

# Specifications for Residential Underground Electric Service Installation

This brochure addresses most typical residential underground service installations. Variances for the following specifications must be approved in advance by Ameren Missouri. For the detailed information, go to <http://www.ameren.com/servicemanual>. If you have any questions, please contact your Ameren Missouri Representative, or call-1-866-992-6619.



## CALL 1-800-344-7483 (DIG RITE) BEFORE DIGGING

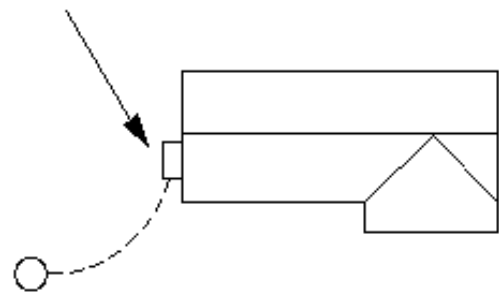
*To ensure your new underground electric service is installed in a safe, reliable and timely manner, the following specifications must be met. Failure to meet any of the requirements may cause a delay in receiving service and/or require the relocation of facilities.*

*Please check with your local inspection authority for any additional requirements before installation.*

## Location for Point of Delivery on Buildings (Service Manual Section 200)

1. These guidelines apply to the Ameren Missouri only.
2. An approved location for the point of delivery to a customer's premises will normally be within 10' of nearest corner front or side of the home if proper clearances can be maintained to the service connection point.
3. Meter socket shall be securely attached to home 3' to 5' 6" above finished grade from center of the meter. A minimum of 3-1/2' of clear working space shall be provided and maintained in front of all meter and instrument transformer enclosures and 6" above, below, and to each side of the meter equipment, and 6' 6" standing headroom. See meter location insert for additional details.
4. For continuous conduit installations, the customer will provide and install the meter socket(s) and line-side conduit of Schedule 40 or greater, electrical grade PVC, and the service riser to the meter socket shall include an expansion coupling that allows for 8" fall. The conduit shall be installed a minimum of 24" below finished grade in as straight a line as possible from the meter location to the designated pole, pedestal or transformer. In rock, depth may be

**See meter location insert for additional details**



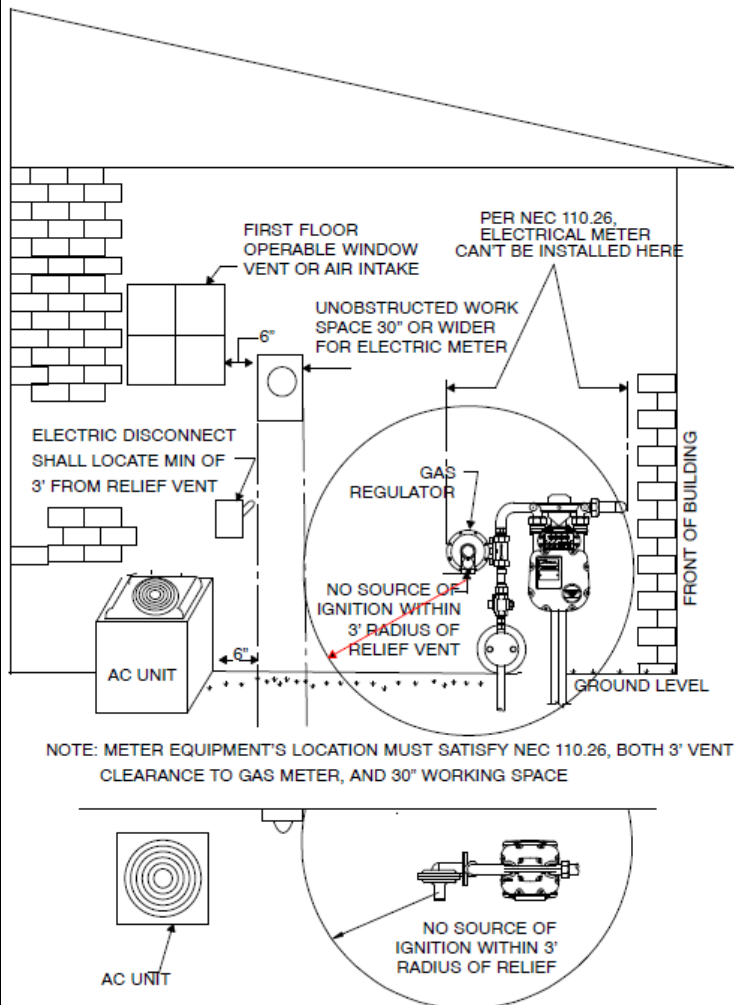
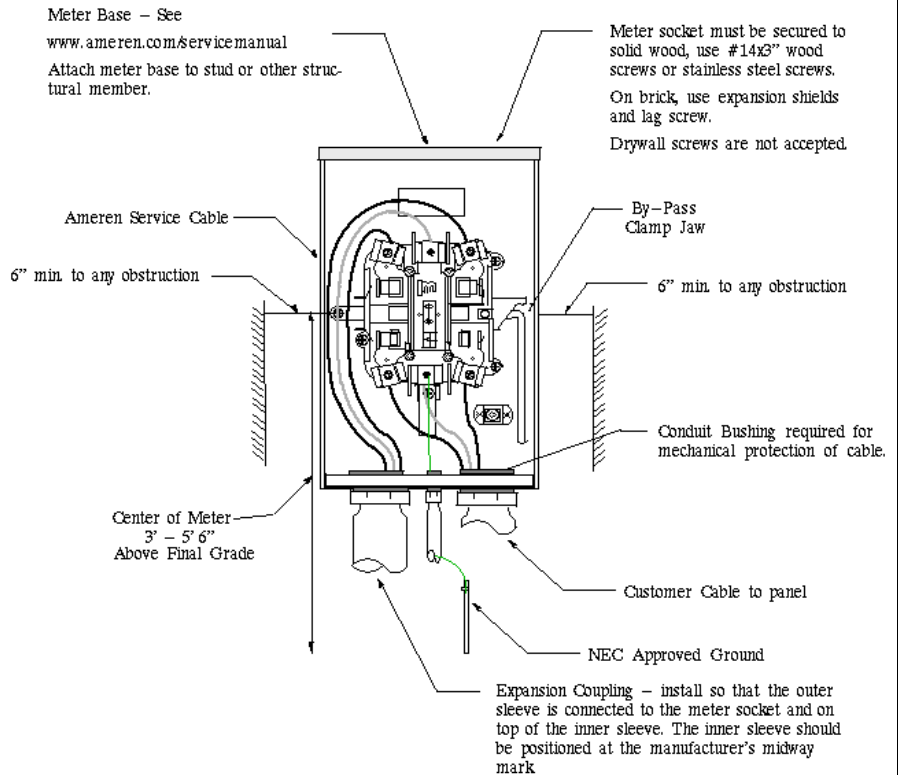
**Pole, Pedestal or Transformer  
See Inserts for conduit details**

