MEDIUM VOLTAGE (601V - 15KV) METERING AND SERVICE EQUIPMENT

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1000.0 MEDIUM VOLTAGE METERING AND SERVICE EQUIPMENT

The following requirements apply to switchgear and services between 601 volts and 15 kV. For higher voltages, contact an APS Customer Project Representative (CPR). Requirements in other sections of this manual also apply to high voltage services.

1000.1 GENERAL

APS may furnish primary service of a voltage and phase listed in Section 200, Paragraph 201.0 where available.

The Customer shall provide fault interrupting means that will interrupt the maximum fault current supplied by APS at the time a new service entrance section is installed and at any future time. Because fault duties generally trend upward, the Customer is encouraged to provide equipment that has interrupting capability to meet future needs. APS will provide the fault current figures.

A. SINGLE PHASE INSTALLATIONS

Single phase primary metered load (no transformation by APS) will be limited by the size of the APS protective device on the source side of meter. **All loads over 150 KVA must receive APS Engineering approval.**

If transformation by APS is required, load will be limited to a 167 KVA transformer.

B. THREE PHASE INSTALLATIONS

Three phase 2400 or 4160 V will normally be limited to 5000 KVA of transformation at a single point of delivery. For loads above 5000 KVA of transformation, Customer will be required to accept the APS primary distribution or transmission voltage (12.47 kV or higher).

C. COORDINATION GUIDELINES

The type and setting of the Customer's protective device must coordinate with upstream equipment. Customer must notify APS Representative prior to implementing any proposed protective device changes at any time throughout the lifetime of the facilities, APS will then verify proper coordination with the APS upstream protective equipment.

1000.2 ENGINEERING SPECIFICATIONS

Each switchgear and service exceeding 600 volts will be considered "specially engineered." To properly coordinate the provisions of these requirements, the consulting engineer, manufacturer or contractor (Customer) must contact an APS Customer Project Representative (CPR) as early in the design stage as possible. Specifications for all equipment (e.g., service entrance section, pull section, breakers, etc.) must be submitted to APS for approval prior to fabrication of the equipment. See paragraph 1000.3. APS Engineering will prepare and issue engineering specifications and drawings for each medium voltage service installation. These specifications will be based on the following.

1000.2-1 CUSTOMER TO SUPPLY THE FOLLOWING INFORMATION

1. Location (address) of the property to be served.
2. Type of structure or facilities to be served. (See Section 200 - Application for Service)
3. Voltage and phase desired. (See Section 200, Paragraph 201.0)
4. Size (ampacity) of the proposed service entrance section (normally 12470/7200 or 20780/12000.) Service entrance sections of 100 amps or greater shall require a breaker (or acceptable interrupting device with phase and ground time current curves to coordinate with APS upstream equipment) for Customer's main disconnect. Any application requesting service needing a protection study will be required to pay in advance a study fee determined by APS.

NOTE: Services below 100 amps may also require a breaker for the main disconnect. Consult an APS Representative to facilitate an engineering review.

5. Size of main disconnect/breaker.
6. Anticipated peak load. (Electrical load calculations)

NOTE: Underground Service Entrance Sections at primary voltage (greater than 600V) 3 phase are limited to 1,200 amps. Any customer requiring more than 1,200 amps will be required to install 2 or more service entrance sections.

1000.2-2 APS ENGINEERING WILL THEN SUPPLY THE FOLLOWING INFORMATION

1. Recommend the type of protective device (breaker or fused disconnect) to be installed by the Customer on his equipment.
2. Type of protective device that is used by APS on the line that will serve Customer.
3. The minimum operating current and time current characteristics of APS relays with which customer equipment must coordinate.

1000.2-3 CUSTOMER THEN TO SUPPLY THE FOLLOWING INFORMATION TO APS ENGINEERING FOR APPROVAL

1. When a breaker is necessary to coordinate with APS facilities, phase and ground relays are required. Relays shall have timed and instantaneous trip capabilities. Characteristics of the timed trip shall be "very inverse." Customer relay information needed:
   a. Manufacturer of relay.
   b. Current transformer ratio.
   c. Setting ranges of relay.
   d. Proposed settings of relay.
   e. Time current characteristics.
2. If a fused disconnect is acceptable to APS Engineering, the following information is needed:
   a. Name of fuse manufacturer.
   b. Fuse type.
   c. Continuous current rating of fuse.
   d. Total clearing time-current characteristic of the fuse.

NOTE: Customer's equipment (relays/fuses) must be designed to isolate the APS system from faults in the Customer's distribution lines, equipment and transformers. Coordination time of customer protective devices must be 1/4 second faster than APS protective devices at the maximum available fault current. The installation shall comply with all applicable codes and ordinances.

1000.3 MANUFACTURER'S DRAWINGS FOR APPROVAL

The designer or manufacturer of the medium voltage switchgear for the customer's service shall submit PDF drawing copies of the service cable terminating section, metering isolation, bus isolation switch and main breaker to an APS Representative in accordance with Paragraph 302.9, Section 300.

