

SPECIFICATION FOR 3750 KVA THREE PHASE PADMOUNT DISTRIBUTION TRANSFORMER

1. SCOPE

This specification covers the electrical and mechanical requirements of three phase padmount distribution transformers.

2. APPLICABLE STANDARDS

2.1. The transformer specified shall be furnished in accordance with the latest applicable ANSI, IEEE, and NEMA standards, and the latest applicable codes, except as required otherwise by this specification.

2.2. The latest revision of the following publications shall be used in conjunction with this specification, and form a part of this specification to the extent specified herein.

IEEE Std C57.12.00 – IEEE Standard for Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

IEEE Std C57.12.22 – American National Standard for Transformers--Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers with High-Voltage Bushings, 2500kVA and Smaller; High Voltage, 34 500 GrdY/19 920 Volts and Below; Low-Voltage 480 Volts and Below

IEEE Std C57.12.26 – IEEE Standard for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for Use with Separable Insulated High-Voltage Connectors (34 500 GrdY/19 920 Volts and Below, 2500 kVA and Smaller)

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

IEEE Std C57.12.34 – IEEE Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 10 MVA and Smaller; High-Voltage, 34.5 kV Nominal System Voltage and Below; Low-Voltage, 15 kV Nominal System Voltage and Below

IEEE Std C57.12.35 – IEEE Standard Bar Coding for Distribution Transformers and Step-Voltage Regulators

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

IEEE Std C57.12.90 – IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers

IEEE Std C57.12.91 – IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators

IEEE Std C57.154 – IEEE Standard for the Design, Testing and Application of Liquid-Immersed Distribution, Power and Regulated Transformers using High-Temperature Insulation Systems and Operating at Elevated Temperatures

NEMA TR 1 – Transformers, Regulators and Reactors, Audible Sound Levels

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3. SPECIFIC REQUIREMENTS

3.1. Ratings

- 3.1.1. Padmount transformers shall have KVA, impedance, primary voltage and secondary voltage permanently stamped on the outside of transformer enclosure.

Comply_____ **Exception**_____

3.2. Construction

- 3.2.1. No Amorphous core transformers will be accepted.

Comply_____ **Exception**_____

- 3.2.2. In addition to the regular locking provisions, all access doors shall be secured by a recessed, captive, pentahead bolt which threads into a noncorrosive nut with a blind hole. A pentahead bolt shall be considered "captive" when the retention scheme will prevent it from being readily removed during normal operation of the door(s) or hood(s). The recess is to be nonrotating. The dimensions of the pentahead bolt and nonrotating recess shall comply with Figure 11 of ANSI C57.12.26-1975. If all doors may be secured with a single bolt, one (1) bolt will be sufficient. (WUC Guide 2.13)

Comply_____ **Exception**_____

- 3.2.3. Each latched door(s) shall be latched at a minimum of three (3) points. In addition to the three point latching, one (1) pentahead bolt shall be coordinated with the latch and padlock to prevent unlatching and insertion of the padlock into the hasp when and until the bolt head is essentially completely seated. Low profile cabinets, with access flip-up hoods, need only padlock and pentahead bolt provisions, and shall be coordinated to prevent insertion of the padlock into the hasp until the bolt head is essentially completely seated. (WUC Guide 2.13)

Comply_____ **Exception**_____

- 3.2.4. Three phase padmount transformer dimensions must not exceed 96" width by 84" length. Secondary connection enclosure shall be minimum of 36" depth and 42" width. Idaho Falls Power reserves the right to reject any bid on the basis of size and weight.

Comply_____ **Exception**_____

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3.2.5. Secondary bushings X1 and X3 shall have a height to center between 53 and 47 inches. Secondary bushings X2 and X0 shall have a height to center between 45 and 39 inches. Primary bushings shall have a height to center between 42 and 36 inches.