reduced to 12" if cable(s) in conduit, and depths less than 12" are not permitted. No more than 3 - 90°, radius rigid bends are permitted in any installation (this includes the bends at each end). Trench bottom shall be undisturbed, firm and uniform over its entire length. Conduit sections shall be securely joined using standard grade solvent cement. See material list for proper size and specifications. Verify maximum service length with your Ameren Missouri Representative.



## Meter Location (Refer to Ameren Service Manual 200.01)

1. The customer shall provide a suitable place for the installation of metering equipment.
  - a) The equipment shall be installed on the outside wall of the customer's building or approved metering structure and be so located that adequate space and unobstructed access is provided to the Company's representatives for reading, testing, maintaining and exchanging of such equipment.
  - b) In flood areas, a permanent ladders or stairways shall be provided by the customer to meet OSHA requirements, and meet the latest NEC, at no cost to Ameren, when Ameren's equipment is located on platforms, balconies, mezzanine floors, roofs, or other hard to reach area as specified by Ameren as defined in Section 100 in Ameren Service Manual.
  - c) The customer shall consult the Company regarding the proper location of the equipment.



2. Metering equipment shall not be located on Company owned poles or on buildings adjacent to driveways, alleys, streets or other similar exposed places where it can be damaged by moving vehicles unless the equipment is protected by a substantial guard rail or posts. The customer shall consult the Company representative regarding providing adequate protected barrier.
 

**Nor shall** any portion of the metering equipment be located below, above, or within:

  - a) 3 feet radius of a gas meter and regulator installation shown Figure 200-4
  - b) 6 feet to any electric motor, generator, belt, or other moving machinery
  - c) Other hazards which would endanger the safety of those reading or working on metering devices.
  - d) Location must also satisfy NEC Article 110.26, clear working space around meter, as described below in 200.01.A.3 and also illustrated in Figure 200-4.
3. Clear working spaces shall not be used for storage.
  - a) A minimum of 3 1/2 feet of clear working space shall be provided in front of all meter and instrument transformer enclosures.
  - b) There shall be a minimum working clearance of 6 inches above, below, and to each side of the metering equipment.
4. Metering equipment shall not be mounted on portable trailers, buildings, mobile home or manufactured (modular) home, recreational trailers, or truck trailers; unless the manufactured (modular) home meets the conditions stated in the latest NEC.
5. Metering equipment must be installed in a workman like manner and firmly attached to the surface on which it is mounted.
6. All locations where metering equipment is installed shall have a minimum standing headroom of 6 feet, 6 inches.



## **GROUNDING** (Refer to 500.01 Ameren Service Manual)

All **standard services** that operate below 1000 volts as defined in Section 400 shall contain a grounded neutral conductor.

A **non-standard** service that operates below 1000 volts as defined in Section 400 may have a grounded phase conductor used as a circuit conductor in the system.

The grounded neutral or grounded phase conductor is earth grounded at the utility transformer and is extended to the self-contained meter socket, meter disconnect, or CT enclosure and to each service disconnect in accordance with the latest edition of the NEC.

For underground systems, the service riser conduit(s) on the supply side of the customer's meter disconnect, self-contained meter socket, or CT enclosure shall not contain the grounding electrode conductor. If a customer chooses to secure/protect the grounding electrode conductor in a conduit, this conduit shall be dedicated solely for this purpose.

Customers requiring an ungrounded service for operations as permitted by the NEC, shall submit an exception request detailing the special circumstances necessitating the request. In addition, the customer shall state in the exception request that they are aware of and accept the increased risks to personal safety associated with an ungrounded service. Customers who receive an ungrounded service from the Company **MUST INSTALL** ground detection sensing equipment. When supplying an ungrounded service results in an additional cost to the Company, this may be passed on to the customer.

For electric service installations where galvanized or EMT metallic conduit is used on the supply side of the service main disconnect, bonded bushings or threaded hubs shall only be used at one end of the conduit to prevent appreciable circulating currents from flowing on the equipment enclosures. An exception to this would be when using metallic conduit for protection of the grounding electrode conductor. In this case, the NEC requires bonded bushings on both ends of this metallic conduit to prevent causing a high impedance path or inductive choke.

