SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

PART 1 – GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of dry-type general-purpose transformers.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items common to more than one section of Division 26.

B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits and outlet boxes.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

B. Shop Drawings:

1. Clearly present sufficient information to determine compliance with drawings and specifications.
2. Include electrical ratings, impedance, dimensions, weight, mounting details, decibel rating, terminations, temperature rise, no load and full load losses, and connection diagrams.
3. Complete nameplate data, including manufacturer’s name and catalog number.

C. Manuals:

1. When submitting the shop drawings, submit companion copies of complete maintenance and operating manuals, including technical data sheets and wiring diagrams.
2. If changes have been made to the maintenance and operating manuals originally submitted, then submit four copies of the updated maintenance and operating manuals to the Resident Engineer two weeks prior to final inspection.

D. Certifications: Two weeks prior to the final inspection, submit four copies of the following to the Resident Engineer:
   1. Certification by the manufacturer that the materials conform to the requirements of the drawings and specifications.
   2. Certification by the contractor that the equipment has been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. National Fire Protection Association (NFPA):
   70-08.....National Electrical Code (NEC)

C. National Electrical Manufacturers Association (NEMA):
   ST20-92.....Dry-Type Transformers for General Applications
   TP1-02.....Guide for Determining Energy Efficiency for Distribution Transformers
   TR1-00.....Transformers, Regulators, and Reactors

PART 2 - PRODUCTS

2.1 GENERAL PURPOSE DRY-TYPE TRANSFORMERS

A. Unless otherwise specified, dry-type transformers shall be in accordance with NEMA, NEC, and as shown on the drawings. Transformers shall be UL-listed and labeled.

B. Dry-type transformers shall have the following features:
   1. Transformers shall be self-cooled by natural convection, isolating windings, indoor dry-type. Autotransformers will not be accepted.
   2. Rating and winding connections shall be as shown on the drawings.
   3. Transformers shall have copper windings.
   4. Ratings shown on the drawings are for continuous duty without the use of cooling fans.
   5. Insulation systems:
      a. Transformers 30 kVA and larger: UL rated 220° C system with an average maximum rise by resistance of 150 ° C in a maximum ambient of 40 ° C.
      b. Transformers below 30 kVA: Same as for 30 kVA and larger or UL rated 185 ° C system with an average maximum rise by resistance of 115 ° C in a maximum ambient of 40 ° C.
   6. Core and coil assemblies:
      a. Rigidly braced to withstand the stresses caused by short-circuit currents and rough handling during shipment.

b. Cores shall be grain-oriented, non-aging, and silicon steel.
c. Coils shall be continuous windings without splices except for taps.
d. Coil loss and core loss shall be minimized for efficient operation.
e. Primary and secondary tap connections shall be brazed or pressure type.
f. Coil windings shall have end filters or tie-downs for maximum strength.

7. Certified sound levels determined in accordance with NEMA, shall not exceed the following:

Transformer Rating	Sound Level Rating
0 - 9 KVA	40 dB
10 - 50 KVA	45 dB

8. If not shown on drawings, nominal impedance shall be as permitted by NEMA.
9. Single phase transformers rated 15 kVA through 25 kVA shall have two 5% full capacity taps below normal rated primary voltage. All transformers rated 30 kVA and larger shall have two 2.5% full capacity taps above, and four 2.5% full capacity taps below normal rated primary voltage.
10. Core assemblies shall be grounded to their enclosures with adequate flexible ground straps.
11. Enclosures:
    a. Comprised of not less than code gauge steel.
    b. Temperature rise at hottest spot shall conform to NEMA Standards, and shall not bake and peel off the enclosure paint after the transformer has been placed in service.
    c. Ventilation openings shall prevent accidental access to live components.
    d. The enclosure at the factory shall be thoroughly cleaned and painted with manufacturer's prime coat and standard finish.
12. Standard NEMA features and accessories, including ground pad, lifting provisions, and nameplate with the wiring diagram and sound level indicated on it.
13. Dimensions and configurations shall conform to the spaces designated for their installations.

14. Transformers shall meet the minimum energy efficiency values per NEMA TP1 as listed below:

kVA Rating	Output efficiency (%)
15	97
30	97.5

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of transformers shall be in accordance with the NEC, as recommended by the equipment manufacturer and as shown on the drawings.

B. Install transformers with manufacturer's recommended clearance from wall and adjacent equipment for air circulation. Minimum clearance shall be 6 in [150 mm].

C. Install transformers on vibration pads designed to suppress transformer noise and vibrations.

D. Use flexible metal conduit to enclose the conductors from the transformer to the raceway systems.

3.2 ACCEPTANCE CHECKS AND TESTS

Perform tests in accordance with the manufacturer's recommendations. Include the following visual and mechanical inspections.

1. Compare equipment nameplate data with specifications and approved shop drawings.
2. Inspect physical and mechanical condition.
3. Inspect all field-installed bolted electrical connections, using the calibrated torque-wrench method to verify tightness of accessible bolted electrical connections.
4. Perform specific inspections and mechanical tests as recommended by manufacturer.
5. Verify correct equipment grounding.
6. Verify proper secondary phase-to-phase and phase-to-neutral voltage after energization and prior to connection to loads.

3.3 FOLLOW-UP VERIFICATION

Upon completion of acceptance checks, settings, and tests, the contractor shall demonstrate that the transformers are in good operating condition and properly performing the intended function.

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