1000.3-1 For UG primary metering the customer protective equipment shall be in load side adjacent to primary meter isolation switch cubicle**.**

1000.3-2 For OH primary metering the customer protective equipment shall be on a load pole within 100 feet of the APS primary meter pole**.**

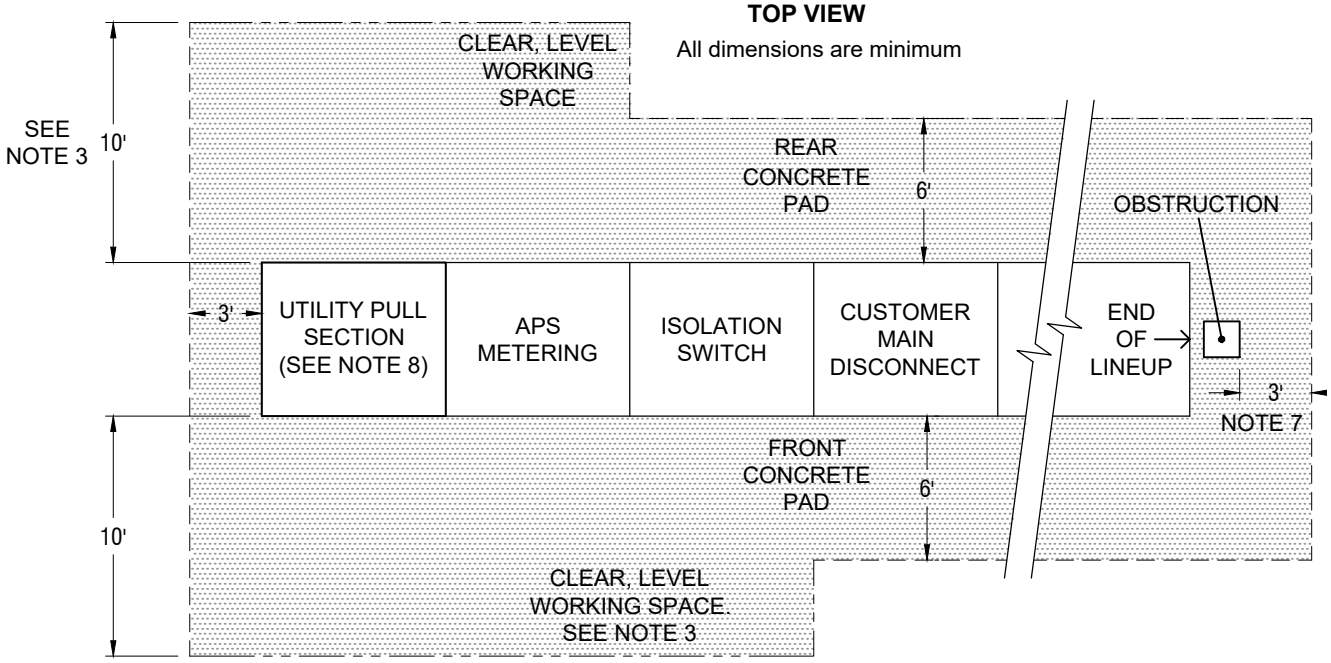
1000.4 SPACE REQUIREMENTS FOR INSTALLATION OF PRIMARY METERED SWITCHGEAR (WORKING SPACE)

Medium voltage switchgear shall be installed with at least the clear space shown in the figure below. A level concrete standing and working space shall be provided in front of any part of the side or end of the switchgear where such portions of the service equipment supports or provides access to metering components, test equipment, utility service termination compartment, or switches. These are minimum working space clearances. Working space clearance may need to be increased as described in the NEC, and should be verified with the AHJ.

Concrete walkways at least 36 inches wide shall be provided around the ends of the medium voltage switchgear because access is required to both the front and rear of the switchgear to perform maintenance, servicing, operation and testing. Additionally, refer to the ESRM, Section 301.9 for meter room requirements. Rooms containing equipment that exceeds 600V ratings must have a sign on all doors stating "Warning – Medium Voltage – Keep Out".

TOP VIEW

All dimensions are minimum



NOTES:

1. EUSERC 401 CABINET IS DOUBLE SIDED. CTs AND UTILITY TERMINATIONS ON ONE SIDE, METER, TEST SWITCH, PTs & PT DISCONNECT ON OTHER SIDE.
2. LABELING PER EUSERC 400 SHEETS PLUS SITE ADDRESS.
3. THE CLEAR WORKING SPACE OF 10 FT SHALL BE CONCRETE ON BOTH SIDES OF THE UTILITY PULL SECTION, METER SECTION, AND FRONT SIDE OF THE ISOLATION SWITCH.
4. INCOMING UTILITY CONDUITS ON CT SIDE ARE PER MANUFACTURER.
5. DIMENSIONS OF GEAR DETERMINED BY MANUFACTURER.
6. CONCRETE PAD SHALL BE 6-INCHES THICK MINIMUM AND 3,000 PSI @ 28 DAYS. TRANSITION FROM CONCRETE PAD TO SURROUNDING AREA SHALL NOT EXCEED 6" IN HEIGHT. REFERENCE 304.5-1 FOR PAD REQUIREMENTS.