## **GROUND METHOD** (Refer to 500.03 Ameren Service Manual)

1. The grounding method drawings are schematic in nature. Actual wiring details will vary between equipment and manufacturer.
2. The details shown in these drawings are not a substitute for an understanding of the grounding and bonding requirements of the National Electrical Code (NEC) and the requirements of the Authority Having Jurisdiction for the area the work is taking place.
3. Ameren requires an external grounding electrode to be electrically connected to the case and grounded conductor for self-contained meter sockets, meter disconnects, and CT enclosures that are mounted outdoors on most installations.
  - This electrode may act either as the sole or auxiliary electrode for the service equipment associated with the premises. Installation and material used for the Ameren required external grounding electrode must meet all NEC requirements for size, material, and installation. If an external grounding electrode system is connected in an outdoor location at the self-contained meter socket or CT enclosure provided by the customer to meet NEC grounding requirements, then this grounding electrode system will also meet Ameren's requirement for an external grounding electrode.
  - Where other electrodes are available inside a premises, these become the grounding electrode system and **MUST NOT** be connected to the driven outside electrode that terminates within the self-contained meter socket, meter disconnects, or the CT enclosure, **EXCEPT** via the grounded (neutral) conductor. This wiring method will ensure that normal neutral currents **WILL NOT** flow on equipment grounding conductors. This method is allowed by the NEC where certain conditions are met. (Reference the latest NEC 250.142(A), for grounding equipment use of grounded circuit conductor.)
  - Where the customer has a main service disconnect mounted within 10 feet and in sight of the Ameren self-contained meter socket or CT enclosure, connection of an external grounding electrode system to the service equipment disconnect is acceptable in lieu of landing in the utility metering equipment.
4. Exceptions to the grounding methods found in section 500 must be approved by Ameren Engineering prior to construction.



# SINGLE-PHASE AND 3-PHASE SELF-CONTAINED METERING LESS THAN 480 VOLTS

(Service Manual Figure 500-2 & Figure 500-3)

## GROUNDING METHODS

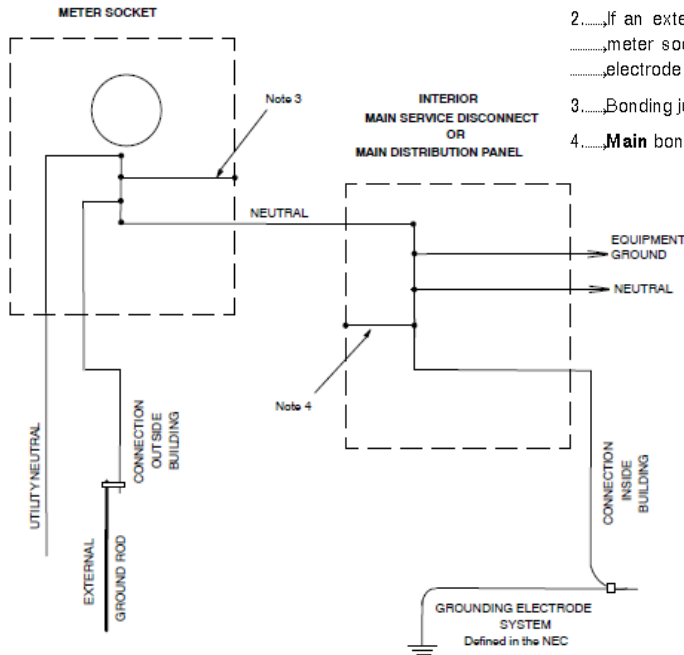
### ➔ 1Ø AND 3Ø SELF-CONTAINED METERING LESS THAN 480 VOLTS

#### Option 1 – Interior Main Disconnect

Figure 500-2

#### Notes: (Figure 500-2)

1. Refer to section 500.03.
2. If an external grounding electrode system is connected in an outdoor location at the self-contained meter socket provided by the customer to meet NEC grounding requirements, then this grounding electrode system will also meet Ameren's requirement for an external grounding electrode.
3. Bonding jumper between neutral and case
4. **Main** bonding jumper between neutral and case



#### Notes: (Figure 500-3)

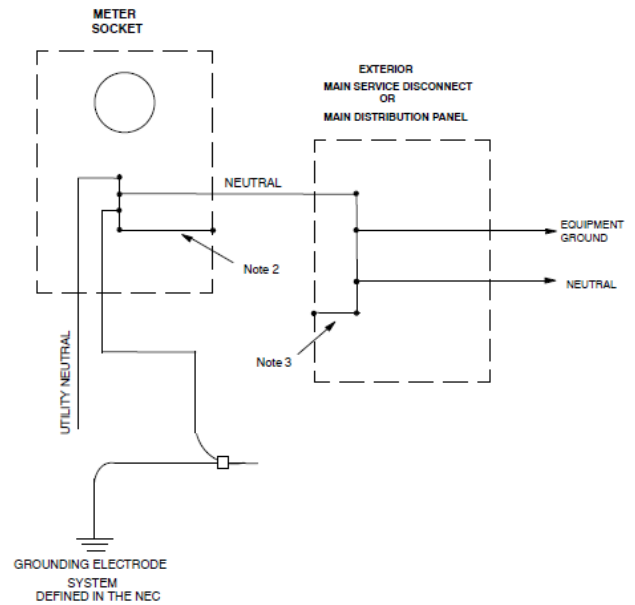
1. Refer to section 500.03
2. Bonding jumper between neutral and case
3. **MAIN** bonding jumper between neutral and case

