SECTION 26 12 00 – MEDIUM VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 – GENERAL

1.1. SUMMARY:
   A. This section includes design and performance requirements for medium-voltage distribution transformers, typically utilized for use for building service entrance use, connected to the campus 11.2 KV and 4.16 KV distribution systems.
   B. Related Sections:
      1. Section 01701 - Building Systems Identification and Labeling

1.2. QUALITY ASSURANCE
   A. Transformers shall be designed, manufactured and tested in accordance with the latest applicable ANSI, NEMA and UL standards and shall be suitable for the intended use on the Project.
   B. Transformers shall be Underwriters' Laboratories (UL) listed; Indoor-mounted transformers to be FM-Listed.

1.3. SUBMITTALS:
   A. Submit product literature detailing the electrical and physical characteristics of the equipment, including:
      1. Dimensions, weights, lifting and installing provisions
      2. Voltage (primary and secondary)
      3. kVA rating
      4. Tap configurations
      5. Insulation system type and rated temperature rise
      6. Sound Level
      7. Design Impedance
      8. K-Factor Rating (where applicable)
      9. Energy Star Label compliance
      10. Basic Impulse Level (BIL) for transformers over 600 Volts
      11. Oil capacity
      12. Factory Test Reports.
   B. Submit manufacturer’s standard connection diagrams and installation instructions.

1.4. TRANSFORMER GENERAL REQUIREMENTS:
   A. Transformer ratings and types shall be selected to match the requirements of the primary service and the types of load served.
   B. Transformers shall conform to latest NEMA TP-1 requirements for energy efficiency.
   C. Transformers shall be capable of operating at 100% of nameplate rating continuously while in an ambient temperature of 40 degrees C (104 degrees F). Maximum temperature rise shall be 80 degrees C.
   D. Three phase transformers shall be wound in a Delta-Wye configuration unless otherwise required for the application.
E. Coolant and insulating fluid: non-toxic, fire resistant, natural ester oil, Envirotemp FR3, as manufactured by Cooper Power Systems, or approved equal.

F. Transformer windings and terminations shall be copper.

G. Core and coils: wound core type using silicon steel laminations. Core frame welded or bolted to provide maximum short circuit strength. Exceed ANSI short circuit requirements for applicable voltage.

1.5. COMMON TRANSFORMER REQUIREMENTS:

A. Voltage ratings and Taps – 11 KV Primary:
   1. Nominal 3-phase primary voltage: 11.5 KV
   2. Taps: (4) 2.5% below nominal rated voltage

B. Voltage ratings and Taps – 4.16 KV Primary:
   1. Nominal 3-phase primary voltage: 4.16 KV
   2. Taps: (2) 2.5% above and (2) 2.5% below nominal rated voltage
   3. Nominal 1-phase primary voltage: 4.16 KV (Phase to Phase)
   4. Taps: (2) 2.5% above and (2) 2.5% below nominal rated voltage

1.6. TRANSFORMERS – PADMOUNT TYPE:

A. Tank: Sealed tank construction of sufficient strength to withstand pressures 25% greater than design without distortion.

B. Bolted access cover with tamper-proof fastenings.

C. Provide with natural convection-type cooling panels on back and sides as required.

D. Taps: externally-operated no-load tap changer, with padlocking provisions.

E. High-voltage terminations: Dead-front type, with 600-amp rated integral dual (loop-feed) primary bushings for load-break elbows and elbow-style surge arrestor.

F. Low-voltage terminations: Molded epoxy bushings with blade-type spade terminals, arranged for vertical takeoff. Neutral grounded to tank via removable strap.

G. Switches: Externally operable, load-break, gang-operated , liquid-immersed type; For loop feed, provide switch for Loop A, Loop B and transformer on-off.

