c. The customer shall provide metering secondary conductors, leaving 6 feet of wire in the transformer enclosure and 2 feet of wire in the socket enclosure.

Exception: SCL will provide secondary conductors when the socket is mounted on or within ten (10) feet of the enclosure of the transformer.

d. If PVC conduit is used, a #12-solid green ground wire shall be installed.

e. All secondary conduit runs over 50 feet shall have prior approval by SCL's Technical Metering Unit.

f. The conductor colors for the metering secondary run are as follows:

Single Phase:	1 black, 1 red #12 solid conductor
	1 black, 1 red and 1 white #10 solid conductor
Three Phase:	1 black. 1 red. 1 blue, 1 white #12 solid conductor
	1 black, 1 red, 1 blue, 1 white #10 solid conductor

Metering on Switchboards

a. Multiple self-contained metering: the clear space around each meter socket will not be less than one inch at the top and the sides, and not less than 2 inches at the bottom.

b. Current transformer metering: the space requirement for a socket meter and test switch will be 24 inches horizontal by 15 inches vertical. All meter panels will open a full 90° to the switchgear. All side clearances will meet EUSERC and G-7 standards.

c. Meters will not be mounted on panels covering compartments that contain any customer's equipment that requires servicing. For further information contact Technical Metering.

d. Services rated at or greater than 800 amps and with voltages rated at or greater than 480 volts shall not have the electric meter located on the switchboard door adjacent to the Current Transformer compartment. The meter shall be located in a single socket enclosure with a test switch provision on the nearest possible wall and connected by a 1 1/4 inch minimum conduit.

Net Metering

SCL allows net metering on approved customer generation installations of up to 100kw in most areas of the service territory. Installations over 25kw will require engineering review.

Net Metering is not allowed in network service areas. However, customer generation is allowed in network areas if it meets certain requirements, chief among which is that the installation be precluded from feeding back onto the network grid.

Customers wishing to participate in this program should contact their SCL Electric Service Representative.

Communications Provisions for Large Metered Loads

Where totalized metering is permitted, the customer shall install the totalizing circuitry. Meter totalizing shall meet the Utility's criteria and be approved by SCL before metering equipment will be installed. The customer shall provide and maintain a phone line that meets SCL requirements. Call the Technical Metering Unit at 206-684-4260 for installation information.

New or enlarged commercial/industrial services served by a single meter with loads that are expected to reach 1 megawatt or more, or that will be totalized, are required to have a phone line or communication line at the point of metering. The customer shall own, install, and maintain the phone/communication line. The approved specifications for this line can be found here.

For all internal meter rooms, the customer shall install Schedule 40,1½-inch conduit from the interior of the room to the exterior of the building for automated meter reading. The conduit shall extend 4 inches at each end and be capped.

Revision Date	Revision
April 2, 2013	Added Section "g" to "Current Transformer Landing Pad Enclosures" – restriction on bonding to the neutral
April 10, 2013	Changed "Commercial Service" to "General Service" in "Service Entrance Equipment Sequencing", referred readers to definitions in SMC. Clarified net metering provisions
October 10, 2013	Added section "d" in "Metering on Switchboards"; added Euserc drawing 325 (See Appendix Six)
December 20, 2013	Further clarified language on Net Metering, added provisions for Temporary Totalized Metering on certain loads.