SECTION 261200 - MEDIUM-VOLTAGE TRANSFORMERS; Attachment A, Revised (ADDENDUM TWO)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of transformers with medium-voltage primaries:

1. Pad Mounted, liquid-filled 3000kVA, 12,470Y/7,200 primary, 480/277V secondary, distribution transformers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of transformer indicated.

B. Shop Drawings: Indicate electrical characteristics and connection requirements, outline dimensions, connections and support points, weight, specified ratings and materials. Identity mounting conditions required for equipment seismic qualification.

C. Test reports: Indicate procedures and results or specified factory and field testing and inspection.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with IEEE C2 and NFPA 70, NEMA TR 1-1993 (R2000), NEMA 260-1996, and 10 CFR Part 431 – DOE Energy Conservation Program.

C. Comply with IEEE C57.12.00, IEEE C57.12.28, IEEE C57.12.34, and IEEE C57.12.90.

1.5 REFERENCE STANDARDS

A. IEEE C57.12.00 – IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

B. IEEE C57.12.90 – IEEE Standard Test Code for Liquid-Immersed Distribution and Power Transformers.

C. NETAATS – Standard For Acceptance Testing Specifications for Electrical Power Equipment and Systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ABB Control, Inc.
2. Cooper Industries; Cooper Power Systems Division – Eaton Distribution Transformers.
3. Pioneer Transformers Ltd.
4. Siemens Energy & Automation, Inc.
5. Square D/Groupe Schneider NA.
6. Virginia Transformer Corp.

2.2 PAD-MOUNTED, LIQUID-FILLED TRANSFORMERS

A. Description: Comply with ANSI C57.12.13, IEEE C57.12.00, IEEE C57.12.22, and IEEE C57.12.26 for pad-mounted, 2-winding transformers. Stainless-steel tank base, cabinet, and sills.

B. Insulating Liquid: Less flammable, edible-seed-oil based, and listed by a NRTL acceptable to authority having jurisdiction as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic.

C. Insulation Temperature Rise: 55 deg C when operated at rated kVA output in a 40 deg C ambient temperature.

D. Basic Impulse Level: 95 kV - primary voltage; 30 kV – secondary voltage.

E. Full-Capacity Voltage Taps: Four, 2.5 percent taps, 2 above and 2 below rated high voltage; with externally operable, de-energized, tap changer; position indicator; and padlock hasp.

F. Primary Fuses: 150-kV fuse assembly with fuses complying with IEEE C37.47. Rating of current-limiting fuses shall be 50-kA RMS at specified system voltage.

1. Bay-O-Net liquid-immersed fuses in series with liquid-immersed current-limiting fuses. Bay-O-Net fuses shall be externally replaceable without opening transformer tank.

G. Construction:

1. The core and coil shall be vacuum processed to ensure maximum penetration of insulating fluid into the coil insulation system. While under vacuum, the windings will be energized to heat the coils and drive out moisture, and the transformer will be filled with preheated filtered degassed insulating fluid. The core shall be manufactured from burr-free, grain-oriented silicon steel and shall be precisely stacked to eliminate gaps in the corner joints OR low-loss amorphous metal OR optimal core material based upon specified loading and/or evaluation formula. The coil shall be insulated with B-stage, epoxy coated, diamond pattern, insulating paper, which shall be thermally cured under pressure to ensure proper bonding of conductor and paper. Coils shall be either aluminum or copper (eliminate a metal if one is required over the other).

H. Tank and Cabinet Enclosure:

1. The high-voltage and low-voltage compartments, separated by a metal barrier, shall be located side-by-side on one side of the transformer tank. When viewed from the front, the low-voltage compartment shall be on the right. Each compartment shall have a door that is constructed so as to provide access to the high-voltage compartment only after the door to the low-voltage compartment has been opened. There shall be one or more additional fastening devices that must be removed before the high-voltage door can be opened. Where the low-voltage compartment door is of a flat panel design, the compartment door shall have three-point latching with a handle provided for a locking device. Hinge pins and associated barrels shall be constructed of corrosion-resistant material, passivated ANSI® Type 304 or the equivalent.

2. A recessed, captive, penta-head or hex-head bolt that meets the dimensions per IEEE Std C57.12.28™-2014 standard shall secure all access doors.

3. The compartment depth shall be in accordance with IEEE Std C57.12.34™-2009 standard, unless additional depth is specified.

4. The tank base must be designed to allow skidding or rolling in any direction. Lifting provisions shall consist of four lifting lugs welded to the tank.

5. The tank shall be constructed to withstand 7 psi without permanent deformation, and 15 psi without rupture. The tank shall include a 15 psig pressure relief valve with a flow rate of minimum 35 SCFM.

6. The exterior of the unit shall be painted Munsell 7GY3.29/1.5 green (STD), ANSI® 70 gray, or ANSI® 61 gray in color. If a special paint color is specified, a federal spec number or paint chip must be provided at the time of order. The cabinet interior and front plate shall be painted gray for ease of viewing the inside compartment.

7. The tank shall be complete with an anodized aluminum laser engraved nameplate. This nameplate shall meet Nameplate B per IEEE Std C57.12.00™-2010 standard.

I. Surge Arresters: Distribution class, one for each primary phase; complying with IEEE C62.11 and NEMA LA 1. Transformers shall have three arresters for radial-feed circuits.

J. High-Voltage Terminations and Equipment: Dead front with universal-type bushing wells for dead-front bushing-well inserts, complying with IEEE 386 and including the following:

1. Bushing-Well Inserts: One for each high-voltage bushing well.
2. Surge Arresters: Dead-front, elbow-type, metal-oxide-varistor units.
3. Parking Stands: One for each high-voltage bushing well.
4. Portable Insulated Bushings: Arranged for parking insulated, high-voltage, load-break cable terminators; one for each primary feeder conductor terminating at transformer.

K. Accessories:

1. Drain Valve: 1 inch, with sampling device.
2. Dial-type thermometer.
3. Liquid-level gage.
4. Pressure-vacuum gage.
5. Pressure Relief Device: Self-sealing with an indicator.
6. Mounting provisions for low-voltage current transformers.
7. Alarm contacts for gages and thermometer listed above.

L. Low-Voltage Terminations and Equipment: Live front with multiple port spade bushings suitable for the number of cables to be terminated, plus 25%.

2.3 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each transformer, mounted with corrosion-resistant screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation will be completed by an electrical contractor based on the following: anchor transformers on concrete bases according to the manufacturer’s written instructions.

1. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Section 033000 "Cast-in-Place Concrete."

B. Maintain minimum clearances according to manufacturer's written instructions and NFPA 70.

3.2 IDENTIFICATION

A. Identify components and provide warning signs as specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.2. Certify compliance with test parameters.

B. Test and adjust controls and safeties.

3.4 FOLLOW-UP SERVICE

A. Voltage Monitoring and Adjusting: Perform the following voltage monitoring after Substantial Completion but not more than six months after Final Acceptance:

1. During a period of normal load cycles, perform seven days of continuous three-phase voltage recording at secondary terminals of each transformer. Voltage unbalance greater than 1 percent between phases, or deviation of any phase voltage from nominal value by more than plus or minus 5 percent during test period, is unacceptable.
2. Corrective Actions: If test results are unacceptable, perform the following corrective actions, as appropriate:

    a. Adjust transformer taps.
    b. Prepare written request for voltage adjustment by electric utility.

3. Retests: After corrective actions have been performed, repeat monitoring until satisfactory results are obtained.
4. Report: Prepare written report covering monitoring and corrective actions performed.

END OF SECTION 261200