

## METERING INSTALLATION

### 4.01 METERING SPECIFICATIONS

Metering specifications will be issued to the customer by OPPD. Metering specifications are required before any work is started on all new wiring or additions to wiring, except for single family, duplex, or triplex dwellings where 200 or 320 ampere socket metering is adequate. Metering specifications will designate the point of entrance, the type of service, the anticipated load and the equipment to be furnished to the customer by OPPD. Meter specifications will also indicate the necessary work to be done by the customer.

#### **Metering Equipment Pick-Up**

##### General Service, Three-Phase

The equipment furnished by OPPD and installed by the customer may be obtained by presenting the customer's copy of the approved metering specification and the building and/or wiring permit to OPPD's Metering Services Department, 4440 Jones Plaza in Omaha.

##### General Service, Single-Phase

The equipment furnished by OPPD and installed by the customer may be obtained by presenting the customer's copy of the approved metering specification and the building and/or wiring permit to OPPD's Metering Services Department, 4440 Jones Plaza in Omaha, or OPPD's area office.

##### Residential

The equipment furnished by OPPD and installed by the customer may be obtained by presenting the wiring permit to OPPD's Metering Services Department, 4440 Jones Plaza in Omaha, or OPPD's area office. Larger residential loads requiring CT metering will also require an approved meter specification.

Architects, Consultants, Builders, Electricians, and Contractors shall adhere to these metering specifications and should incorporate them into their own plans and specifications. If any revision in these specifications should become necessary, please call the ESD, or AE listed in the specification.

### 4.02 CUSTOMER INSTALLATION - METER SOCKETS

OPPD's ESD or Engineer will designate the point of entrance on all Residential or General Service services, both overhead and underground. Please call the appropriate ESD.

- See Section 1.02 for telephone numbers.
- See Chapter 6 for further information on Residential or General Service overhead

services.

- See Chapter 7 for underground Residential services.
- See Chapter 8 for underground General Service or multi-unit Residential services (four units or larger).

All OPPD meter sockets are limited to one set of conductors on the line side of the sockets. See Approved Meter Socket List on oppd.com.

Socket Metering Drawings

(\* designates “Not for new construction” or “For Maintenance Only”. These options will not be available for new installations, or for upgrade of existing services.)

- 4.02.1 120V 2W (1 kW max.)
- 4.02.2 120/240V 1Ph 3W 150A overhead
- 4.02.3 120/240V 1Ph 3W 200A overhead
- 4.02.4 120/240V 1Ph 3W 200A underground General Service (See 8.04.1)
- 4.02.5 120/240V 1Ph 3W 200A underground Residential Service (See 7.05.1)
- 4.02.6 120/240V 1Ph 3W 320A overhead
- 4.02.7 120/240V 1Ph 3W 320A underground General Service. (See 8.04.2)
- 4.02.8\* 240V 1Ph 2W & 120/240V 1Ph 3W totalized
- 4.02.9 240/480V 1Ph 3W 200A overhead
- 4.02.10 240V 3Ph 3W or \*480V 3Ph 3W 200A overhead (Wye)
- 4.02.11\* 480V 3Ph 3W 200A overhead (Delta)
- 4.02.12 120/240V 3Ph 4W overhead
- 4.02.13 120/208V 3Ph 4W or 277/480V 3Ph 4W 200A overhead
- 4.02.14 120/208V 1Ph 3W 150A overhead
- 4.02.15 120/208V 3Ph 4W 320A overhead & underground  
(See Section 6.14 and 8.04.)