Comply _____ **Exception** _____

3.2.6. The transformers shall be equipped with three (unless otherwise specified) standard 8.3/15 KV, 200 amp loadbreak high voltage bushings, specifically, externally clamped universal bushing wells with latched elbow indicator loadbreak inserts. Bushings to be arranged in ANSI type "B" configuration (Figure 2, page 9 of ANSI C57.12.26-1975). Minimum height of secondary bushings shall be 28" to center of lowest bushing.

Comply _____ **Exception** _____

3.2.7. Parking stands shall be provided beside each of the bushings.

Comply _____ **Exception** _____

3.2.8. All internal leads and connections shall be sized to carry full ampere rating, including any overload rating of the transformer on both the high and low voltage sides.

Comply _____ **Exception** _____

3.2.9. The top of the cabinet and tank shall be domed or sloped to shed water.

Comply _____ **Exception** _____

3.2.10. Two (2) 18 x 12 inch minimum covered tank openings shall be required: one over each of the primary and secondary bushing areas to provide access to tank interior. These openings shall be concealed by a covering mechanism which may only be opened from inside the primary and secondary compartments or by a completely removable tank top with concealed bolts.

Comply _____ **Exception** _____

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3.3. Accessories

The standard accessories shall include, but not be limited to the following, unless otherwise specified.

3.3.1. Transformers shall be supplied shall have 8 hole secondary H spade terminals with NEMA spacing or 16 lug spade connectors (such as Thomas & Betts ABK 881-7024 or equal).

Comply _____ **Exception** _____

3.3.2. All three phase transformers shall be furnished with insulated secondary spade supports, suspended from above.

Comply _____ **Exception** _____

3.3.3. Grounding provisions in both compartments.

Comply _____ **Exception** _____

3.3.4. Oil drain in primary compartment.

Comply _____ **Exception** _____

3.3.5. Provisions for jacking.

Comply _____ **Exception** _____

3.3.6. Provisions for rolling in two (2) directions.

Comply _____ **Exception** _____

3.3.7. Lifting lugs.

Comply _____ **Exception** _____

3.3.8. Oil level gauge in low voltage compartment.

Comply _____ **Exception** _____

3.3.9. Internal loadbreak ganged oil switch. Switch to be located on the primary side and wired between the bushings and transformer internal fusing.

Comply _____ **Exception** _____



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3.4. Protection

3.4.1. Under-oil fuse in series with a partial-range current-limiting fuse.

Comply _____ **Exception** _____

3.4.2. Pressure relief device(s) that automatically open(s) at 8 to 10 PSIG and automatically resets at a positive pressure of between 2 and 8 PSIG. In addition, a 1/2-inch-minimum drain plug and fitting(s) for filling, pressure testing and manual pressure relief shall be provided.

Comply _____ **Exception** _____



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4. TEST REQUIREMENTS

At a minimum, all units shall be tested for the following:

4.1. No-Load losses at rated current

*No load losses will be reported at 95 °C or 20 °C for 75 °C AWR units, and 85 °C or 20 °C for 65 °C or 65/75 °C AWR units.

4.2. Total losses at rated current

*Total losses and impedance values will be reported at 95 °C for 75 °C AWR units, and 85 °C for 65 °C AWR units.

