

## METERING INSTALLATION REQUIREMENTS

### Table of Contents - Section 300

PARAGRAPH	PAGE
<b>300.0 METERING AND SERVICE ENTRANCE EQUIPMENT .....</b>	<b>1</b>
300.1 GENERAL .....	1
300.2 METERED AND UNMETERED CONDUCTORS .....	1
300.3 SEALING OF METERS AND METERING EQUIPMENT .....	1
300.4 UNACCEPTABLE EQUIPMENT IN SEALED AREAS .....	2
<b>301.0 METER LOCATION REQUIREMENTS .....</b>	<b>3</b>
301.1 METER AND SERVICE LOCATIONS .....	3
301.2 PLANNING AND GROUPING FOR ADDITIONAL METERS .....	3
301.3 METER LOCATIONS – RESIDENTIAL .....	3
301.3-1 METER LOCATIONS - FACTORY-BUILT BUILDINGS/HOMES .....	3
301.3-2 RESIDENTIAL SERVICE - SINGLE DWELLING METER LOCATIONS .....	4
301.4 METER LOCATIONS - RESIDENTIAL MULTI-FAMILY BUILDINGS .....	5
301.5 METER LOCATIONS - COMMERCIAL AND INDUSTRIAL .....	5
301.6 UNACCEPTABLE METER LOCATIONS .....	5
301.7 WORKING SPACE (600 volts or less) .....	6
301.8 BARRICADE/BARRIER POSTS .....	9
301.8-1 BARRIER POSTS FOR EQUIPMENT WITHOUT DOORS .....	10
301.8-2 BARRIER POSTS FOR EQUIPMENT WITH ONLY ONE DOOR .....	10
301.8-3 BARRIER POSTS FOR EQUIPMENT WITH MORE THAN ONE DOOR .....	12
301.9 METER ROOM REQUIREMENTS .....	13
301.9-1 UNACCEPTABLE EQUIPMENT IN METER ROOMS .....	17
301.9-2 METER ROOM VENTILATION .....	17
301.10 LOCK BOX LOCATION .....	17
301.11 RESIDENTIAL ELECTRIC METER CLOSET REQUIREMENTS .....	18
301.11-1 RESIDENTIAL ELECTRIC METER CLOSET REQUIREMENTS .....	19
301.12 MAIN SWITCH LOCATION .....	20
301.13 METER AND MAIN SWITCH SEQUENCE .....	20
301.14 TYPICAL SEMI-FLUSH INSTALLATION .....	20
301.15 ELECTRIC METER SEPARATION BETWEEN, GAS METER, AND FUEL SOURCES .....	21
301.15-1 ELECTRIC, WATER AND GAS METER SEPARATION .....	21
301.15-2 ESTABLISHING GAS CLEARANCES DURING CONSTRUCTION .....	22
301.15-3 REQUIRED SEPARATION FROM FUEL SOURCES .....	23
301.16 ROLL-UP DOORS .....	24

PARAGRAPH		PAGE
<b>302.0</b>	<b>SPECIAL CONSIDERATIONS</b>	<b>25</b>
302.1	METER AND SERVICE LOCATION LABELING IDENTIFICATION BY CUSTOMER	25
302.1-1	SERVICE IDENTIFICATION	26
302.2	METER HEIGHT	26
302.3	MAIN SWITCH	26
302.3-1	MULTIPLE SERVICE DISCONNECTS (Two to Six)	27
302.4	FOREIGN DEVICES IN SEALABLE CABINETS	28
302.5	METER SOCKET ENCLOSURES	28
302.6	PROPER INSTALLATION OF COUPLINGS AND GUTTERS	28
302.7	TERMINATIONS OR LUGS FURNISHED BY APS (Underground)	28
302.8	SECURED IN PLACE (S.E.S.)	28
302.9	REQUIRED APPROVAL FOR METERING IN SERVICE EQUIPMENT	28
302.10	EUSERC - ELECTRIC UTILITY SERVICE EQUIPMENT REQUIREMENTS COMMITTEE	29
302.11	SERVICE ENTRANCE SECTION	29
302.12	OVERHEAD RISER AND BUS DUCT RISER REQUIREMENTS	29
302.13	(RESERVED)	29
302.14	METER TYPES USED ON APS SYSTEM	29
<b>303.0</b>	<b>SELF-CONTAINED METERING</b>	<b>30</b>
303.1	EQUIPMENT FURNISHED AND INSTALLED BY APS - STANDARD OFFER CUSTOMERS ONLY	30
303.2	EQUIPMENT FURNISHED AND INSTALLED BY THE CUSTOMER	30
303.3	SELF-CONTAINED SOCKET RATINGS	30
303.4	SOCKET ENCLOSURES	30
303.5	METER SOCKET CLOSING DEVICES	30
303.6	SAFETY TEST BLOCKS	31
303.6-1	SINGLE-PHASE SAFETY TEST BLOCK INSTALLATIONS	31
303.6-2	THREE-PHASE SAFETY TEST BLOCK INSTALLATIONS	31
303.7	HIGH LEG LOCATION (3Ø 4W DELTA SERVICE)	31
303.8	CONNECTION DIAGRAM FOR SELF CONTAINED METER SOCKETS - DWG #G1	32
303.9	TYPICAL MULTI METERING ARRANGEMENTS - DWG#G2	33
303.10	TYPICAL UNDERGROUND SERVICE TERMINATIONS ARRANGEMENTS - DWG #G3	34
303.11	SAFETY-SOCKET BOX WITH TEST BY-PASS FACILITIES FOR MULTIPLE SELF-CONTAINED METER INSTALLATION -DWG #G4	35
303.12	MULTI METERING AND SERVICE FOR SPEC BUILDINGS	36
303.13	MOBILE HOME & TEMPORARY METER PEDESTAL - 1Ø 3 WIRE 120/240 VOLT SERVICE	37
303.14	120 VOLTS 1Ø 2 WIRE - METERING PEDESTAL	38

PARAGRAPH		PAGE
<b>304.0</b>	<b>C.T. METERING .....</b>	<b>39</b>
304.1	EQUIPMENT FURNISHED AND INSTALLED BY APS STANDARD OFFER CUSTOMERS ONLY .....	39
304.2	EQUIPMENT FURNISHED AND INSTALLED BY CUSTOMER .....	39
304.2-1	C.T. METER SOCKETS (See Section 300 Paragraph 305.8 for self-contained meter sockets) .....	39
304.3	POWER LEG LOCATION (3ø 4W DELTA SERVICE) .....	39
304.4	EQUIPMENT FURNISHED AND INSTALLED BY CUSTOMER .....	39
304.5	OUTDOOR SERVICE ENTRANCE SECTION PADS .....	40
304.5-1	OUTDOOR SERVICE ENTRANCE SECTION PADS .....	41
304.5-2	OUTDOOR SERVICE ENTRANCE SECTION PADS .....	42
304.5-3	OUTDOOR SERVICE ENTRANCE SECTION PADS IN REMOTE LOCATIONS WITH NO ACCESS TO WATER .....	43
304.6	INDOOR SERVICE ENTRANCE SECTION HOUSEKEEPING PADS .....	44
<b>305.0</b>	<b>INSTALLATION REQUIREMENTS FOR THE TOTALIZED METERING OF ELECTRIC LOAD .....</b>	<b>45</b>
305.1	GENERAL RULES FOR TOTALIZED METERING INSTALLATIONS .....	45
305.2	INDOOR TOTALIZING/COMBINING CABINETS .....	46
305.2-1	APS OUTDOOR TOTALIZING/COMBINING CABINET .....	47
<b>306.0</b>	<b>TYPICAL STAND ALONE SERVICE ENTRANCE SUPPORTS FOR SERVICE EQUIPMENT .....</b>	<b>48</b>
<b>307.0</b>	<b>JOB SITE POWER (TEMPORARY METER IN PERMANENT POSITION) .....</b>	<b>50</b>

## 300.0 METERING AND SERVICE ENTRANCE EQUIPMENT

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### 300.1 GENERAL

All meter and service equipment installations shall comply with the service requirements of APS and with rules and regulations of the inspection authorities having jurisdiction. All meter sockets and enclosures shall be listed and approved by a recognized testing lab.

If any question arises for which you cannot find the answer in the following pages, it is suggested that you call APS for further information. See Pages "B" and "C" in the front of this manual for telephone numbers and addresses of local APS offices.

Whenever any electrical wiring for service connection is installed whether regulated by inspection authorities or not, provision shall be made for the installation of metering equipment. It shall comply with these service requirements except when existing metering equipment, in the opinion of APS, is satisfactory and adequate to register all current to be supplied.

Whenever one meter registers the electricity supplied to two or more single family residential occupancies, it will be considered a non-residential installation for the purpose of these requirements.

**When a Customer does his own wiring, he will be considered the electrical contractor for the purpose of these requirements.**

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### 300.2 METERED AND UNMETERED CONDUCTORS

**Line side (unmetered) and load side (metered) conductors shall not occupy the same raceway or enclosure. Exception:** Meter socket and current transformer enclosures.

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### 300.3 SEALING OF METERS AND METERING EQUIPMENT

**All meters, meter facilities and all points of access to unmetered wiring on the Customer's premise shall be sealed by APS. All cabinets, conduit fittings and equipment enclosures containing unmetered conductors shall be made sealable by the Customer before service will be energized. The breaking of seals and tampering with meters or unmetered wiring by unauthorized persons is prohibited and subject to penalty of the law. (See Section 100, Paragraph 100.17).**

Stud and wing-nut assembly, or sealing screws shall be used for sealing all removable panels and covers to compartments used for routing or terminating unmetered conductors.

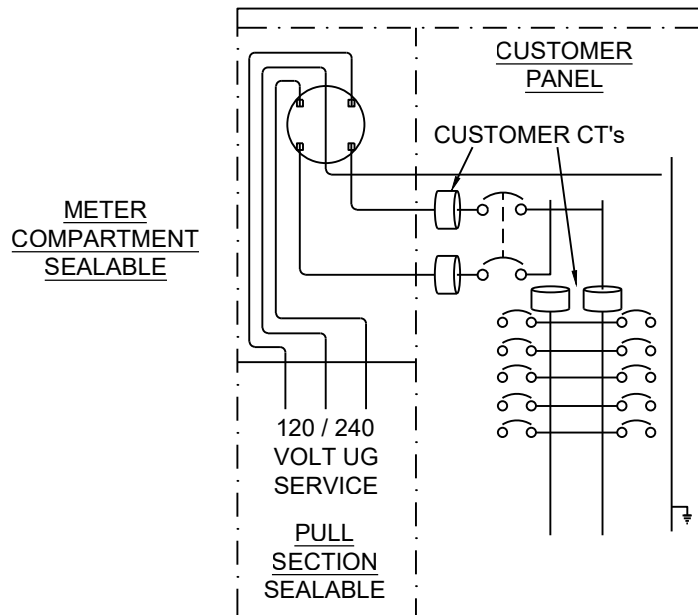
When a stud and wing-nut assembly is used for sealing, the stud shall be 1/4" x 20 (minimum). The stud and wing nut shall each be drilled .0635" (minimum) for sealing purposes.

All sealing screws shall be drilled .0635" (minimum) for sealing purposes.

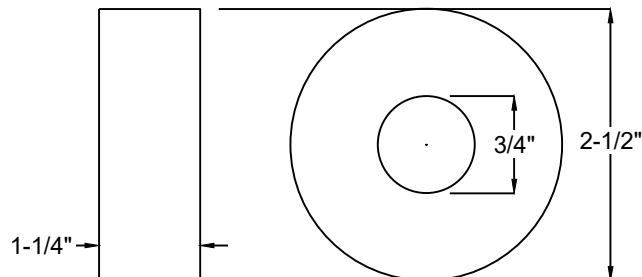


### 300.4 UNACCEPTABLE EQUIPMENT IN SEALED AREA

APS AND INDUSTRY POLICY SPELS OUT THAT NO "CUSTOMER" RELATED EQUIPMENT BE ALLOWED IN THE SEALABLE (METERING) AREA OF ANY SERVICE ENTRANCE GEAR. ALL SUCH EQUIPMENT SHALL BE INSTALLED IN THE NON-SEALED PORTION OF THE SERVICE ENTRANCE EQUIPMENT. EXAMPLE: LOAD CONTROL CURRENT TRANSFORMERS MUST BE IN THE NON-SEALED AREA OF THE SERVICE ENTRANCE GEAR.



### ACCEPTABLE CUSTOMER EQUIPMENT LOCATION



\* CURRENT TRANSFORMER DIMENSIONS  
\* THESE ARE GENERAL DIMENSIONS OF CURRENT TRANSFORMERS AVAILABLE WITH EXISTING DEMAND CONTROLLERS. THERE MAY BE NEW UNITS IN THE FUTURE THAT WILL NOT CONFORM TO THESE DIMENSIONS.

TYPICAL 100 - 200 AMP  
ALL IN ONE METER CAN - RESIDENTIAL

## 301.0 METER LOCATION REQUIREMENTS

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### 301.1 METER AND SERVICE LOCATIONS

**APS reserves the right to determine all meter and service locations.** Only authorized APS personnel shall determine these locations. See Section 100, Paragraph 102.20 and Section 200, Paragraph 200.0.

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### 301.2 PLANNING AND GROUPING FOR ADDITIONAL METERS

Occasionally there is a need to locate and install additional service and metering equipment after the originally planned electric service for a building is installed and energized.

The additional meters must be grouped with those already in services, and be installed in accordance with the established meter location plan for the building.

The added service equipment must be located and installed in conformance with applicable codes, laws, and ordinances of the inspection authority having jurisdiction, and with the requirements of this Service Requirements Manual.

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### 301.3 METER LOCATIONS - RESIDENTIAL

For single family residential buildings, meters and metering equipment shall be installed:

- a. Outdoors and mounted on or recessed in an exterior building wall, but not under a carport, breezeway, patio, porch, or in any area that can be enclosed, or
- b. Outdoors in a meter pedestal or service entrance section, but not under a carport, breezeway, patio, porch, or in any area that can be enclosed, or
- c. In a room within the building, approved by APS, for the location of electric meters, and with access only by a door opening to the outside of the building. See Paragraph 301.9 for meter room requirements.

In addition, the meter area must be readily accessible (See Section 100, Paragraph 102.20) without requiring passage through restricted private areas, gates or fences. See next page for acceptable meter locations for single family residences. **The meter and main switch shall be installed next to each other on the same wall.** See Paragraph 301.13.

**NOTE:** See Section 500, Paragraph 506.6-1 for requirements for mobile home pedestals.

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#### 301.3-1 METER LOCATIONS - FACTORY-BUILT BUILDINGS/HOMES

Factory-built buildings and homes (FBBs) shall meet the following requirements before meters and metering equipment can be mounted on the building:

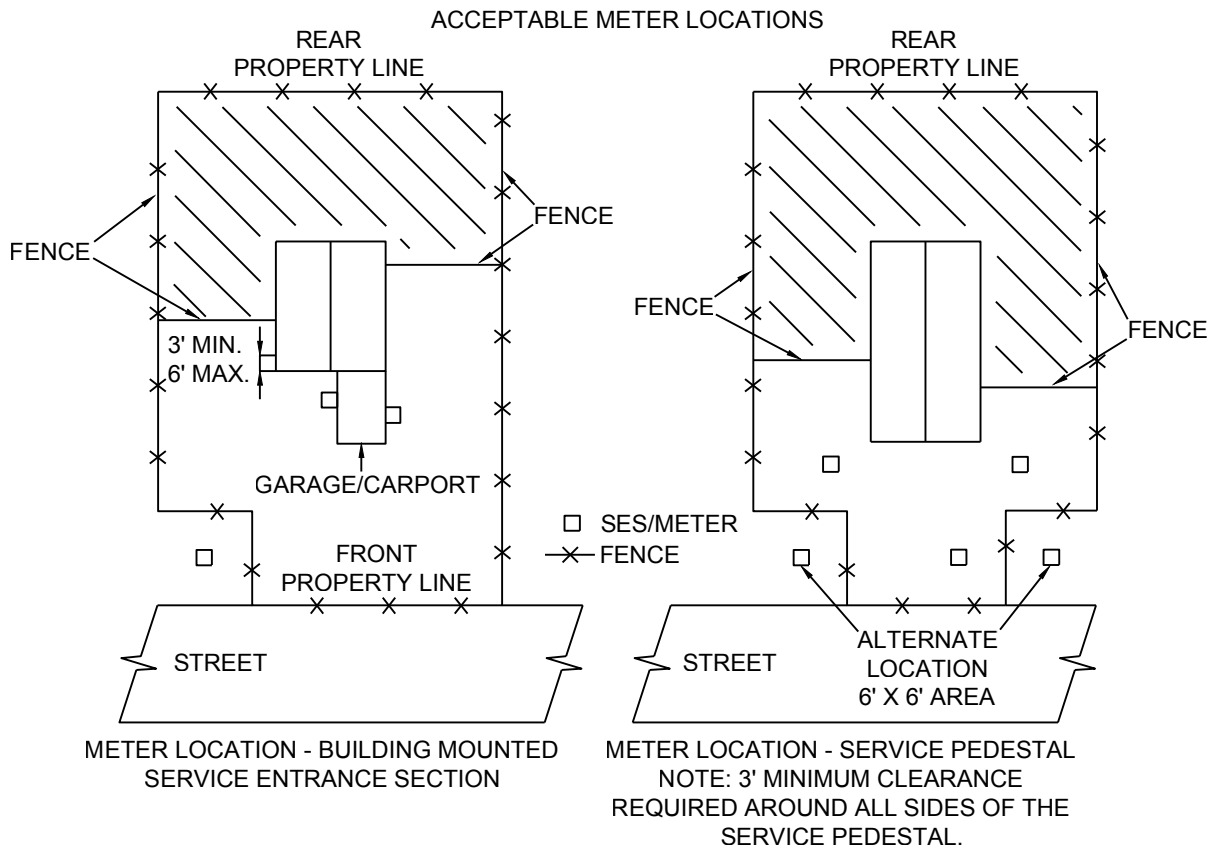
1. FBBs shall be secured on a permanent foundation (Type E) per HUD Permanent Foundations Guide for Manufactured Housing - December 1996 and requirements of the authority having jurisdiction.
2. The trailer tongue, axles and wheels shall be removed.
3. The meter panel shall meet all APS requirements.
4. Service entrance equipment attached to FBB's shall be completely installed by the manufacturer of the structure.
5. Meter location shall be per Paragraphs 301.3 or 301.5.
6. For overhead applications refer to Section 400.
7. For underground applications refer to Section 500.

**NOTE:** If the above requirements #1 - #3 are not met, a meter pedestal shall be required.

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**APS RESERVES THE RIGHT TO DETERMINE ALL METER AND SERVICE LOCATIONS.**

1. THE METER AND MAIN SWITCH SHALL BE ACCESSIBLE FOR READING AND MAINTENANCE WITHOUT PASSING THROUGH RESTRICTED AREAS, GATES, OR FENCES.
2. ALL METER AND MAIN SWITCHES SHALL BE LOCATED THREE FEET MINIMUM TO SIX FEET MAXIMUM ON THE FRONT CORNER OF A RESIDENCE, NEAREST TO THE POINT OF AVAILABLE SERVICE, AS DETERMINED BY APS ON AN EXTERIOR WALL OR ALTERNATE LOCATION (SUBJECT TO LOCAL INSPECTION AUTHORITY), BUT NOT UNDER A CARPORT, BREEZEWAY, PATIO, PORCH, OR OTHER AREA THAT CAN BE ENCLOSED WITH BUILDING EXPANSION OR FENCE.
3. THE ELECTRIC METER AND MAIN SWITCH "MAY BE" INSTALLED AT AN ALTERNATE LOCATION NOT ATTACHED TO A DWELLING TO ENSURE ACCESSIBILITY. (SUBJECT TO LOCAL INSPECTION AUTHORITY APPROVAL)
4. IF OVERHEAD SERVICE IS AVAILABLE IN THE REAR OF THE PROPERTY (ALLEY OR EASEMENT) THE POINT OF ATTACHMENT MAY BE ON THE REAR OF THE RESIDENCE. THE METER & MAIN DISCONNECT SHALL BE LOCATED PER ITEMS #1 & #2 ABOVE. IT IS THE CUSTOMER'S RESPONSIBILITY TO INSTALL CONDUIT AND WIRING BETWEEN THE METER LOCATION AND THE POINT OF ATTACHMENT. THE CONDUIT SHALL BE LOCATED ON THE EXTERIOR OF BUILDING IN ITS ENTIRETY.
5. WHEN REMODELING EXISTING RESIDENCES, CHECK WITH LOCAL APS OFFICE.
6. SERVICE ENTRANCE EQUIPMENT SHALL BE UTILIZED FOR ITS INTENDED PURPOSE.



#### 301.4 METER LOCATIONS - RESIDENTIAL MULTI-FAMILY BUILDINGS

1. Meters and metering equipment shall be installed:
  - a. Outdoors and mounted on or recessed in an exterior building wall, or
  - b. In a room within the building, approved by APS for the location of electric meters, and with **access only** by a door opening to the outside of the building. See Paragraph 301.9 for meter room requirements.
2. Meters and metering equipment shall not be installed within any residential occupancy.
3. Before meters can be installed in multiple residential panels, each individual meter socket must be permanently and clearly identified. See Meter Identification, Paragraph 302.1. Permanently affixed identification tags are also required on all apartment/condo doors and buildings.

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#### 301.5 METER LOCATIONS - COMMERCIAL AND INDUSTRIAL

1. Location of metering to be approved by the Electric Meter Shop prior to construction.
2. For single occupancy non-residential and industrial buildings, meters and metering equipment shall be installed:
  - a. Outdoors and mounted on an exterior wall with vehicle access, or
  - b. Within a meter room inside the building on the first floor (see Definitions, Section 100, Paragraph 102.12) and with access only by a door opening to the outside of the building with vehicle access. See Paragraph 301.9 for meter room requirements.
3. For multiple occupancy buildings meters and metering equipment shall be located per above Number 2a or 2b, and shall be grouped in one readily accessible central location, accessible to all occupants. Meter sockets must be permanently and clearly identified. See Meter Identification, Paragraph 302.1.
4. In large multiple occupancy buildings, extensive shopping centers or buildings, APS may, at it's option, establish more than one meter location for groups of individual meter facilities. Consult APS prior to construction for approval of service plans.
5. Service stations - the meter location shall be located such that it is a minimum of twenty (20) feet clear of any gas pump and ten (10) feet clear of any gas storage tank fill spout and/or vent.

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#### 301.6 UNACCEPTABLE METER LOCATIONS

For reasons of public safety, maintenance of service equipment, and reliability of metering, meters shall not be installed in any of the following locations:

1. Inside any building, unless located within an acceptable meter room. See Paragraph 301.9.
2. In any location not readily accessible. See Section 100, Paragraph 102.20.
3. In any substation or transformer vault.
4. In any location which may be hazardous to personnel.
5. On any surface subject to excessive vibration.
6. In or accessed through any rest, bath, shower, powder, or toilet room.
7. In any elevated area.
8. In any location not providing a clear and continuously unobstructed working space extending a minimum of three (3) feet from the face of the meter panel, and having a width to permit ready access to the complete metering installation. See Working Space, Paragraph 301.7.
9. In any location where moisture, fumes, or dust may interfere with the operation of the meter, or materially damage it.
10. In any location giving less than three feet clearance to any property line, or with less than three feet clearance to any sidewalk, alley or driveway giving access to non-residential or industrial property.
11. In any basement or depressed area.
12. Within carport or patio areas which are or can become enclosed, when served Overhead or Underground.
13. Mounted on APS poles.
14. In a room containing mechanical equipment.
15. In any elevator shaft or hatchway.
16. Mounted on any trees.
17. In any unsanitary areas in reference to farm animals and products.
18. In a plenum or any portion of a return or supply air ducting system.
19. In a drive-thru area (ex: fast food restaurants, drug stores, banks, etc.).