**Estimated Socket Dimensions( in. )**

<u>Socket</u>	<u>H x W x D</u>	<u>Wire Size</u>	<u>Hubs</u>
Single Phase CT	7 " Diameter	(OPPD Wires)	1.0
Temp Pole	7 " Diameter	#2	1.0
Single Phase 180 Amp	12 x 8.5 x 4	#8 thru 250 KCMIL	1.25 - 2.5
Single Phase 200 Amp UG	16 x 12 x 5	#2 thru 350 KCMIL	1.25 - 2.5
Single Phase 320 Amp	32 x 19 x 7	600 MCM or parallel 250 KCMIL	3.0 - 3.5
Single Phase 400 Amp	32 x 20 x 7	Line Lugs 3/0 thru 800 KCMIL Load Lugs parallel 350 KCMIL	3.0 - 3.5
Single Phase Duplex 150A	16 x 25 x 5	Line Lugs #6 thru 350 KCMIL Load Lugs #6 thru 3/0	1.25 - 2.5
Single Phase Duplex 200 A	19 x 30 x 6	Line Lugs 500 KCMIL Load Lugs #6 thru 250 KCMIL	3.0 - 3.5
Single Phase Triplex 150 A	15 x 33 x 5	Line Lugs #6 thru 350 Load Lugs #6 thru 3/0	1.25 - 2.5
Three Phase 200 Amp	23 x 14 x 6	#6 - 350 KCMIL	1.25 - 2.5
Three Phase 320 Amp	32 x 19 x 7	600 KCMIL or parallel 250 KCMIL	3.0 - 3.5
Other CT-rated sockets	21 x 13 x 5	(OPPD Wires)	1.25 - 2.5

The dimensions are for the estimated maximum cabinet size for each type of socket. Actual dimensions will vary by manufacturers. Additional room will be needed for the line and load risers.

#### **4.03 RESIDENTIAL SERVICE,**

As mentioned in section 3.02, OPPD provides each building with only one service. This may be either overhead, or underground.

##### Overhead, Single-Family, Duplex, or Three-Plex Dwellings

OPPD will provide the overhead service drop conductors to the residence. The service entrance conductors are provided by the customer from the meter socket in the riser pipe up to the weatherhead. (See Chapter 6 for overhead requirements.)

##### Underground Single Family, Duplex, or Three-Plex Dwellings

The service wires up to the line side of the meter socket for a single-family residence, or to a duplex socket for a duplex residence, are provided and sized by OPPD. OPPD does not have a 3-gang underground socket, so a three-plex residential building, without firewalls, (approved by the local inspecting authority), will have a single point of entrance at one location, with three single sockets ganged together, or an approved meter center. (See Chapter 7 for underground residential requirements.)

#### **4.04 RESIDENTIAL/COMMERCIAL SERVICE - MULTIPLE OCCUPANCY**

##### Residential- 4 Dwelling Units or More

This type of service requires a meter specification. A building or dwelling shall be supplied either by only one overhead service drop, provided by OPPD, or by only one underground service lateral, provided by the customer, with each customer metered individually by single sockets ganged together, or an approved meter center. See OPPD's Service Regulation C-8 on Master Metering for exceptions to individual metering.

A multi-unit residential building contains four or more residential dwelling units. It may also contain a house meter for common hall or parking lot lighting. The metering shall be grouped, or an OPPD-approved, customer-provided, clustered meter center may be used. **The metering is to be located outside.** Energizing the permanent service and installation of meters on multi-unit residential building will require permanent marking (see Identification of Meter by Locations 4.13). It will also require all the feeder wires to be installed and landed in the individual apartment panels. At the time of installation OPPD will also need access to each apartment to verify proper addressing. All meters will be set at the time the service is energized (see Opening a New Service Account 1.15). The only exception to this is if the House Meter is ahead of the building lockable main disconnect. It may be energized and have just the House Meter set and the building main will be locked in the open (off) position.

### Commercial – 2 or More Units

A multi-unit commercial building contains two or more commercial units. It may also contain a house meter for common hall or parking lot lighting. The metering shall be grouped, or an OPPD-approved, customer-provided, clustered meter center may be used. **The metering is to be located outside.**

Energizing the permanent service and installation of meters on multi-unit commercial building will require permanent marking (see Identification of Meter by Locations 4.13). It will also require all the feeder wires to be installed and landed in the individual unit panels. At the time of installation OPPD will also need access to each unit to verify proper addressing. Only requested meters will be set at the time the service is energized (see Opening a New Service Account 1.15). The remaining or spare meter sockets will be locked in the open (off) position. In the case of 480 or 277/480 services it is recommended that all the meters are set when the service is first energized to eliminate a service outage for the installation of the remaining meters.

## **4.05 GROUPING OF METERS**

Any installation of two or more meters shall have all meters, and any required instrument transformers, grouped in a safe and readily accessible, outside location at the point of entrance.

The contractor shall permanently identify each meter position by apartment or space number. See drawings 4.05.1, 4.05.2, and 4.05.3.

The customer furnishes, installs and maintains any cable trough required by the customer for ganged meter sockets, or meter centers.