4.3. Percent Impedance at rated current

4.4. Excitation current (100% voltage) test

4.5. Winding resistance measurement tests

Comply _____

Exception _____

5. DOCUMENTATION

5.1. Performance data for the following shall be provided with the bid:

5.1.1. Physical Dimensions

5.1.2. Temperature rating

5.1.3. Core Construction

5.1.4. Core and Winding Losses

5.1.5. Percent Impedance

Comply _____

Exception _____

5.2. The following shall be provided after bid acceptance:

5.2.1. Certified Test Results

5.2.2. Manuals

5.2.3. Final Drawings

Comply _____

Exception _____

6. SHIPPING AND HANDLING

6.1. Transformers shall be shipped anchored to wood pallets.

Comply _____

Exception _____

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7. EVALUATION

- 7.1. Idaho Falls Power reserves the right to select the equipment which in its opinion best meets its requirements.
- 7.2. Award of bid will be on the basis of delivery, compliance with these specifications and price using the cost evaluation procedure described below. At the time of award of bid items, Idaho Falls Power reserves the right to accept delivery at a later date (not to exceed 60 days) than suggested by the Bidder. Idaho Falls Power reserves the right to accept individual bid items.
- 7.3. Prior to award of bid items and upon request from Idaho Falls Power, Bidders shall be required to provide product reference material and/or certified test reports within ten (10) days substantiating their products' expected loss performance, and compliance with the requirements set forth in these specifications. Failure to satisfy this request can result in bid rejection for noncompliance.

7.4. Terms

- 7.4.1. No-Load Loss: Excitation (or core) loss at 100% rated voltage.
- 7.4.2. Load Loss: Winding (or copper) loss at a reference temperature of 85 degrees centigrade and full load current.
- 7.4.3. Rated Voltage: High and low-side nominal voltages as specified herein for each Item Number distribution transformer.
- 7.4.4. BCL: Bidders expected no-load (core) loss in KW for each Item Number based on available certified test data showing the expected average losses of the transformers designated for the vendor's bid.
- 7.4.5. BWL: Bidders expected load (winding) loss in KW for each Item Number based on available certified test data showing the expected average losses of the transformers designated for the vendor's bid.
- 7.4.6. ACL: Actual no-load loss in KW (average of actual no-load loss tests on all units supplied for each bid item).
- 7.4.7. AWL: Actual load loss in KW (average of actual load loss tests on all units supplied for each bid item).

7.5. Cost Evaluation

The following amounts will be added algebraically to each item's loss evaluated unit price:

No-Load Loss: $(BCL \text{ KW}) \times \$2000/\text{KW} = \text{Amount to Add}$

Load Loss: $(BWL \text{ KW}) \times \$500/\text{KW} = \text{Amount to Add}$

The evaluation process above is strictly for determining the lowest loss evaluated bid for each Item Number. Actual adjustment to the purchase price for losses is specified below.

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Note: Bidders which misrepresent the expected BCL and BWL values will not be allowed to submit future bids to Idaho Falls Power for a period of time to be determined by Idaho Falls Power.

7.6. Payment Adjusted for Losses

Certified copies of the actual no-load and load loss test data shall be supplied with each loss evaluated transformer purchased under these specifications.

When the average of the actual measured losses of all loss evaluated transformers supplied for each item (considered as an individual lot) is higher than the bid loss (BCL or BWL) the following amount will be subtracted from the offer unit price to arrive at the actual price to be paid:

No-Load Loss: $((ACL-BCL) KW) \times \$2000/KW = \text{Amount to Subtract}$
 Load Loss: $((AWL-BWL) KW) \times \$500/KW = \text{Amount to Subtract}$

When an Item Number's actual average is lower than the bid loss, the following amount will be added to the contract unit price to arrive at the actual price to be paid:

No-Load Loss: $((BCL-ACL) KW) \times \$1000/KW = \text{Amount to Add}$
 Load Loss: $((BWL-AWL) KW) \times \$250/KW = \text{Amount to Add}$

7.7. Guaranteed Values of Losses

The Vendor will guarantee that the tolerances between the actual loss values and the bid loss values for each Item Number's loss evaluated transformer or transformers, on a given order (Item Number) shall not exceed the percentages in Table 2.

Table 2*
Tolerances for Single Phase and Three Phase
Transformer Losses

<u>Number of Units on One Order</u>	<u>Basis of Determination</u>	<u>No-Load Losses (%)</u>	<u>Total Losses (%)</u>
1	1 Unit	10	6
2 or More	Each Unit	10	6
2 or More	Ave of All Units	2	2

(*These percentages are from ANSI C57.12.00-1980 modified by Idaho Falls Power.)

