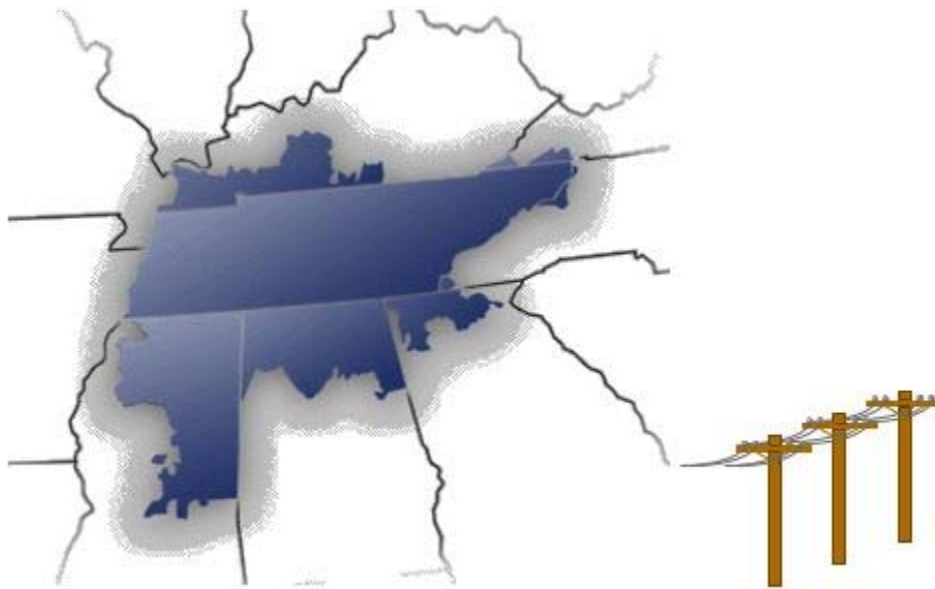


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PARTNERSHIP STANDARDIZATION GROUP TRANSFORMERS SPECIFICATIONS

**Sponsored by:
Volunteer Energy Cooperative**

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I. TRANS PARTNERING POWER DISTRIBUTORS

	POWER DISTRIBUTOR	CORPORATE LOCATION	PRIMARY VOLTAGE
1	Alcoa Electric Department	Alcoa, TN	7620
2	Athens Utilities	Athens, AL	7200 ; DV 2400/7200
3	Cullman Power Board	Cullman, AL	7200
5	Cleveland Utilities	Cleveland, TN	7620
4	Clarksville Department of Electricity	Clarksville, TN	7200
6	Dayton Electric Department	Dayton, TN	7200
7	Decatur Utilities	Decatur, AL	7200 ; DV 2400/7200
8	Duck River Electric Membership Corporation	Shelbyville, TN	14400; DV 7200/14400
9	Erwin Utilities	Erwin, TN	7200
10	Etowah Utilities	Etowah, TN	7200
11	Fort Loudoun Electric Cooperative	Vonore, TN	7200; DV 7200/14400
12	Gallatin Department of Electricity	Gallatin, TN	7200
13	Glasgow Electric Plant Board	Glasgow, KY	7200
14	Harriman Utility Board	Harriman, TN	7620
15	Lenoir City Utilities Board	Lenoir City, TN	7200
16	Lexington Electric System	Lexington, TN	7200
17	Loudon Utilities	Loudon, TN	7200
18	Maryville Electric Department	Maryville, TN	7620
19	McMinnville Electric System	McMinnville, TN	7200
20	Morristown Utility Systems	Morristown, TN	7620
21	Mountain Electric Cooperative	Mountain City, TN	7200
22	Murfreesboro Electric Department	Murfreesboro, TN	7200
23	Newport Utilities Board	Newport, TN	7620
24	Paducah Power System	Paducah, KY	7200
25	Pulaski Electric System	Pulaski, TN	7620
26	Rockwood Electric Utility	Rockwood, TN	7200
27	Sequachee Valley Electric Coop	South Pittsburg, TN	7200; DV 7200/14400; 14400
28	Shelbyville Power System	Shelbyville, TN	7200
29	Smithville Electric System	Smithville, TN	7200
30	Sparta Electric & Water System	Sparta, TN	7200
31	Sweetwater Utilities Board	Sweetwater, TN	7620
32	Tennessee Valley Electric Co-op	Savannah, TN	7200 ; DV 2400/7200 & DV 7200/14400
33	Tullahoma Utilities Board	Tullahoma, TN	7200
34	Volunteer Energy Cooperative (VEC)	Decatur, TN	14400; DV 7200/14400
35	Warren Rural Electric Cooperative	Bowling Green, KY	7200

The following specifications shall apply to transformers with Primary voltages stated herein and purchased through the Partnership.