**NOTE:** If an existing meter panel has had the meter removed for more than 6 months and the panel is in an unacceptable location, the customer is required to move the panel to a location that complies with all applicable ESRM requirements prior to APS reconnecting the service.

## NOTES:

1. TO PERMIT ACCESS TO THE METERING INSTALLATIONS AND PROVIDE SAFETY FOR PERSONNEL, A WORKING AND STANDING SPACE ENTIRELY ON THE PROPERTY OF THE CUSTOMER SHALL BE PROVIDED IN FRONT OF ALL METERING EQUIPMENT.
2. WORKSPACE SHALL BE CLEAR OF OBSTRUCTIONS, INCLUDING A/C UNITS AND PIPING SYSTEMS AND SHALL HAVE A SLOPE TO PROVIDE DRAINAGE AWAY FROM THE METERING EQUIPMENT. MAXIMUM SLOPE ALLOWED IS 1 INCH IN 3 FEET. THERE SHALL BE 10" MINIMUM HORIZONTAL AND 9" MINIMUM VERTICAL CLEARANCES FROM THE CENTER OF THE METER SOCKET TO ANY OBSTRUCTION. WHEN THE PANEL WIDTH IS LESS THAN 36", THE CLEAR WORKING SPACE SHALL BE 18" MINIMUM HORIZONTALLY FROM THE CENTER OF PANEL. IN ALL CASES THE HORIZONTAL CLEARANCE SHALL BE THE GREATER OF EITHER THE 10" MINIMUM FROM THE CENTER OF THE METER SOCKET TO ANY OBSTRUCTION OR 18" MINIMUM FROM CENTER OF PANEL CLEARANCE.

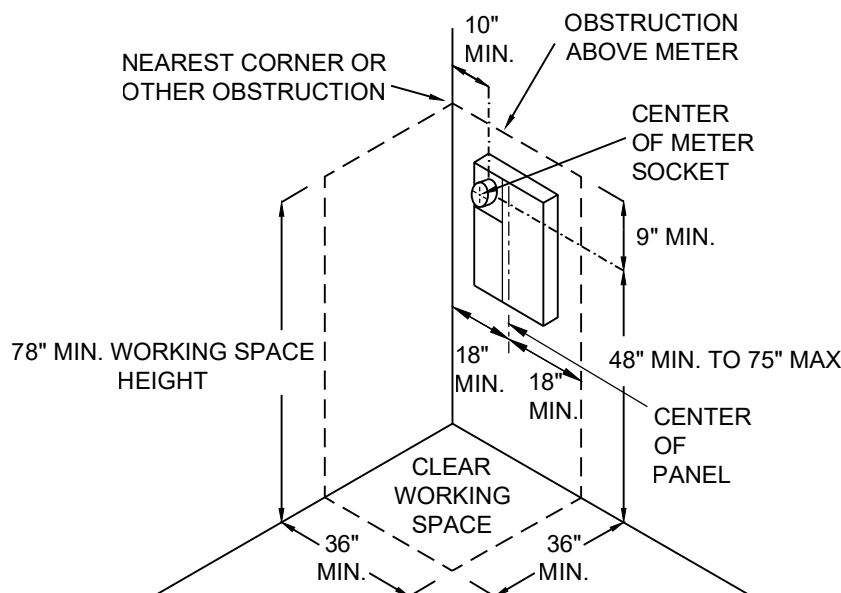


FIGURE 1  
SURFACE OR SEMI-FLUSH  
METER INSTALLATIONS

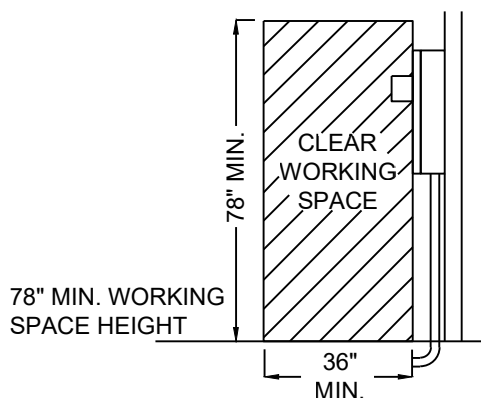
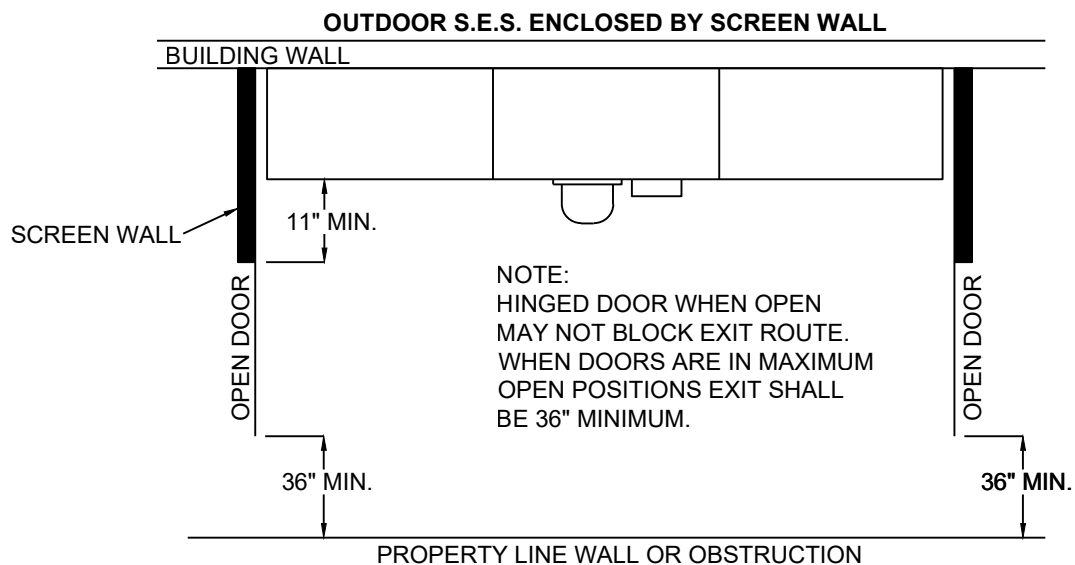
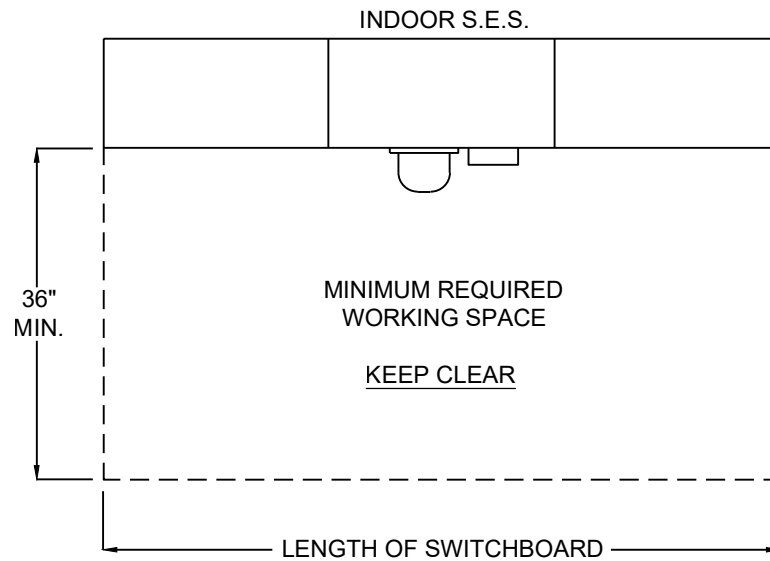


FIGURE 2  
WORKING SPACE - SIDE VIEW

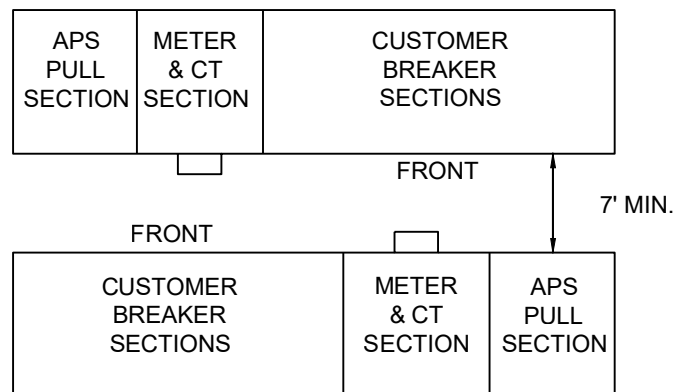
**WORKING SPACE AND CLEARANCE REQUIREMENTS  
(TOP VIEW OF SWITCHBOARD)**



NOTE: Refer to ESRM 301.8 for additional outdoor SES working space, clearance and escape route requirements.

## MULTIPLE SERVICE ENTRANCE SECTIONS

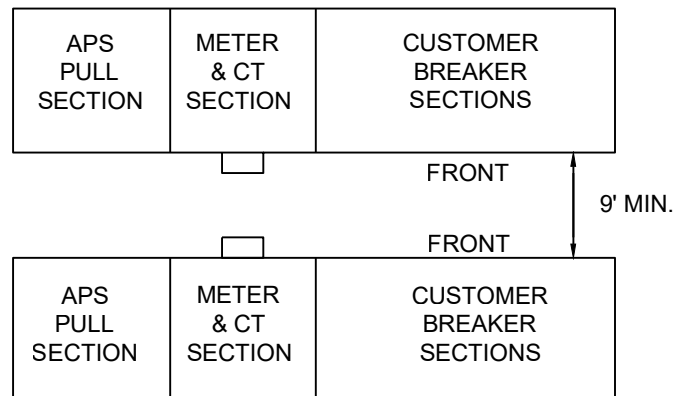
FIGURE 1 - METER STAGGERED



## NOTES

1. SERVICE ENTRANCE SECTIONS THAT FACE EACH OTHER WITH STAGGERED METER LOCATIONS SHALL HAVE A MINIMUM WORKING SPACE OF 7 FEET BETWEEN SERVICE ENTRANCE SECTIONS.
2. TWO EXIT PATHS SHALL BE PROVIDED.

FIGURE 2 - METERS FACE - TO - FACE

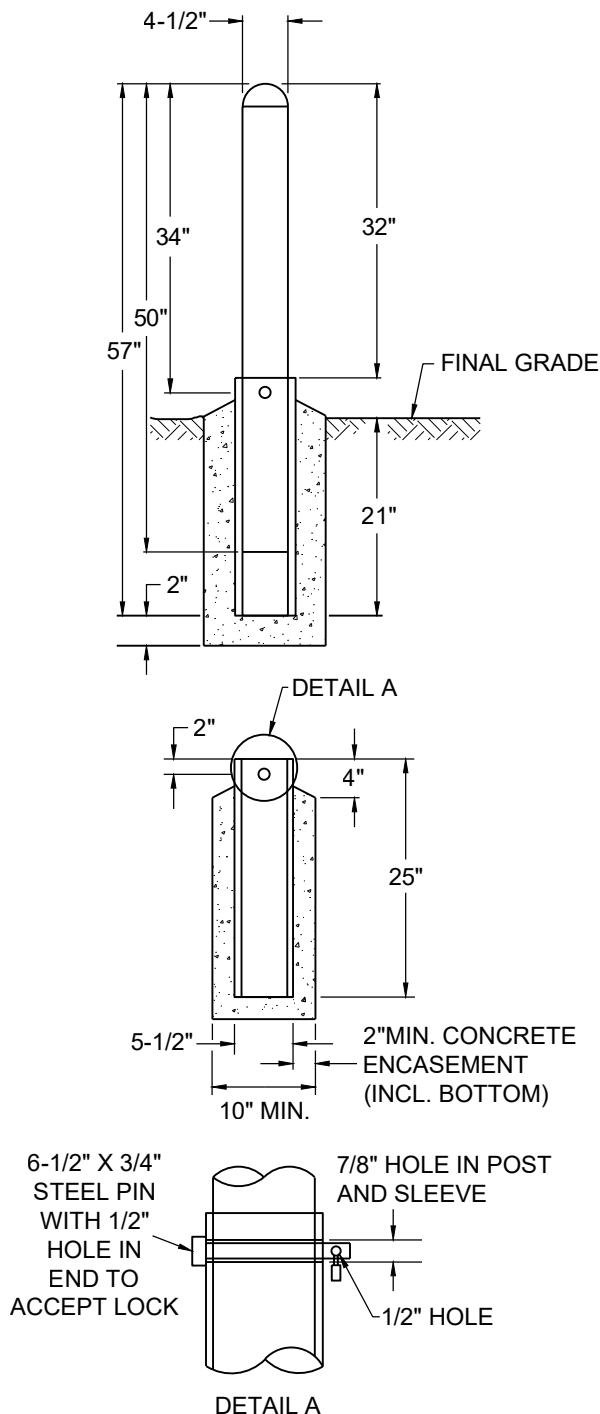
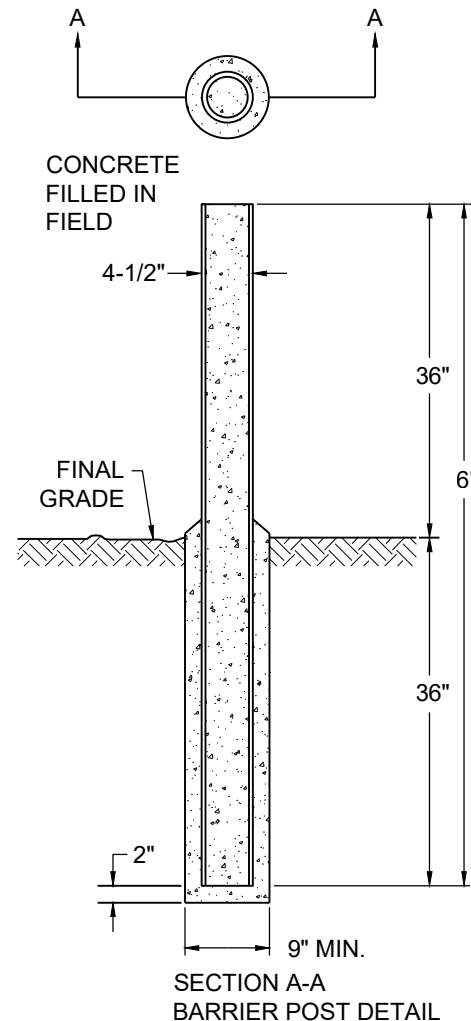


## NOTES

1. SERVICE ENTRANCE SECTIONS THAT FACE EACH OTHER WITH FACE-TO-FACE METER LOCATIONS SHALL HAVE A MINIMUM WORKING SPACE OF 9 FEET BETWEEN SERVICE ENTRANCE SECTIONS.
2. TWO EXIT PATHS SHALL BE PROVIDED.

THE CUSTOMER SHALL FURNISH, INSTALL AND MAINTAIN PERMANENT BARRICADES/BARRIER POST(S) TO PROVIDE CLEARANCES AS SPECIFIED IN ESRM, SECTION 304.5-1, WHERE THE WORKING SPACE IS EXPOSED TO VEHICLES OR HAZARDOUS CONDITIONS. APS SHALL SPECIFY WHEN REMOVABLE POST(S) CAN BE USED. VEHICULAR TRAFFIC OR HAZARDOUS CONDITIONS INCLUDE BUT ARE NOT LIMITED TO MOTORIZED VEHICLES, PALLET JACKS, HAND CARTS, ETC., THAT COULD PHYSICALLY ENTER THE WORKING SPACE OR ESCAPE ROUTE.

POSTS SHALL BE A MINIMUM 4" (4.5" OUTSIDE DIAMETER) GALVANIZED SCHEDULE 40 PIPE, OR 4" (4.5" OUTSIDE DIAMETER) GALVANIZED RIGID METAL CONDUIT.

**REMOVABLE POST****FIXED POST****CONSTRUCTION NOTES:**

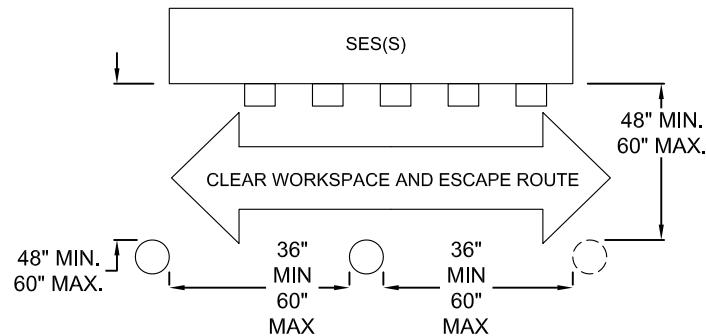
1. USE ADDITIONAL BARRIER CENTER POST AS REQUIRED TO PREVENT TRAFFIC PENETRATIONS TO SES.
2. CAUTION MUST BE TAKEN INSTALLING POSTS SO THAT POSTS DO NOT MAKE CONTACT WITH CONDUIT SYSTEM.
3. STEEL BOLLARD SHALL NOT BE IN CONTACT WITH THE SOIL.
4. CALL ARIZONA811 FOR BLUE STAKING AT 811, TO GET ALL UTILITIES MARKED PRIOR TO EXCAVATION.



301.8-1 BARRIER POSTS FOR EQUIPMENT WITHOUT DOORS

EQUIPMENT WITHOUT DOORS

THE CUSTOMER SHALL PROTECT AN AREA 48" MEASURED FROM THE FRONT OF THE SES FOR THE ENTIRE WIDTH OF THE EQUIPMENT. THE PROTECTED AREA IS INTENDED TO PROVIDE A SAFE WORKSPACE AND CLEAR ESCAPE ROUTE. IF THE DISTANCE FROM THE FRONT OF THE SES TO THE BARRIER POST EXCEEDS 60", THEN ADDITIONAL BARRIER POSTS SHALL BE PROVIDED TO PREVENT SIDE VEHICLE PENETRATION INTO THE WORKSPACE.

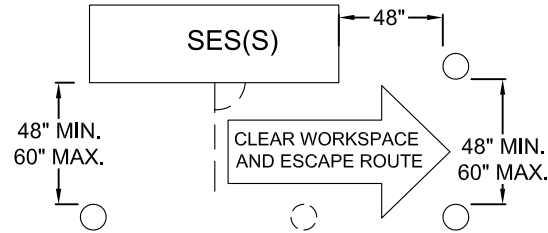


A FIXED BARRIER POST SHALL BE INSTALLED AT EACH END OF THE SES. IF SPACING BETWEEN BARRIER POSTS EXCEEDS 60" INSTALL ADDITIONAL POSTS TO PREVENT VEHICLE PENETRATIONS TO SES WORKSPACE AND ESCAPE ROUTE.

**301.8-2 BARRIER POSTS FOR EQUIPMENT WITH ONLY ONE DOOR**

EQUIPMENT WITH ONLY ONE DOOR

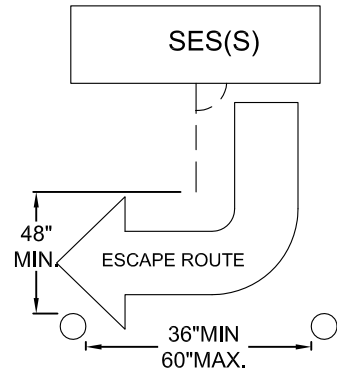
IF A 48" ESCAPE ROUTE CAN BE PROVIDED IN FRONT OF THE SES AND LEADING AWAY FROM THE OPEN SES DOOR THEN THE CUSTOMER SHALL PROTECT AN AREA 48" MEASURED FROM THE FRONT OF THE CLOSED SES DOOR FOR THE ENTIRE WIDTH OF THE EQUIPMENT. IF THE 48" ESCAPE ROUTE LEADING AWAY FROM THE OPEN SES DOOR IS SUBJECT TO VEHICULAR TRAFFIC ADDITIONAL BARRIER POST(S) MAY BE NEEDED TO PROTECT THE ESCAPE ROUTE. (SEE EXAMPLE 1) IF THE DISTANCE FROM THE FRONT OF THE SES TO THE BARRIER POST EXCEEDS 60", THEN ADDITIONAL BARRIER POSTS SHALL BE PROVIDED TO PREVENT SIDE VEHICLE PENETRATION INTO THE WORKSPACE.



**EXAMPLE 1**

A FIXED BARRIER POST SHALL BE INSTALLED AT EACH END OF THE SES. IF SPACING BETWEEN BARRIER POSTS EXCEEDS 60" INSTALL ADDITIONAL POSTS TO PREVENT VEHICLE PENETRATIONS TO SES WORKSPACE AND ESCAPE ROUTE.

IF A 48" ESCAPE ROUTE CAN ONLY BE PROVIDED AROUND THE OPEN SES DOOR THEN THE CUSTOMER SHALL PROTECT AN AREA 48" MEASURED FROM THE END OF THE LOCKED OPEN SES DOOR FOR THE ENTIRE WIDTH OF THE EQUIPMENT. (SEE EXAMPLE 2)

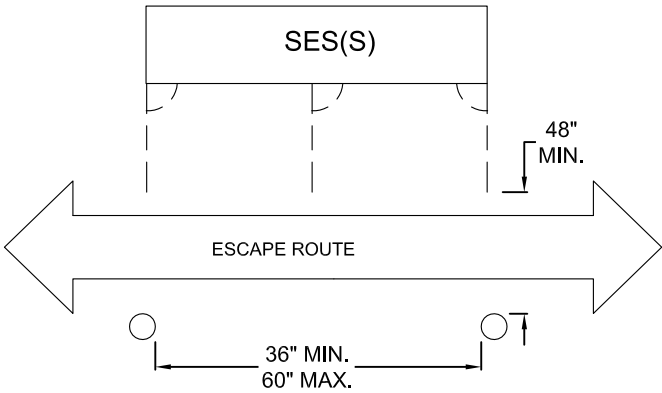


**EXAMPLE 2**

A FIXED BARRIER POST SHALL BE INSTALLED AT EACH END OF THE SES. IF SPACING BETWEEN BARRIER POSTS EXCEEDS 60" INSTALL ADDITIONAL POSTS TO PREVENT VEHICLE PENETRATIONS TO SES WORKSPACE AND ESCAPE ROUTE

**301.8-3 BARRIER POSTS FOR EQUIPMENT WITH MORE THAN ONE DOOR**

EQUIPMENT WITH MORE THAN ONE DOOR  
THE CUSTOMER SHALL PROTECT AN AREA 48" MEASURED FROM THE END OF THE  
LOCKED OPEN SES DOORS FOR THE ENTIRE WIDTH OF THE EQUIPMENT.



A FIXED BARRIER POST SHALL BE INSTALLED AT EACH END OF THE SES. IF  
SPACING BETWEEN BARRIER POSTS EXCEEDS 60" INSTALL ADDITIONAL POSTS TO  
PREVENT VEHICLE PENETRATIONS TO SES WORKSPACE AND ESCAPE ROUTE.