## GROUNDING METHODS

### ➔ 1Ø AND 3Ø SELF-CONTAINED METERING LESS THAN 480 VOLTS

#### OPTION 2 – Exterior Main Disconnect

Figure 500-3

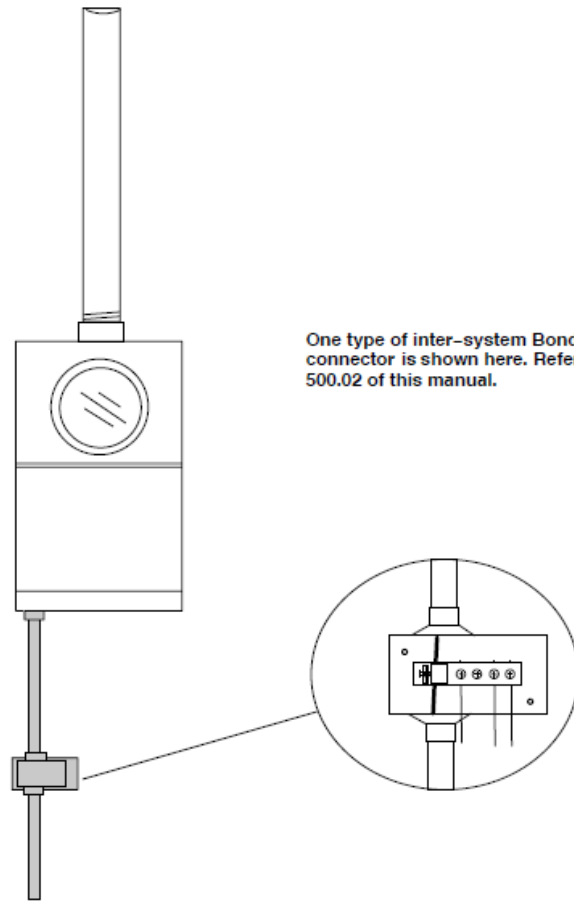


## Inter-system bonding (Refer to Figure 500-1)

The National Electrical Code requires in most situations an inter-system bonding termination to be made between the electrical system and other communication/broadband(CATV) systems located external to the main service disconnect, CT enclosure, or self-contained meter socket to minimize the potential differences between equipment of different systems. This inter-system bond shall not be attached to the meter socket, meter socket lid, or CT enclosure.

This connector must be listed for the intended purpose and solidly affixed to the premises wall or other substantial premises structure

**TYPICAL  
INTER-SYSTEM BONDING  
FIGURE 500-1**



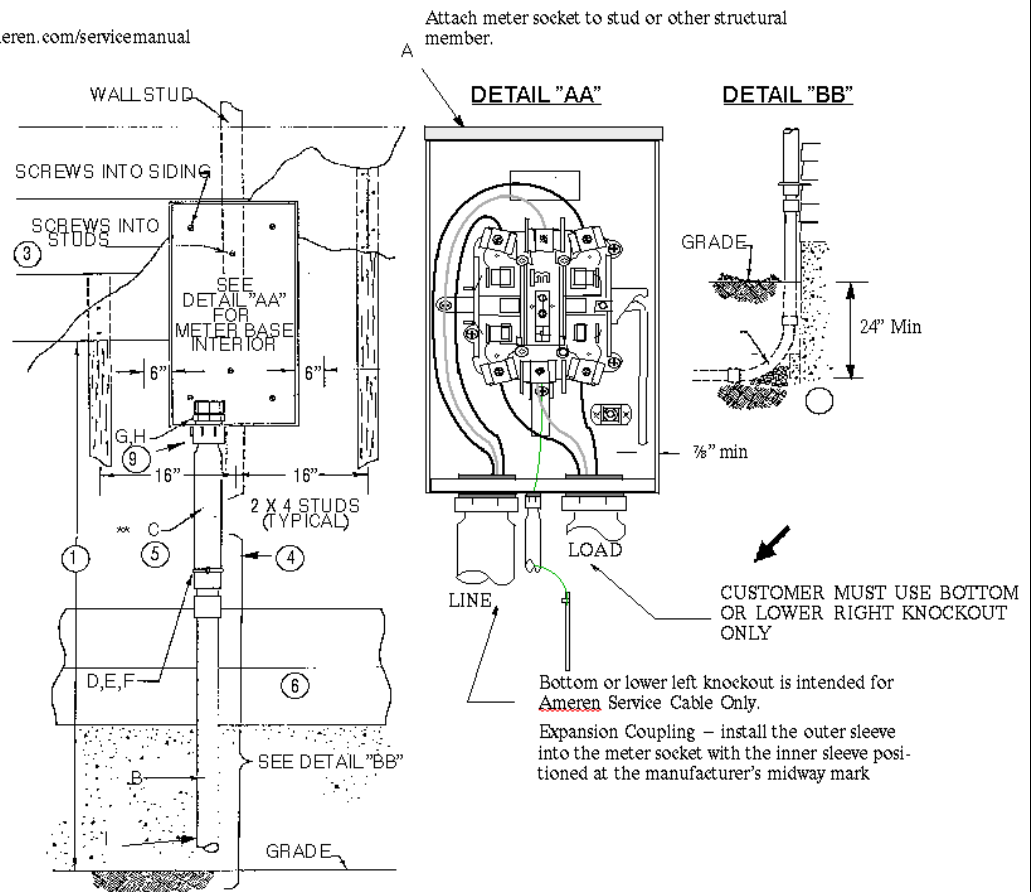
# SERVICE CABLE AND METER CONNECTION SINGLE FAMILY DWELLING (200 AMP SERVICE) (Ameren Service Manual Figure 700-1)

## NOTES: (Figure 700-1)

- See Section 200 of the Service Manual for mounting height, approved locations and requirements for mechanical protection.
- All materials except the supply cables shall be furnished, installed and connected by customer.
- The meter socket shall be secured to solid wood, use #14 x 3 in. wood screws or stainless steel screws. In brick, use expansion shields and lag screws. No drywall screws accepted.
- The conduit hanger shall be securely fastened, preferably by a lag screw into the floor joist. If attached to the foundation, a lead expansion shield shall be used. An alternative to the expansion shield is a stud shot into the foundation.
- When back filled, expansion coupling "C" shall be installed. The expansion coupling should be installed so the outer sleeve into the meter socket with the inner sleeve positioned at the manufacturer's midway mark. The expansion coupling is only required for continuous conduit.
- The area underneath the bend shall consist of good quality fill material and dirt free of debris. The area shall be compacted around the foundation wall. Acceptable fill materials: Sand, limestone screenings, concrete slurry, concrete.
- Approved NEC ground required.
- For services 200 amperes and less, 2-1/2 in. electrical grade Schedule 40 PVC conduit, expansion coupling, bends, and connectors shall be used. For services 201 amperes to 400 amperes, 3 in. Schedule 40 PVC conduit, expansion coupling, bends, and connectors shall be used.
- Conduit Riser for Ameren service cable shall enter left knockout of meter socket.