These specifications in no way exempt the manufacturer from furnishing a complete transformer and the necessary accessories in accordance with the latest ANSI, NEMA, and IEEE standards.

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REFERENCES

- 1) C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
- 2) Title 10: Energy. Code of Federal Regulations (CFR) Subpart K of 431, 431.191 – 196; effective date for liquid-immersed distribution transformers, on or after January 1, 2010.
- 3) National Bureau of Standards (NBS) Technical Note 1204, “Calibration of Test Systems For Measuring Power Losses of Transformers” (104 Pages)
- 4) ASTM D3487 – 16, Standard Specification for Mineral Insulating Oil Used in Electrical Apparatus
- 5) C57.12.90-2015 - IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
- 6) NEMA Standards Publication TP 2-2005 – Standard Test Method for Measuring the Energy Consumption of Distribution Transformers
- 7) C57.12.31-2010 - IEEE Standard for Pole-Mounted Equipment--Enclosure Integrity
- 8) C57.12.20-2011 - IEEE Standard for Overhead-Type Distribution Transformers 500 kVA and Smaller: High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below
- 9) C57.12.28-2014 - IEEE Standard for Pad-Mounted Equipment--Enclosure Integrity
- 10) C57.12.34-2015 - 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
- 11) C57.12.25-1990 - American National Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With Separable Insulated High-Voltage Connectors; High Voltage, 34 500 GrdY/ 19 920 Volts and Below; Low Voltage, 240/120 Volts; 167 kVA and Smaller Requirements
- 12) C57.12.21-2000 - American National Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With High-Voltage Bushings: High Voltage (34 500 GrdY/19 920 V and Below) and Low Voltage (240/120 V, 167 kVA and Smaller)
- 13) ANSI Z535 Safety Alerting Standards
- 14) United States Department of Agriculture (USDA) Rural Development Electric Program, formerly Rural Utility Service (RUS) and formerly Rural Electrification Administration (REA); Informational Publication 202-1, March 2018 “List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers”

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III. PRESENT WORTH - TOTAL OWNERSHIP COST

Transformer losses for the proposal shall be specified as guaranteed no load and total losses per C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers, Section 9.3 – Tolerances and Losses, and with all losses referenced to an 85-degree centigrade winding temperature. The total losses are to include any breaker losses, if applicable, and any other incidental losses. The PARTNER (OWNER)'s Total Ownership Cost (TOC), i.e., present worth value, of the transformer shall be determined according to the following Transformer Evaluation Formula with Escalation Factors:

Total Owning Cost: = NO LOAD LOSS x 'A' + FULL LOAD LOSS x 'B' + BID PRICE

GROUPING	"A" FACTOR	"B" FACTOR
1KVA TO 50KVA Single Phase	\$6.41	\$0.92
75KVA TO 167KVA Single Phase	\$6.41	\$1.22
45KVA TO 500KVA Three Phase	\$6.41	\$1.47
750KVA TO 3000KVA Three Phase	\$6.41	\$1.77

PARTNER (OWNER) may, at their expense, make certified test on the transformers delivered. The no load losses of a transformer shall not exceed the specified no load losses by more than 10%, and the total losses of a transformer shall not exceed the specified total losses by more than 6%. If any unit(s) fails to meet this requirement, said unit(s) may be returned to the Manufacturer/Supplier at their expense or Partner (Owner) may request damages as outlined in LOSS DAMAGES AND NBS (NIST) COMPLIANCE (next page), as negotiated between the parties.

The manufacturer shall furnish actual certified test report loss data on the completed transformers. Certified test report shall state the matching serial number on the transformer at time of delivery. This information shall be furnished by in electronic format by email to the individual PARTNER (OWNER)'S designee.