1000.4 SPACE REQUIREMENTS FOR INSTALLATION OF PRIMARY METERED SWITCHGEAR (WORKING SPACE) (CONTINUED)

7. CONCRETE WALKWAY SHALL BE 36" FROM THE END OF LINEUP OR ANY OBSTRUCTION.
8. A DEDICATED PULL SECTION SHALL BE REQUIRED IF THE SERVICE EXCEEDS 600A.

1000.5 ENCLOSURE AND SEALING OF METERING AND PULL SECTIONS

Service terminating pull sections and metering sections shall be fully enclosed. All removable parts that will give access to these sections or to any secondary wiring shall be sealable.

1000.6 MAIN SERVICE SWITCH OR BREAKER

The manufacturer or contractor shall furnish and install main service switch(s) or breaker(s) for each medium voltage service. The maximum number of main service switches or breakers shall be limited to no more than 6 and shall be installed on the load side of the metering equipment. Consult an APS Representative if requesting an alternate feed/spot network service for location of service switch/breaker in respect to metering equipment.

1000.7 OVERHEAD BUSWAY (2400 AND 4160 VOLTS)

In cases where the top feed connection employing busway is desired, the contractor shall furnish and install such busway. The busway shall extend from the meter section of the switchgear to a location designated by APS as being suitable for connection to its supply facilities and shall be equipped with a suitable service head.

1000.8 UNDERGROUND SERVICE

The Delivery Point will be at the connection of the pull section located at ground level. The customer shall furnish and install the appropriate pull section and metering cubicle in accordance with this section. Any exceptions to the above must be approved by APS Engineering.

1000.9 SERVICE CABLE TERMINATING SECTION

Medium voltage switchgear to which underground service is to be supplied by APS shall be equipped with a fully enclosed service terminating pull section by the manufacturer. The pull section shall be part of the switchgear that houses the metering section and disconnecting device. Bus bars with provisions for terminating lugs (See Section 1100 Dwg #347) are required from the pull section into metering cubicle. One landing position per phase and neutral shall be provided for each 400 amps of section size.

1000.10 METER PANEL DETAILS

Two 15" meter panels as shown in Section 1100, EUSERC Dwg. 332 (1-panel cutout and 1-panel blank) or one 30" panel are acceptable to APS. (See Paragraph 302.2 of Section 300 for meter height requirements.) A #4 AWG flexible braided bond wire shall be installed across at least one hinge per door.

1000.11 LIFTING HANDLES ON REMOVABLE PANELS

Each removable panel giving access to an instrument transformer or medium voltage termination compartment shall be equipped with two lifting handles. The area of any single panel shall not exceed 9 square feet. Where hinged doors are used, their size is not limited. Both panels and doors used for meter compartments or termination compartments shall be sealable and lockable.

1000.12 CUSTOMER'S LOAD CONDUCTORS

Customer's load conductors may not run through any meter or termination area.

1000.13 UNACCEPTABLE METER LOCATIONS

See Paragraph 301.6 of Section 300 for unacceptable meter locations.

1000.14 WEATHER-PROOF ENCLOSURES

See Section 300 for outdoor switchgear requirements.

1000.15 EUSERC - ELECTRIC UTILITY SERVICE EQUIPMENT REQUIREMENTS COMMITTEE

Switchgear service sections 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 switchgear manufacturers. (See Manufacturing Requirements, Section 1100 - EUSERC DWGS #401 through 408)

1000.16 CONDUCTORS PASSING THROUGH COMPARTMENT WALLS

When cable or bus pass through compartment walls, through-the-wall bushings must be used, or bare bus clearance must be maintained.

1000.17 INSULATED NEUTRAL TERMINATION

The neutral termination shall be located in the service termination area. The insulated neutral bus shall extend from the service termination in the pull section through the metering voltage transformer (V.T.) area into the Customer's disconnect compartment (non-sealed area), where it shall have a disconnect link, if necessary and provisions for a bond tie on the line side of said link. The insulated neutral bus is to be separate from the ground/bond bus. (See Bonding and Grounding, Section 700, Paragraph 705.6)

1000.18 GROUND/BOND BUS

A ground/bond bus shall extend from the pull section, through the metering section into the Customer's disconnect compartment (non-sealed area). The ground/bond bus shall be tied to the Customer's neutral in the Customer's disconnect compartment (non-sealed area) with a properly sized main bond jumper. (See Section 700, Paragraph 705.6)

1000.19 METER HEIGHT

See Section 300, Paragraph 302.2 for meter heights.