### 301.9 METER ROOM REQUIREMENTS

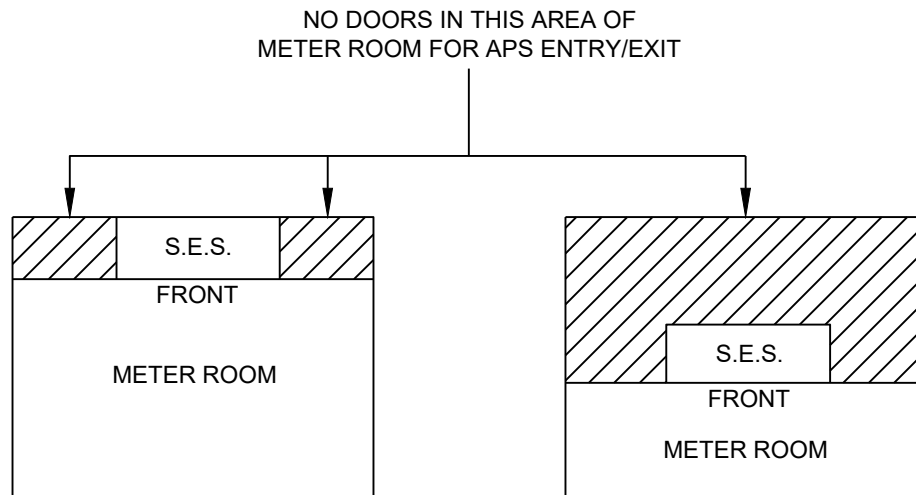
A meter room is a permanent, accessible, illuminated, ventilated room (per NEC section 100), provided by the customer for the exclusive use and location of the Customer's electric service and metering equipment, and for the installation of an APS meter or meters. The one exception to exclusive use will allow the installation of communication equipment provided space requirements for the electric installation is not impaired. Meter rooms shall be provided with a doorway opening to the outside of the building with a kick down doorstep and panic hardware. Meter room shall not provide access to interior of building. Meter room location and design to be approved by APS. For safety's sake, meter rooms are not to be used for storerooms.

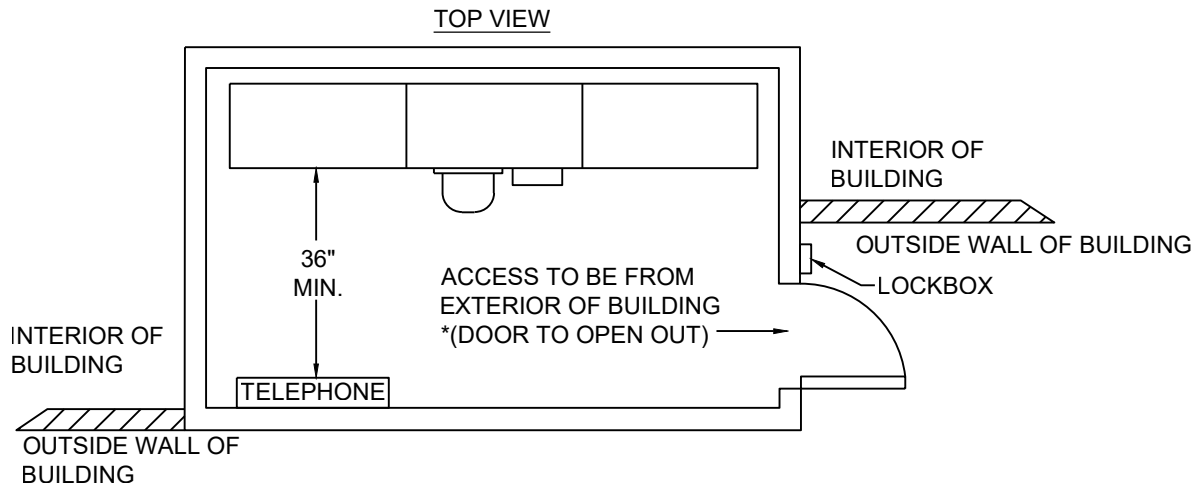
Meter rooms may be locked provided independent access is given to APS. The Customer's key will not be accepted for retention by APS for entry; therefore, locking shall be accomplished only by one of the following methods:

1. Customer may provide and install a device that will allow one pad lock for the Customer and one pad lock for APS on the door, or.
2. The Customer may place a meter room door key in an APS acceptable lockbox installed on or near the door. The meter room key shall not unlock any other door on the premises.

See Paragraph 301.10 for lock box location. Notify APS prior to the design stage for meter room requirements and locations in high rise buildings. (See definitions Section 100—High Rise Building).

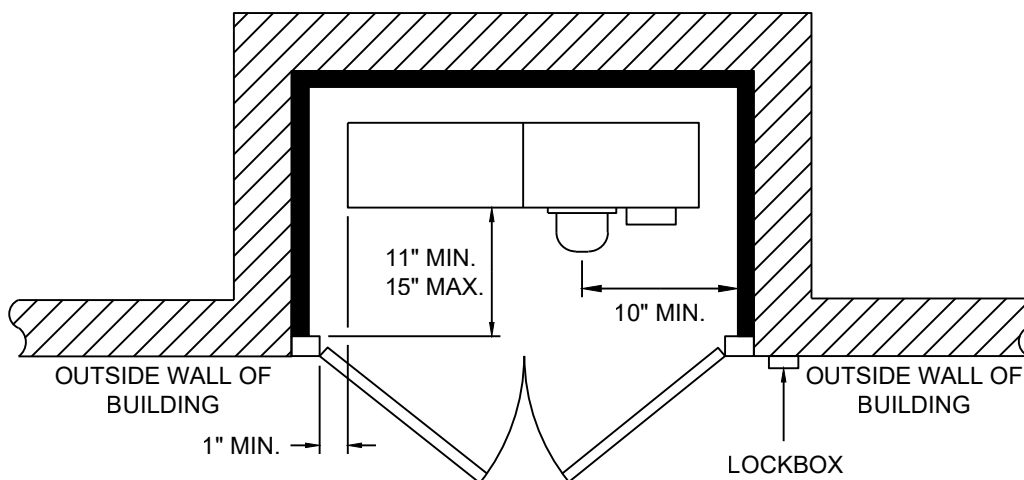
See additional requirements referencing section 301 such as (301.4, 301.5 AND 301.6).





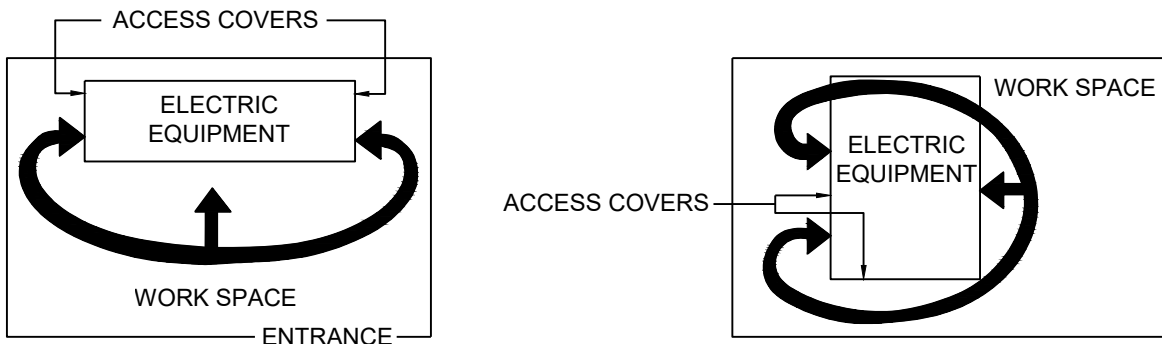
**NOTE: ADDITIONAL CLEARANCES MAY BE REQUIRED BY THE LOCAL INSPECTION AGENCY**

THE FOLLOWING ALTERNATIVE TO A METER ROOM IS ACCEPTABLE TO APS IF THE S.E.S. DOES NOT HAVE ANY REMOVABLE REAR PANELS. CHECK WITH THE LOCAL AGENCY FOR ACCEPTABILITY.

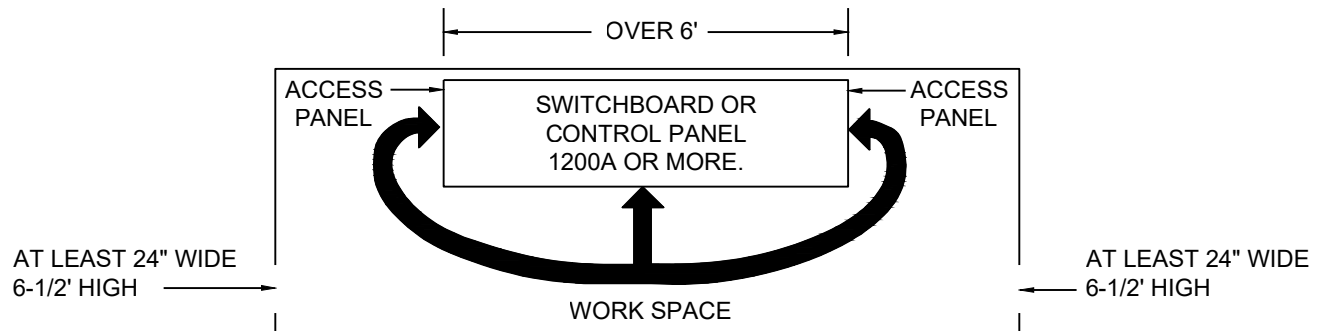


1. SEE REQUIREMENTS FOR LOCKING DOORS. (PARAGRAPH 301.10)
2. 36" CONCRETE PAD REQUIRED IN FRONT OF METERING.
3. SES METER DOORS MUST OPEN 90° (OR MORE) WITH METER AND TEST SWITCH INSTALLED. ALSO, EXTERIOR DOORS MUST BE EQUIPPED WITH A DEVICE TO HOLD THE DOOR IN THE 90° (OR MORE) POSITION.
4. CARE MUST BE EXERCISED TO DESIGN THE ENCLOSED SUCH THAT NEITHER THE ROOF NOR THE DOOR FRAME WILL INTERFERE WITH THE CLEARANCES OR THE INSTALLATION AND MAINTENANCE OF THE METERING EQUIPMENT.
5. WITH EXTERIOR METER DOORS IN OPEN 90° LOCKED POSITION, A 36" EXIT WAY IS REQUIRED BETWEEN DOOR EDGE AND CLOSEST OBJECT.
6. THIS ENCLOSURE IS APPROVED FOR COMMERCIAL LOCATIONS.

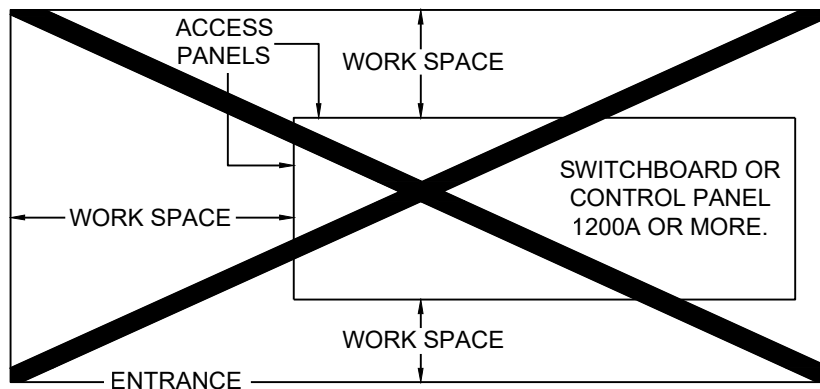
## 301.9 NATIONAL ELECTRIC CODE REQUIREMENTS



AT LEAST ONE ENTRANCE IS REQUIRED TO PROVIDE ACCESS TO THE WORKING SPACE AROUND ELECTRIC EQUIPMENT. THE INSTALLATION SHOWN IN THE SKETCH ON THE RIGHT WOULD NOT BE ACCEPTABLE IF THE ELECTRIC EQUIPMENT WAS A SWITCHBOARD OR PANELBOARD OVER 6' WIDE AND RATED 1200A OR MORE.

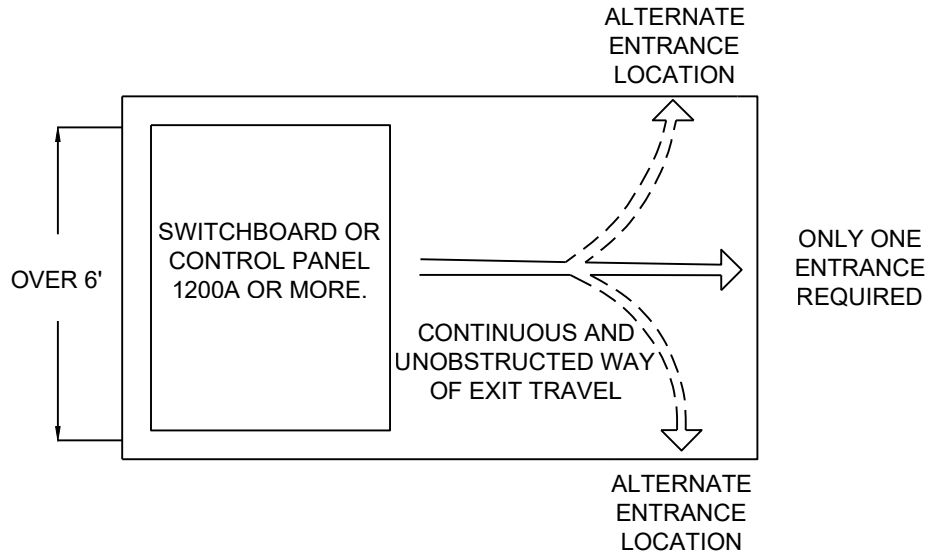


FOR SWITCHBOARDS AND CONTROL PANELS RATED 1200A OR MORE AND OVER 6' WIDE, THERE SHALL BE ONE ENTRANCE NOT LESS THAN 24" WIDE AND 6-1/2' HIGH AT EACH END.



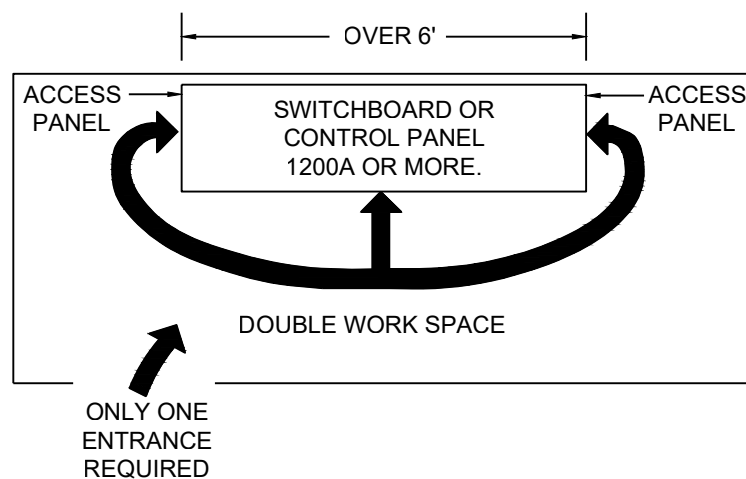
**NOT  
ACCEPTABLE**

EXCEPTION #1: WHERE THE EQUIPMENT LOCATION PERMITS A CONTINUOUS AND UNOBSTRUCTED WAY OF EXIT TRAVEL.



EXCEPTION #1: WHERE THE EQUIPMENT LOCATION PERMITS A CONTINUOUS AND UNOBSTRUCTED WAY OF EXIT TRAVEL.

EXCEPTION #2: WHERE THE WORK SPACE REQUIRED BY SECTION 110-16(A) IS DOUBLED.



EXCEPTION #2: WHERE THE WORK SPACE REQUIRED BY SECTION 110-16(A) IS DOUBLED.

### **301.9-1 UNACCEPTABLE EQUIPMENT IN METER ROOMS**

Equipment not permitted within the electric meter room includes, but is not limited to following:

1. Gas equipment – including piping.
2. Water heaters/boilers – including piping.
3. Mechanical equipment – including motor/generator sets.
4. Batteries and battery charging equipment.
5. Fire risers.

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### **301.9-2 METER ROOM VENTILATION**

Meter room shall have at least two 10" X 10" air vents. Vent locations shall be designed to provide maximum separation, with one vent located high and the other vent located low.

Meter room containing any electrical equipment that produces heat such as a dry type transformer shall require the room air temperature to be maintained at maximum of 95° F.

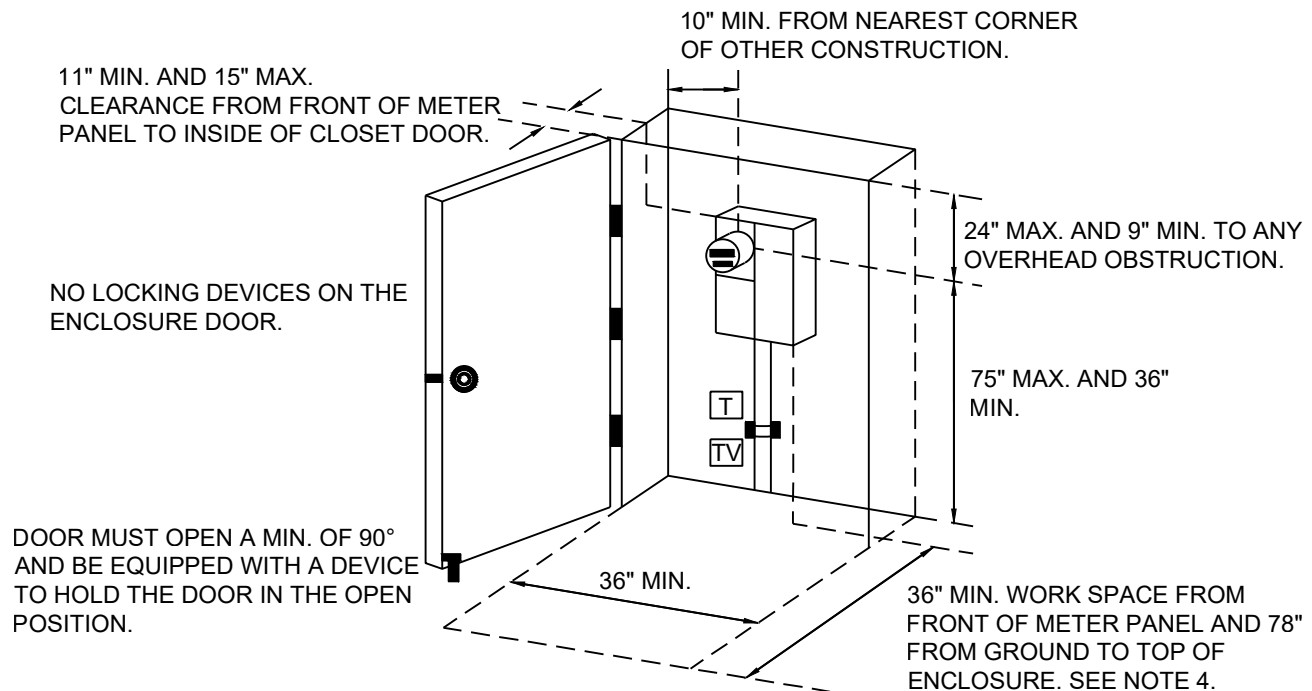
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### **301.10 LOCK BOX LOCATION**

The customer may place a meter room door key in an APS acceptable lock box installed on or within 36" of the door. The minimum height shall be 36" and the maximum height 60". The meter room key shall not unlock any other door on the premises.

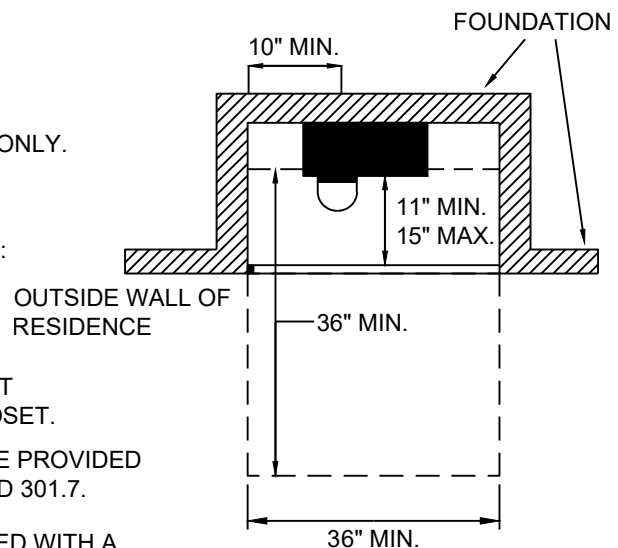


# 301.11 RESIDENTIAL ELECTRIC METER CLOSET REQUIREMENTS - SELF CONTAINED

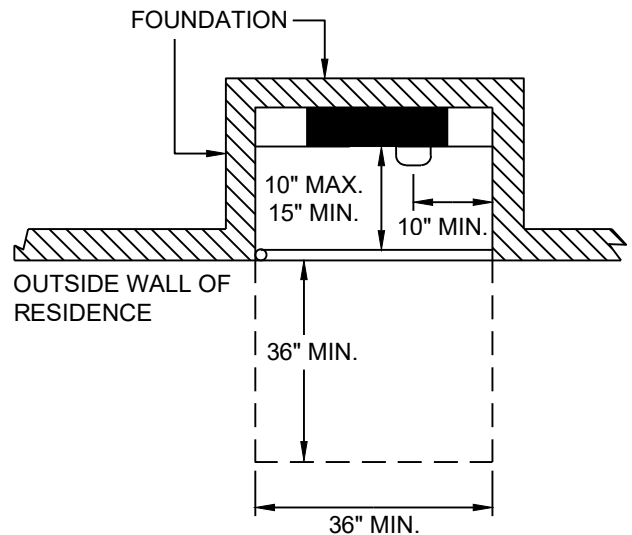
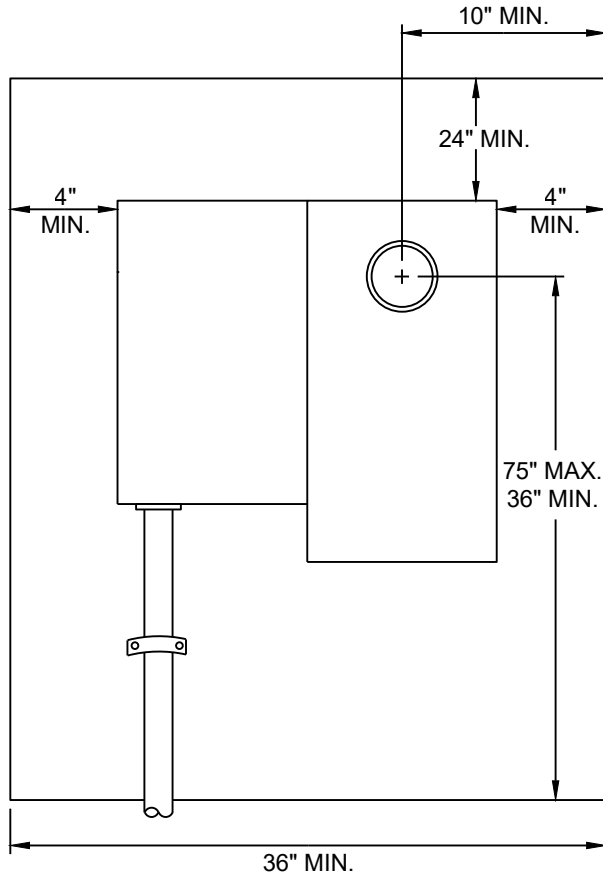


## NOTES:

1. THIS ENCLOSURE IS APPROVED FOR:
  - A. SINGLE FAMILY SELF-CONTAINED USE ONLY.
  - B. COMMUNICATION EQUIPMENT
  - C. CATV
2. THIS ENCLOSURE IS NOT APPROVED FOR:
  - A. GAS SERVICE OR PIPING
  - B. WATER SERVICE OR PIPING
  - C. STORAGE OF ANY KIND
3. THE STRUCTURE FOUNDATION SHALL NOT EXTEND INTO OR UNDER THE METER CLOSET.
4. CLEAR AND LEVEL WORK SPACE SHALL BE PROVIDED PER PARAGRAPH 301.6, NOTES 8, 9, 10 AND 301.7.
5. METER CLOSET DOOR SHALL BE IDENTIFIED WITH A PERMANENT TAG SHOWING "ELECTRIC METER", MANUFACTURE PER 302.1
6. POCKET DOORS ARE ACCEPTABLE.