H. Fuses: Bayonet type, oil-immersed type, current-limiting fuses, with external hookstick access.

I. Enclosure:
   1. High and low voltage, full-height compartments located side by side, separated by a steel barrier. Low voltage on the right side when facing the front of transformer.
   2. High voltage door fastenings not accessible unless low voltage door is opened.
   3. 3-point latches for both enclosures.
   4. Low voltage door provided with vault type handle with padlock provisions and penta-head access bolt.
   5. Stainless steel hinges and door stays.
   6. Removable doors, sills and barriers to facilitate cable installation.

A. Manufacturer’s standard pretreatment and finish paint – munsell green color.

B. Accessories:
1. Dial-type thermometer
2. Liquid level gage
3. Pressure vacuum gage
4. Automatic Pressure relief device
5. 1” upper filter press and filling plug
6. 1” lower drain valve and sampling port, provide with threaded type sealing plug.

1.7. TRANSFORMERS – SUBSTATION TYPE:
A. Tank: Sealed tank construction of sufficient strength to withstand pressures 25% greater than design without distortion.
B. Bolted access cover.
C. Provide with natural convection-type cooling panels on back and sides as required; provide with automatic, thermostatically-controlled forced air cooling fan(s) when required per project design.
D. Taps: externally-operated no-load tap changer, with padlocking provisions.
E. High-voltage terminations: Dead-front type primary bushings, or molded epoxy bushings located within an air-filled terminal cabinet.
F. Low-voltage terminations: Molded epoxy bushings with blade-type spade terminals, arranged for vertical takeoff located within an air-filled terminal cabinet. Neutral grounded to tank via removable strap.
G. Oil containment: Provide transformer with oil-containment pan.
H. Accessories:
   1. Dial-type thermometer
   2. Liquid level gage
   3. Pressure / vacuum gage
   4. Automatic Pressure relief device
   5. 1” upper filter press and filling plug
   6. 1” lower drain valve and sampling port, provide with threaded type sealing plug.
   7. Sudden pressure relay
   8. Alarm contacts for temperature and level gages
   9. Forced air cooling: Control panel with temperature indicator, status indicating lights, fan controls, test switches, alarm and alarm silence switches, with 120VAC external power source.

1.8. TRANSFORMERS – “POLEMOUNT” TYPE:
A. Single or three-phase, “polemount” type transformers suitable for platform or pad mounting in a three-phase configuration.
B. Tank: Self-venting cover assembly with minimum dielectric strength of 15KV. Provide with lifting and mounting lugs.
C. Provide with natural convection-type cooling panels on sides as required.
D. Taps: externally-operated no-load tap changer, with padlocking provisions.
E. High-voltage terminations: Dead-front type primary bushings.
F. Low-voltage terminations: Molded epoxy bushings with blade-type spade terminals, arranged for vertical takeoff. Neutral grounded to tank via removable strap.

G. Oil containment: Install transformer bank within a common oil-containment pan or berm area.

H. Accessories:
   1. Dial-type thermometer
   2. Liquid level gage
   3. Automatic Pressure relief device
   4. Alarm contacts for temperature and level gages

PART 2 – PRODUCTS

2.1. MANUFACTURERS:
   A. Transformer manufacturer shall generally match the brand of installed building electrical distribution equipment.

   B. Manufacturers:
      1. Cooper
      2. Pauwels
      3. Square D
      4. Siemens

PART 3 – EXECUTION

3.1. INSTALLATION:
   A. Transformers shall be installed in accordance with the National Electric Code (NEC) and the manufacturer's instructions.

   B. Provide proper spacing from walls for proper transformer ventilation and cooling.

   C. Provide concrete housekeeping pad for floor-mounted transformers.

   D. Verify final connections for proper application and workmanship prior to energizing.

   E. Verify that all internal shipping braces and brackets are removed.

   F. Check primary and secondary voltages and make appropriate tap adjustments after transformer energization to provide optimum voltage conditions to the utilization equipment.

   G. Transformer installation shall be left neat and clean with all foreign material removed from inside and around enclosures.

3.2. IDENTIFICATION:
   A. Label each transformer with laminated plastic nameplate, secured to the case with corrosion-resistant screws.

END OF SECTION