



Public Utility District No. 1 of Ferry County

DISTRIBUTION TRANSFORMER SPECIFICATION #24.01

12.47kV \7,200 Grd Wye System

(Single Phase – Padmount Transformer Specification)

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1 SCOPE

This specification is to cover minimum requirements for Padmount type, outdoor, oil-immersed distribution transformers suitable for operation on the District's 60 Hz 12470GrdY/7200 Volt Distribution System. Transformers must be manufactured in accordance with the requirements of "Build America, Buy America" (BABA). See:

<https://www.whitehouse.gov/wp-content/uploads/2022/04/M-22-11.pdf>

2 STANDARDS

All material and equipment furnished under these specifications shall conform to the latest applicable approved standards of IEEE, ANSI, NEMA and DOE except as otherwise specified herein. All distribution transformers shall be manufactured in compliance with:

IEEE C37.47 Specifications for Distribution Fuse Disconnecting Switches, Fuse Supports, And Current Limiting Fuses.

IEEE C57.12.00 General Requirements for Liquid Immersed Distribution, Power, and Regulating Transformers.

IEEE C57.12.01 General Requirements for Dry-Type Distribution and Power Transformers.

IEEE C57.12.20 Standard for Overhead Type Distribution Transformers 500 kVA and smaller; High Voltage 34.5 kV and Below; Low Voltage 7970/13,800Y Volts and below.

ANSI C57.12.25 Standard for Transformers-Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage, 34,500GrdY/19,920 Volts and Below; Low Voltage, 240/120Volts; 167 kVA and Smaller. (Only applicable for single phase pad mount transformers)

IEEE C57.12.28 Standard for Pad-Mounted Equipment - Enclosure Integrity.

IEEE C57.12.38 Standard for Pad-Mounted-Type, Self-Cooled, Single-Phase Distribution Transformers 250 kVA and Smaller; High Voltage, 34,500GrdY/19,900 Volts and Below, Low Voltage 480/240 Volts and Below.

IEEE C57.12.70 Terminal Markings and Connections for Distribution and Power Transformers.

IEEE C57.12.80 Terminology for Power and Distribution Transformers.

IEEE C57.12.90 Test Code for Liquid Immersed Distribution Power and Regulating Transformers.

IEEE 386 Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV.

ASTM D877 Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.

ANSI Z535 Sets Design and Application Standards for all Haz-Com Across North America. ANSI Z535 Standards Integrate with International ISO 3864 Standards.

DOE 2016 - Medium Voltage Transformer Efficiencies. All Transformers Must Meet or Exceed These Minimum Standards.

ANSI 70 National Electric Code

3 EVALUATION AND AWARD

For the purpose of evaluating bids, consideration will be given to the following items.

- BABA Compliance Certification
- Purchase Price
- Delivery Date – Lead Time
- Product Quality
- Loss Evaluation – All Transformers Must Meet or Exceed DOE 2016 Efficiency Standards. Provide average losses and loss tolerance for each transformer size.
- Adherence to Specifications *(The District reserves the right to reject any bids that do not meet the specifications.)*

4 PAD MOUNT TRANSFORMER – SINGLE PHASE

Ratings

All ratings shall be for 60 Hertz alternating current, oil immersed, self-cooled transformers capable of continuous operation at rated KVA without exceeding either a 65°C average temperature rise or an 80°C hot spot temperature rise.

The electrical characteristics of the completely assembled high and low voltage terminals shall be in accordance with ANSI C57.12.25, Table 1 and Section 6.2.1.

The basic impulse level (BIL) shall be 95 kV.

Loop Feed

Transformers will be suitable for loop feed.

The minimum current-carrying capabilities of components for looped primary cable systems shall be 200 Amps (continuous) and 10,000 Amps rms symmetrical for 0.17 sec. (short-time current rating) for transformers with or without high-voltage switching.

Transformer Type

Single phase padmount transformers shall be designed to IEEE C57.12.38, Figure 3, Type 2.

