

UNDERGROUND SERVICES - GENERAL SERVICE AND MULTI-UNIT RESIDENTIAL

8.01 GENERAL

This material is not intended to cover service from OPPD's network in the downtown Omaha area. See Chapter 12 for details concerning the downtown network.

The customer will install, own, and maintain the underground service lateral in accordance with OPPD's applicable rates and extension rules, and the requirements laid out in Chapter 4.

A multi-unit residential building is one containing 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.

Underground service lateral is defined as the underground service conductors from the supplying pole, pedestal, transformer, or other OPPD equipment, and connecting to the customer's meter socket or current transformer metering at the customer's building or other structure.

The customer shall obtain meter specifications and approval of the metering location from OPPD before starting installation of the service entrance. Since OPPD has voltage range limits, within which it strives to supply voltage to the customer, OPPD may require the customer to accept service, and install the metering equipment adjacent to OPPD's equipment to insure adequate voltage at the point of metering of the service. This would apply in those cases where the customer's service conductors would be lengthy, and the metering point would be over 100 feet from OPPD's supplying equipment.

Nebraska law requires that all persons, prior to digging any hole or trench, should contact the "Diggers Hotline of Nebraska" (Call 811).

The customer shall install, own, and maintain all service entrance facilities.

General service self-contained meter sockets shall have a lever bypass. Exceptions: temporary services, residential garages, residential communication pedestals, sign lighting, apartment house meters, and farm services. It should be understood that the consequence of not installing a lever bypass socket is that power will be lost during work on the meter.

Service Riser Pipes

Customer-provided schedule 80 PVC risers from grade level to the meter point will be allowed on General Service underground service laterals, when permitted by the local inspecting authority. PVC risers should include an expansion fitting, and fastening methods should allow for the expansion and contraction characteristics of PVC raceways, as required in the NEC. Metal conduit may be

required in areas where the possibility of damage to the riser is great. EMT is not recommended for use in direct contact with the earth.

8.02 CONNECTIONS

OPPD will connect the customer's underground service lateral to OPPD's supplying equipment, where OPPD will provide the service lateral connectors with the following limitations on size and number of sets of customer-provided conductors:

Secondary Dips

- Single-phase 200 amp, or 320 amp secondary dip: a combined total of 350 KCMIL maximum (2 sets), and 4/0 (2 sets).
- Three-phase 480 amp secondary dip: 500 KCMIL maximum (2 sets).

See Section 8.07 for secondary dips.

Padmounts

- Single-phase padmounted transformer:
 - up to 75 KVA: 350 KCMIL (4 sets)
 - 100 KVA, up to 167 KVA: 750 KCMIL (4 sets)
- Three-phase padmounted transformer (up to 500 KVA maximum): 750 KCMIL maximum (6 sets).
 - Exception: Three-phase padmounted 500 KVA transformers only may have up to 6 sets of 750 KCMIL (maximum) cable or up to 8 sets of 500 KCMIL (maximum) cable.
- Three-phase padmounted transformer (over 500 KVA): 750 KCMIL maximum (8 sets).

See Section 8.08 for padmounts.

The customer will be responsible for connecting his service lateral conductors at the metering and service equipment location, using customer-provided connectors. **Caution!** While OPPD service equipment may have lugs large enough to accommodate service conductors, the metering equipment may not.

8.03 CLEARANCES

To avoid damage to facilities when digging, the underground service lateral shall be installed, by the customer or his contractor, in accordance with clearances in the NEC, or local building ordinances.

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

8.04 UNDERGROUND SERVICE TO METER SOCKET

SINGLE-PHASE OR THREE-PHASE

Refer to drawings 4.02.1 through 4.02.15, 7.05.3, 8.04.1, & 8.04.2.

OPPD furnishes, installs, and maintains: ○

1. Socket-type meter.

The Customer furnishes, installs, and maintains: △

2. Meter socket.
3. Underground service lateral to meter socket.
4. Schedule 80 PVC, or galvanized, rigid conduit riser, with insulating bushing.
(See discussion of service riser pipes in section 8.01.)
5. Grounds, in accordance with applicable code (see Paragraph 4.16).