1. QUOTER shall quote the (NLL) No load losses, at 100% rated voltage, and the (LL) Load Losses, at 100% rated load and corrected to 85 Deg. C.
2. PARTNER (OWNER)'S (TOC) Total Ownership Cost will be evaluated by the Power Distributors.
3. Additionally, due to the realization that it is not possible to accurately predict all of the variables involved in establishing TOC/Present Worth, PARTNER (OWNER)'s will consider the Manufacturer's bid price for those offers within 3% of the lowest TOC.

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4. In all cases, the Partnership shall have the right to negotiate the Contract, awarding individual line items as deemed appropriate. Individual Partnership members may choose to opt out of certain line items and the Contract may reflect multiple manufacturers for certain line items.

*The manufacturer shall in all cases meet or exceed the requirements of: Title 10: Energy. Code of Federal Regulations (CFR) Subpart K of 431, 431.191 – 196; effective date for liquid-immersed distribution transformers, on or after January 1, 2010.

Any unit NOT meeting design losses quoted, must receive prior notice AND written approval BEFORE shipment.

IV. LOSS DAMAGES AND NBS (NIST) COMPLIANCE

Liquidated Damages for Exceeding Guaranteed Losses

The No-Load and Load (winding) Losses quoted by the QUOTER are of **UTMOST IMPORTANCE** to the contract(s). Should the QUOTER neglect, refuse, or fail to meet the quoted losses herein provided, in the event and in view of the difficulty of determining with exactness damages caused by such failure, the PARTNER (OWNER) shall have the right to deduct from and/or retain out of such monies that which may be due or which may become due and payable to the QUOTER: a sum equal to the difference in quoted loss values and the actual loss values as verified by the certified test reports provided after manufacture. Such sum shall be computed in dollars, utilizing the No-Load Loss and Load (winding) Loss values listed above (Refer to formula below as well). Such sum shall be considered liquidated damages and not a penalty.

FORMULA: "A" (ACTUAL - GUARANTEED) NLW + "B" (ACTUAL - GUARANTEED) LLW

Where:

GROUPING	"A" FACTOR	"B" FACTOR
1KVA TO 50KVA Single Phase	\$6.41	\$0.92
75KVA TO 167KVA Single Phase	\$6.41	\$1.22
45KVA TO 500KVA Three Phase	\$6.41	\$1.47
750KVA TO 3000KVA Three Phase	\$6.41	\$1.77

No adjustment will be made for negative loss damages

Under no circumstance shall the adjustment factor under this provision result in a net price increase to the PARTNER (OWNER). If the amount due or to become due from the PARTNER (OWNER) to the QUOTER is insufficient to pay in full any such liquidated damages, the QUOTER shall pay to the PARTNER (OWNER) the amount necessary to effect such payment in full, provided; however, that the PARTNER (OWNER) shall promptly notify the QUOTER in writing the manner in which the amount retained, deducted, or claimed as liquidated damages was computed.

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The loss measurement system shall be traceable by means of a procedure described in the National Bureau of Standards (NBS) Technical Note 1204, "Calibration of Test Systems For Measuring Power Losses of Transformers" (104 Pages), or an approved equivalent procedure. The QUOTER (manufacturer) shall clearly indicate the ability to comply with this requirement. Inability to comply during the quotation process shall result in an adjustment to the No-Load and Load (winding) Loss quoted by the QUOTER for purposes of evaluation. This adjustment shall be made by multiplying the quoted losses as used for evaluation purposes by a factor of 1.15. The QUOTER's failure to comply with NBS Technical Note 1204 during the testing of the transformers shall result in an adjustment to the computation of the liquidated damage provisions contained in this section. The certified test report losses shall be multiplied by and compared to the quoted losses including any adjustments made at the time of the bid evaluation. The PARTNER (OWNER) shall have the right to deduct from and retain such monies which may be due to the QUOTER, a sum equal to the difference in quoted loss values and the actual loss values as verified by the certified test reports as adjusted above.

Partnership may randomly verify the manufacturers certified test reports to confirm losses.

