

SECTION 262200 - LOW-VOLTAGE TRANSFORMERS**PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 KVA:
 - 1. Distribution transformers.

1.2 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.3 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 C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Products.
 - 2. Square D; Schneider Electric.

2.2 GENERAL TRANSFORMER REQUIREMENTS

- A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
- B. Cores: Grain-oriented, non-aging silicon steel.
- C. Coils: Continuous windings without splices except for taps.
 - 1. Internal Coil Connections: Brazed or pressure type.
 - 2. Coil Material: **Copper.**

2.3 DISTRIBUTION TRANSFORMERS

- A. Comply with NEMA ST 20, and list and label as complying with UL 1561. Sound level shall not exceed 50db of any transformer size.
- B. Cores: One leg per phase.
- C. Enclosure: Ventilated, NEMA 250, Type 2.
 - 1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
- D. Transformer Enclosure Finish: Comply with NEMA 250.
 - 1. Finish Color: Gray.
- E. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.

- F. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
- G. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of **150** deg C rise above 40 deg C ambient temperature.
- H. Energy Efficiency for Transformers Rated 15 kVA and Larger:
 - 1. Complying with NEMA TP 1, Class 1 efficiency levels.
 - 2. Tested according to NEMA TP 2.

2.4 IDENTIFICATION DEVICES

- A. Nameplates: Engraved, laminated-plastic or metal nameplate. Nameplates are specified in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.
- B. Install distribution transformers level on concrete house-keeping pad.
- C. Install suspended transformers level and plumb from structure using 1/2" dia. (minimum) all-thread rod. See transformer mounting detail on plans.
- D. Follow all manufacturers installation instructions.

3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Follow NECA 90, Annex A Electrical Testing Procedures.
 - 3. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of transformer connections.
 - a. Instrument: Use an infrared scanning device designed to measure temperature and detect significant deviations from normal values. Minimum resolution 320x240, 45deg. field of view. Equal to Flir E8-XT or Fluke TiS60. Provide calibration record for device used. Follow instructions of test equipment used.
 - b. Comply with ASTM E1934-99a. Standard guide for Examining Electrical and Mechanical equipment with Infrared Thermography.
 - c. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each transformer 11 months after date of Substantial Completion.
 - d. Prepare a certified report identifying items checked and describing results of scanning. The infrared thermographer shall provide documentation for all infrared examinations. The following information shall be included in a report to the end user:
 - 1) The name, affiliation, address, and telephone number of the infrared thermographer, and his/her certification level and number, if applicable.
 - 2) The name and address of the end user,
 - 3) The name(s) of the assistant(s) accompanying the infrared thermographer during the examination,

- 4) The manufacturer, model and serial number of the infrared imaging system used,
- 5) The inventory list with notations of the items of equipment that were examined and explanations for the items not examined. Also, the items with low-emissivity surfaces should be identified.
- 6) The date(s) of the inspection and when the report was prepared.
- 7) When performing a qualitative infrared examination, the infrared thermographer shall provide the following information for each item identified:
 - a) Its exact location.
 - b) A description, such as its significant nameplate data, phase or circuit number, rated voltage, current rating and/or rotation speed.
 - c) The measured voltage and measured current.
 - d) The ambient air temperature and, when relevant, the wind speed and direction and the sky conditions at the time of the examination.
 - e) The time the item was documented.
 - f) Hardcopies of the thermal image (thermogram) and of a corresponding visible-light image.
 - g) The field of view or magnification multiplier of the infrared imager lens, and any imager settings that could affect the accuracy, reliability, or repeatability of the inspection data.
 - h) Notation of any attenuating media, such as windows, filters, atmospheres, or external optics.
 - i) A subjective repair priority rating provided by the qualified assistant or end user representative, or both, based on the importance of the exception to the safe and profitable operation of the facility.
 - j) Any other information or special conditions which may affect the results, repeatability, or interpretation of the exception.

3.3 ADJUSTING

- A. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.
- B. Connect buck-boost transformers to provide nameplate voltage of equipment being served, plus or minus 5 percent, at secondary terminals.
- C. Output Settings Report: Prepare a written report recording output voltages and tap settings.

END OF SECTION 262200