The method of construction shall be such that all of the wiring relating to the metering may be readily traced. The use of concealed conduits, raceways, gutters, etc., containing un-metered conductors shall be kept to a minimum. Metered conductors from one meter shall not be placed in the metering compartment of any other meter.

### Meter Centers

The customer may elect to furnish modular multi-position metering centers in lieu of the regular meter sockets. To assure conformance of the metering centers to OPPD's wiring specifications, the customer, prior to the purchase of the metering centers, shall make application for approval of their design to OPPD's Metering Engineer. All meters shall have individually removable and lockable covers, be UL listed, ringless sockets and individually sealing lids. There shall be provisions for a 5th terminal at the 9 O'clock position. Meter centers used for commercial applications shall have a bypass lever for each position. "Horn" bypass designs are prohibited. When installed, the bottom meter shall be no lower than 30" and the top meter no higher than 66" (center-line of meter glass). Exception: If the meter center has 4 vertical positions, the bottom meter shall be no lower than 24" and the top meter no higher than 72" (center-line of meter glass).

#### 4.06 CUSTOMER INSTALLATIONS - GENERAL SERVICE METERING INSTRUMENT TRANSFORMERS

- Refer to Section 6.10 for Residential 1Ph & for General Service 1Ph & 3Ph overhead CT installation details.
- Refer to Section 7.07 for Residential underground CT installation details.
- Refer to Section 8.06 for General Service underground CT installation details.
- Refer to Section 8.08 for metering on dedicated padmounted transformers.

The term “instrument transformers” refers to current transformers (CT’s), and to potential transformers (PT’s), used by OPPD for metering purposes.

##### Instrument Transformer Drawing

(\* designates “Not for new construction” or “For Maintenance Only”. These options will not be available for new installations, or for upgrade of existing services.)

- 4.06.2\* 120/240V 1Ph 3W “A”-base CT
- 4.06.3 120/240V 1Ph 3W socket CT
- 4.06.4 \* 6W totalized “A”-base (120/240V 1PH 3W & 240V 3Ph 3W)
- 4.06.5 \* 6W totalized “A”-base (120/240V 1PH 3W & 240V 3Ph 3W) kW, kVA
- 4.06.6\* 6W totalized “A”-base (120/240V 1PH 3W & 240v 3Ph 3W) kW
- 4.06.7\* 6W totalized “A”-base (120/240V 1PH 3W & 240v 3Ph 3W) kW
- 4.06.8 \* 3Ph 3W delta “A”-base CT (240V, 480V, 2400V, or 13,800V)
- 4.06.9\* 3Ph 3W delta Metering (can use with 8.08.8)
- 4.06.10\* 3Ph 3W delta “A”-base CT (240V, 480V, 2400V, or 13,800V)
- 4.06.11\* 3Ph 3W delta 480V socket CT kW, kVA (can use with 8.08.8)
- 4.06.12\* 3Ph 3W delta “A”-base CT (240V, 480V, 2400V, or 13,800V) 2circuit totalized
- 4.06.13\* 120/240/240V 3Ph 4W “A”-base CT
- 4.06.14\* 3Ph 4W “A”-base (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW
- 4.06.15 3Ph 4W socket CT (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW (can use with 8.08.8)
- 4.06.16\* 3Ph 4W “A”-base (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW, kVA
- 4.06.17\* 3Ph 4W socket CT (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) KW, kVA (can use with 8.08.8)
- 4.06.18\* 3Ph 4W “A”-base (120/208V, 277/480V, 2400/4160V, or 7960/13,800V) kW, kVA 2-circuit totalized
- 4.06.19 3Ph 4W socket CT

When instrument transformers are required for OPPD’s metering, the transformers will be furnished by OPPD and installed by the contractor. The contractor will also be responsible for any removal of instrument transformers (CT’s or PT’s). Upon removal, the contractor will return all instrument transformers to the Metering Services Department. The contractor will coordinate with the Metering Services Department at 552-5934 for the installation, replacement or removal of instrument transformers and meter equipment. The Metering Services Department will be responsible for the meters, as well as for the secondary wiring between the instrument transformers and the meters.

## CT Cabinet

The contractor shall provide and install a side-hinged, weatherproof metal cabinet, either galvanized or painted, of adequate strength and size per NEC requirements for the instrument transformers. When mounting the instrument transformers, no wood or plywood should be used for mounting inside of the cabinet. The instrument transformers should be mounted in direct contact with the metal cabinet, insuring a good bond for grounding the instrument transformer bodies.