# 301.11-1 RESIDENTIAL ELECTRIC METER CLOSET REQUIREMENTS - 400 AMPS & LARGER



## NOTES:

- 1) DOOR
  - A) MUST BE THE WIDTH AND HEIGHT OF THE CLOSET
  - B) OPEN 90° WITH DEVICE TO HOLD DOOR IN OPEN POSITION
  - C) HANDLE CAN NOT BE LOCKABLE
- 2) THIS ENCLOSURE APPROVED FOR:
  - A) SINGLE FAMILY
  - B) COMMUNICATIONS EQUIPMENT
  - C) CATV
- 3) THIS ENCLOSURE NOT APPROVED FOR:
  - A) GAS PIPING
  - B) WATER SERVICE OR PIPING
  - C) STORAGE OF ANY KIND
- 4) THE STRUCTURE FOUNDATION SHALL NOT EXTEND INTO OR UNDER THE METER CLOSET.
- 5) CLEAR AND LEVEL WORK SPACE PER 301.6 NOTES 8, 9, 10, AND 301.7.
- 6) METER CLOSET DOOR SHALL BE IDENTIFIED WITH A PERMANENT TAG SHOWING "ELECTRIC METER" MANUFACTURE PER 302.1

### 301.12 MAIN SWITCH LOCATION

The meter and service main switch shall be installed on the same wall adjacent to each other and accessible from the same working area. Exception Fire Pump disconnects may be located at the fire pump control panel. (See Paragraph 302.3 Main Switch).

### 301.13 METER AND MAIN SWITCH SEQUENCE

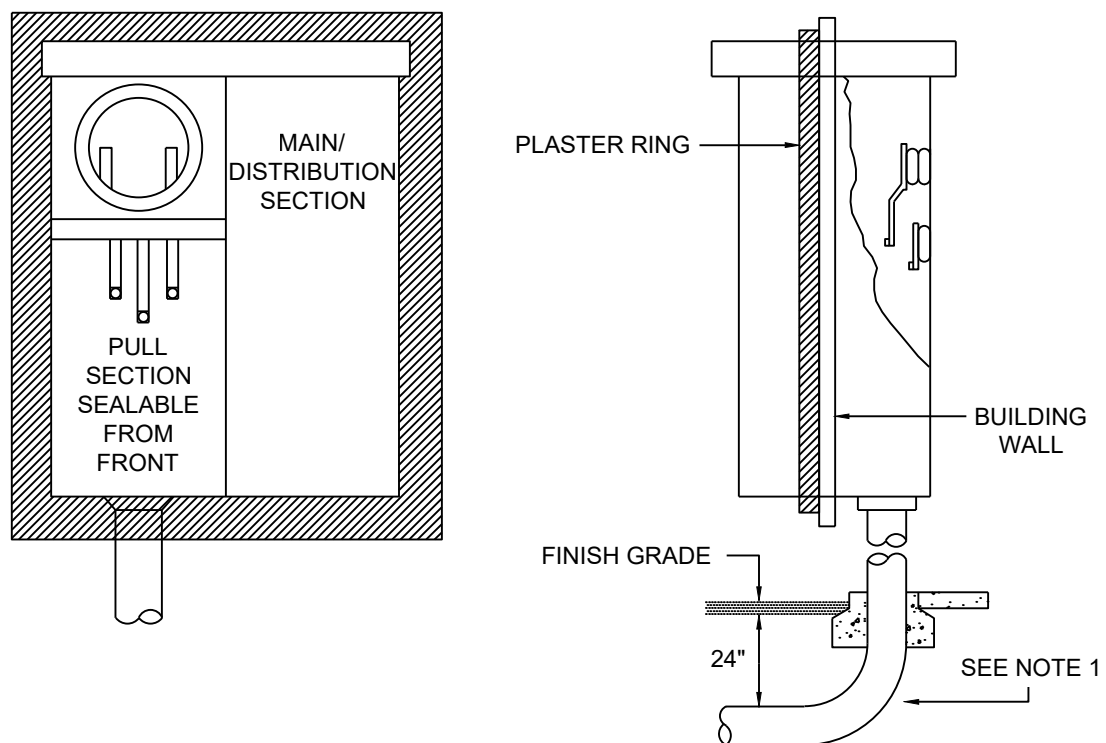
Meters and metering equipment for services of 0 - 600 volts shall be located ahead, or on the supply side, of the customer's main service entrance switch. Exception to this sequence is permissible only when required by electrical codes.

When a single set of service entrance conductors supply a multi-meter installation, numbering from two to six meters, a main switch for each meter shall be located on the load side of each meter.

For multi-meter installations, numbering seven or more meters connected to a single set of service entrance conductors, NEC 230-71 requires the installation of a main service switch located on the supply side of the group of meters (its access door shall be under APS lock and seal). In these instances, an individual main switch must also be installed on the load side of each meter.

**APS shall not allow a main service disconnect ahead of less than seven meters in or on a separate enclosure or switchboard.**

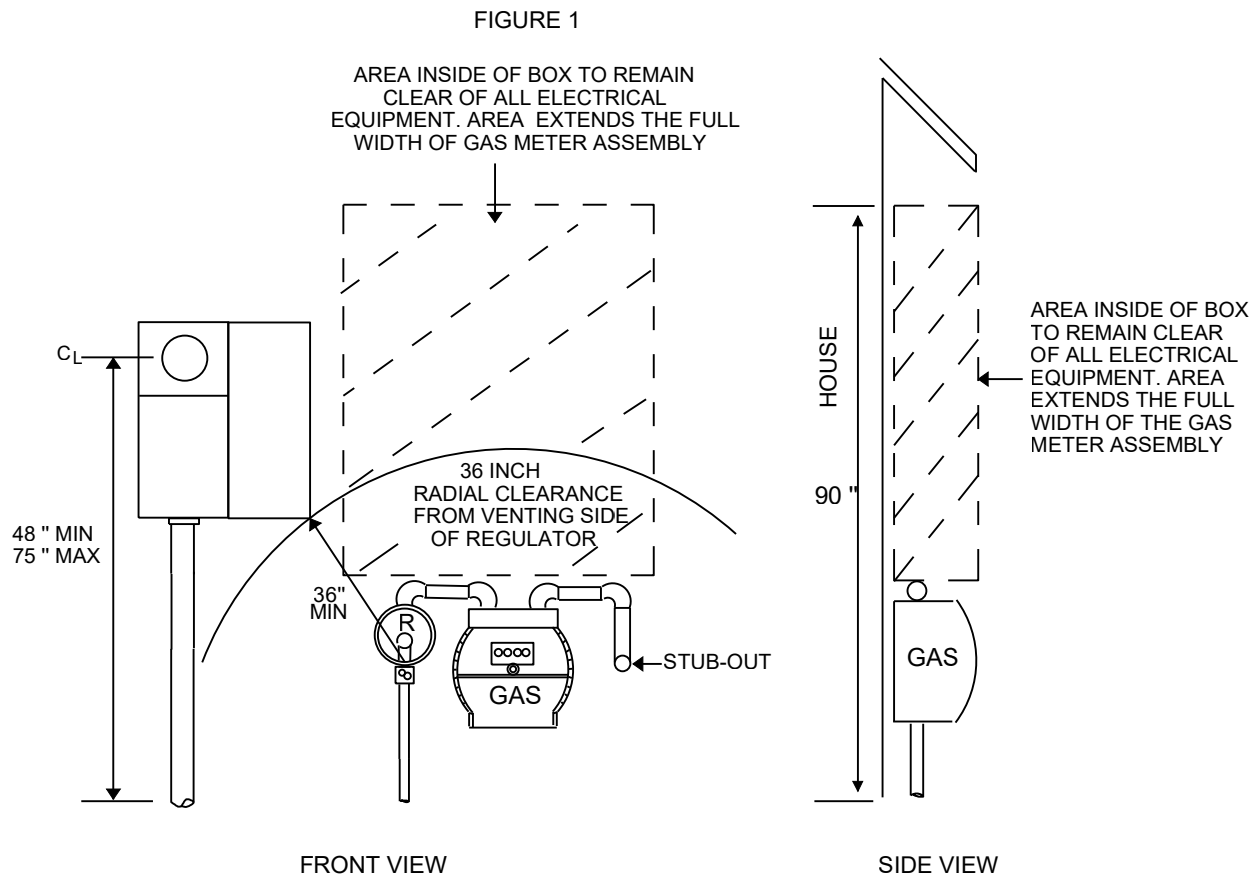
### 301.14 TYPICAL SEMI-FLUSH INSTALLATION



#### NOTES:

1. SEE SECTION 500 FOR UNDERGROUND CONDUIT AND RISER REQUIREMENTS.
2. SEE SECTION 1100, DRAWING 301 FOR METER CAN REQUIREMENTS.

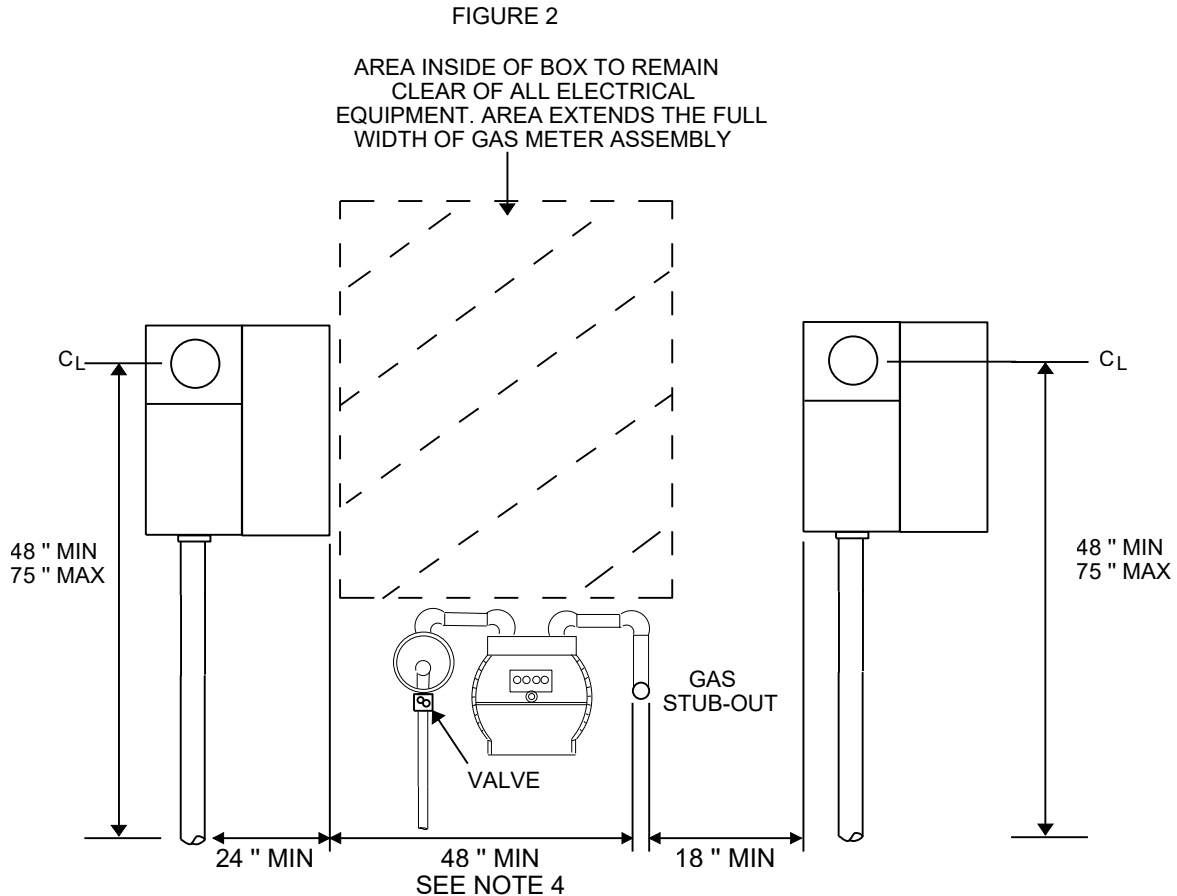
## 301.15 ELECTRIC METER SEPARATION BETWEEN WATER, GAS METER, AND FUEL SOURCES



### 301.15-1 ELECTRIC, WATER AND GAS METER SEPARATION (FIGURE 1)

1. Size and dimensions of panels will vary.
2. Working clearance shall be a minimum of 36 inches wide in front of meter panel. If electric panels extend wider than the 36 inch minimum, the working clearance shall be the width of the entire assembly. Working space shall extend out from the face of the electric meter panel a minimum of 36 inches. See paragraph 301.7 for additional workspace requirements.
3. Area directly above gas meter shall remain clear of any electrical equipment.
4. For conduit system and riser requirements, refer to Section 500.
5. For Trenching Requirements, refer to Section 600.
6. Gas piping (above grade) may be located below electric panel(s), but shall not include any couplings in that area.
7. APS prohibits water valves or hose bibs to be located within the 36 inch by 36 inch safe work area in front of the electric panels. This is to prevent any grounded surfaces in the work area and to ensure the standing surfaces remain safe and dry.
8. Drain pipes or soffits are prohibited above the meter enclosures to ensure the work area standing surfaces remain safe and dry.

### 301.15 ELECTRIC METER SEPARATION BETWEEN WATER, GAS METER, AND FUEL SOURCES

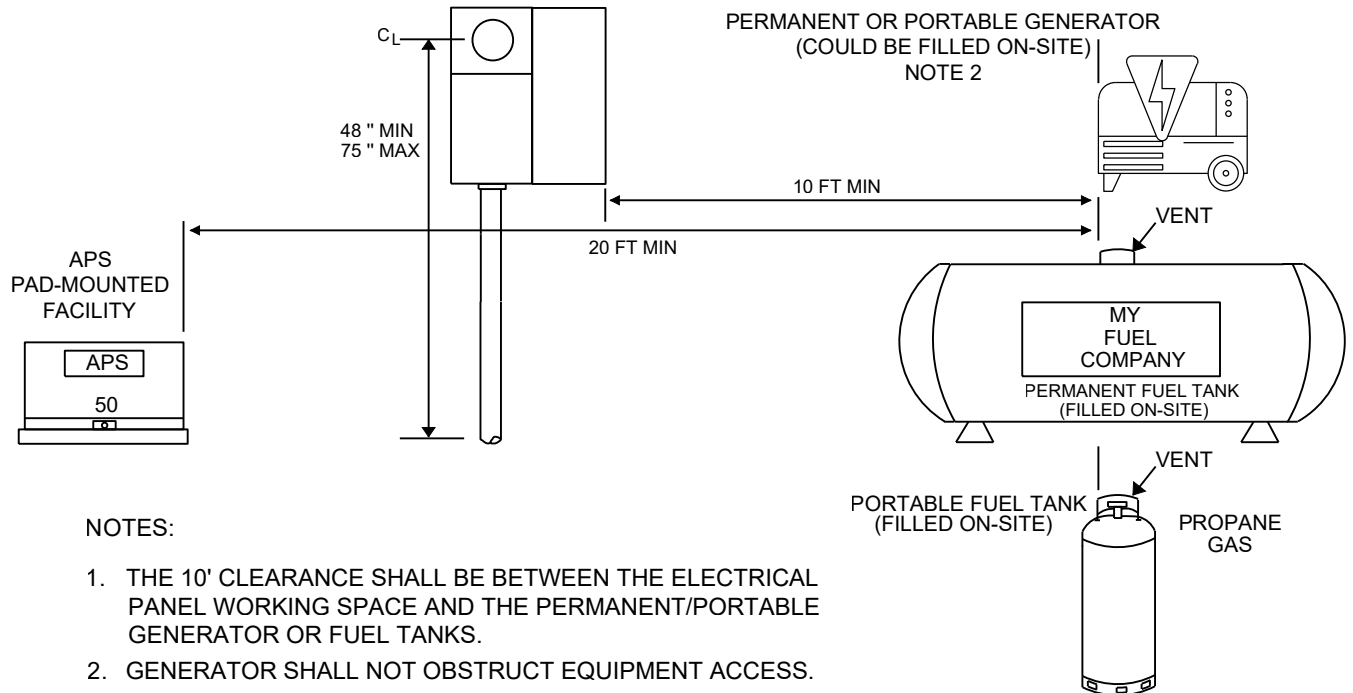


#### 301.15-2 ESTABLISHING GAS CLEARANCES DURING CONSTRUCTION (FIGURE 2)

1. Measure the minimum horizontal separation from the edge of the electric meter panel to the closest point of the gas service (if known), or from the electrical UG riser pre-construction "Stub-Up" to the gas service "Stub-Out" on the house (Preferred Method).
2. Size and dimensions of panels will vary.
3. See paragraph 301.15-1 for additional requirements.
4. 48 inch dimension is required based upon typical gas meter dimensions and layout. The intent is to maintain a 36 inch radial clearance (see figure 1 in 301.15-1) from the venting side of the regulator to the closest corner of the electric panel. If the location does not provide 48 inches, contact the gas company to explore options for maintaining the 36 inch radial clearance that is required.

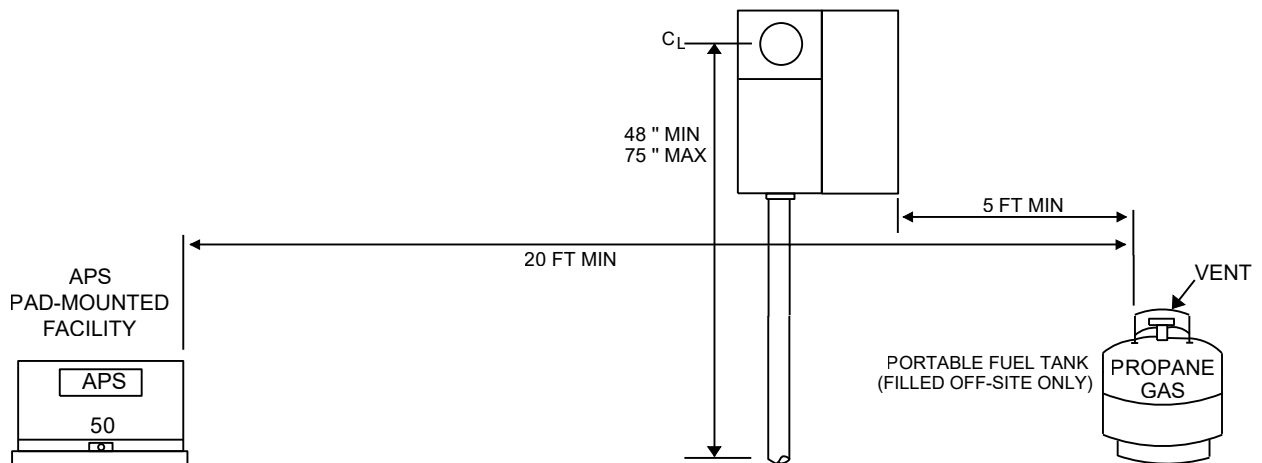
### 301.15 ELECTRIC METER SEPARATION BETWEEN WATER, GAS METER, AND FUEL SOURCES

FIGURE 3



301.15-3

FIGURE 4



A minimum 20-foot separation / clearance is required between APS electrical facilities in outdoor locations where fire or explosion hazards may exist and the following:.

GASOLINE  
COMPRESSED NATURAL GAS (CNG)  
LIQUEFIED PETROLEUM GAS (LPG)  
HYDROGEN IN A LIQUID FORM (LH2)

DIESEL FUEL  
LIQUEFIED NATURAL GAS (LNG)  
HYDROGEN IN A GASEOUS FORM (GH2)

If the minimum 20-foot separation cannot be maintained, a fire barrier / fire wall shall be installed between the pad-mounted facility and the generator.

The fire barrier / fire wall shall have a minimum 2-hour fire rating. The fire wall height shall extend at least 1-foot above the line of sight between any point on the top of the pad-mounted facility and any point on the top of the generator. The fire wall shall also extend at least 2-feet horizontally beyond the line of sight between any point of the pad-mounted facility and any point of the generator. A minimum of 3-feet separation shall be maintained between the fire wall and side of APS pad-mounted facility except from the side of certain facilities (e.g., automatic transfer switch, supervisory switches) containing control features where a 6-foot separation shall be maintained. See FIGURES 5 AND 6 for illustration.

### 301.15 ELECTRIC METER SEPARATION BETWEEN WATER, GAS METER, AND FUEL SOURCES

Where the degree of hazard is unknown, Contact APS Representative for proper classification of the hazardous locations.

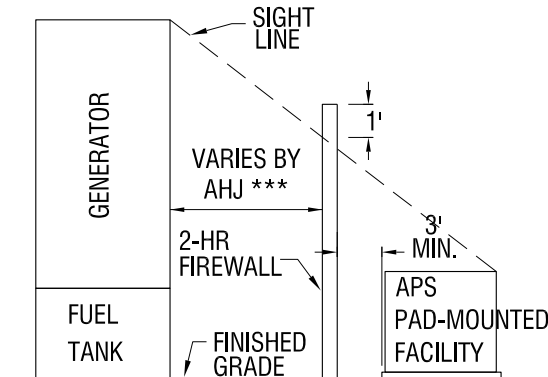


FIGURE 5 - FIRE WALL HEIGHT (PROFILE VIEW)

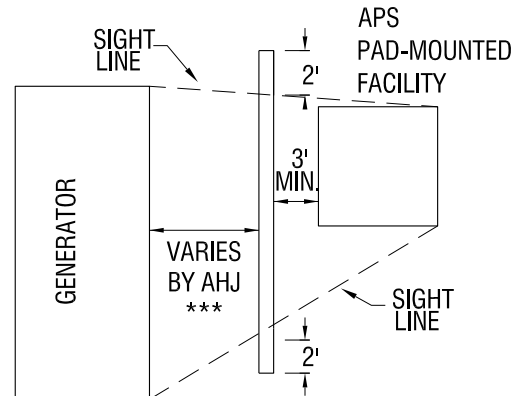


FIGURE 6 - FIRE WALL LENGTH (PLAN VIEW)

PAD USAGE (TYPICAL)	PAD DIMENSION		MINIMUM CLEARANCES		
			TO BUILDINGS	TO FENCES	TO COMM. PED
	A	B	C	C	D
1Ø LOW PROFILE TRANSFORMER 25-50KVA	42"	42"	24"	24"	12"
1Ø LOW PROFILE TRANSFORMER 75-167KVA	42"	48"			
1Ø BOX PAD INSTALLATION	57"	57"			
3Ø TWO TRANSFORMER BANK	90"	48"			24"
3Ø 75-750KVA TRANSFORMER	88"	75"			
3Ø 1000-2500KVA TRANSFORMER	102"	100"			

### 301.16 ROLL-UP DOORS

Aluminum Roll-up doors used in conjunction with enclosed meter rooms are to be constructed utilizing minimum 22-gauge slats. Dimensions of roll-up door must provide for a minimum clearance of 12" in width and height greater than the largest piece of equipment being located within the meter room. This is to provide for ease of installation and removal.