QUOTER shall respond to the following in their response to this RFP:

The manufacturer currently complies with NBS Technical Note 1204 (Yes or No)

The manufacturer will comply at the time of test with NBS Technical Note 1204 (Yes or No)

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V. SPECIAL INSTRUCTIONS

1. The terms “shall” and “will” which appear in the Proposal and Specifications place an absolute obligation on the QUOTER to do that which is designated and/or specified.
2. Descriptive literature, including dimensions, approximate weights and impedance’s of the transformers, shall be furnished with the Proposal. A schedule of the manufacturer’s recommendations for inspection and testing needed prior to operating the transformers should also be included.
3. The Power Distributors evaluation of the proposal will be based upon the transformers providing the best compromise for all of the PARTNER (OWNER)’s requirements based on:
 - 3.1. Initial Cost
 - 3.2. Total Ownership cost over thirty (30) years
 - 3.3. Warranty periods
 - 3.4. Product performance and quality
 - 3.5. Delivery
 - 3.6. PARTNER (OWNER)’S previous history dealing with both the approved manufacturer and approved supplier. (See approved lists below)
4. Acceptance of manufacturer’s documentation by the PARTNER (OWNER)’S will be general only. Such acceptance will not relieve the QUOTER of responsibility for meeting all requirements of the Specifications and for providing a completely operational transformer.

APPROVED SUPPLIERS:
Anixter
Border States
EPE Solutions, Power Supply
Stuart C. Irby Company/ Whitehead & Assoc.
Utility Sales Agency/GRESCO
WESCO/GRESCO
Yoder Sales

APPROVED MANUFACTURERS:
Asea Brown Boveri (ABB)
Cooper Power Systems
Central Moloney
ERMCO
General Electric (GE)
Howard Industries
Power Partners Inc. (PPI)

A user list will be required for any manufacturer and/or supplier not approved.

5. Deliver during normal business hours. Method - Open, Flatbed Truck, pallets arranged for side unloading, unless otherwise specified by ordering partner. Delivery quantities and requested delivery dates for each item will be stated in individual orders. No deliveries will be requested before quoted delivery time submitted in this proposal by QUOTER.

Notification of delivery:

Single Phase	*24 hours
Three Phase	*72 hours

* Unless otherwise noted on Purchase Order or Release

NOTE: Provide weight for individual units > 5,000 lbs.

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VI. GENERAL REQUIREMENTS, ALL TRANSFORMERS

Includes Common Features and Material Requirements

1. The standards set forth shall be adhered to in all cases and any exceptions shall be approved in advance by the applicable Power Company using this Specification.
2. All transformer oil furnished shall conform to ASTM D3487 – 16, Standard Specification for Mineral Insulating Oil Used in Electrical Apparatus, and be inhibited with ditertiary-butyl-para-cresol (DBPC). Amount provided shall be 0.3% by weight. Oil shall contain less than 1 PPM of PCBs (Polychlorinated Biphenyls).
3. All insulating paper used as layer insulation in the transformer coil assembly shall be bonded type, coated on both sides with a thermosetting adhesive and properly cured prior to impregnating with oil.
4. All applicable tests shall be made in accordance with the latest revision of C57.12.90-2015 - IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers, where applicable, and as prescribed by NEMA Standards Publication TP 2-2005 – Standard Test Method for Measuring the Energy Consumption of Distribution Transformers.
5. LABELING – All Transformers:
 - 5.1. The nameplate shall be made of corrosion-resistant material (stainless steel, anodized aluminum). The nameplate will provide all information as required by RUS Specifications and as specified by C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers, Section 5.12, Nameplates. The nameplate shall include permanent stenciling stating “non-PCB Less Than 1 PPM”.
 - 5.2. An external, permanently affixed tag shall state, non-PCB Less Than 1 PPM.
 - 5.3. Label stating compliance with EPA Standards for non-PCB oil at time of manufacture.
 - 5.4. For single-phase pole mount and pad mount transformers, manufacturer to provide serial number on top exterior of tank with a permanent or non-permanent label. The serial number on the manufacturer’s bar-coding strip is an acceptable fulfillment of this request.
 - 5.5. For dual voltage units – one (1) externally mounted decal/stencil stating “DV”, to be placed above or below the KVA decal/stencil as appropriate.
6. Units expected to be operated in an outdoor situation with environment conditions of rain, snow, sleet and Sunshine. The ambient temperature range to which the unit shall be subjected will be -20 to + 40 degrees C, as per C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers, Sections 4.1.2.1, Cooling Air Temperature Limit, and 4.1.2.2, Liquid Temperature Limit. Units shall comply with a 65 degree C rise, “oil insulated surface cooled” (OISC) cooling standard.
7. Construction shall comply in all cases with “United States Department of Agriculture (USDA) Rural Development Electric Program, formerly Rural Utility Service (RUS) and formerly Rural Electrification Administration (REA); Informational Publication 202-1, March 2018 “List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers”
8. Units shall have no less than a One (1) Year Warranty, beginning at the time of delivery. QUOTER will give consideration during evaluation for award for longer warranty offers.