Pressure Relief Device

All transformers shall be designed such that all excessive pressure build-ups are released without damage to the tank in accordance with ANSI C57.12.25.

All transformers shall be equipped with a pressure relief device (either TOMCO Series 1776K or Qualitrol Model 202-032-1 or District approved equivalent). The threads shall be sealed with pipe dope.

Transformer Taps

No transformer taps are required.

High Voltage Bushings

Transformers shall come equipped with two high voltage bushing wells and corresponding load break inserts for dead front application. The bushing wells shall be externally clamped, 200-amp rated, separable, and rated for primary switching per IEEE 386.

The bushings shall conform to ANSI C57.12.25, Type 2 arrangement.

The load-break bushing inserts shall be Eaton-Cooper Power Systems LBI 215, Elastimold (Catalog No. 1601A4), or District approved equivalent.

Inserts shall be shipped with physically wired down & secured dust caps.

Low Voltage Bushings

Transformers shall be equipped with fully insulated, low voltage bushings with in-line NEMA standard stud terminals in accordance with Figure 4C of ANSI C57.12.25.

Transformers shall be furnished with the following terminals:

Table 3: Single Phase Padmount – Terminal Size		
KVA	Secondary Voltage	Terminal Size
25-75	240/120	Stud, 5/8" – 11 UNC-2A
100 – 167	240/120	Stud, 1" – 14 UNC-2A

Grounding Lugs

Transformers shall be furnished with a minimum of 3 grounding lugs installed in the transformer high-voltage compartment and spaced horizontally 8 inches or more apart. Ground lug shall not be located directly under the H1A bushing to allow easy access to the lug when the high voltage cable is connected.

The ground lugs shall be MacLean Catalog No. BVC-207-FT (or equivalent) with thin brass jam-nut, installed in horizontal position on pad mount transformers.

HOXO bushing shall be a fully insulated bushing with a removable copper ground strap bolted to a ground pad. The strap shall be connected to the bushing between two nuts on the bushing.

Compartmental Locking

The terminal compartment covers shall be secured with a captive nut and a captive recessed 9/16" stainless steel or silicon bronze Penta head bolt, and provisions for padlocking. The Penta head bolt shall be coordinated so that it must be engaged before a padlock can be inserted into or removed from the hasp. All transformers shall meet the requirements for tamper-resistance of NEMA TR-1 and Western Underground Guide No. 2.13.

Fusing

Transformers shall be provided with Eaton-Cooper Power Systems Bay-O-Net – Isolation Link (ISO) fusing (or equivalent) and the appropriate standard sized fuse.

Transformer Tanks

Transformer tanks shall be constructed in accordance with ANSI C57.12.25. The primary and secondary bushing compartment shall have a hinged, vertical-swing cover. Both the cover and the tank shall be domed or sloped to prevent moisture collection.

Grounding provisions shall consist of at least three grounding lugs, centered near the bottom of the HV compartment of the transformer and spaced horizontally 8 inches or more apart. The tapped holes shall be plugged during painting to prevent coating of the threads. Lugs must not be located directly below lowest HV bushing to allow easy access to lug when an HV cable is connected.

Drain and fill plugs shall be bronze, cadmium, or stainless steel. No galvanized hardware will be acceptable. Drain and fill plugs will be sealed with pipe dope.

Drain and fill plugs shall be a threaded plug, not a cap, located to minimize interference with anything inside the HV or LV compartments.

15 kVA and 25kVA transformers must fit on a 42X42X4 pad with opening 12X25 (Formex FORTP42-12X25UTN) without gaps, exposed openings or base footprint overhang.

HAZ-COM Decals

Decals meeting the ANSI Z535 safety standard shall be provided on each transformer. "WARNING – ELECTRIC SHOCK HAZARD" decals shall be provided on the outside of each transformer, and "DANGER - HIGH VOLTAGE" decals shall be provided on the inside of each door.