Door must be equipped with bottom and guide weather stripping.

A minimum clearance of 12" is required between the face of the service entrance equipment and the door.

The door may be operated either mechanically or electronically. Manual push-up doors are not permitted.

If the door is mechanically operated, the door must be equipped with an indoor mounted chain hoist with a maximum allowable pull tension of ten pounds. A minimum working clearance of 36" square must be provided adjacent to the chain hoist to provide for safe operation.

Room must be equipped with light.

If the door is electrically operated it must have an emergency release device.

Chain hoist and/or electrical control switch for the door must be located so that the door may be operated without the need to cross in front of the SES to operate.

APS lock box to be installed in close proximity to main entry door to meter room.

Owner is responsible for the on-going maintenance to insure continuous proper operation of the door.

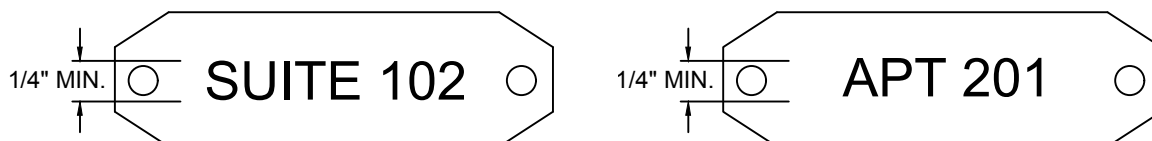
**302.1 METER AND SERVICE LOCATION LABELING IDENTIFICATION BY CUSTOMER**

Where the installation requires more than one meter for service to the premises, then each meter socket and corresponding disconnect shall be permanently (not painted) marked by the customer to properly identify the portion of the premises being served.

When adding a new meter to an existing service location, all meters and corresponding disconnects shall be labeled to properly identify the portion of the premises being served by each meter and corresponding disconnect.

The identification shall be the same as the apartment, townhouse, office, suite, trailer, R.V. space, etc., actually served through the socket and the corresponding disconnect. The identifying marking placed on each meter panel shall be impressed into or raised from a tag of aluminum, brass or other approved non-ferrous metal with minimum 1/4" high letters. The tag shall be riveted to the meter socket panel and corresponding disconnect.

If meters are located in a meter room or cabinet, micarda tags are acceptable. Tags will be black with white letters Minimum 1/4" high letters. Micarda tags shall be riveted to the meter panel. These requirements are intended to prevent the identification(s) from being obscured by painting of the building and attached service equipment.



The Company's meter department may require the assistance of the Customer prior to the setting of the meters in a multi-metered development in order to verify that each meter socket identification coincides with the apartment, townhouse, office, suite, trailer, R.V. space, etc. actually served through the socket.

For all interconnect label requirements, refer to the APS Interconnection Requirements for Distributed Generation at [aps.com/dg](http://aps.com/dg) for specific label verbiage. Go to [aps.com/dg](http://aps.com/dg) and click on Interconnection for the latest copy of this manual, along with several guides, tools, and sample diagrams.

For properties that have multiple buildings sharing the same address, each service section shall be permanently marked with the property address and the building's identification number or letter for which it serves.

EXAMPLE - 123 N MAIN ST BUILDING 1

For buildings that have multiple service entrance sections, each service section shall be permanently marked with the property address, along with "1 of x", "2 of x", or "3 of x", etc. where x equals the total number of service sections serving that building.

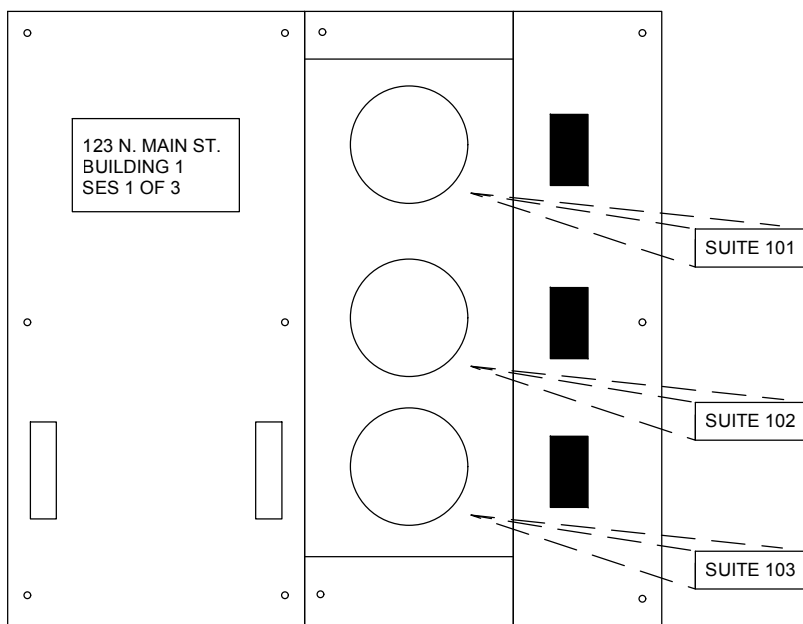
EXAMPLE - 123 N MAIN ST SES 1 OF 3

For properties that have both multiple buildings and building(s) with multiple service entrance sections, apply all of the aforementioned identification.



### 302.1 METER AND SERVICE LOCATION LABELING IDENTIFICATION BY CUSTOMER (CONTINUED)

EXAMPLE - 123 N MAIN ST BUILDING 1 SES 1 OF 3



#### 302.1-1 SERVICE IDENTIFICATION

All equipment shall be permanently labeled for the specific voltage and current being served.

#### 302.2 METER HEIGHT

The requirements for meter height, which is the vertical distance between the center line of the meter and the standing surface, shall be as follows:

1. When meters are located in a meter room or enclosed cabinet. 36" min. 75" max.
2. When meters are wall, semi-flush, pedestal, or surface mounted outdoors, but not located in a meter room or enclosed cabinet. 48" min. 75" max.

#### 302.3 MAIN SWITCH

For each meter installed on a service, the contractor/customer, in compliance with applicable codes, shall furnish and install a fusible switch, a circuit breaker, or other approved disconnecting means which shall control all of and only the energy registered by that meter. The disconnecting means, where permitted by the governing code or ordinance, may consist of a group of fusible switches or circuit breakers. These fuses or circuit breakers must be lockable and designed to interrupt and withstand the available fault current. (See Paragraph 301.13 Main Switch Locations).

In cases where residential all-in-one meter panels are installed with multiple positions for main disconnects, APS requires all positions to be filled with disconnects that are designed to interrupt and withstand the available fault current.

### 302.3-1 MULTIPLE SERVICE DISCONNECTS (TWO TO SIX):

Code and Standards: NEC - Article 230.90(A), Exception No. 3  
UL 891 - Table 26 and Section 8.8.1.6.13

Using the Codes and Standards: NEC and UL 891 establish the rules for multiple service disconnects in dead-front switchboard. The following requirements shall be met:

1. Client provides calculations showing that the load does not exceed the sum of the ratings of service disconnects.
2. If the sum of the service disconnects does not exceed the service rating, then the installation is code compliant.
3. However, if the sum of the service disconnects exceeds the service rating, then Exception No. 3 in NEC 230.90 (A) can be used. To apply this exception, provide calculations showing a value below the service rating by utilizing the diversity factors from UL 891 Table 26 shown below.

Note: Exceeding the current rating of the SES after applying the factors in Table 26 of UL 891 will result in a violation of NEC 110.3(B).

*Exception: A UL891 switchboard that has been listed, and marked as "Solar Ready" would have a dedicated disconnect for a photovoltaic back-feed. In this case the disconnect can be excluded from the sum of disconnects. A permanent warning label shall be affixed by the manufacturer next to the disconnect indicating its purpose and that no loads are to be connected.*

Application Examples:

- Specification: 600A SES, with (6) 200A service disconnects  
The sum of the disconnects is 1200A. Apply the 70% factor from Table 26.  
 $(1200A \times .7 = 840A > 600A)$  - **NOT APPROVED!**
- Specification: 600A SES, with (2) 200A & (4) 100A service disconnects  
The sum of the disconnects is 800A. Apply the 70% factor from Table 26.  
 $(800A \times .7 = 560A < 600A)$  - **APPROVED!**

Diversity Factors from UL 891, Table 26	
# Service Disconnects	Factor (%)
1	100
2 - 3	80
4 - 6	70

- *Preserving Utility Service Integrity: A separate but related issue arises in cases where a fusible disconnect configuration can physically accommodate a larger fuse ampacity than originally calculated using table 26. Mandating that the fusible disconnect configuration does not have the ability to accommodate a larger fuse ampacity will ensure that the potential for future load additions are limited to the rating of the utility equipment and SES.*

#### **302.4 FOREIGN DEVICES IN SEALABLE CABINETS**

No devices by the Customer shall be installed in or attached to the meter, meter socket, meter cabinet or the metering compartment and pull section area of a service entrance section. Emergency power transfer switches, energy devices, over-current devices, etc., shall be located on the load side and exterior to these metering components.

---

#### **302.5 METER SOCKET ENCLOSURES**

All socket enclosures shall be of the ring type. The meter socket shall be securely mounted so that its meter jaws are in true horizontal and vertical planes, and will support the meter without tilt in any direction. Gutter connectors (of the Chase nipple-sleeve type) shall not be used on unfused gutters.

Meter enclosures and pull sections shall not be used as junction boxes, raceways, or wireways.

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#### **302.6 PROPER INSTALLATION OF COUPLINGS AND GUTTERS**

When entering or leaving service entrance enclosure, an approved method shall be used. Burning of holes in the enclosure or the welding of couplings or fittings in lieu of an approved hub is not permitted or acceptable.

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#### **302.7 TERMINATIONS OR LUGS FURNISHED BY APS (Underground)**

APS shall furnish and install compression terminations for connecting APS service conductors to the bus bar in service entrance sections, 400 amp wall hung cabinets and pull boxes with cable terminating facilities when served from underground. See EUSERC DWG #347 in Section 1100 for termination bolt requirements. 200 amps and less - use mechanical terminals supplied by the customer.

---

#### **302.8 SECURED IN PLACE (S.E.S.)**

All service entrance sections shall be securely fastened to the surface on which it is mounted. Wooden plugs driven into holes in masonry, concrete, plaster, or similar material shall not be used.

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#### **302.9 REQUIRED APPROVAL FOR METERING IN SERVICE EQUIPMENT**

Customer shall select from the pre-approved list for all single-phase residential self-contained services. If it is on the pre-approved list, then it is approved for that type of residential service only. If it is not on the list, then it is not approved to be used in APS service territory for self-contained services. Commercial sites require meter enclosures with EUSERC approved test blocks/bypass provisions for all self-contained services 200 Amps and below. All commercial sites above 200 Amps are required to have EUSERC approved CT rated meter enclosures. The following meter enclosures shall be submitted through an APS Representative for review and approval prior to manufacturing of the equipment: residential multi-meter packs not listed on the APS pre-approved list; residential CT rated enclosures; and all commercial meter enclosures. Customer shall coordinate through the APS Control Desk @ [APS Contact Map](#) for new service or service upgrades (also see ESRM 200.2-1 and 200.2-2).

Drawing submittal shall include: engineering and manufacturer one-lines showing location of neutral to ground bond link and neutral disconnecting means, switchboard manufacturer (name), EUSERC page references that are applicable, ampacity of switchboard, physical dimensions, voltage, phase, bus bracing (AIC rating), how many service disconnects (which all are required to have padlockable provisions), accurate address (street and number), etc.

In addition to the above equipment submittal requirements, a separate application is required for review and approval when this equipment includes any connections or provisions for any existing or proposed inverters or generators. Contact an APS Representative and review the guides and resources available @ [APS Interconnection](#) page. Begin the APS Interconnection Application Process @ [APS PowerClerk](#) login. Refer to ESRM 104.11 – 104.12-2 for additional information on backup generation.

## 302.10 EUSERC - ELECTRIC UTILITY SERVICE EQUIPMENT REQUIREMENTS COMMITTEE

Switchboard service sections and bus duct risers approved for use in the area served by APS are built to the standards developed by the Electric Utility Service Equipment Requirements Committee, and are available to the customer through electric wholesale distributors (See Section 1100).

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### 302.11 SERVICE ENTRANCE SECTION

A standard service entrance section is a free-standing piece of equipment which contains bussing for the termination of service entrance conductors, bussing for the connection and mounting of current transformers, panels for the installation of the test switch and meter socket, a service main disconnect switch or breaker, and in many cases, distribution feeder breakers or switches.

The standard service entrance section is usually built to serve the Customer with heavy electrical supply needs, and is available with service main switch or breaker ratings from 200 amperes through 3000 amperes. For sections above 3000 amperes consult APS.

Standards for service entrance section have also been developed for self-contained meters, both residential and non-residential, and with either standard duty or heavy-duty sockets. This equipment is built on special order to meet the needs of the Customer's service.

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### 302.12 OVERHEAD RISER AND BUS DUCT RISER REQUIREMENTS

Maximum number of conductors per phase shall be two (2); all service entrance conductor requirements exceeding 2-750 MCM conductors per phase shall be bus bar construction. All bus bar cabinets shall be constructed in accordance with Electric Utility Service Equipment Requirements (EUSERC). For address of Electric Meter Section, see Paragraph 302.9. For bus-way service head requirements, see EUSERC DWG. 349 in Section 1100. (See also Section 400, paragraph 400.3). The customer shall submit drawings and information to APS for review and approval in accordance with the submittal requirements described in ESRM 302.9.

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### 302.13 (RESERVED)

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### 302.14 METER TYPES USED ON APS SYSTEM

Direct Access meters shall have a visual kWh display and must have a physical interface to enable site interrogation of all stored meter data. All meters installed must support the Customer's APS rate tariff.

<u>FORM NUMBERS</u>	<u>DESCRIPTION</u>
1S	Single phase, 2 wire, Self-contained
2S	Single phase, 3 wire, Self-contained
3S	Single phase, 2 wire, 5 terminal, Transformer rated
5S*	Single phase, 3 wire, 6 terminal, Transformer rated
5S	Three phase, 3 wire, 8 terminal, Transformer rated
6S	Three phase, 4 wire Wye, 2 1/2 element, Transformer rated
8S	Three phase, 4 wire Delta, Transformer rated
9S	Three phase, 4 wire Wye, 13 terminal, Transformer rated
12S	Network, Three phase, 3 wire, 5 terminal, Self-contained
14S	Three phase, 4 wire Wye, 2 1/2 element, Self-contained
15S	Three phase, 4 wire Delta, Self-contained
16S	Three phase, 4 wire Wye, 3 element, Self-contained

\* = 5S for new installations - 4S for Maintenance Only

## 303.0 SELF CONTAINED METERING

### 303.1 EQUIPMENT FURNISHED AND INSTALLED BY APS - STANDARD OFFER CUSTOMERS ONLY

1. All meters and metering equipment required for billing purposes.
2. Sealing rings and seals.

### 303.2 EQUIPMENT FURNISHED AND INSTALLED BY THE CUSTOMER

1. Meter sockets.
2. Multiple meter panels and prefabricated panels.
3. Meter enclosures.
4. Service entrance switchboards.
5. Safety test blocks.
6. Proper bonding and grounding.

### 303.3 SELF-CONTAINED SOCKET RATINGS

TYPE OF SERVICE	SIZE OF SERVICE ENTRANCE	SOCKET RATINGS
Residential	All sockets shall have a maximum ampere rating not less than the ampacity of the main service switch (Maximum ampere rating of socket being 125% of continuous duty rating).	
Non-residential & Industrial	Up to 100 amp	100 amp Continuous
Non-residential & Industrial	101-200 amp	200 amp Continuous
Irrigation (480Y/277V)	Up to 100 amp (Up to & including 75 HP)	100 amp Continuous
Irrigation (480Y/277V)	101-200 amp (Up to & including 75 HP)	200 amp Continuous

In addition, self-contained sockets shall conform to the following requirements:

1. Dimensions and construction for sockets and enclosures shall comply with ANSI C12.7 standard for watt-hour meters, and UL 414 standard.
2. Line and load terminals shall be compatible with either copper or aluminum wire.
3. Terminals shall be of sufficient size as to permit insertion of maximum specified wire without removing any strands.
4. The socket jaw or clip shall be of beryllium copper alloy or equivalent.
5. The socket jaw or clips shall be clean. Foreign material (such as paint, mud, etc.) shall be removed by customer prior to APS installing service or meter.

### 303.4 SOCKET ENCLOSURES

All socket enclosures shall be of the "ring-type."

### 303.5 METER SOCKET CLOSING DEVICES

Meter sockets shall not be equipped with circuit closing or bypass devices which automatically close when the meter is removed from the socket.

## 303.6 SAFETY TEST BLOCKS

**APS RESERVES THE RIGHT TO REQUIRE SAFETY TEST BLOCKS BE INSTALLED IN THE EVENT AN EXISTING SERVICE NO LONGER MEETS THE FOLLOWING REQUIREMENTS.**

### 303.6-1 SINGLE-PHASE SAFETY TEST BLOCK INSTALLATIONS

All single-phase non-residential services with self-contained meter installations shall require safety test blocks be furnished by the Customer. Reference Section 1100, Drawings 304,305 and 306.

Locations that do not have safety test blocks are subject to service interruptions for meter maintenance without prior notification.

**Locations where safety test blocks are not required:**

1. \* House meters on residential apartment complexes that serve non-essential loads.
2. Non-computerized sign boards.
3. Sprinkler controls.
4. Single-phase temporary construction services (when 400Amps are needed a CT-Current Transformer rated panel will be required).
5. Parking lot lighting services.
6. Barns.
7. Domestic wells serving individual or multifamily water supply so long as they are not a water company.
8. Residential hobby shops.
9. CATV rectifiers and dryers.
10. Gas Company cathodic protection sites.
11. Non-computerized gates to residential communities.
12. Generating Facility (GF) Production Metering (see 303.6-3 for additional details).

\* When a single phase socket (typically within a multi-pack) at a multi-family residential complex is designated as a "house meter", it will be intended to serve the common area's power needs. The house meter is not intended to serve essential loads (e.g. sales offices, pool equipment, security, common laundry facilities), thus not requiring safety test blocks.

### 303.6-2 THREE-PHASE SAFETY TEST BLOCK INSTALLATIONS

**Safety test blocks shall be required on all three-phase self-contained installations except for Generating Facility (GF) Production Metering as noted in section 303.6-3.**

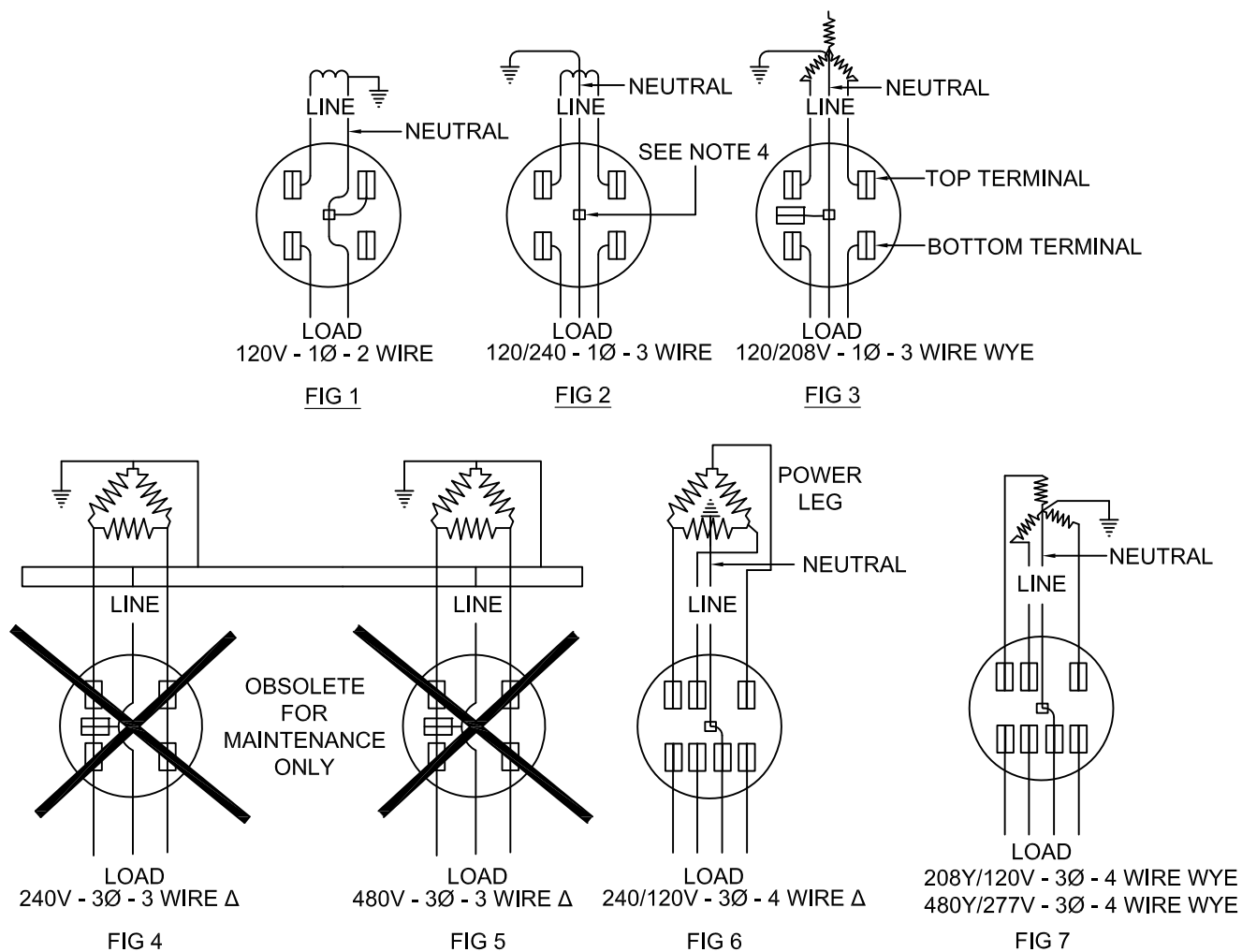
### 303.6-3 GENERATING FACILITY (GF) PRODUCTION METERING APPLICATIONS

Safety Test Blocks are not required to be installed at Customer Installed Production Metering specified in Section 9.0 ("Metering Requirements") of the APS document entitled "Interconnection Requirements for Distributed Generation" for Customer Owned Generation (Reference section 104.11). The Customer shall install an isolation device(s) (i.e. Utility Disconnect Switch (on the Line side of the Production Meter to isolate/remove all voltage and current from the meter. This isolation device shall meet all the requirements of Section 8.2 ("Disconnect Switch") of the APS document entitled "Interconnection Requirements for Distributed Generation." (Reference Section 104.12.2).