Refer to Ameren Approved Meter Equipment listing using attached link:

<http://www.ameren.com/servicemanual>



## NOTE:

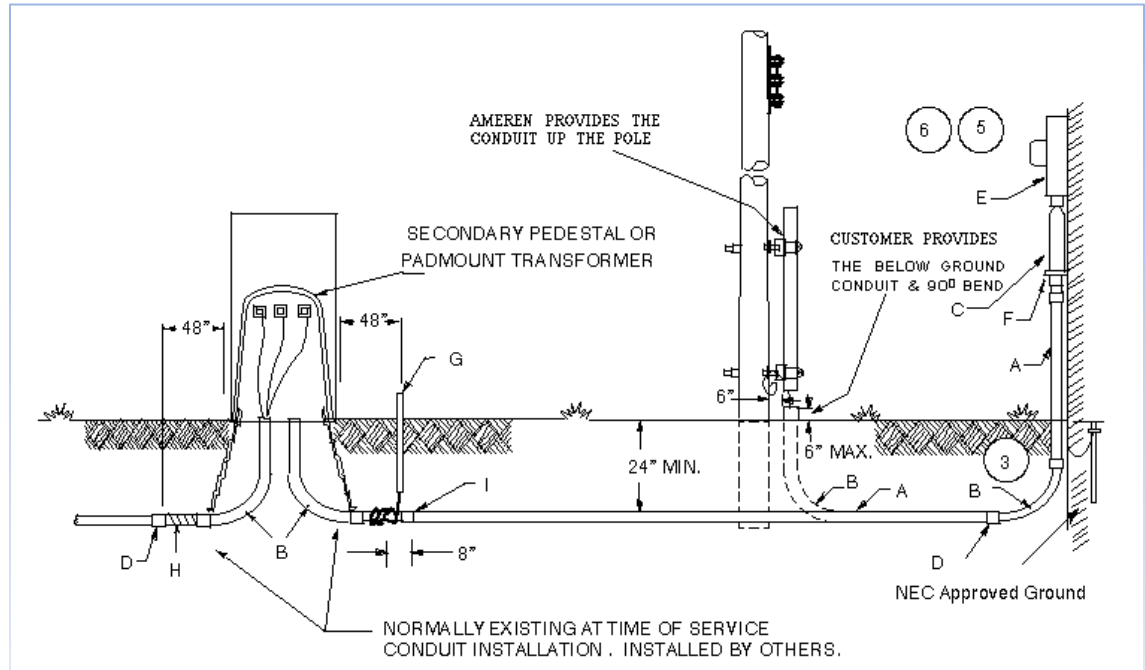
Ameren installed service cable will only enter through the bottom left hand knockout. No customer wiring is permitted on the left hand side of the device where the conduit that would contain Ameren's service cable enters the device. This area must be kept clear to permit installation and potential replacement of Ameren-owned service cable and to eliminate the possibility of premature failures due to cables coming in contact with each other. If improper wiring is performed, service cable will NOT be installed by Ameren.

| Note |   | MATERIAL FURNISHED AND INSTALLED BY CUSTOMER FOR SERVICE INSTALLED IN CONDUIT   |
|------|---|---|
| 1    | A | Meter Socket, Clamp Jaw Lever Bypass, <a href="http://www.ameren.com/servicemanual">http://www.ameren.com/servicemanual</a> |
|      | B | Conduit, electrical grade Sch 40 PVC or greater, 2-1/2 or 3 in.   |
| 5    | C | Coupling, Expansion, Sch 40, PVC, 2-1/2 or 3 in., 8 in. fall  |
|      | D | Hanger, Conduit   |
|      | E | Screw, Lag  |
|      | F | Shield, Expansion   |
|      | G | Nut, Lock, 2-1/2 or 3 in.   |
|      | H | Insulated Bushing, Conduit 2-1/2 or 3 in.   |
| 8    | I | Bend, Conduit, 90 Deg., 24 in. Radius, electrical grade Sch 40, PVC or greater, 2-1/2 or 3 in., when required.              |



# INSTALLATION DETAIL AT PEDESTAL OR TRANSFORMER OR POLE

(Service Manual Figure 700-6)



