

SECTION 26 05 17

DRY-TYPE TRANSFORMERS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Dry-type transformers.

1.02 MEASUREMENT AND PAYMENT

- A. General: Dry-type transformers, as specified herein, will not be measured separately for payment but will be paid for as part of the Contract lump-sum price for Electrical Work as indicated in the Bid Schedule of the Bid Form.

1.03 REFERENCES

- A. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. IEEE C57.12.01 Standard for General Requirements for Dry-Type Distribution and Power Transformers
 - 2. IEEE C57.12.91 Standard Test Code for Dry-Type Distribution and Power Transformers
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA ST 20 Dry Type Transformers for General Applications
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code (NEC)

1.04 REGULATORY REQUIREMENTS

- A. Refer to Section 20 70 26, Common Materials and Methods for Electrical Systems, for requirements.
- B. California Code of Regulations (CCR):
 - 1. Title 24, Part 3 California Electrical Code

1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Product Data: Submit manufacturer's product data of transformers.

- C. Operation and Maintenance Data: Submit maintenance data and operating instructions in accordance with Section 01 78 23, Operation and Maintenance Data. Include the following requirements:
 - 1. Description of the equipment and its components;
 - 2. Manufacturer's operating and maintenance instructions, parts list, illustrations, and diagram of components;
 - 3. Recommended list of spare parts; and
 - 4. Wiring diagram.
- D. Test Reports: Submit certified field test reports.

1.06 QUALITY ASSURANCE

- A. Select a transformer manufacturer who has been regularly engaged in the manufacture of equipment and facilities similar to BART rail applications.
- B. Conform to NEMA ST 20 and California Electrical Code, or National Electrical Code, as applicable.
- C. Equipment of the same type, size, rating, functional characteristics, and make shall be interchangeable

1.07 DELIVERY, STORAGE AND HANDLING

- A. Ship each unit securely wrapped, packaged, and labeled for safe handling of shipment and to avoid damage.
- B. Store transformers in secure and dry storage facility.

PART 2 – PRODUCTS

2.01 EQUIPMENT, APPURTENANCES AND ACCESSORIES

- A. Dry-Type Transformers: Provide two winding, NEMA Premium compliant energy-efficient with copper winding type, Class H transformer with full capacity taps on the high voltage winding in accordance with NEMA ST 20. Autotransformer type is not acceptable. Transformers smaller than 30 kVA shall have the core and coil completely resin-encapsulated and shall have minimum 185 degrees Celsius insulation with 115 degrees Celsius rise. Transformers larger than 30 kVA shall have 220 degrees Celsius insulation with 150 degrees Celsius rise.
- B. Terminals: Terminals of transformer windings shall be extended from the coil for external connection. Proper terminal identification shall be provided.

- C. Noise Level: Noise level shall not exceed the following values when measured in accordance with NEMA ST 20:
- | | |
|------------|--------|
| 1-9 kVA: | 40 dBA |
| 10-50 kVA: | 45 dBA |
| 51-75 kVA: | 50 dBA |
- D. Enclosures: Equipment enclosures shall be of NEMA classification suitable for the environment to which equipment is exposed. Where NEMA 4 watertight enclosures are required, ensure that bolt down covers do not cause accessibility problems. NEMA 4 enclosures shall be used in subway locations and in areas exposed to rain, or water, or high humidity environment.
- E. Finish: Metallic surfaces shall be thoroughly cleaned, degreased, primed with an approved corrosion-inhibitive primer, and finished with a heavy-duty, industrial-grade polyurethane enamel.
- F. Nameplate: Provide nameplates showing transformer number. Nameplates shall conform to the requirements of Section 20 70 26, Common Materials and Methods for Electrical Systems

2.02 FACTORY TESTS

- A. Perform the following factory tests on each transformer unit in accordance with IEEE C57.12.01 and IEEE C57.12.91:
1. Resistance measurements of all windings on the rated voltage connections and on all tap connections of each transformer;
 2. Ratio tests on the rated voltage connections and on all tap connections;
 3. Phase-relation and polarity tests on the rated voltage connections;
 4. No-load losses and excitation current at rated voltage on the rated voltage connections;
 5. Impedance and load losses at rated current and rated frequency on the rated voltage connections of each transformer;
 6. Applied and induced potential tests;
 7. Regulation and efficiency at rated load and voltage;
 8. Insulation resistance tests (high voltage to ground, low voltage to ground, high voltage to low voltage); and
 9. Perform temperature tests in accordance with IEEE C57.12.91.
- B. Provide certified test reports of all tests.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install dry type transformers as indicated, in accordance with NEMA criteria, and as recommended by the manufacturer. Transformers shall be properly anchored, and the installation shall conform with applicable code requirements for seismic restraints. Transformers shall be maintained dust-free during the construction period and until accepted by the District.

3.02 FIELD TESTS

- A. Verify that circuits are connected in accordance with the applicable wiring diagrams.
- B. Verify that circuits are continuous and free from short circuits.
- C. Verify that the insulation resistance to ground of non grounded conductors is megger tested to not less than 10 MΩ.

END OF SECTION 26 05 17