## 303.7 HIGH LEG LOCATION (3Ø 4W DELTA SERVICE)

Self-contained Meter Sockets: wiring to self-contained meter sockets, whether individual sockets or in multiple meter panel boards, shall have the power phase or "high leg" to ground, in the right hand socket terminals. Identification of "high leg" shall be by an outer finish that is orange in color or permanent tagging. This identification shall be placed at all points where a connection is made or will be made, including leads where service will be connected. Refer to 304.3 for CT rated equipment.





**FRONT VIEWS SHOWN  
EUSERC DWG #G1**

**NOTES:**

1. SOCKETS FOR NON-RESIDENTIAL INSTALLATIONS SHALL BE EQUIPPED WITH TEST-BYPASS FACILITIES WHEN REQUIRED BY THE SERVING AGENCY.
2. LINE CONDUCTORS SHALL BE CONNECTED TO THE TOP TERMINALS OF SOCKET AND LOAD CONDUCTORS CONNECTED TO THE BOTTOM TERMINALS OF THE SOCKET.
3. POTENTIAL TAPS, INCLUDING THE NEUTRAL TAP, SHALL BE LOCATED BEHIND SEALED PANELS.
4. CLAMPED OR BOLTED CONNECTIONS IN METERING EQUIPMENT ENCLOSURES SHALL BE PERMITTED, INCLUDING THE NEUTRAL CONNECTION.
5. SEE PARAGRAPH 304.2-1 FOR CT METER SOCKETS

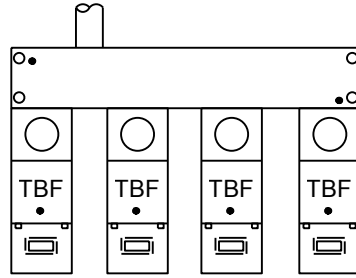


FIG. 1  
COMMERCIAL

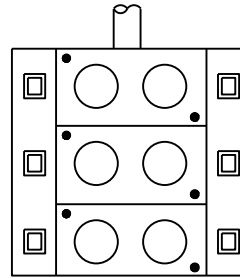


FIG. 2  
RESIDENTIAL

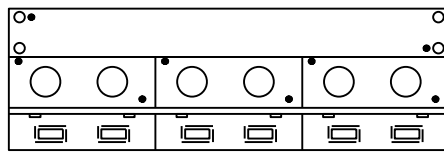


FIG. 3  
RESIDENTIAL

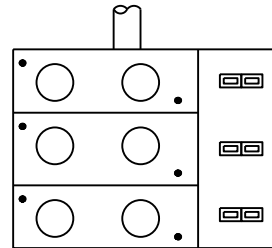


FIG. 4  
RESIDENTIAL

OVERHEAD INSTALLATIONS

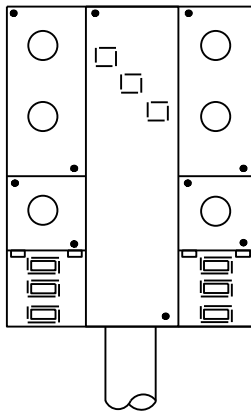


FIG. 5  
RESIDENTIAL

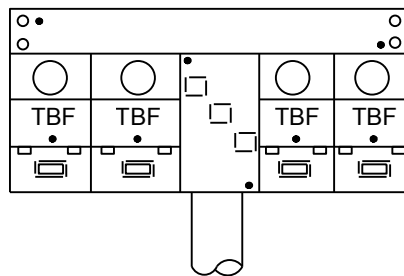


FIG. 6  
COMMERCIAL

UNDERGROUND INSTALLATIONS

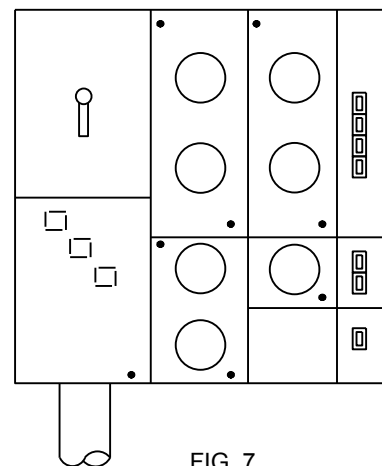


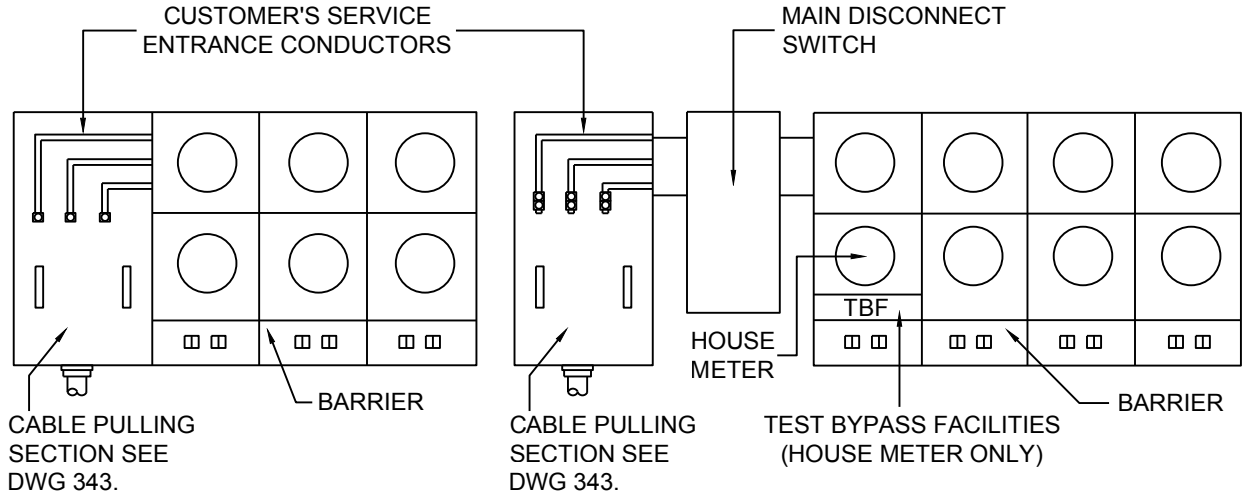
FIG. 7  
RESIDENTIAL

TBF = TEST BLOCK FACILITIES

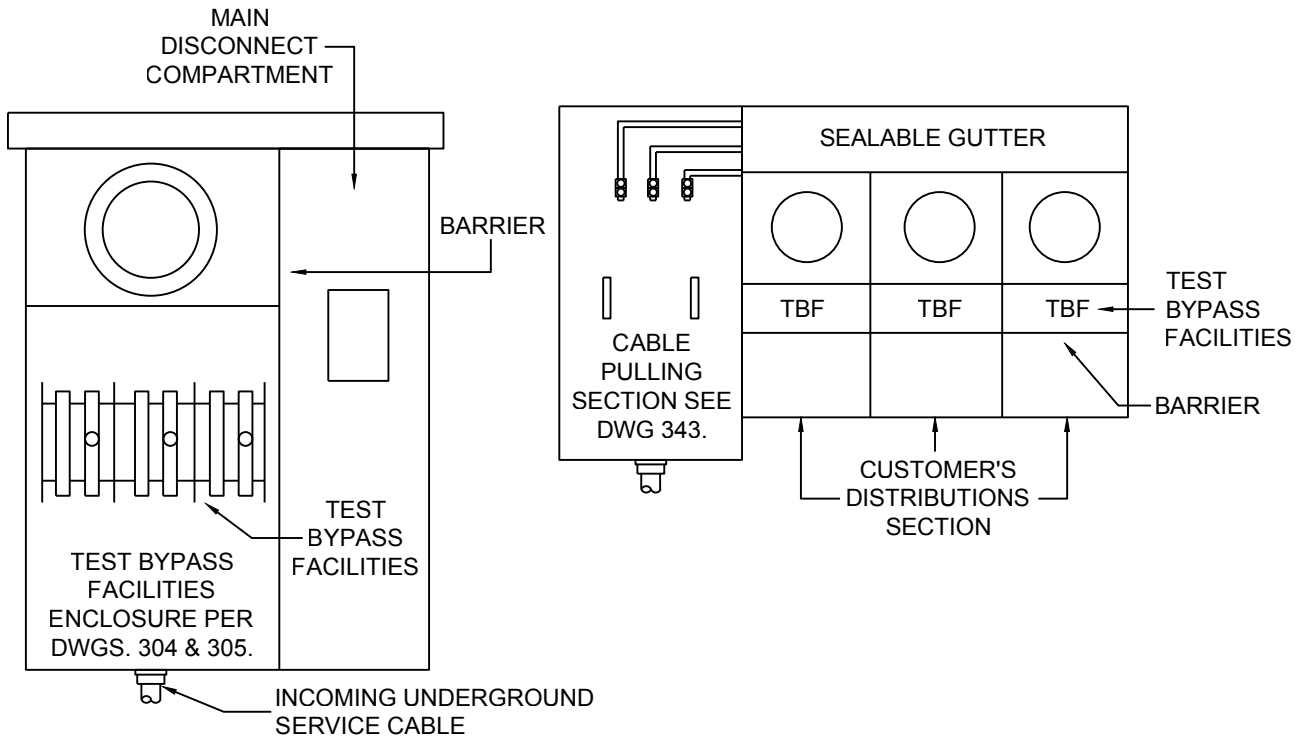
EUSERC DWG #G2



**303.10 INSTALLATION GUIDE DRAWING TYPICAL UNDERGROUND SERVICE TERMINATION ARRANGMENTS - DWG #G3**



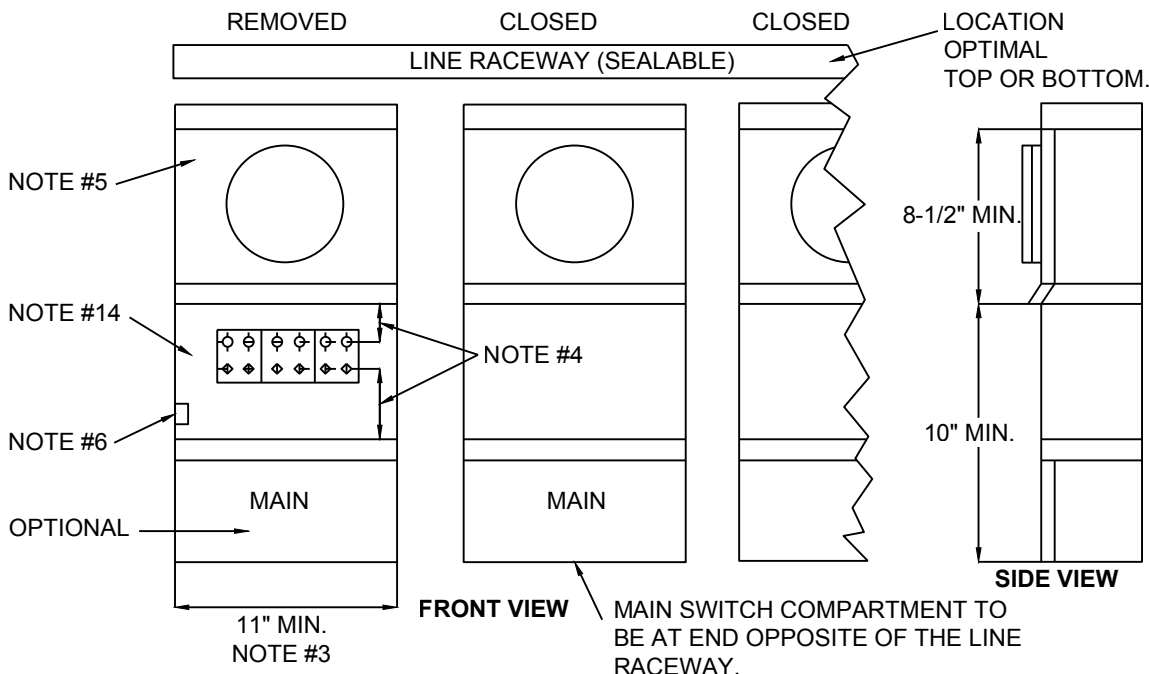
**FIG. 1** TYPICAL COMBINATION SERVICE TERMINATION ENCLOSURE AND METER SOCKET PANELS FOR MULTI-UNIT RESIDENTIAL USE.



**FIG. 2** TYPICAL SERVICE TERMINATION ENCLOSURE COMBINATION METER SOCKET PANEL COMMERCIAL USE.

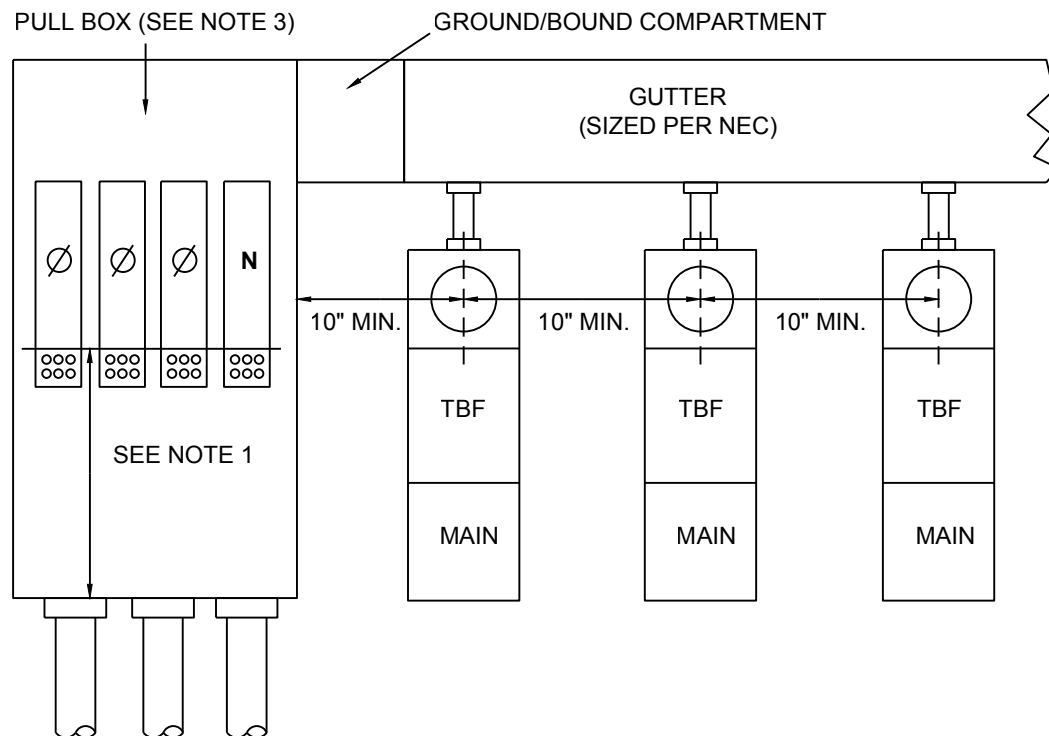
EUSERC DWG #G3

**303.11 SAFETY - SOCKET BOX WITH TEST BY-PASS FACILITIES FOR MULTIPLE SELF-CONTAINED METER INSTALLATIONS 0 - 200 AMPS, 0 - 600 VOLTS**



EUSERC DWG #G4  
ALL DIMENSIONS SHOWN ARE IN INCHES

1. THIS DEVICE MAY BE USED FOR MULTIPLE NON-RESIDENTIAL AND INDUSTRIAL METER INSTALLATIONS MOUNTED IN A GANGED ARRAY.
2. TEST-BYPASS BLOCKS WITH RIGID INSULATING BARRIERS SHALL BE INSTALLED AND WIRED OR BUSSED TO A LINE RACEWAY AND ALSO WIRED OR BUSSED TO THE METER SOCKET THEN TO THE MAIN SWITCH BY THE MANUFACTURER. BLOCKS AND BARRIERS SHALL CONFORM TO EUSERC DRAWING 312 REQUIREMENTS WITH PHYSICAL ARRANGEMENT CONFORMING TO DRAWINGS 304 AND 305. CONNECTIONS SEQUENCE IS LINE-LOAD, LINE LOAD, LINE LOAD FROM LEFT TO RIGHT.
3. MINIMUM ACCESS OPENING TO TEST-BYPASS BLOCK SHALL BE 11' X 10".
4. THREE INCHES MINIMUM CLEARANCE REQUIRED FOR UTILITY TEST PURPOSES.
5. ALL SECTION COVERS SHALL BE INDEPENDENTLY REMOVABLE. UPPER COVER SHALL BE NON-REMOVABLE WHEN METER IS IN PLACE. METER SOCKET SHALL BE MOUNTED ON SUPPORT AND ATTACHED TO PANEL. TEST BY-PASS COVER SHALL BE SEALABLE AND PERMANENTLY LABELED: "DO NOT BREAK SEAL. NO FUSES INSIDE".
6. WHEN A NEUTRAL IS REQUIRED FOR METERING OR TESTING, AN INSULATED NEUTRAL TERMINAL, MOUNTED ON EITHER SIDE, SHALL BE PROVIDED BEHIND EACH TEST-BYPASS COVER PANEL. THE TERMINAL SHALL BE READILY ACCESSIBLE WHEN THE COVER PANEL IS REMOVED AND SHALL BE INDIVIDUALLY CONNECTED TO THE NEUTRAL BUS WITH A MINIMUM OF NO. 8 COPPER WIRE.
7. FOR 3Ø, 4 WIRE. CONNECT 7TH JAW TO BODY OF NEUTRAL LUG WITH NO. 12 MINIMUM COPPER WIRE.
8. FOR 3Ø, 4 WIRE DELTA, IDENTIFY THE RIGHT HAND TEST-BYPASS BLOCK.
9. FOR 3Ø, 3 WIRE. INSTALL BUS TO CONNECT LINE AND LOAD POLES TOGETHER AT TOP OF CENTER TEST-BYPASS BLOCK AND CONNECT 5TH JAW TO THIS BUS USING NO. 12 MINIMUM COPPER WIRE.
10. FOR 1Ø, 3 WIRE, OMIT CENTER TEST-BYPASS BLOCK.
11. FOR 1Ø, 3 WIRE, 120/208 VOLTS, OMIT CENTER TEST-BYPASS BLOCK. CONNECT 5TH JAW TO BODY OF NEUTRAL LUG WITH NO. 12 MINIMUM COPPER WIRE.
12. PERMANENT LINE-LOAD LABELS ON INSIDE BACK OF ENCLOSURE IN 3/4" (MIN.) HIGH BLOCK LETTERS.
13. MINIMUM DEPTH SHALL BE 4 1/2" INCHES FOR 0 - 100 AMPS AND 6 INCHES FOR 101 - 200 AMPS
14. SEE EUSERC DRAWING 343 FOR PULL BOX DETAILS WHEN USED ON UNDERGROUND SERVICE

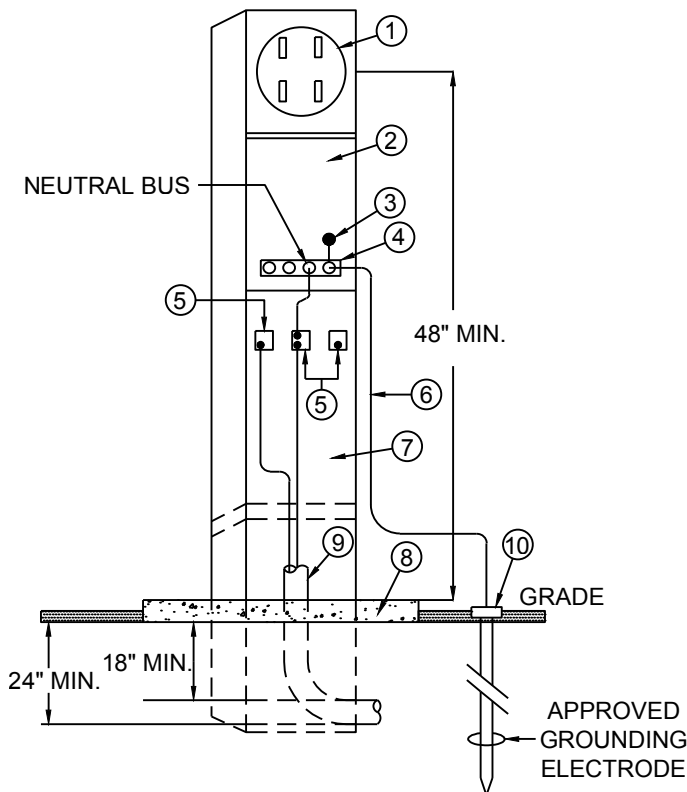


**TBF = TEST BLOCK FACILITIES**

#### NOTES:

1. THIS AREA OF PULL BOX FOR APS SERVICE CONDUCTORS. PULL BOX AND GUTTER COVERS TO BE SEALABLE.
2. A MINIMUM OF ONE (1) METER MUST BE INSTALLED AT THE TIME SERVICE IS ENERGIZED.
3. PULL BOX TO BE ACCORDING TO EUSERC DWG. 343.
4. CUSTOMER SHALL INSTALL EACH SET OF SERVICE CONDUCTORS FROM PULL BOX THROUGH GUTTER TO EACH METER. SIZE TO BE PER NEC REQUIREMENTS.
5. SEE SECTION 700 FOR GROUNDING AND BONDING REQUIREMENTS
6. SEE EUSERC DWGS. 304, 305 AND G4 FOR METER CAN REQUIREMENTS.
7. MAIN DISCONNECT REQUIRED TO BE ADJACENT TO THE METER (SEE PARAGRAPH 301.13). OPTIONAL FACTORY INSTALLED MAIN IS SHOWN.

### 303.13 MOBILE HOME AND TEMPORARY METER PEDESTAL - 1Ø 3W 120/240 VOLT



THIS IS A LIST OF MATERIAL FOR A NORMAL METER PEDESTAL INSTALLATION. IT IS NOT INTENDED TO BE ALL INCLUSIVE BUT GIVES THE MORE COMMON REQUIREMENTS. ALL EQUIPMENT SHALL COMPLY WITH EUSERC REQUIREMENTS (SEE SECTION 1100, DWG. 307) AND SECTION 500, PARAGRAPH 506.6-1, 2.

- 1.) METER SOCKET, BREAKER COMPARTMENT AND PULL SECTION MUST BE RAIN TIGHT EQUIPMENT. METER SOCKET JAWS OR CLIPS SHALL BE FREE OF FOREIGN MATERIAL (MUD, PAINT, PLASTER, ETC.). RINGLESS METER SOCKETS ARE NOT ACCEPTABLE.
- 2.) BREAKER COMPARTMENT.
- 3.) PEDESTAL BOND LUG. MAY BE A BOND SCREW IN SOME MODELS.
- 4.) CUSTOMER'S NEUTRAL LANDING BLOCK.
- 5.) SERVICE TERMINATION LUGS SHALL BE TWIN #2 TO #350 MCM ALUMINUM BODIED PRESSURE TYPE FOR IN AND OUT CONNECTION OF THE SERVICE CONDUCTORS.
- 6.) THE GROUND WIRE (#4 BARE COPPER) SHALL BE CONTINUOUS FROM THE NEUTRAL LANDING BLOCK IN THE BREAKER COMPARTMENT TO A GROUNDING ELECTRODE SYSTEM IN COMPLIANCE WITH NEC (CHECK WITH AHJ). THE GROUND WIRE MUST BE PROPERLY SUPPORTED AND ATTACHED TO THE OUTSIDE OF THE PEDESTAL AT 24" INTERVALS. WHEN ATTACHING THE GROUND WIRE TO THE PEDESTAL, THE METHOD OF ATTACHMENT SHALL NOT RESULT IN SHARP PROJECTIONS, SUCH AS METAL SCREWS INTO THE WIREWAY BELOW THE NEUTRAL LANDING BLOCK. SEE ILLUSTRATION AT LEFT FOR PREFERRED METHOD OF INSTALLING THE GROUND ELECTRODE CONDUCTOR.
- 7.) ACCESS TO UTILITY PULL SECTION SHALL NOT BE BLOCKED IN ANY MANNER. PULL SECTION SHALL BE SEALABLE. NO CUSTOMER WIRING OR EQUIPMENT IS ALLOWED IN THIS AREA.
- 8.) POURED CONCRETE SLAB SHALL BE 24" X 24" MINIMUM SIZE AND HAVE A 3 1/2" MINIMUM THICKNESS.