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VII. SINGLE PHASE POLEMOUNT SPECIFICATIONS

1. OVERALL - Must comply with RUS design for **CONVENTIONAL** and **CSP** pole-mounted transformers with standard features and accessories as appropriate.
2. TANK - Mild steel painted ANSI Gray Number 70 as per C57.12.31-2010 - IEEE Standard for Pole-Mounted Equipment--Enclosure Integrity.
3. TANK LID - Bolted clamping ring, totally bolted type, or self-venting lid. External cover (lid) grounding strap is required.
4. HANGER BRACKETS - One set of hanger brackets required.
 - 4.1. STATED AT LINE ITEM LEVEL: if the Partner requires Two (2) Position mounting brackets, the Two (2) Position mounting brackets description shall be stated in the item description at the line item level as follows:

Two (2) Position mounting - Double hanger brackets at 180 degrees mounting locations through 50 kVA as per C57.12.20-2011 - IEEE Standard for Overhead-Type Distribution Transformers 500 kVA and Smaller: High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below.
5. LIFTING LUGS - Minimum of two required on opposite sides of tank and positioned to support tank in a near vertical position during lifting.
6. PRIMARY VOLTAGE – MULTIPLE
7. H.V. BUSHINGS, ARRESTOR MOUNTING, ARRESTORS, SELF PROTECTION –
 - 7.1. **STATED AT LINE ITEM LEVEL:**
CSP: One (1) 15KV, 95KV B.I.L. porcelain or RUS approved composite bushing required for **CSP** type transformers, One (1) MOV arrester - direct connected, with lightning arrester and lightning arrester mount provided on the tank. ANSI 70 Gray color unless noted. Units must comply with United States Department of Agriculture (USDA) Rural Development Electric Program, formerly Rural Utility Service (RUS) and formerly Rural Electrification Administration (REA); Informational Publication 202-1, March 2018 “List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers”, Section AN-1, item “an”.
 - 7.2. **STATED AT LINE ITEM LEVEL:**
CONVENTIONAL: ONE (1) OR TWO (2) 15KV, 95KV B.I.L., OR ONE (1) OR (TWO) 25KV, 125KV B.I.L., porcelain or RUS approved composite bushings required for **CONVENTIONAL** type transformers, ONE (1) OR TWO (2) sets of lightning arrester mounts provided on the tank, one set below each H.V. bushing. ANSI 70 Gray color unless noted. STATED AT LINE ITEM LEVEL AS FOLLOWS & STATED WITH OR WITHOUT PRIMARY LIGHTNING ARRESTORS INSTALLED:
 - 7.2.1. **15KV-1 BUSHING, TWO POSITION MOUNT (With or Without Arrester)**
 - 7.2.2. **15KV-2 BUSHING, ONE POSITION MOUNT (With or Without Arrester)**
 - 7.2.3. **25KV-1 BUSHING, TWO POSITION MOUNT (With or Without Arrester)**
 - 7.2.4. **25KV-2 BUSHING, ONE POSITION MOUNT (With or Without Arrester)**

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7.3. ARRESTORS

Lightning Arrestor shall be mounted such that the top of the arrestor is approximately at the level of the top of the primary bushing.

7.3.1. FOR 15KV UNITS, STATED AT LINE ITEM LEVEL:

Approved Arrestor Manufacturers and Part Numbers:

Primary MOV arrestor approved material:

- 7.3.1.1. Ohio Brass, DNAVAR PDV-100 Arrestor, Cat#213709-7533
- 7.3.1.2. Cooper UHS Arrestor, Cat#UHS10080A1AC1A
- 7.3.1.3. Joslyn, ZHP Heavy Duty Arrestor, Cat# ZHP010 - 0N00112-B
- 7.3.1.4. ABB LV Spark Gap Assembly No. 6065B60601