## NOTES for Figure 700-6:

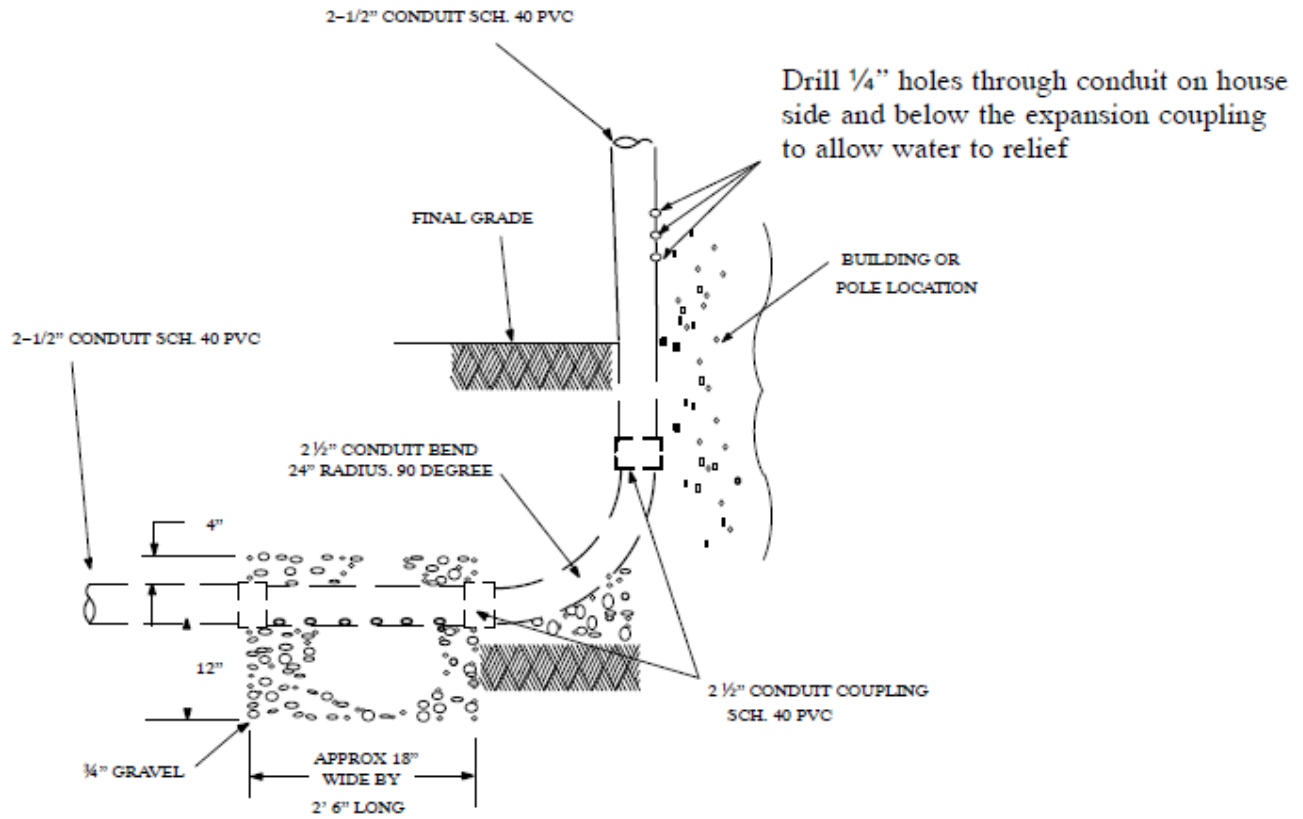
- Customer installed conduit shall be installed along the shortest route and the number of bends shall be kept to a minimum. There shall be a maximum of 3-90 degree bends for any installation. All sections shall be securely fastened together using standard grade cement. Minimum burial depth is 24". In rock or untrenchable soil, depth may be reduced to 12" if cable(s) in conduit. Depths less than 12" are not permitted.
- The trench bottom shall be undisturbed, firm and uniform for its entire length. If it is impossible to achieve uniformity in the trench bottom it must be over-excavated 4 to 6 inches and the bottom refilled with good quality properly compacted bedding material. Approved materials: sand, limestone screenings, concrete slurry, concrete.
- Minimum bend radius is 24" for 2-1/2" or 3" conduit.
- Conduit seals on customer service conduit are the customer responsibility and should be accomplished at the building wall.
- See Meter Location for required meter socket and riser attachment.
- See Service Manual, Section 200 for meter socket mounting height.
- NEC approved ground required.
- If equipment is not in place, the location where it will be installed shall be obtained from company representative before conduit installation. The customer shall seal and mark the conduit end.
- Contractor installed flexible conduit shall point in the direction of the service. The conduit will extend 48" beyond the edge of the pedestal or transformer pad. \*End is marked with red tape or similar manner.

| Note | Description   |
|------|---|
|      | A Conduit - Electrical Grade Sch. 40 PVC, 2-1/2 or 3 in.                                |
|      | B Bend-Conduit 2-1/2 or 3 in., 90°, 24 in. min Radius, Electrical Grade Sch. 40, PVC    |
| 11   | C Expansion Coupling, 2-1/2 in. or 3 in. (allow 8 in. fall) Electrical Grade Sch 40 PVC |
|      | D Coupling-Conduit, 2-1/2 in. or 3 in., Electrical Grade Sch 40, PVC                    |
|      | E Meter Socket, Clamp Jaw Lever Bypass  |
|      | F Hanger-Conduit  |
|      | G Market-Buried Conduit, Red, 1" w x 7/4" L   |
|      | H Conduit-2 1/2 in. Plastic Flexible or 3 in. and Corrugated                            |
|      | I Plug-Conduit, 2-1/2 in. or 3 in.  |

- To attach the conduit to the previously installed flexible conduit, first locate the end of the conduit by digging down by the red marker until the protective PVC cover is located. After removing the cover, plug and conduit marker, join the flexible conduit to the rigid conduit using standard grade cement. In cases where the service conduit and conduit stubbed out of a pedestal or transformer differ in size, the customer will be responsible for making the conduit connection.
- When an expansion coupling is required, it should be installed so that the outer sleeve is connected to the meter socket and on top of the inner sleeve. The inner sleeve should be positioned at the manufacturer's midway mark.
- For customer conduit extensions to overhead poles, Company will designate the quadrant of the pole for the customer to stub up the conduit bend. Actual installation of the conduit varies by Ameren area. Contact your local Ameren representative for direction. Customer shall install and secure at each end a polyester pulling tape of 2500lb capacity for pulling in service conductor.