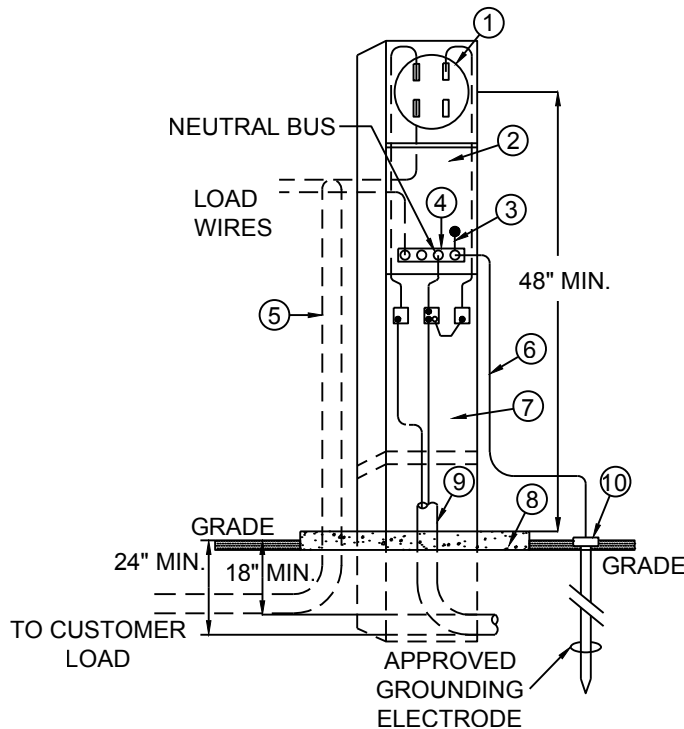
- 9.) PROVIDE AND INSTALL 2 1/2" CONDUIT(S) WITH 24" SWEEP(S). CONDUIT TO EXTEND A MINIMUM OF 1" AND A MAXIMUM OF 2" ABOVE THE CONCRETE SLAB. CONDUIT SYSTEM SHALL BE CUSTOMER INSTALLED PER APS SPECIFICATIONS TO A LOCATION DETERMINED BY AN APS REPRESENTATIVE.
- 10) APPROVED GROUND ELECTRODE CLAMP SHALL BE BURIED, FLUSH OR SOMEHOW PROTECTED FROM PHYSICAL DAMAGE. CLAMP SHALL BE DESIGNED FOR UNDERGROUND USE. GROUND ROD SHALL NOT BE INSTALLED IN OR BENEATH THE CONCRETE SLAB.

#### GENERAL NOTES:

1. METER LOCATION TO BE SPECIFIED BY AN APS REPRESENTATIVE.
2. PEDESTAL SHALL BE UL LISTED (AS EQUIPMENT SUITABLE FOR USE AS SERVICE EQUIPMENT) AND EUSERC APPROVED. THAT PORTION OF PEDESTAL BURIED IN CONCRETE AND EARTH SHALL BE COATED WITH AN APPROVED CORROSION RESISTANT MATERIAL SUCH AS ZINC, CADMIUM, OR ENAMEL TO WITHSTAND DETERIORATION.
3. PEDESTAL AND METER SHALL HAVE A MINIMUM RATING OF 100 AMPS.
4. PEDESTAL AND POWER OUTLET SECTION SHALL BE RATED 10,000 AIC MINIMUM.
5. THE SOCKET SHALL BE FACTORY-WIRED WITH THE CONDUCTORS IN A SEPARATE OR BARRIERED WIREWAY FROM THE SERVICE TERMINATION LUGS TO THE METER SOCKET. THE CONDUCTORS WHICH EXTEND TO THE METER SOCKET SHALL BE CONNECTED AT THE SERVICE TERMINATION LUGS INDEPENDENT OF THE CONNECTIONS FOR THE SERVICE LATERAL CONDUCTORS.
6. SERVICE CABLE PULL AND TERMINATION SECTION SHALL BE COVERED WITH A SEALABLE, REMOVABLE PANEL, EXTENDING FROM AT LEAST 2" TO 6" ABOVE THE CONCRETE PAD AND WHEN REMOVED GIVE FULL ACCESS TO THE SERVICE TERMINATION LUGS.
7. THE PEDESTAL AT GRADE LINE SHALL HAVE A MINIMUM CROSS-SECTIONAL DIMENSION OF 4" X 8". THE FIXED PANEL FOR THE FINAL GRADE AND CONCRETE POURS SHALL EXTEND 2" TO 6" ABOVE GRADE AND A MINIMUM OF 18" BELOW GRADE. THE PEDESTAL SHALL EXTEND 24" BELOW GRADE.
8. THE CUSTOMER SHALL BE RESPONSIBLE FOR THE FINAL GRADE OF THE UTILITY ISLAND AND THE INCLUDED METER PEDESTAL.
9. MINIMUM METER HEIGHT SHALL BE 48".
10. SEE SECTION 500, PAGES 15, 16 AND 17 FOR FURTHER REQUIREMENTS.

### 303.14 120 VOLT 1Ø 2 WIRE METER PEDESTAL

THE TOTAL AMPACITY OF THE BREAKERS IS NOT TO EXCEED 30 AMP, WITH NO MORE THAN TWO BREAKERS



THIS IS A LIST OF MATERIAL FOR A NORMAL METER PEDESTAL INSTALLATION. IT IS NOT INTENDED TO BE ALL INCLUSIVE BUT GIVES THE MORE COMMON REQUIREMENTS. ALL EQUIPMENT SHALL COMPLY WITH EUSERC REQUIREMENTS (SEE SECTION 1100, DWG. 307) AND SECTION 500, PARAGRAPH 506.6-1, 2.

- 1.) METER SOCKET, BREAKER COMPARTMENT AND PULL SECTION MUST BE RAIN TIGHT EQUIPMENT. METER SOCKET JAWS OR CLIPS SHALL BE FREE OF FOREIGN MATERIAL (MUD, PAINT, PLASTER, ETC.). RINGLESS METER SOCKETS ARE NOT ACCEPTABLE.
- 2.) BREAKER COMPARTMENT.
- 3.) PEDESTAL BOND LUG. MAY BE A BOND SCREW IN SOME MODELS.
- 4.) CUSTOMER'S NEUTRAL LANDING BLOCK.
- 5.) LOAD CONDUCTORS SHALL NOT BE RUN THROUGH UTILITY SERVICE CABLE PULL AND TERMINATION SECTION. METALLIC CONDUIT SHALL BE WRAPPED OR COATED PER PARAGRAPH 4.1-4 IN SECTION 500.
- 6.) THE GROUND WIRE (#4 BARE COPPER) SHALL BE CONTINUOUS FROM THE NEUTRAL LANDING BLOCK IN THE BREAKER COMPARTMENT TO A GROUNDING ELECTRODE SYSTEM IN COMPLIANCE WITH NEC (CHECK WITH AHJ). THE GROUND WIRE MUST BE PROPERLY SUPPORTED AND ATTACHED TO THE OUTSIDE OF THE PEDESTAL AT 24" INTERVALS. WHEN ATTACHING THE GROUND WIRE TO THE PEDESTAL, THE METHOD OF ATTACHMENT SHALL NOT RESULT IN SHARP PROJECTIONS, SUCH AS METAL SCREWS INTO THE WIREWAY BELOW THE NEUTRAL LANDING BLOCK. SEE ILLUSTRATION AT LEFT FOR PREFERRED METHOD OF INSTALLING THE GROUND ELECTRODE CONDUCTOR.
- 7.) ACCESS TO UTILITY PULL SECTION SHALL NOT BE BLOCKED IN ANY MANNER. PULL SECTION SHALL BE SEALABLE. NO CUSTOMER WIRING OR EQUIPMENT IS ALLOWED IN THIS AREA.
- 8.) POURED CONCRETE SLAB SHALL BE 24" X 24" MINIMUM SIZE AND HAVE A 3 1/2" MINIMUM THICKNESS.

- 9.) PROVIDE AND INSTALL 2 1/2" CONDUIT(S) WITH 24" SWEEP(S). CONSULT AN APS REPRESENTATIVE TO DETERMINE IF SERVICE WILL BE RADIAL OR CASCADED. CONDUIT TO EXTEND A MINIMUM OF 1" AND A MAXIMUM OF 2" ABOVE THE CONCRETE SLAB. CONDUIT SYSTEM SHALL BE CUSTOMER INSTALLED PER APS SPECIFICATIONS TO A LOCATION DETERMINED BY AN APS REPRESENTATIVE.
- 10) APPROVED GROUND ELECTRODE CLAMP SHALL BE BURIED, FLUSH OR SOMEHOW PROTECTED FROM PHYSICAL DAMAGE. CLAMP SHALL BE DESIGNED FOR UNDERGROUND USE. GROUND ROD SHALL NOT BE INSTALLED IN OR BENEATH THE CONCRETE SLAB.

#### GENERAL NOTES:

1. METER LOCATION TO BE SPECIFIED BY AN APS REPRESENTATIVE.
2. PEDESTAL SHALL BE UL LISTED (AS EQUIPMENT SUITABLE FOR USE AS SERVICE EQUIPMENT) AND EUSERC APPROVED. THAT PORTION OF PEDESTAL BURIED IN CONCRETE AND EARTH SHALL BE COATED WITH AN APPROVED CORROSION RESISTANT MATERIAL SUCH AS ZINC, CADMIUM, OR ENAMEL TO WITHSTAND DETERIORATION.
3. PEDESTAL AND METER SHALL HAVE A MINIMUM RATING OF 100 AMPS.
4. PEDESTAL AND POWER OUTLET SECTION SHALL BE RATED 10,000 AIC MINIMUM.
5. THE SOCKET SHALL BE FACTORY-WIRED WITH THE CONDUCTORS IN A SEPARATE OR BARRIERED WIREWAY FROM THE SERVICE TERMINATION LUGS TO THE METER SOCKET. THE CONDUCTORS WHICH EXTEND TO THE METER SOCKET SHALL BE CONNECTED AT THE SERVICE TERMINATION LUGS INDEPENDENT OF THE CONNECTIONS FOR THE SERVICE LATERAL CONDUCTORS.
6. SERVICE CABLE PULL AND TERMINATION SECTION SHALL BE COVERED WITH A SEALABLE, REMOVABLE PANEL, EXTENDING FROM AT LEAST 2" TO 6" ABOVE THE CONCRETE PAD AND WHEN REMOVED GIVE FULL ACCESS TO THE SERVICE TERMINATION LUGS.
7. THE PEDESTAL AT GRADE LINE SHALL HAVE A MINIMUM CROSS-SECTIONAL DIMENSION OF 4" X 8". THE FIXED PANEL FOR THE FINAL GRADE AND CONCRETE POURS SHALL EXTEND 2" TO 6" ABOVE GRADE AND A MINIMUM OF 18" BELOW GRADE. THE PEDESTAL SHALL EXTEND 24" BELOW GRADE.
8. THE CUSTOMER SHALL BE RESPONSIBLE FOR THE FINAL GRADE OF THE UTILITY ISLAND AND THE INCLUDED METER PEDESTAL.
9. MINIMUM METER HEIGHT SHALL BE 48".

## 304.0 C.T. METERING

### 304.1 EQUIPMENT FURNISHED AND INSTALLED BY APS STANDARD OFFER CUSTOMERS ONLY

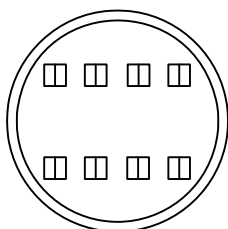
1. All meters and metering equipment required for billing purposes.
2. Sealing rings and seals.
3. Instrument transformers for metering.
4. Test Switches.
5. Secondary wiring to the meter sockets and the C.T.s.
6. Meters and metering equipment for Direct Access Customers are supplied by the EPS, MSP or Customer and installed by the EPS, MSP.

### 304.2 EQUIPMENT FURNISHED AND INSTALLED BY CUSTOMER

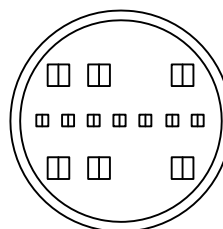
- a. Transformer rated meter sockets (See paragraph 304.2-1 for socket configuration).
- b. Pre-fabricated panels.
- c. Meter enclosures; refer to EUSERC drawings (1100 Section).
- d. Service entrance sections.
- e. Perches for test switches.
- f. Metering transformer cabinets.
- g. Proper grounding and bonding.

#### 304.2-1 C.T. METER SOCKETS (See Section 300 Paragraph 303.8 for self-contained meter sockets)

##### FRONT VIEWS SHOWN



**FIGURE 1**  
**8 JAW SOCKET**  
**120/240V 1Ø 3 WIRE**



**FIGURE 2**  
**13 JAW SOCKET**  
**208Y/120V 3Ø 4 WIRE**  
**480Y/277V 3Ø 4 WIRE**  
**240Y/120V 3Ø 4 WIRE**

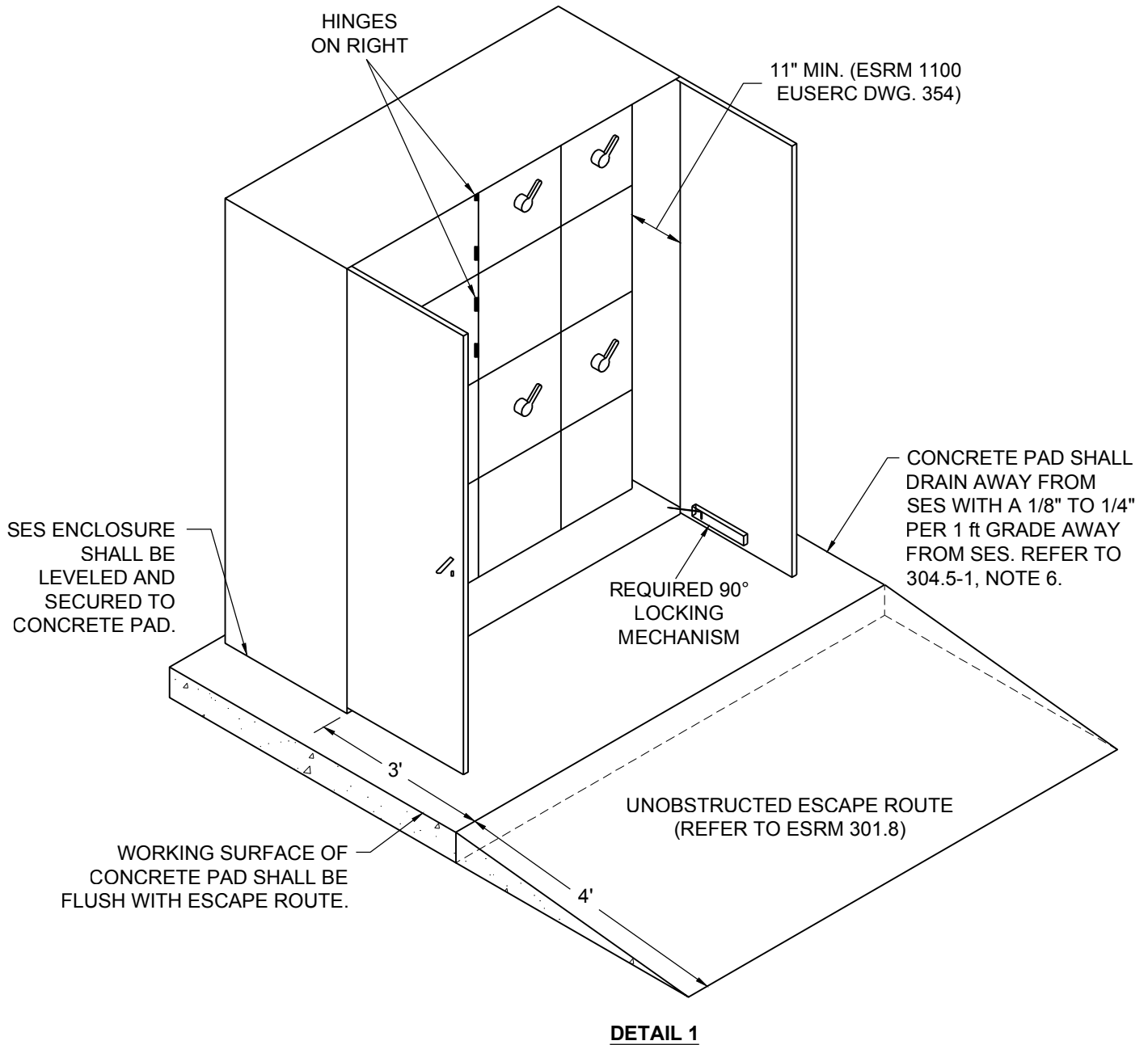
(SEE SECTION 1100, EUSERC DWG. 332 FOR METER PANEL DRILLING & TAPPING SPECIFICATIONS)

### 304.3 POWER LEG LOCATION (3Ø 4W DELTA SERVICE)

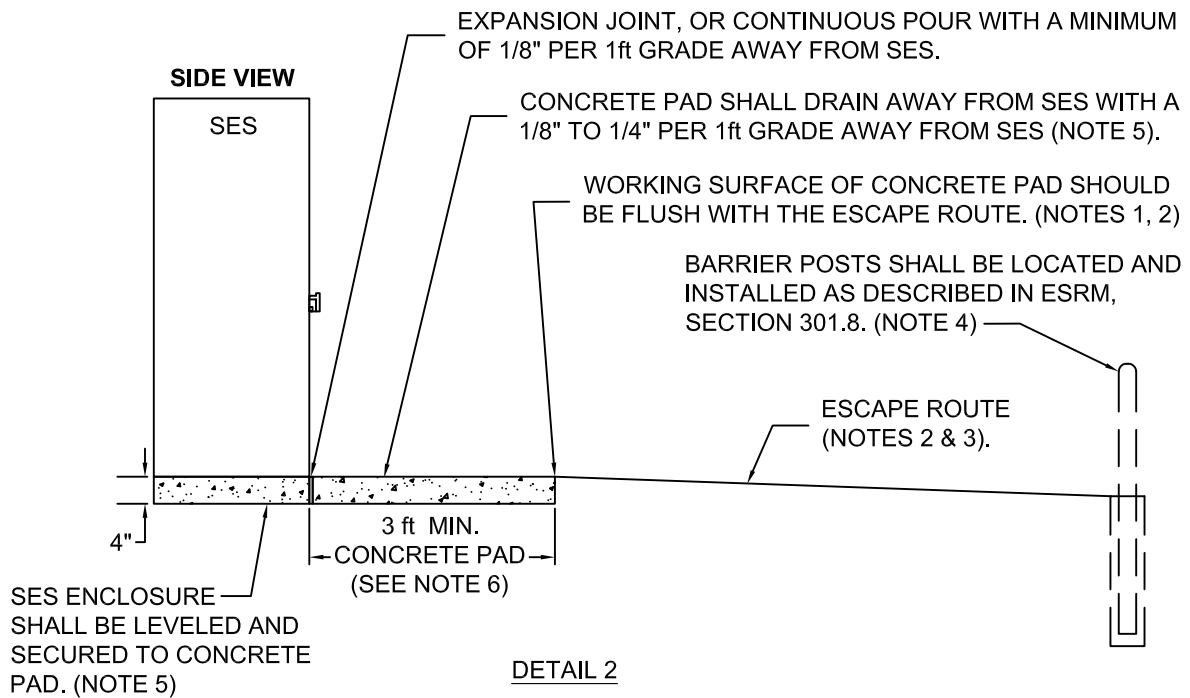
The C or right phase is preferred for the power phase, or “high leg” to ground. The B or center phase may be used as the power phase but in either case the conductor having the higher voltage to ground shall be identified by an outer finish that is orange in color or permanent tagging. This identification shall be placed at all points where a connection is made or will be made (including leads where service will be connected). Refer to 303.7 for self-contained equipment.

### 304.4 EQUIPMENT FURNISHED AND INSTALLED BY CUSTOMER

See Section 1100 for standard switchboard service section illustrations. The drawings on these pages are basically EUSERC drawings and show only sections as they would be used with overhead service entrance conductors. Pull sections would be added alongside for underground service entrance conductors and additional distribution feeder sections would be added as needed to supply a particular Customer’s electrical load.



### 304.5-1 OUTDOOR SERVICE ENTRANCE SECTION PADS



#### NOTES:

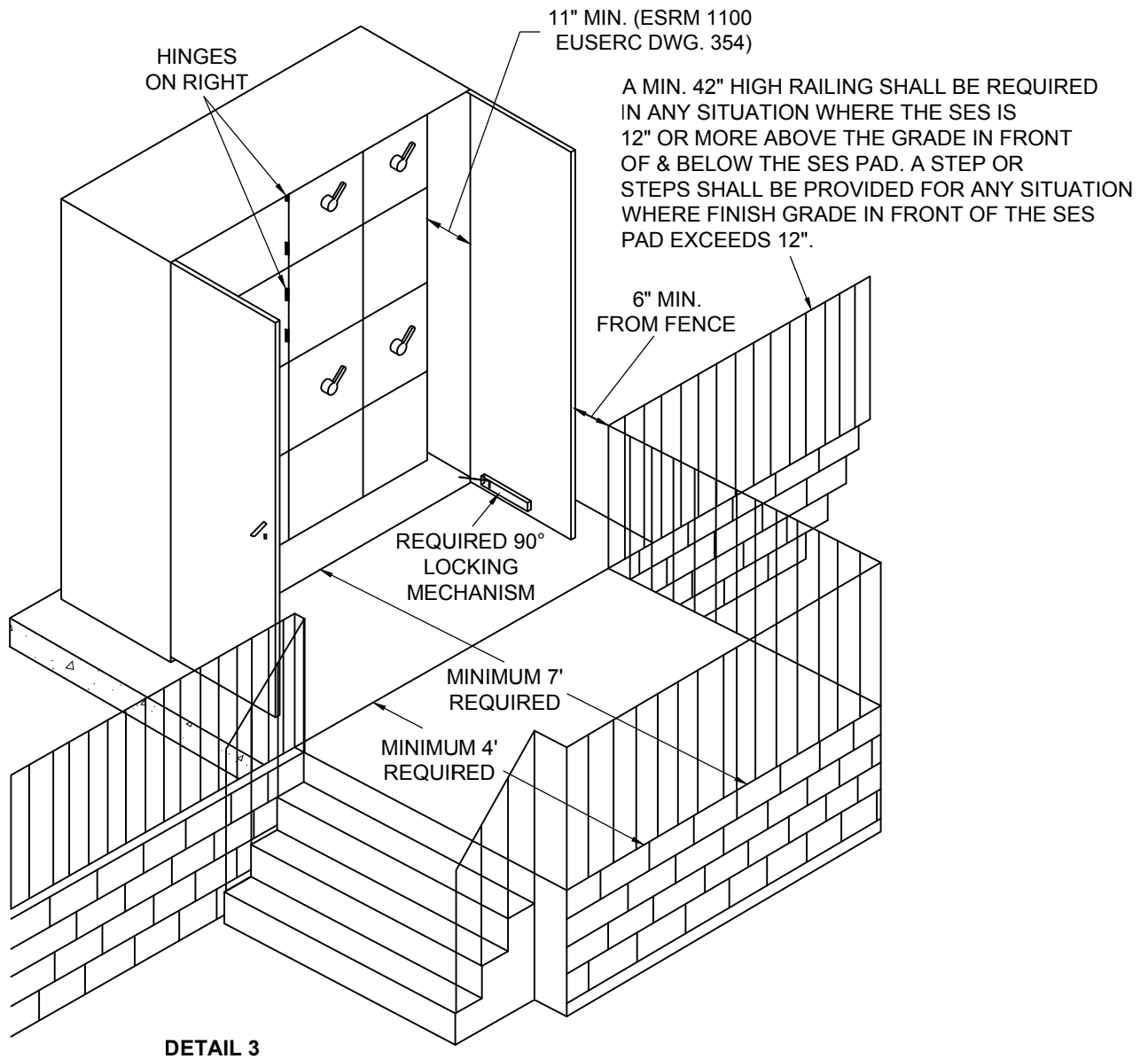
1. AN ACCEPTABLE PERSONNEL ESCAPE ROUTE SHALL BE PROVIDED IN FRONT OF THE SES. REFER TO ESRM 301.8 FOR PERSONNEL ESCAPE ROUTE AND BARRIER POST LOCATION REQUIREMENTS WHEN SUBJECT TO VEHICULAR TRAFFIC OR HAZARDOUS CONDITIONS.
2. THERE SHALL NOT BE MORE THAN 2" PER 1 ft GRADE AWAY FROM SES PAD ALONG THE ROUTE OF ESCAPE (SEE "DETAIL 1" ON PREVIOUS PAGE), UNLESS AN ALTERNATIVE ACCEPTABLE ESCAPE ROUTE IS PROVIDED. (SEE "DETAIL 3").