Instrument transformer cabinet size is to be determined by the customer after receipt of the instrument transformers from OPPD. The contractor should take into consideration the number, physical size, and orientation of the Instrument Transformers; the direction, size and number of incoming and outgoing conductors; and the conductor-bending radius needed to comply with the NEC. This cabinet shall have provisions for being sealed by OPPD.

## Cabinet Mounting

The CT cabinet shall be installed in a safe and readily accessible agreed upon location. CT cabinet locations are not considered readily accessible if the cabinet bottom is over 8 feet higher than the floor, unless the location is over a permanently installed standing platform, which is accessible from permanent stairs. In addition, the platform must not require use of any ladder on the platform to access the CT cabinet. Ceiling locations are not acceptable for being used as the mounting surface, nor can CT cabinets be concealed above a suspended ceiling.

## Manufactured Switchgear

The installation of instrument transformers in a manufactured switchgear will be approved by OPPD's Manager-Metering Services, only when the manufacturer provides adequate segregated and accessible space and proper mounting and connection facilities for the instrument transformers. Approval shall be obtained before the purchase of the switchgear.

OPPD's meters shall not be located on manufactured switchgear. Instrument transformers must be installed, so that nameplates on the instrument transformers are in a readable location. Metering instrument transformers are the property of OPPD and shall not be altered in any manner. The contractor will be responsible for any installation or removal of instrument transformers (CT's or PT's) from the customer's switchgear. Upon removal, the contractor will return all instrument transformers to the Metering Services Department.

## Six Main Rule

The NEC allows no more than six customer main disconnect switches to a building. When a customer needs more than six disconnect switches, he can install a new building main disconnect switch (Bldg. Main) ahead of the existing main disconnect switches, which now makes the former main disconnect switches into branch disconnect switches. OPPD requires all existing CT services to be moved ahead of

the new main switch. OPPD requires any service meters downstream of a new building main switch be only self-contained sockets.

The customer can add a new main switch ahead of enough of the existing disconnect switches, to comply with the six main rule, and leave the remaining disconnect switches undisturbed. This option saves the customer money, since the new main switch must have a capacity equal to the total capacity of the disconnect switches now downstream of it. OPPD would, in most cases, require this option because it leaves CT's upstream of main switches, with a minimum of wiring change required of the customer.

OPPD requires all instrument transformer (CT) metering to be located ahead of the building main switches. Incoming service conductors must be connected directly to the meter sockets, or to the CT's, if used, for from one to six customer disconnect switches, as shown in Diagram I of drawing 4.06.01.

For the situation where more than six customer disconnect switches (a combination of both main and branch disconnect switches) are needed, OPPD requires all CT's to be connected to the incoming service conductors ahead of the building main switches as shown in Diagram II of drawing 4.06.01

In the situation where the customer presently has less than six main switches with metering positions, but may install more in the future, this is not sufficient reason to allow self-contained or CT services to be down-stream of the present building main switches. See Diagram III of drawing 4.06.01

#### Wiring for Instrument Transformers

A conduit of 1 inch minimum size having no more than two bends shall be installed between the instrument transformer cabinet and the meter test cabinet or socket. Meters should be located as close as practical to the instrument transformer cabinet.

Potential transformer (PT) primary connection leads require a minimum #10 copper wire, and will be furnished by the Contractor.

Code wire for instrument transformer (both PT and CT) secondary leads will be furnished and installed, connected, disconnected, changed or removed only by OPPD. Only OPPD's metering equipment, or equipment under OPPD's exclusive control, may be connected to the secondary terminals of OPPD's instrument transformers.

### **4.07 CONNECTIONS**

The neutral conductor of all incoming services must be solidly bonded in and to the instrument transformer housing (metal cabinet or switchgear), or to the meter socket, or cabinet for self contained meter.

