**SECTION 26 22 00**

**LOW-VOLTAGE TRANSFORMERS**

**BASED ON DFD MASTER ELECTRICAL SPEC DATED 09/03/24**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.

***The consultant shall coordinate locations and weights of transformer installations with the structural engineer.***

**PART 1 - GENERAL**

**SCOPE**

The work under this section includes dry type general purpose transformers and dry type isolation transformers. Transformer primary and secondary voltages are under 600V. Included are the following topics:

PART 1 - GENERAL

 Scope

 Related Work

 References

 Submittals

 Operation and Maintenance Data

 Delivery, Storage, and Handling

PART 2 - PRODUCTS

 Dry Type General Purpose Transformers

 Dry Type Isolation Transformers

PART 3 - EXECUTION

 Installation

 Field Quality Control

 Construction Verification Items

 Agency Training

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 26 08 00 – Commissioning of Electrical

Section 01 91 01 or 01 91 02 – Commissioning Process

**REFERENCES**

U.S. Department of Energy (DOE) CFR Title 10, Chapter II, Part 431, Subpart K - Distribution Transformers.

**SUBMITTALS**

Include outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, impedance ratings and characteristics, loss data, efficiency at 25, 50, 75 and 100 percent rated load, sound level, tap configurations, insulation system type, and rated temperature rise.

# OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under Division 1.

**DELIVERY, STORAGE, AND HANDLING**

Store and protect equipment in a dry location with uniform temperature. Cover ventilating openings to keep out dust.

Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet, or snow if handled in inclement weather.

**PART 2 - PRODUCTS**

**DRY TYPE GENERAL PURPOSE TRANSFORMERS**

Dry Type General Purpose Transformers: Factory‑assembled, air cooled, dry type general purpose two winding transformers; ratings as shown on the Drawings.

***Consultant shall review the load profiles and size transformers to obtain peak loading between 60-80%.***

All transformers shall meet the U.S. Department of Energy minimum efficiency levels for distribution transformers as mandated in CFR Title 10, Chapter II, Part 431, Subpart K - Distribution Transformers, - also referred to as DOE 2016 Efficiency levels.

Insulation system shall be rated at 220 degrees C.

Winding temperature rise shall be rated at 150 degrees C above a 40 degree C ambient.

Case temperature shall not exceed 50 degrees C rise above a 40 degrees C ambient at its warmest point.

Winding Taps, Transformers 15 KVA and Larger: Four 2-1/2 percent taps, two above and two below rated voltage, full capacity taps on primary winding.

Sound Levels: Maximum sound levels shall be as follows:

 KVA Sound

 Rating Level

 0-9 40 dB

10-50 45 dB

 51-150 50 dB

 151-300 55 dB

 301-500 60 dB

 501-700 62 dB

Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap sized to meet NEMA and UL standards.

Coil Conductors: Continuous windings with termination pads brazed or welded.

Isolate core and coil from enclosure using vibration absorbing mounts.

Enclosure: NEMA Type [1.] [3R.] Provide lifting eyes or brackets.

Nameplate: Include transformer connection data.

Mounting: Transformers 75 KVA and less shall be suitable for wall (min. 12” off wall), floor, or trapeze mounting; transformers larger than 75 KVA shall be suitable for floor or trapeze mounting.

**DRY TYPE ISOLATION TRANSFORMERS**

***Consultant shall review the need for isolation transformers for special purposes such as A/V or medical equipment installations. Isolation transformers shall be identified on the drawings. If isolation transformers are included in the project, leave in the above specifications for dry type, general purpose transformers, and include the following paragraph.***

Dry type isolation transformers shall meet the specifications for dry type general purpose transformers, and shall include an electrostatic winding shield with separate insulated grounding connection.

**PART 3 - EXECUTION**

**INSTALLATION**

Set transformer plumb and level. All transformers mounted to floor shall be installed on a 3-1/2” concrete pad.

Use flexible conduit, 2 ft. (0.6 m) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure. Conduit entry can be in the bottom of the transformer in locations where PVC conduit is used in slab on grade, - provide a PVC connector and bushing, or bell ends, on each conduit entry. Coordinate conduit installation with submittals and shop drawings for the transformer.

***Consultant shall review the need for additional transformer sound dampening beyond the transformer’s built-in vibration absorbing mounts. If additional sound dampening is required, include the following sentence.***

[Mount transformers on vibration isolating pads installed between the floor and the transformer, suitable for isolating the transformer noise from the building structure.]

Provide sufficient space around transformer for cooling as recommended by the manufacturer. Provide a minimum space of 12” between the transformer and any wall.

Transformers within the same room shall not be installed directly above or below another transformer, unless preapproved by DFD.

**FIELD QUALITY CONTROL**

Check for damage and tight connections prior to energizing transformer.

Measure primary and secondary voltages and make appropriate tap adjustments within 2-1/2% of the normal operating load after the building is in full operation.

**CONSTRUCTION VERIFICATION**

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 26 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

# AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 01 or 01 91 02.

END OF SECTION