5 TRANSFORMER OIL

Transformers shall be insulated with new (unused) mineral oil. The oil shall meet the requirements of ANSI C57.12.00, Article 6.6.1 (1), ANSI C57.106 and ASTM 3487 Type II. The transformer nameplate shall indicate that the PCB content of said transformer is less than 1 PPM or at time of manufacture gas chromatographic analysis certified non-detectable PCB. The oil shall be inhibited mineral oil containing 0.2 % by weight DBPC. The nameplate shall show the gallons of oil.

6 NOISE

Transformer sound levels shall not exceed the values specified in the latest revision of NEM Publication TR 1-0.11.

7 PAINT FINISH

The transformer shall have a corrosion resistant finish that shall be capable of meeting the functional specifications or exceeding paint requirements of ANSI C57.12.28, latest revision. The outside shall be properly prepared, primed and painted with a highly weather resistant finish coat. All transformers shall have the manufacturer's premium paint system.

Pad Mounted Transformers - the finish coat shall be semi-gloss olive-green similar to Munsell 7GY3.29/1.5. The interior cabinet surfaces shall be primed and finished, with no less than 2.0 mils dry thickness.

8 NAMEPLATES

Nameplates shall be made of stainless steel or anodized aluminum and permanently marked with essential operating data meeting ANSI standard C57.12.00 for nameplates including city/country of manufacturer and weights of major components. Nameplate must be constructed so it is readable for the life of the transformer.

The transformer nameplate shall specifically state that the transformer is filled with "Mineral Oil" and the number of gallons of oil it contains.

Nameplate impedance must be the actual tested impedance on all units.

The nameplate shall indicate that the PCB content of said transformer is less than 1 ppm, or that at the time of manufacture gas chromatographic analysis certified non-detectable PCB.

Each nameplate shall contain a transformer bar code. The bar code label shall meet all requirements of IEEE standard C57.12.35.

Nameplates shall be mechanically fastened with rivets, bolts, or screws.

9 INSPECTION

The purchaser shall, at any reasonable time, be permitted to have a representative visit the Contractor's factory for the purpose of witnessing manufacture of the transformers to ascertain if the material and process used in the manufacturing conform to the Specifications.

10 TESTS

Each transformer shall receive complete tests at the factory in accordance with the latest ANSI standards. At the option of the District, transformers may be tested for acceptance upon receipt.

Transformers shall be designed to meet ANSI C57.12.00 and C57.12.90 latest revision for short circuit strength.

Guaranteed losses: the losses submitted by the bidder for bid evaluation shall be considered as guaranteed losses by the District. DOE efficiencies will be calculated from these quoted losses.

Certified test reports shall be furnished to Ferry County PUD prior to shipment. Invoices must reference serial number of transformers, bid item and quoted losses.

11 DELIVERY METHODS

Destination

The transformers shall be shipped F.O.B. destination, to:

3 Old Kettle Falls Road,
Republic WA 99166.

The delivery will be accepted Monday through Friday between the hours of 8:00 a.m. and 2:00 p.m. No delivery of transformers will be accepted on weekends or holidays. Please call the Ferry County PUD Warehouse at (509) 207.9787 or (509) 775.3325, at least 24 hours prior to delivery. Transformers must arrive on the same trailer from the factory to Ferry County PUD. No moving of transformers from one trailer to another.

Methods

All transformers shall be oil filled, completely assembled, and be shipped on a trailer that can be unloaded from the side with a forklift.

All pallets or mounting timbers the transformers are shipped on must be high quality to prevent pallets breaking during shipment. Transformers on broken pallets may be rejected. Overhead transformers shall be strapped to the pallet. Padmount transformers shall be bolted to the pallet. Broken pallets are unacceptable.

Rejection of Shipment

Transformers exhibiting damaged parts, broken securing devices or oil leaks shall be cause for rejection of shipment.