All wires of the incoming service must pass through the meter cabinet, socket, or instrument transformer cabinet. Under no circumstances may metered and

unmetered conductors be placed in the same nipple, conduit, raceway, or gutter. Only conductors necessary to the individual metering will be permitted in each meter cabinet, socket, or instrument transformer cabinet. Metered conductors of one meter may not pass through the metering cabinet of any other meter. Nor may conductors, once exited from a socket, or metering enclosure, reenter it. The socket, or metering enclosure, may not be used for a wiring raceway. T-condulet conduit bodies are not permitted in service entrance conduits. Disconnected meter loops must be removed by the Contractor, and unused openings in cabinets closed by the Contractor. Meter sockets shall be installed with both the blank protective cover and the meter-sealing device in place.

#### Service Risers

OPPD supplies the service riser on underground Residential services. See Chapter 7.

Refer to section 8.01 for discussion of customer-supplied General Service underground service risers.

The customer supplies the service riser on overhead General Service and Residential services. See Chapter 6.

### **4.08 METER LOCATIONS**

Meter sockets, modular meter centers, meter enclosures or cabinets shall be installed by the customer outdoors on a substantial building or structure where they will be accessible to OPPD at all times, at the POE designated by OPPD, as referred to in Section 3.01 & 3.02. When existing service with indoor meter locations is upgraded or extensively re-wired, the metering equipment shall be relocated to the outside of the building.

In no case shall metering equipment be installed on insecure supports, or where they will be vulnerable to mechanical injury, excessive dust, excessive moisture, corrosive vapors, or vibration.

In areas prone to vandalism, OPPD may require the customer to provide vandal-resistant protection for the metering equipment, and maintain access for OPPD's employees.

### **4.09 MOUNTING**

Meter mounting devices shall be securely fastened to the supporting building or structure with rust-resistant fasteners. Certain structures may require the addition of a rust-resistant reinforced mounting surface, such as "uni-strut." Conduits and cables shall not be used to support meter-mounting devices.

Minimum working clearances as required by NEC 110.26 shall be provided and maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

### Underground, General Service and All Overhead

Meter supporting devices or walls shall be plumb and the meters shall be mounted no higher than 5'-6" and no lower than 2'-6" above finish grade, measured to the center of the meter glass.

### Underground, Residential

Meter supporting devices or walls shall be plumb and the meters shall be mounted no higher than 4'-0" above finish grade, and no lower than 2'-6" to the bottom of the meter socket for a 200 amp socket. (See drawing 7.05.1.) For a 320 amp socket, no higher than 3'-6" and no lower than 2'-6", above finish grade to the bottom of the meter socket, to provide adequate room below the bottom of the meter socket for the plastic slip-fit riser pipe. (See drawing 7.05.2.) An exception may be made for modular meter centers as follows:

- Modular meter centers shall be mounted so that the centers of all meters are between 2'-6" and 6'-6" above the standing surface.

#### **4.10 METER SEALS**

All meters, meter facilities, and points of access to unmetered wiring on the customer's premises will be sealed by OPPD. All cabinets and equipment enclosures containing unmetered conductors shall be made sealable before the service is energized. Meter seals should not be confused with "conduit seals" which are water barriers designed to prevent leakage into the customer's service equipment.

The customer furnishes, installs and maintains any cable trough required by the customer for ganged meter sockets, or meter centers. Troughs, if used, must have provisions for sealing by OPPD.

#### **4.11 CAPACITY**

Self-contained meter centers, troughs, transformer metering cabinets, and other current-carrying components of the customer's metering installation shall have an ampacity rating equal to or greater than the rating of the service entrance conductors. OPPD will size the current transformers or the self-contained meter sockets to the expected demand determined by OPPD from information supplied by the customer or their representative.

#### **4.12 SEPARATION**

Metered circuit wires shall not be enclosed with unmetered circuit wires in the same raceway or cable, except as required in OPPD approved meter equipment assemblies.

#### **4.13 IDENTIFICATION OF METERS BY LOCATION**

Multiple occupancy building owners and customers with more than one meter shall permanently mark or tag each meter socket to coincide with the apartment (occupancy) number or unit number. It is the responsibility of the customer to notify OPPD and re-identify the meters when addressing changes are made.

#### **4.14 METER JUMPERS**

Customers, contractors, or persons other than authorized OPPD personnel shall not bypass meters or place jumpers in meter sockets.

#### **4.15 HIGH VOLTAGE METERING**

The customer shall consult with OPPD before planning any installation for voltages above 480 volts or at 2000 amps or above.

#### **4.16 BONDING METERING ENCLOSURES**

All metering enclosures shall be grounded in accordance with current NEC requirements.