

**SECTION 26 22 13
DRY-TYPE TRANSFORMERS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide dry-type transformers in accordance with the Contract Documents.
- B. Transformers shall be of the ratings and types shown on the Drawings.

1.2 QUALITY ASSURANCE

- A. Transformers shall be the same manufacturer as the switchboards.
- B. Transformers shall comply with energy efficiency standards, including Department of Energy 2016 standards (DOE 2016), and shall be Energy Star labeled.

1.3 REFERENCE STANDARDS

- A. Published specifications standards, tests or recommended methods of trade, industry or governmental organizations apply to work in this Section where cited below:
- B. IEEE – Institute of Electrical and Electronic Engineers
 - 1. IEEE C57.12.00 Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
 - 2. IEEE C57.96 Guide for Loading Dry-Type Distribution and Power Transformers
 - 3. IEEE C57.110 Recommended Practice for Establishing Liquid-Filled and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents
- C. NEMA – National Electrical Manufacturers Association
 - 1. NEMA ST 20 Dry-Type Transformers for General Applications
 - 2. NEMA TR 27 Commercial, Institutional and Industrial Dry-Type Transformers
- D. UL – Underwriters Laboratories Inc.
 - 1. UL 506 Standard for Specialty Transformers
 - 2. UL 1561 Standard for Dry-Type General Purpose and Power Transformers

1.4 SUBMITTALS

- A. Manufacturer's product data sheets, electrical ratings, heat release data, physical dimensions, noise ratings, and weights.
- B. Factory test reports.
- C. Certified vibration isolation and seismic restraint details and product data showing the number and location of each support and restraint and the exact number, size, and type of each anchor.

1.5 FACTORY TESTING

- A. Ratio tests at the rated voltage connection and at all tap locations.
- B. Polarity and phase relation tests on the rated voltage connection.
- C. Applied and induced potential tests.
- D. No-load and excitation current at rated voltage on the rated voltage connection.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Cutler Hammer, General Electric, Siemens, or Square D.

2.2 RATINGS

- A. Transformers shall be self-cooled, designed for continuous operation at rated kVA for 24 hours a day, 365 days a year.
- B. Voltage Ratings:
 - 1. Primary: 480V, 3 phase, 3 wire, delta connected.
 - 2. Secondary: 120/208V, 3 phase, 4 wire, wye connected.

2.3 CORE AND COIL ASSEMBLY

- A. Core shall be high grade, non-aging, grain oriented, silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Coil windings shall be wound of electrical grade copper with continuous-wound construction.
- B. The core and coil assembly shall be impregnated with non-hydroscopic thermosetting varnish and cured to reduce hot spots and seal out moisture. The assembly shall be installed on vibration absorbing pads.
- C. Provide NEMA standard taps.
- D. The core and coil assembly shall be grounded to the enclosure by means of an adequately sized flexible copper grounding strap.
- E. Transformers indicated on the Drawings to be shielded isolation type or identified with the designation TK or ETK shall be provided with an electrostatic shield consisting of a single turn of aluminum placed between the primary and secondary winding and grounded to the transformer core.
- F. Transformers identified on the Drawings with the designation TK or ETK shall be UL Listed as suitable for non-sinusoidal current loads with minimum K Factor of 13. The secondary neutral conductor and neutral pad shall be rated to carry 200 percent of normal phase current.

2.4 ENCLOSURES

- A. Heavy gauge steel, finished utilizing a continuous process of degreasing, cleaning, and phosphatizing, followed by an electrostatic deposition of thermosetting polyester powder coating and subsequent baking. Finish color shall be ANSI 61 grey enamel.
- B. Units rated 30 kVA and below shall be totally enclosed, non-ventilated, NEMA 3R with lifting eyes and wall-mount hardware.
- C. Units rated 45 kVA and above shall be ventilated, NEMA 2, drip-proof, with lifting holes.

2.5 INSULATION

- A. Insulation materials shall be flame retardant and shall not support combustion as defined in ASTM Standard Test Method D635.
- B. Transformers shall be insulated with a 220 degrees C insulation system.
- C. Transformers shall be 115 degrees C temperature rise above 40 degrees C ambient, capable of carrying a 15 percent continuous overload without exceeding a 150 degrees C rise in a 40 degrees C ambient.

2.6 SOUND LEVELS

- A. Sound levels shall not exceed the following ANSI and NEMA levels for self-cooled ratings:

Transformer Capacity	Maximum Sound Level
Up to 50 kVA	45dB
51 to 150 kVA	50dB
151 to 300 kVA	55dB
301 to 500 kVA	60dB
501 to 700 kVA	62dB
701 to 1,000 kVA	64dB
1,001 to 1,500 kVA	65dB

PART 3 - EXECUTION

3.1 GENERAL

- A. Transformers shall be floor-mounted except where indicated on the Drawings to be suspended or wall-mounted.
- B. Suspended transformers shall be mounted on hanger rods with a spring isolator in each rod.
- C. Floor-mounted transformers shall be mounted on 4-inch high concrete housekeeping pads. Provide neoprene pads between transformer legs and housekeeping pad and anchor transformer to floor.
- D. Provide grounding electrode conductor from transformer secondary neutral to nearest effectively grounded building structural steel.
- D. Conduit connected to transformers shall be flexible metal conduit, 24 inches minimum length, 60 inches maximum length.

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