**CUSTOMER OWNED AND INSTALLED SERVICE CONDUIT -  
CUSTOMER DRAINAGE INSTALLATION AT METER/POLE IF REQUIRED**  
(Service Manual Figure 700-7)



② **CUSTOMER DRAINAGE INSTALLATION  
IF REQUIRED AT METER or POLE**

**DRAINAGE CONDUIT SECTION OF CONDUIT CONTAINING  
6 - 1/2" DIA HOLES DRILLED ON 4" CENTERS. REAM INSIDE  
OF CONDUIT TO REMOVE SHARP EDGES.**

Note:

1. Customer Conduit Installation for 2-1/2 in. PVC.
2. 24 in. min radius conduit bends are required.



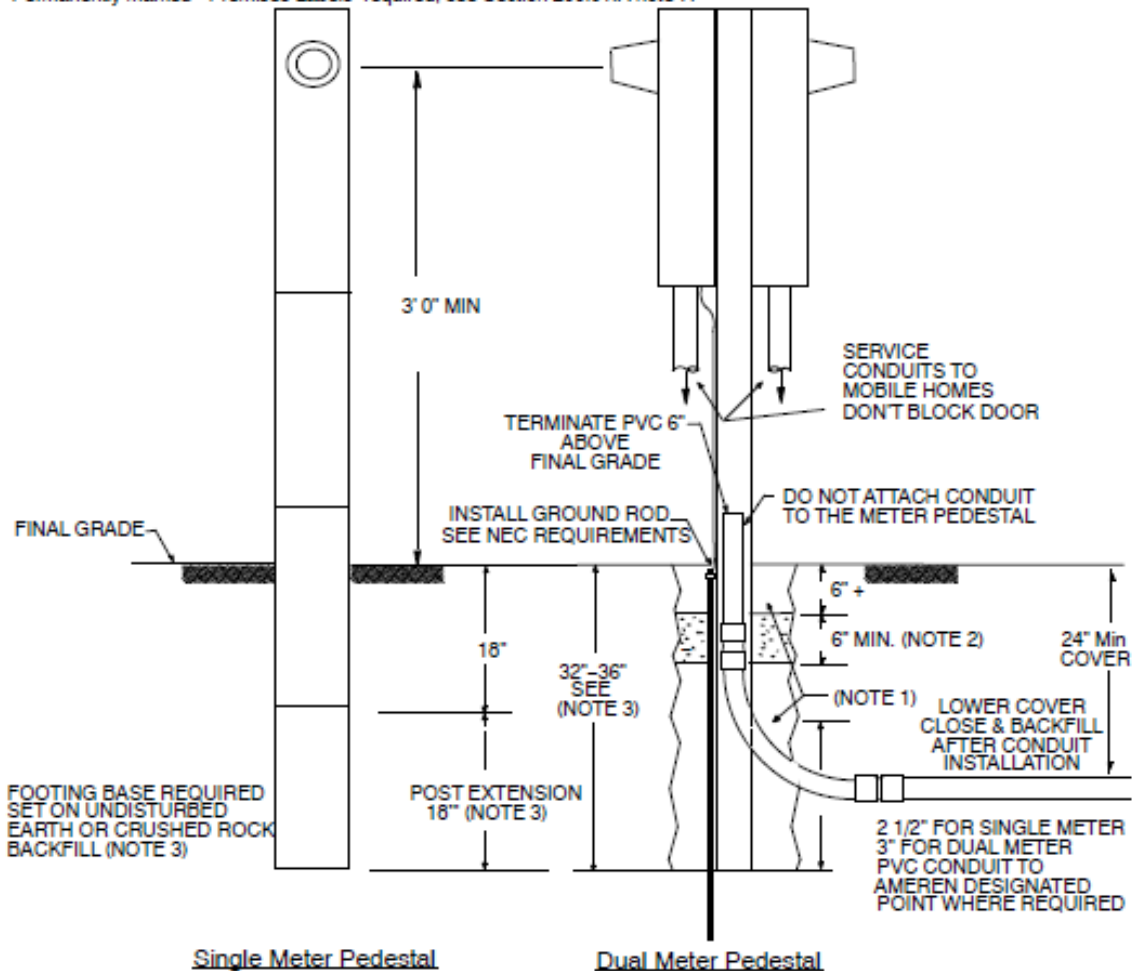


# Meter Pedestal Installation Single or Dual Meter (Ameren Service Manual Figure 700-14)

## METER PEDESTAL INSTALLATION SINGLE OR DUAL METER Figure 700-14

### EQUIPMENT NOTES:

- All materials shall be furnished and installed by customer.
- Pedestals shall be labeled for service equipment by U.L. and approved by Ameren.
- Install ground rod for each service per NEC requirements.
- Install weather proof disconnect on each service
- Permanently marked "Premises Labels" required, see Section 200.01.A note 7.

