

**Section 261200.00**

**Indoor Medium Voltage Transformers**

**PART 1 - GENERAL**

**1.1 RELATED WORK**

- A. Types of transformers specified in this section include dry-type Medium Voltage Distribution Transformers (Over 600 Volts).

**PART 2 - PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with requirements, provide products of one of the following (for each type of transformer).
  - 1. Square D Co.
  - 2. Westinghouse/Cutler-Hammer/Eaton
  - 3. General Electric Co.
  - 4. Siemens/ITE.

**2.2 MATERIALS**

- A. Medium Voltage Distribution Transformers (Over 600 Volts)
  - 1. Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for complete installation.
  - 2. Transformer(s) shall be dry-type construction, mounted in a suitable, ventilated enclosure. Enclosure shall be designed for indoor installation.
  - 3. Enclosure shall be able to easily be removed and bussing swung down for easy transport through existing openings without violating warranty.
- B. Ratings
  - 1. Provide forced air cooling to increase the allowable full-load kVA by minimum of 33-1/3%.
  - 2. The transformer(s) shall be per drawings and as follows.

Capacity:	See Drawings.
Primary Voltage:	See Drawings.
Secondary Voltage:	See Drawings.
Frequency:	60 Hertz.
Impedance:	5.5%.
Sound Level:	Per NEMA TR-1.
Insulation Material:	220 deg. C
Temperature Rise:	115 deg. C
Basic Impulse Level:	95 kV.
Primary Taps:	2-1/2% full-capacity above normal & 2-1/2% full capacity below normal.

- C. Construction
  - 1. Both HV and LV windings shall be of Copper conductors. Coils shall have bolted connections.

2. The enclosure(s) shall be constructed of heavy-gauge sheet steel. All ventilating openings shall be in accordance with NEMA and National Electrical Code standards for ventilated enclosures.
  3. The base(s) shall be constructed to permit rolling or skidding in any direction and shall be equipped with jacking pads designed to be flush with the transformer enclosure.
  4. The core shall be visibly grounded to the frame by means of a flexible grounding strap.
- D. Accessories
1. Fan cooling equipment shall be controlled automatically by sensors placed in the LV air ducts. Forced air cooling system shall include: Fans, control wiring, controller with test switch, current limiting fuses in the power supply to the controller, indicating lights, alarm silencing relay, and necessary pushbuttons to properly control the system.
  2. The fan control system shall be equal to Square D model #85A.
- E. Standards and Tests
1. The transformer shall comply with all applicable portions of NEMA TR-1, ANSI C57.12.00 and ANSI C57.12.01.
  2. Testing shall be performed in accordance with ANSI C57.12.91 and shall include, as a minimum, the following tests:
    - a. Ratio
    - b. Polarity
    - c. Phase Rotation
    - d. No Load Loss
    - e. Excitation Current
    - f. Impedance Voltage
    - g. Load Loss
    - h. Applied Potential
    - i. Induced Potential
  3. The impulse rating of the high voltage windings shall be at least equal to the Basic Impulse Level specified by ANSI C57.12.90 for oil-filled transformers of the same voltage class, without the use of supplemental surge arresters.
  4. The impulse rating of the low voltage windings shall be at least 25kV.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Provide factory installed lifting eyes, properly balanced for weight load and properly positioned for rigging without lifting cables making contact with any transformer component.
- B. Provide "C" channel (or equivalent method), with water-resistant finish, below transformer skids. Such supporting means shall be per factory recommendations relating to structural strength, dimensions and positioning and shall possess length and width dimensions at least equal to the transformer skids.
- C. Primary switches/breakers shall be padlocked in the open position while performing any installation or maintenance work on the transformer. The load side of primary switches/breakers shall be properly grounded while performing any installation or maintenance work on the transformer.
- D. Prior to shipment to job site, field verify (with written, dated log) all physical characteristics to ensure compliance and compatibility with project requirements. Such verification shall include, but not be limited to, the following: - weight, height/width/depth dimensions and line-up of bus connections.

- E. All final connections to primary and secondary gear shall be made with flexible conductors of proper size, ratings and quantities as recommended by factory.
- F. Install units on vibration mounts; comply with manufacturer's indicated installation method.
- G. Transformers shall be installed in strict compliance with NEC Article 450. Transformer locations shown on drawings are shown approximately to scale. It shall be the responsibility of the electrical contractor to provide final coordination between all trades (prior to rough-in) so that code required and factory recommended ventilation and working clearances around all transformer installations are maintained.
- H. All final connections shall be made with an accurate torque wrench and shall be tightened to factory published torque values. Submit written documentation for same with shop drawing submittals.
- I. Make final connections to primary and secondary taps as required to fulfil project voltage requirements.
- J. Vacuum and wipe down transformer, enclosure interior and enclosure exterior.
- K. From the time of manufacture, through all shipping/storage phases, the transformers shall be kept dry and free of condensation and rapid temperature fluctuation. Transformers shall not be stored outdoors. Transformers shall be maintained at temperatures above ambient while in storage.

### **3.2 TESTING**

- A. Provide testing, and keep written (dated) log, for the following:
  - 1. "Megger", at factory at time of shipping.
  - 2. "Megger", at local warehouse.
  - 3. "Megger", on truck at job site prior to removal.
  - 4. "Megger", at job site, immediately prior to final connections.
  - 5. Turns ratio, at factory at time of shipping.
  - 6. Turns ratio, on truck at job site prior to removal.
  - 7. Turns ratio, at job site, immediately prior to final connections.
  - 8. Secondary voltage under no load, after installation.
  - 9. Secondary voltage under full load, after installation.
- B. Upon completion of installation of transformers, energize primary circuitry at rated voltage and frequency from normal power source, and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units or components, and proceed with retesting.

**End of Section 261200.00**