SECTION 26 21 00 - MEDIUM-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

A. Primary Transformers:
1. Electrical transformers will be included as part of the project design and will be located during the design phase.
2. Where a building transformer is to be furnished under the building contract, the size is to be determined by the Engineer. All sizing is to be approved through the University Project Manager.
3. Liquid-filled pad-mount transformers will be dead front design.
4. Three-phase medium voltage transformers will have a primary voltage of 13.2 KV 3-phase delta with a wye secondary.
5. Single-phase medium voltage transformers will have a primary voltage of 13.2/7.6kV Wye and be line-to-neutral connected.
6. Transformer capacity, secondary voltage, and impedance ratings will be as specified on the drawings.
7. Transformers installed at the end of a medium voltage circuit radial tap or tap loop open point will include lightning arresters.
8. Exterior pad-mounted service transformers will be located adjacent to the building being served.
9. Indoor dry-type medium voltage transformers will be located per applicable code requirements in the primary building electrical room.
10. Transformers will be connected and grounded as specified on the drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Medium Voltage Transformers: Cooper, ABB (Hitachi), GE, Square D, and High to Low Voltage.

2.2 MATERIALS AND CONSTRUCTION, GENERAL

A. Primary Exterior Pad-Mounted Transformers:
1. Liquid-filled: IEEE/ANSI C57.12.00, C57.12.34, and C57.12.38; pad mounted, self-cooled, copper or aluminum windings, 95KV BIL, KNAN class, 65°C rated rise, self-cooled.
a. Insulation, Cooling, and Lubricating Liquid: Natural Ester Oil
b. Parking stands will be provided near each bushing.
c. Three-phase pad mount accessories, including the following:
1) Externally operated no-load tap changer with (2) 2 1/2% above and (2) 2 1/2% below normal taps.
2) Liquid level gauge
3) Vacuum/pressure gauge
4) Dial-type thermometer with maximum temperature indicator
5) Drain valve
6) Oil sampling device (see section 3.1.E)
7) Fill plug
8) Pressure relief device
d. Single-phase pad mount accessories, including the following:
1) Externally operated no-load tap changer with (2) 2 1/2% above and (2) 2 1/2% below normal taps.
2) Liquid level gauge
3) Dial-type thermometer with maximum temperature indicator

4) Drain valve
5) Fill plug
6) Pressure relief device

e. Primary Terminations:
1) Bushing wells in accordance with ANSI/IEEE 386. Bushing well quantities and arrangement for radial or loop feed will be as specified on the project drawings.
2) Include bushing inserts (and/or feed through inserts) for insulated load break connectors as indicated on project drawings.
3) On three-phase pad mount transformers, the primary termination compartment must be isolated from the secondary termination compartment.

f. Primary Switching Devices:
1) Load break switches will be included as indicated on the project drawings.

g. Primary Protective Devices:
1) Bayonet-type, oil-immersed, expulsion fuses in series with oil-immersed, partial-range, current-limiting fuses or isolation links for kVA ratings up to and including 2500 kVA.
2) For transformers with kVA ratings above 2500 kVA, the equipment should be protected by a dedicated upstream vacuum fault interrupter or circuit breaker. The protective device must be in series, but does not have to be housed in the transformer.

h. Secondary Terminations:
1) Spades with connection holes, dimensions, and quantities as indicated on project drawings.

B. Primary Indoor Transformers
1. Dry Type: IEEE C57.12.01; housekeeping pad-mounted, self-cooled, copper windings, 95kV BIL, AA/FA class, 150°C rated rise.
a. Dry-type indoor transformers will be equipped with internally adjustable (2) 2 1/2% above and (2) 2 1/2% below normal taps.
b. Primary Terminations:
1) Bolted connections torqued to manufacturer specifications.
c. Primary Switching Devices:
1) As specified on the project drawings.
d. Primary Protective Device:
1) As specified on the project drawings.
e. Secondary Terminations:
1) As specified on the project drawings.

C. No transformers containing polychlorinated biphenyls (PCBs) are allowed on the University medium voltage distribution system.

2.3 TESTING

A. The manufacturer will test liquid-filled pad-mount transformers in accordance with IEEE C57.12.00.

B. The manufacturer will test dry-type transformers in accordance with IEEE C57.12.01.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Transformers will be installed in accordance with project drawings, manufacturers' recommendations, and Article #450 of the National Electric Code (NEC).

B. Install safety labels in accordance with NEMA 260 requirements.

C. Transformer clearances will comply with Xcel Energy requirements.

D. Provide radial or loop feed to transformers as specified on project drawings.

E. Keep conduits/conductors clear from the oil test port. Provide an exterior-mounted test port enclosed in a lockable NEMA 3R enclosure if clearance cannot be maintained.

F. Transformer installation on foundation/pad will ensure no less than 2 inches from the edge of the equipment to the lip of the foundation/pad to ensure anchoring integrity.

3.2 TESTING, CLEANING, AND CERTIFICATION

A. Test the dielectric liquid to ASTM D877, using 25,000 volts minimum breakdown voltage, after installation and before energizing from the system.

B. Test pad mount liquid-filled transformers in accordance with ANSI/IEEE C57.12.90.

C. Test indoor dry-type transformers in accordance with ANSI/IEEE C57.12.91.

D. Cable Testing: Perform DC high-potential test of each conductor in accordance with NEMA WC 3. Connect untested conductors in the circuit to ground during test. Apply test voltage in at least eight equal increments to the maximum test voltage. Record leakage current at each increment. Allowing for charging current decay. Hold the maximum test voltage for ten minutes.

END OF SECTION 26 21 00