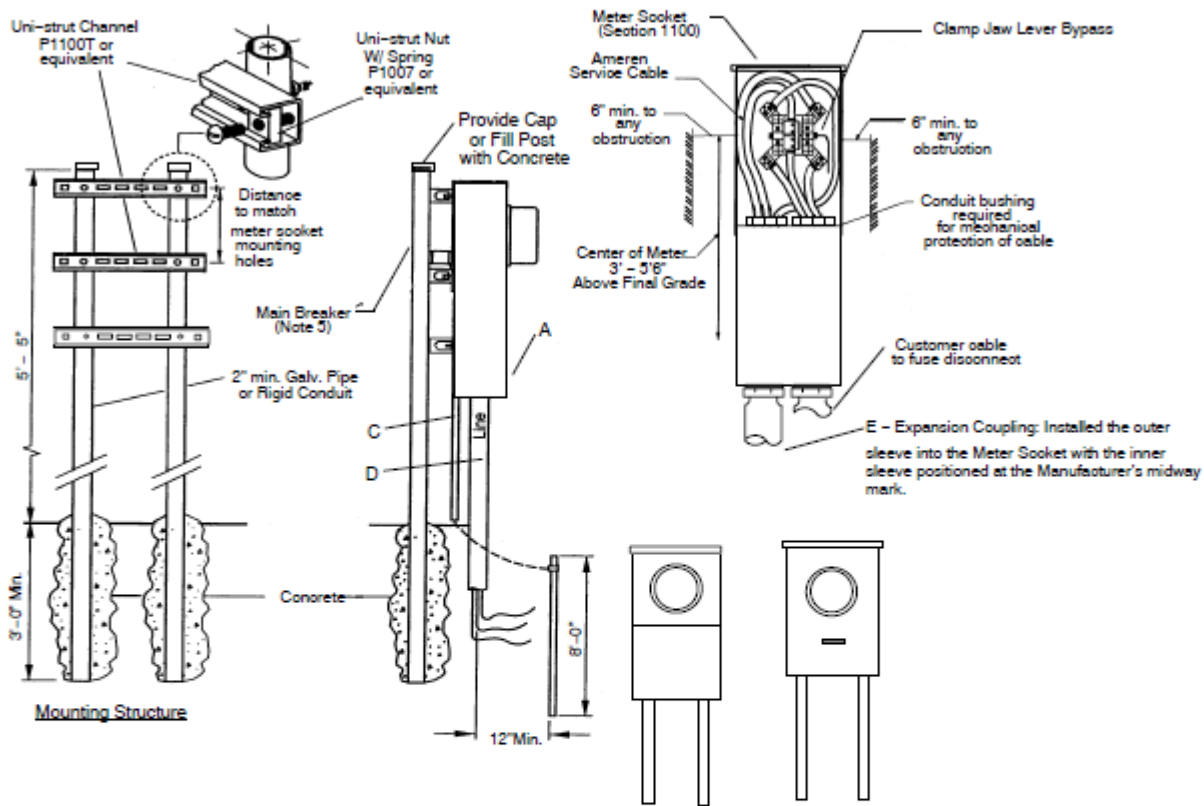


### NOTES:

- Backfill with tamped crushed rock screening including entire conduit elbow.
- Place concrete collar 6 in. thick, min., 6 in. below grade to firm earth as shown.
- 32 in. to 36 in. pedestal embedment required. Order post extension and footing base with meter post as shown.
- Owner shall be responsible to see that pedestal is firmly embedded in ground, and plumb to within 1" in 12" vertical.
- Conduit shown shall be installed with a minimum of 30" of cover to the 24" radius bend into channel. Direct buried cable can be installed with 24" of cover.
- Service conduit should not block supply cable access door.

# Meter Support for UG Meter Service (Ameren Service Manual Figure 700-9)

## METER MOUNTING SUPPORT FOR UG METER SERVICE – Meter Socket, Meter/Breaker Combo or Instrument Rated Meter Socket Figure 700-9



| Notes |   | Description   |
|-------|---|---|
| 5, 6  | A | Meter Socket, Clamp Jaw Lever Bypass  |
|       | C | ½ in. PVC Conduit   |
|       | D | Conduit—Electrical Grade Sch 40 PVC or Sch 80 PVC if subject to physical damage |
| 8     | E | Expansion Coupling, Sch 40 PVC, 8 in. fall                                      |

### NOTES:

1. The installation of all entrance equipment, conductors and conduit shall conform to local codes or the latest NEC. Requirements.
2. All material shall be furnished and installed by customer.
3. NEC approved ground required.
4. Different arrangements of the service equipment (fuse/breaker box) may be used side-by-side or below meter.
5. Refer to Section 1100 for meter sockets or combo units requirement.
6. Instrument rated meter sockets **In MO:** stock #40 04 246-8 Terminal and stock #40 04 245 - 13 Terminal; **In IL:** stock #40 54 378 - 8 Terminal and stock #40 54 353 - 13 Terminal
7. Refer to Section 200 for meter mounting height.
8. When an expansion coupling is required, it should be installed so that the outer sleeve into the meter socket with the inner sleeve positioned at the manufacturer's midway mark.

## MATERIALS TO BE FURNISHED & INSTALLED BY CUSTOMER

Meter socket – 200 or 320 amp\*, UL listed, Ringless, clamp jaw lever bypass type, 5-terminal, 600 Volt AC with lay-in lugs for up to 350 AL wire, designed for UG service

To get the latest catalog number information for the devices, please use the website as indicated below. (Note: **Ameren Missouri only accepts meter mounting devices from the list, and if failure to comply the requirements may delay service until requirement is met.**)

<http://www.ameren.com/servicemanual>

## IF CONDUIT SYSTEM

**Conduit** – Schedule 40 or greater, PVC, Rigid, Electrical Grade, Gray, Size: 2 ½” for 200 amp (under 200’ length), 3” if over 200’ and for all 320 amp installations.

**Solvent type conduit cement, couplings, hangers, fittings, bushings, etc.** – As needed.

**Expansion Coupling** – Same size as Conduit.

**Conduit Bends** – Schedule 40, PVC, Rigid, 24” radius bend for 2 ½ ” conduit or 36” radius bends for 3” conduit, same size as conduit (maximum of 3 bends permitted).

## CUSTOMER CHECKLIST

- Correct type & size meter socket installed? (see [www.ameren.com/servicemaual](http://www.ameren.com/servicemaual) for details) Meter socket properly installed? (securely fastened to wall, 3’ to 5’6” above finished grade, and proper located (see Location for Point of Delivery on Buildings)
- Permanent unobstructed work space left in front of meter socket? (minimum 3 1/2’ of clear working space in front of meter and 6” above, below, and to each side of the meter socket, 6’ 6” standing headroom)
- Expansion coupling installed in the left bottom meter socket knockout is for complete conduit system only and is not required in direct buried applications.
- Customer wiring completed and inspected as necessary?
- Correct conduit size and length of service installed? (see material list for details)
- All conduit that is subject to traffic damage is required to be Schedule 80 PVC or greater.
- Conduit installed (see Installation detail at Pedestal or Transformer or Pole) for complete conduit system only.
- Grade over conduit within 6” of final grade over entire length of conduit? Customer installed conduit shall be a depth that will result in a minimum depth of 24” after final grading.
- Clear work area required around meter and Ameren Missouri transformer, pedestal, or pole.
- Cost arrangements made and easements provided? (as required)

Ameren Missouri Work Request No. \_\_\_\_\_

Engineering Contact: \_\_\_\_\_ Phone: \_\_\_\_\_

Construction Contact: \_\_\_\_\_ Phone: \_\_\_\_\_

***Thank you for letting Ameren Missouri serve your energy needs.***