NOTES:

- A. Consult with OPPD on maximum number and size of ducts, and conductors, as well as number of sets per phase, which OPPD equipment may accommodate. OPPD also has an approximate 100 feet limit for the distance between OPPD's point of delivery and the meter.
- B. T-condulet conduit bodies are not permitted in the conduit run containing the customer's service conductors ahead of the metering.
- C. Minimum working clearances as required by NEC 110.26 shall be maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

8.05 FREE-STANDING SUPPORT FOR UNDERGROUND SERVICE ENTRANCE

100 to 320-AMP - 240 VOLTS AND UNDER

Refer to drawing 8.05.

The Customer shall consult OPPD before this installation is planned or started.

Where no building or structure is available, the Customer shall install a freestanding support for OPPD's meter and his service equipment. The customer shall terminate their underground service lateral in the socket. Support posts must be

4X4 treated wood, galvanized pipe, or channel suitable for earth contact and set in concrete.

OPPD furnishes, installs, and maintains: ○

1. Socket-type meter.

The Customer furnishes, installs and maintains: △

2. Meter socket.
3. Underground service lateral to the meter socket.
4. Meter support.
5. Schedule 80 PVC, EMT, or galvanized rigid riser conduit, with insulating bushing.
(See discussion of service riser pipes in section 8.01.)
6. Grounding, in accordance with applicable codes. (See Paragraph 3.10.)

NOTES:

- A. Consult with OPPD on maximum size of conductors, as well as number of sets per phase, which OPPD equipment may accommodate. OPPD also has an approximate 100 feet limit for the distance between OPPD's point of delivery and the meter.
- B. Minimum working clearances as required by NEC 110.26 shall be maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

8.06 UNDERGROUND SERVICE TO CT CABINET

SINGLE-PHASE 400 TO 800 AMP - 120/240 VOLTS, OR THREE-PHASE

Refer to Section 4.06 for CT metering requirements.

Refer to Section 6.11 for General Service & Residential overhead CT installation details.

Refer to Section 7.07 for Residential underground CT installation details.

Refer to drawing 8.06.

OPPD furnishes, installs, and maintains: ○

1. Meter and all instrument wiring. (See Chapter 4)

OPPD furnishes and the Customer installs and maintains: □

2. Current transformers. For lug connections on current transformers

under 600 amperes, minimum bolt size is 3/8". For over 600 amperes, minimum bolt size is 1/2". For all ratings, two-hole lugs are required, and one-hole lugs are not allowed.

3. Meter socket for CT application.

The Customer furnishes, installs, and maintains: Δ

4. Underground service lateral. Service entrance neutral must be bonded to instrument transformer cabinet.
5. Weatherproof, side-hinged, metering transformer cabinet of "National Electrical Code " grade steel of adequate size for the instrument transformers and all wiring connections. (See Section 4.06). Customer is to install 1" conduit from instrument cabinet to meter socket.
6. Schedule 80 PVC, EMT, or rigid riser conduit, with insulating bushing. (See discussion of service riser pipes in section 8.01.)
7. Grounding, in accordance with applicable codes. (See Paragraph 3.10).
8. Two-hole line-side and load-side lugs.

NOTES:

- A. Consult with OPPD on maximum size of conductors, as well as number of sets per phase, which OPPD equipment may accommodate. OPPD also has an approximate 100 feet limit for the distance between OPPD's point of delivery and the meter.
- B. The customer shall consult OPPD before this installation is planned or started.
- C. Minimum working clearances as required by NEC 110.26 shall be maintained by the customer at all times. OPPD requires a minimum of 8 inches of side clearance on all metering equipment.

8.07 UNDERGROUND SECONDARY SERVED FROM OVERHEAD

No person or persons, except qualified employees of OPPD or its authorized agents, are permitted to climb or do work on, or to install any equipment whatsoever upon OPPD's poles.

Limitations – Distance

At the discretion of OPPD, underground secondary service may be available in an overhead distribution area. OPPD will specify the installation and service requirements, and will designate the location from which a customer is to be

served. The customer's meter point is to be no further than 100 feet away from OPPD's point of delivery, for a General Service account. If the distance to the customer's building exceeds this distance, a customer-supplied meter support adjacent to the service location will be required.

Limitations – Size

This type of service shall be limited to a maximum of 320 amperes for single-phase and 480 amperes for three-phase. Service cables shall be installed, owned and maintained by the customer on his property. Size and number limits on customer's conductors are shown in Section 8.02.

A Service and Metering Specification shall be issued by OPPD designating the terminal point to which the underground secondary cables are to be run and the amount of extra cable to be left at the pedestal located adjacent to the base of the pole. OPPD will provide wires down the pole to a connection pedestal, and make the connection to the customer's conductors.