THE ESCAPE ROUTE IS A CONTINUOUS AND UNOBSTRUCTED PATH OF TRAVEL FROM ANY POINT WITHIN A WORKSPACE TO A PLACE OF SAFETY. AN ESCAPE ROUTE IS NECESSARY TO PROVIDE PERSONNEL EGRESS/INGRESS FROM THE EQUIPMENT DURING EMERGENCY CONDITIONS (E.G., ARC FLASH, FIRE). REFER TO ESRM 301.8 FOR ADDITIONAL REQUIREMENTS.

3. ABSOLUTELY NO OBSTRUCTIONS SHALL BE ALLOWED IN THE PROVIDED "SAFETY ESCAPE ROUTE", INCLUDING BUT NOT LIMITED TO: SHRUBS, TREES, ROCKS, OR GRAVEL IN EXCESS OF 1.5" DIAMETER. ADDITIONALLY, NO FENCING SHALL BE ALLOWED IN FRONT OF THE SES WITHIN THE ESCAPE ROUTE UNLESS AN OPERABLE GATE IS PROVIDED WHICH OPENS TO THE FULL WIDTH OF THE SES, OR UNLESS AN "ALTERNATIVE" ESCAPE ROUTE HAS BEEN PROVIDED. (SEE ADDITIONAL DETAILS PROVIDED IN "DETAIL 3").REFER TO ESRM 301.8 FOR ADDITIONAL REQUIREMENTS.
4. WHERE THE WORKING SPACE OR ESCAPE ROUTE IS EXPOSED TO VEHICLES OR HAZARDOUS CONDITIONS. REFER TO 301.8 FOR BARRIER POST PLACEMENT REQUIREMENTS.
5. "PADS" SHALL MEAN "CONCRETE PADS" FOR PAD-MOUNTED SES CABINETS. THE CONCRETE PAD THAT THE SES IS SECURED TO SHALL REMAIN LEVEL AND FLUSH THROUGHOUT THE ENTIRETY OF THE SES FOOTPRINT. THERE SHALL BE NO VAULT, BASIN, DEPRESSION, OR OPEN CONDUIT WINDOW ALLOWED IN THE CONCRETE PAD UNDER THE SES. OUTDOOR SES'S SHALL NOT HAVE HOUSEKEEPING PADS.
6. SEE ESRM 1000 FOR MEDIUM VOLTAGE CONCRETE PAD REQUIREMENTS THAT REQUIRE 10 FT MINIMUM WORKING SPACE IN FRONT OF THE SES.

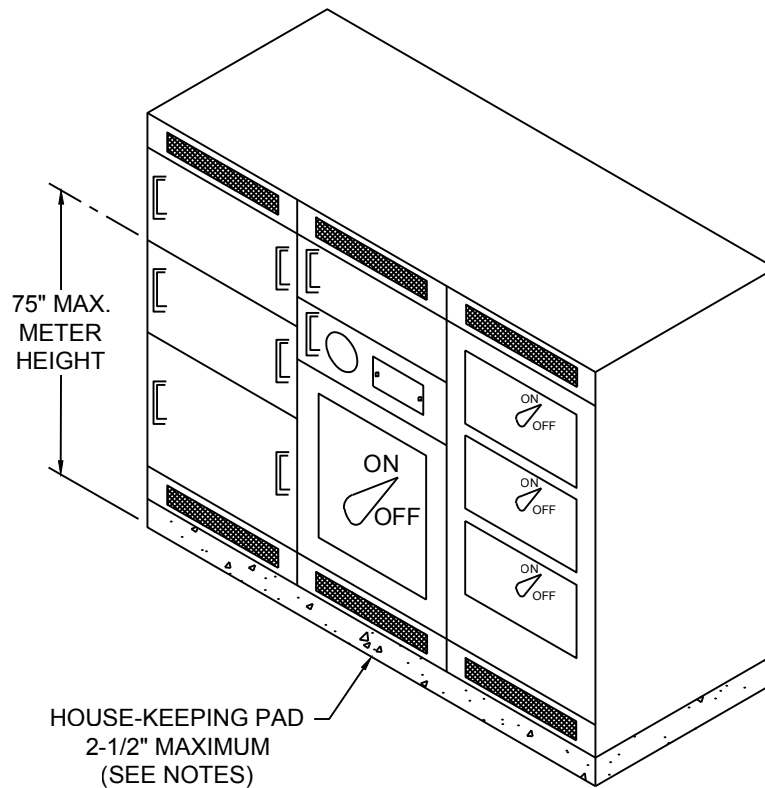


## ALTERNATE ESCAPE ROUTE

**NOTES :**

- 1) OPENING TO STEPS TO BE MINIMUM 3' WIDE
- 2) IF STEPS ARE PLACED DIRECTLY IN FRONT OF SES PAD THE 4' LANDING AREA WILL STILL BE REQUIRED.
- 3) HANDRAIL ACCORDING TO AHJ.

PAGE  
43

**NOTES:**

1. IF CUSTOMER PREFERS TO INSTALL, HOUSEKEEPING PAD SHALL BE NO MORE THAN 2-1/2 INCHES THICK, AND SHALL NOT EXTEND MORE THAN 1 INCH BEYOND THE FRONT EDGE OF THE SERVICE ENTRANCE SECTION. **DO NOT USE 2" X 4" AS FORM FOR CONCRETE PAD.**
2. PAD MATERIAL TO BE RATED 3000 LB. AT 28 DAY MINIMUM.
3. SEE SECTION 300, PARAGRAPH 301.9 FOR METER ROOM REQUIREMENTS.
4. PAD IS NOT AN APS REQUIREMENT AND SHALL BE FOR INDOOR USE ONLY.
5. THE METER ROOM'S CONCRETE FLOOR OR, IF PREFERRED, THE CUSTOMERS HOUSEKEEPING PAD WHERE THE SES IS SECURED TO, SHALL REMAIN LEVEL AND FLUSH THROUGHOUT THE ENTIRELY OF THE SES FOOTPRINT. THERE SHALL BE NO VAULT, BASIN, DEPRESSION, OR OPEN CONDUIT WINDOW ALLOWED IN THE CONCRETE PAD UNDER THE SES.

## 305.0 INSTALLATION REQUIREMENTS FOR THE TOTALIZED METERING OF ELECTRIC LOADS

Totalized metering is the measurement for billing purposes at the appropriate rate, through one meter, of the simultaneous demands and energy of a Customer who receives this electric service at more than one delivery point. The Customer must qualify under APS "Conditions Governing the Totalized Metering of Electric Loads", and must receive prior approval from APS Totalizing Committee. The Customer will then be notified in writing, by the Design Project Leader, that totalized metering has been approved and may be implemented.

After determination by APS that totalized metering will be permitted, a meeting will be held with the Customer (or his representative), the APS Customer Service Representative, and a representative from the APS Electric Meter Shop. This is for the purpose of discussing conduit routing and general installation details. Following the meeting, the Customer shall submit an installation plan, showing all details, to the Design Project Leader. The Electric Meter Shop is responsible for the final approval of the plan. Installation of totalized metering facilities shall not begin prior to final approval.

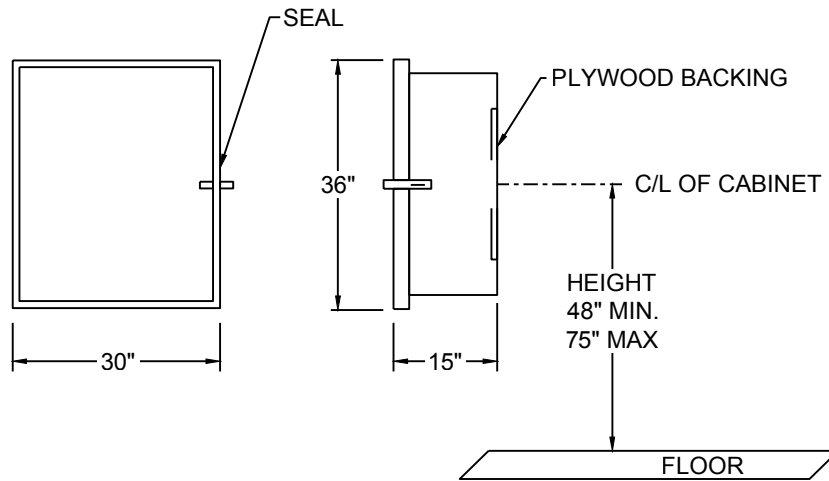
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### 305.1 GENERAL RULES FOR TOTALIZED METERING INSTALLATIONS

1. Totalized metering compartment and service entrance equipment locations shall meet APS specifications for meter locations, meter rooms, and other applicable requirements.
2. Totalized metering compartment shall be in accordance with Electric Meter Shop specifications. Customer shall provide and install totalizing cabinet. See Section 300, Paragraph 305.2 for requirements.
3. Customer shall provide and install all totalized metering conduit. Conduits shall be installed in accordance with the current National Electric Code requirements. All conduit installations shall be 1 inch conduit.
4. Totalized metering conduits shall originate in the individual service entrance section's CT compartments and shall terminate in the totalized metering compartment. Exact location of conduit entries shall be specified by the Electric Meter Shop.
5. Conduit shall be rigid steel when installed outdoor, underground, or in locations exposing it to possible mechanical damage. **EXCEPTION: Schedule 40 PVC conduit may be used in underground installations that have a minimum of 24 inches of cover over conduit, or DB 120 conduit may be used if encased in concrete per paragraph 502.8 in Section 500, and there is a minimum of 24 inches of cover over conduit. Conduit may be EMT when installed overhead indoors in an approved location. Plastic conduit is not acceptable.**
6. Steel conduit, bends, and accessory parts installed underground shall be factory coated or wrapped with an approved PVC tape (overlapped a minimum of 1/2 the tape width thereby providing a minimum thickness of 40 mils) suitable for direct burial. See Section 500, Paragraph 501.4 for coating requirements.
7. A pull box with a sealable cover shall be installed for each 270° of conduit bends. In no case shall pull boxes be more than 500 feet apart. Pull boxes shall normally be 6" x 18" x 18". If installed outdoors or below grade, pull boxes shall be watertight and approved for the purpose. All pull boxes shall be accessible after job completion. Pull box locations shall be approved by Electric Meter Shop. The conduit system shall be a clean, usable system at the time APS installs conductors.
8. Flat-strap or true-tape to be supplied and installed by Customer.
9. Customer wiring shall not be allowed in S.E.S. metering compartments, totalized metering conduits and pull boxes, or totalized metering compartment.

Because each installation is different, the above general rules may not be all inclusive. Each installation must be designed and approved on an individual basis; therefore, additional requirements may be necessary.

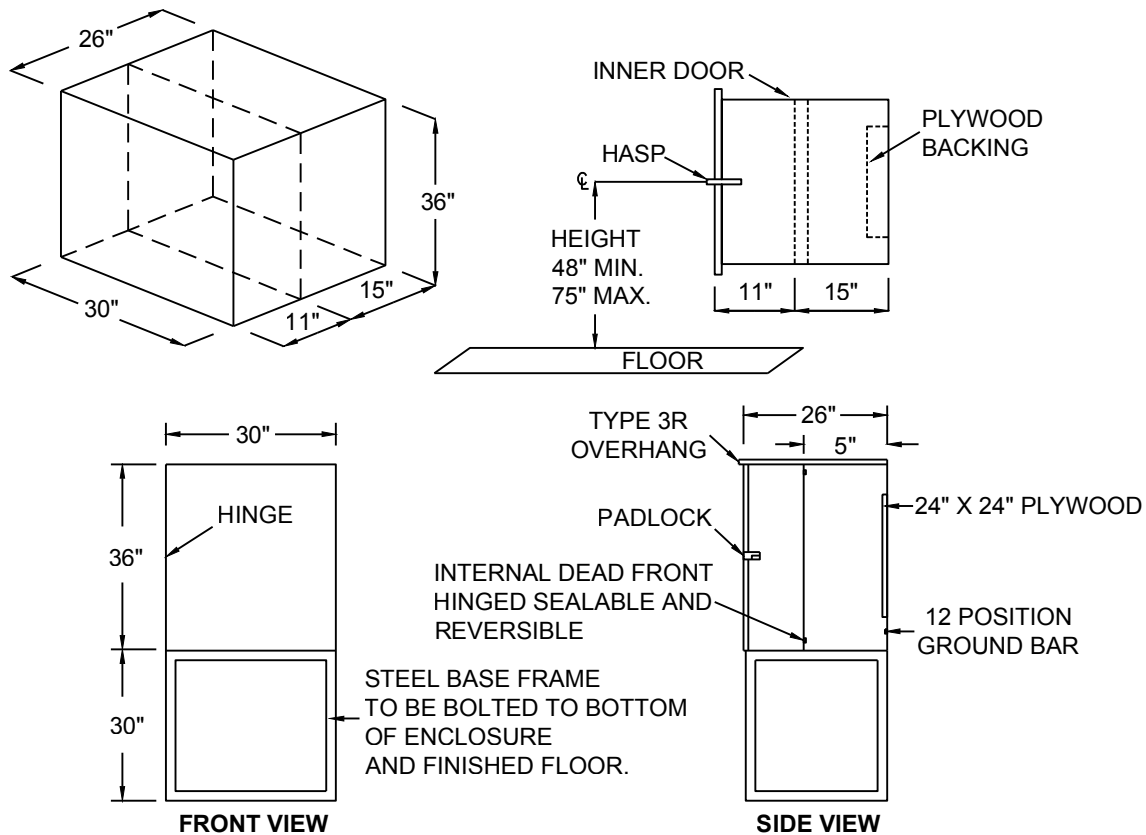
**305.2 INDOOR TOATLIZING/COMBINING CABINET**



**NOTES:**

1. CABINET TO BE MADE WITH A MINIMUM OF 12 GAUGE STEEL.
2. CABINET DIMENSIONS SHOWN ARE MINIMUMS.
3. CABINET TO BE PAINTED TO SAME SPECS AND COLOR AS SERVICE ENTRANCE SECTION.
4. COVER/DOOR TO BE DEMOUNTABLE AND REVERSIBLE.
5. COVER/DOOR TO BE SEALABLE.
6. 3/4" MINIMUM PLYWOOD TO BE INSTALLED ON BACK INSIDE WALL OF CABINET. SIZE TO BE 24" X 24". (SEE ABOVE)
7. CABINET TO BE BONDED TO SERVICE ENTRANCE SECTION WITH MINIMUM OF #8 COPPER WIRE.
8. CABINET TO BE SOLIDLY ANCHORED TO THE WALL.
9. APS METER SHOP TO DETERMINE SIZE OF CONDUIT AND POINT OF ENTRY INTO SERVICE SECTIONS.
10. DOOR TO BE HINGED.

### 305.2-1 APS OUTDOOR TOTALIZING/COMBINING CABINET



**NOTE:**

30" X 36" X 26" OUTDOOR TYPE 3R REMOVABLE REVERSIBLE AND SEALABLE DEAD FRONT COVER. STEEL REQUIRED TO BE PAINTED GRAY ENAMEL.

**NOTES:**

1. CABINET TO BE MADE WITH A MINIMUM OF 16 GAUGE STEEL.
2. CABINET DIMENSIONS SHOWN ARE MINIMUMS.
3. CABINET TO BE PAINTED TO SAME SPECS AND COLOR AS SERVICE ENTRANCE SECTION.
4. INNER DOOR TO BE DEMOUNTABLE AND REVERSIBLE.
5. INNER DOOR TO BE SEALABLE.
6. OUTER DOOR TO BE PAD LOCKABLE. PROVISION FOR TWO PADLOCKS IS REQUIRED.
7. 3/4" MINIMUM PLYWOOD TO BE INSTALLED ON BACK INSIDE WALL OF CABINET. SIZE TO BE 24" X 24". (SEE ABOVE)
8. CABINET TO BE BONDED TO SERVICE ENTRANCE SECTION WITH MINIMUM OF #8 COPPER WIRE.
9. CABINET TO BE SOLIDLY ANCHORED ON AN EXTERIOR WALL ADJACENT TO THE METERING SECTIONS, OR TO A SEPARATE STRUCTURE PER SECTION 300, PARAGRAPH 306.0 ADJACENT TO THE METERING SECTIONS.
10. APS METER SHOP TO DETERMINE SIZE OF CONDUIT AND POINT OF ENTRY INTO SERVICE ENTRANCE SECTIONS.
11. BOTH DOORS ARE TO BE HINGED.
12. CABINET TO BE WEATHERPROOF.
13. CABINET REQUIRED TO BE ON STAND.

**306.0**



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## 306.0 TYPICAL STAND ALONE SERVICE ENTRANCE SUPPORTS FOR SERVICE EQUIPMENT

- 5 5/8"X8' GROUND ROD SHALL BE POSITIONED IN A PLACE WHERE IT DOES NOT POSE A TRIPPING HAZARD TO APS OR THE PUBLIC. THERE SHALL BE A MAINTAINED 3'x3' CLEAR FLAT SAFE WORKING SPACE IN FRONT OF METERING EQUIPMENT.
- 6 ACORN CLAMP REQUIRED AT CONNECTION. GROUNDING SHALL BE PROVIDED BY THE CUSTOMER IN COMPLIANCE WITH N.E.C. AND ARIZONA PUBLIC SERVICE. MADE ELECTRODES SHALL HAVE A RESISTANCE-TO-GROUND OF NOT MORE THAN 25 OHMS.
- 7 GROUND WIRE SHALL BE A MINIMUM SIZE OF #4 SOLID COPPER.
- 8 RISERS SHALL BE SECURELY FASTENED TO UNISTRUT BY AT LEAST ONE STRAP AND THE SERVICE EQUIPMENT ENCLOSURE. THE STRAP SHALL BE LOCATED 1/3 THE DISTANCE UP FROM FINISH GRADE BETWEEN THE RISER ENTRANCE TO THE SERVICE EQUIPMENT AND FINISHED GRADE.
- 9 UNDERGROUND RISERS SHALL BE RIDGED STEEL OR SCHEDULE 80 PVC AND NOT HAVE ANY PVC COUPLINGS ABOVE GRADE EXCEPT FOR THE CONNECTION AT THE PANEL., THREADED RIGID STEEL RISER SHALL NOT BE CUT WITH A TORCH, WELDED, BRAZED, OR CONTAIN ANY COMPRESSION COUPLINGS. ONLY TRUE ROUND CROSS-SECTION RISERS WILL BE ACCEPTABLE. RISERS SHALL BE PLUMB WITH NO KICKS OR BENDS.
- 10 RIGID STEEL RISER OR SCHEDULE 40, 24 INCH RADIUS ELBOW ARE ACCEPTABLE. IF ELBOW IS STEEL THE PORTION OF THE STEEL RISER BELOW GRADE, UP TO A MINIMUM OF 6" ABOVE GRADE, SHALL BE HALF-LAPPED WITH 20 MIL. TAPE SUITABLE FOR IT'S USE, TO A TOTAL THICKNESS OF 40 MIL. THE TAPE SHALL BE LABELED TO INCLUDE THE THICKNESS (20 MIL.) AND THE MANUFACTURER'S NAME OR FACTORY COATED. IF RISER IS FACTORY COATED, IT SHALL HAVE A U.L. LABEL. THE COUPLER CONNECTING THE PVC CONDUIT SYSTEM TO THE STEEL ELBOW SHALL ALSO BE TAPED.
- 11 ALL STEEL POSTS USED FOR PANEL SUPPORTS MUST BE HALF-LAPPED WITH 20 MIL. TAPE SUITABLE FOR IT'S USE, TO A TOTAL THICKNESS OF 40 MIL. UP TO A MINIMUM OF 6" ABOVE GRADE. THE TAPE SHALL BE LABELED TO INCLUDE THE THICKNESS (20 MIL.) AND THE MANUFACTURER'S NAME
- 12 FACTORY BOLT-ON HUB IS PREFERRED. ALL RISER KNOCK OUTS SHALL BE REMOVED BEFORE ANY RISER ATTACHMENT IS MADE. REDUCER WASHERS SHALL BE INSTALLED ON THE INSIDE AND OUTSIDE OF THE SECTION WHENEVER A SELF-BONDING HUB IS NOT USED. SCHEDULE 80 PVC CONDUIT RISERS SHALL BE SECURED TO THE PULL SECTION USING A THREADED MALE SLIP-SLEEVE CONNECTOR AND A STEEL LOCK NUT. STEEL CONDUIT RISERS SHALL BE SECURED TO THE PULL SECTION USING A RISER "HUB" WITH A BONDABLE LOCK NUT/BUSHING, A FACTORY BOLT-ON HUB, OR A SELF-BONDING HUB (MYERS OR EQUIVALENT).
- 13 ALL STEEL UNISTRUT SHALL BE ATTACHED TO THE POLE OR POST SECURELY WITH A MINIMUM 1/2" GALVANIZED THROUGH BOLT WITH ONE 1/2" GALVANIZED BACKING AND A LOCK NUT. LAG BOLTS WILL NOT BE ACCEPTED. UNISTRUT MAY BE WELDED TO STEEL POLES. WELDING MUST BE APPROVED BY AN APS INSPECTOR.
- 14 RIVETED NON-FERROUS METAL ADDRESS LABEL. SEE 302.1 FOR LABEL REQUIREMENTS
- 15 APS APPROVED PANEL.



307.0 JOB SITE POWER (TEMPORARY METER IN PERMANENT POSITION)