For assistance in planning such an installation, call OPPD's Electrical Service Designer responsible for the territory. Or call the Customer Sales & Services Division at 636-3536, to be referred to the appropriate Account Executive. See section 1.02 for phone numbers.

8.08 PADMOUNT TRANSFORMER SERVICE

Primary Duct and Conductors

Primary conductors are extended by OPPD from its distribution system to the primary compartment of the padmount transformer through schedule 40 PVC non-metallic duct supplied and installed by the customer on his property. The customer may also use continuous duct, SDR 13.5 HDPE, or approved equal. Standard 36" radius, 90 degree bends, **must** be coupled to the continuous duct for all transitions at poles, switchgear and transformers. The customer's duct runs from the transformer location to the property line, with the end of the duct plugged to keep out dirt. The end of the duct, if below grade, is to be marked above grade, through use of a 2x4 sticking above grade, for example. All primary ducts are to be rodded and proven clear. Also, a pull line is to be installed by the customer, and left for OPPD use, in future cable installation. Details for cable route, manholes, (See drawing 8.08.9), pull boxes, (See drawing 8.08.7), conduit size and other installation requirements by customer will be stated on the Service and Metering Specification issued for each project, and on the slab detail drawing, referenced to for that project.

Transformer Slab

The customer supplies all slabs for three-phase padmount transformers, except when located on public right of way. OPPD will only permit placement of the transformer on public right of way when there is no adequate space on private property for the padmounted transformer. The Service and Metering

Specification will reference a slab detail by a page number from this General Wiring and Metering Specifications Manual.

Clearances shown on OPPD slab detail drawings are for OPPD physical purposes only, (for example: installation, removal, maintenance, operation, and adequate ventilation for cooling). For any additional clearances required of the customer, such as for fire protection purposes, please check with your insurer, or Factory Mutual for those clearances.

Protection pipes, as required, and slab piers are supplied and installed by the customer. The padmount transformer is supplied and installed by OPPD.

The customer is to provide an all-weather, hard-surfaced access road on customer's property to the padmount transformer location for use by OPPD equipment. No walls shall be built around, or canopies above a transformer.

Single-phase

Slabs for single-phase transformers, normally 167 KVA and smaller, are supplied and installed by OPPD. See drawings 8.08.1, 8.08.2, and 8.08.3 for slab detail.

Three-Phase, 500 KVA & Smaller

See drawings 8.08.4 and 8.08.5 for slab detail.

Three-Phase, 750 KVA & Larger

Transformer slabs for three-phase transformers larger than 750 KVA (see drawing 8.08.6) shall be designed and constructed by the customer. Location and dimension of slot and conduits must be maintained in relation to over-all slab dimensions. Ducts are not to be installed in concrete within the slot in the slab.

Slab Inspection

OPPD shall inspect transformer slab forms prior to pouring. Customer shall call OPPD's Electrical Service Designer (ESD), or Account Executive (AE) after slab has been formed, holes for support piers excavated, rebar placed and conduits placed, backfilled and tamped. Telephone numbers for ESD's and AE's may be found on meter specifications issued for installation, or call Customer Services at 636-3536 to be referred to the ESD or AE. Customer should allow at least one normal working day for this inspection after placing call. OPPD will make an effort to respond to inspection requests in reasonable time, but failure to provide sufficient early notification to OPPD for an inspection will not be sufficient reason for a customer to pour a slab without an inspection. OPPD may refuse to set padmount transformer on a slab that has not been inspected prior to pouring.

Secondary Conduits & Cables

Secondary conduits and cables are supplied and installed by the customer. (See Section 8.02 for size and number limits.) Connections to the transformer terminals will be made through connectors furnished and installed by OPPD.

The length of service conductors above the slab necessary to connect to the secondary bushings of padmount transformers will vary with the size and shape of the transformer.

Single-phase installations require that service conductors extend at least four feet above the surface of the transformer slab. No more than four sets of conductors and four conduits may be used.

Three-phase installations require that:

- (a) Up to and including 500 KVA transformers, the service conductors extend at least six feet above the surface of the transformer slab. No more than six conductors per phase, not to exceed 750 KCMIL, may be used. Exception: For 500 KVA transformers only, eight sets of conductors per phase, not to exceed 500 KCMIL, may be used.
- (b) Transformers larger than 500 KVA must be in place before the service conductors are installed, and with no more than eight conductors per phase, not to exceed 750 KCMIL. OPPD's Engineering Department recommends that NEC type USE, 90 degree Celsius dry, 75 degree Celsius wet rate cable be used for underground service entrances due to the possible high ambient temperature in the transformer secondary compartment. For further information, call Customer Services at 636-3536 to be referred to the ESD or AE, or OPPD's area office. Telephone numbers are listed in Section 1.02.

Metering on the Transformer

When a padmounted transformer is dedicated to only one customer served through a single instrument transformer meter, the metering may be located on the transformer. (See drawing 8.08.8 for required customer's work in three-phase padmounted transformers. All metering work in single-phase padmounted transformers will be done by OPPD.)

General Padmounted Transformer Requirements

All-weather access to the transformer location for OPPD's heavy vehicles must be provided to ensure proper maintenance and service continuity. The customer must provide easement on his property for OPPD equipment, when required.

The foregoing discussion in this chapter represents the general requirements for commercial and industrial padmount transformer installations. Additional specific requirements will be covered in the Service and Metering Specification issued for the particular project, and on the slab detail drawing, referenced to for that

project.

8.09 THREE PHASE PADMOUNTED TRANSFORMER WITH SEPARATE SECONDARY COMPARTMENT

OPPD can provide a separate secondary compartment, adjacent to OPPD's larger three-phase padmount transformer, to accommodate more sets of customer provided service conductors than the transformer can accommodate by itself. This is not a standard OPPD service, so contact the OPPD ESD or AE to apply for this service. All provisions of section 8.08, except for the maximum number of sets of customer provided service cables apply to this section.

On a new installation, a slab to accommodate both the transformer and the compartment should be poured by the customer per drawing 8.09.2.

In regard to construction details, such as protection pipes, reinforcing steel, clearances, distances from buildings, etc., all notes of drawing of 8.08.6 apply to drawing 8.09.2. A slab inspection by OPPD should be called for before concrete is poured. See section 8.08 for slab inspection requirements.

Adding on to an existing slab

If an existing transformer is to have a separate secondary compartment added, at a later time, the customer should compare the drawing of section 8.08, to the corresponding drawing of section 8.09, to add on to the existing slab. For the purpose of adding an extension to an existing slab:

Slab detail 8.09.1 corresponds to slab detail 8.08.5 (750 – 1000KVA), and
Slab detail 8.09.2 corresponds to slab detail 8.08.6 (1500 – 2500KVA).

The existing slab should be drilled and doweled with rebar to tie the addition to it. Additional rebar and wire mesh should be used in the addition, and a slab inspection by OPPD should be called for before concrete is poured. See section 8.08 for slab inspection requirements.

Service Conductors

The customer is responsible to provide, install, and maintain all service conductors, and conduits, both from the building main switch to the secondary compartment, and also from the secondary compartment to the padmount transformer secondary terminals. OPPD will make the final connections at the padmount transformer secondary terminals. The customer's service conduits should be stubbed up in the rear area of the transformer slab slot to avoid possible conflict with the cables running between the transformer and the separate secondary cabinet.

The customer must make all final connections in the separate secondary compartment. The customer must wire and connect the service conductors in a specific order.

- The service conductors from the secondary compartment to the padmount transformer secondary terminals use the eight available slots labeled “UTILITY POSITIONS” on the buss inside of the secondary cabinet. These should be wired and connected in sequence from right to left. Maximum of 8 sets of 750 KCMIL conductors. The customer shall install a grounding electrode conductor, identified as such, between the separate secondary cabinet and the padmount transformer. The size of the conductor shall be the minimum size as indicated in NEC table 250-66.
- The service conductors from the building main switch to the secondary compartment use the sixteen available slots labeled “CUSTOMER’S POSITIONS” on the buss inside of the secondary cabinet. These should be wired and connected in sequence from left to right. Maximum of 16 sets of 750 KCMIL conductors.

The buss in the secondary compartment will handle up to a maximum of 4000 amps. The connectors in the secondary compartment are integral set-screw connectors on the buss. Oxide inhibitor is recommended on all wire terminations.

Instrument Transformer Metering on the Transformer

When a padmount transformer with a separate secondary compartment is dedicated to only one customer served through a single meter, the instrument transformer metering will be located on the buss in the secondary compartment. The customer shall not install his service cables in the secondary compartment, or connect them to the buss prior to OPPD installing the instrument transformers on the buss between the “UTILITY POSITIONS”, and the “CUSTOMER’S POSITIONS”.