7.3.2. FOR 25KV UNITS, STATED AT LINE ITEM LEVEL:

Approved Arrestor Manufacturers and Part Numbers:

Primary MOV arrestor approved material:

- 7.3.2.1. GE, Cat#9L23AHX018BC
- 7.3.2.2. Hubbell, Cat#213715-7533
- 7.3.2.3. Cooper, Cat#UHS 18080A1C1C1A

7.4. Manufacturer to connect from arrestor to high voltage bushing utilizing #6 Copper insulated conductor.

8. SECONDARY VOLTAGE - 120/240 Volt or 277 Volt or 240/480 Volt

9. L.V. BUSHINGS –

9.1. Two (2) or Three (3), 30KV B.I.L. as required, insulated porcelain or RUS approved composite type with ring type lugs for 75 KVA and below, or (4) four hole flat pad lugs on 100 KVA and above.

9.2. Leads from secondary windings to secondary bushings shall have either copper or hard drawn aluminum at the point of connection the tank exiting secondary bushings.

10. PRESSURE RELIEF - Automatic relief device supplied and installed on each item QUOTED as per C57.12.20-2011 - IEEE Standard for Overhead-Type Distribution Transformers 500 kVA and Smaller: High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below, Section 7.2.5.1, Section 7.2.5, Relief of Excessive Pressure. Only Section 7.2.5.1 will meet the requirements for automatic relief device (venting lids are not acceptable as stand-alone venting).

11. TANK GROUND - Provisions shall be provided for PARTNER (OWNER)'S ground connections at two locations on the tank.

12. L.V. GROUND –

12.1. All **CSP** transformers shall be provided with a removable ground strap connected to the X2 bushing and solidly bolted at one end to the transformer tank.

12.2. **CONVENTIONAL** transformers shall NOT be provided with a removable ground strap, unless otherwise specified at the line item level.

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12.3. STATED AT LINE ITEM LEVEL: if the Partner requires removable ground strap, the removable ground strap description shall be stated in the item description at the line item level as follows:

Provide **CONVENTIONAL** transformers with a removable ground strap connected to the X2 bushing and solidly bolted at one end to the transformer tank

13. STATED AT LINE ITEM LEVEL: if Partner requires a Secondary arrester, the Secondary arrester description shall be stated in the item description at the line item level as follows:

Secondary arrester, mounted and direct connected to secondary bushings and to ground.
Approved material:

13.1. Cooper Storm Trapper MOV Arrester, Cat#ASZ350B2

13.2. ECI LV Lightning Arrester, Cat#9F96DA480

14. NAMEPLATE - All transformers will be provided with a nameplate mounted solidly to the top of tank or top support bracket.

15. TAPS – STATED AT LINE ITEM LEVEL:

15KV & 25KV: Where taps are required (straddle or split taps), (2)-2.5% taps above nameplate rated voltage and (2)-2.5% taps below nameplate rated voltage will be provided with an EXTERNAL tap changer.

16. DUAL VOLTAGE SELECTOR SWITCH – Dual Voltage Units shall have an appropriately labeled and identified external selector switch for switching 14,400 volt – 7,200 volt. Selector switch shall have lockable provisions.

17. LABELS -

17.1. Transformer kVA shall be stenciled on transformer as per C57.12.20-2011 - IEEE Standard for Overhead-Type Distribution Transformers 500 kVA and Smaller: High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below, Section 7.3.5, Kilovolt-Ampere Rating on Tank.

17.2. Apply a permanent label stating compliance with EPA Standards for non-PCB oil at time of manufacture.

17.3. "CONV" shall be marked beneath the secondary bushings with labeling suitable for outdoor use, FOR CONVENTIONAL UNITS ONLY (NOT CSP UNITS).

17.4. POLARITY –

Polarity shall be additive for all single-phase transformers in sizes 200kVA and smaller having high-voltage windings 8660 V and below, per C57.12.20-2011 - IEEE Standard for Overhead-Type Distribution Transformers 500 kVA and Smaller: High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below, Section 7.3.1, Polarity.

18. CORE-COIL – Transformer core-coil shall be of either shell or core type interlaced design. **Shell type non-interlaced designs are not acceptable.**

19. TANK SIZE – 15KV ONLY: MAXIMUM dimensions & weights are as follows:

RATING: 12470GrdY/7200 and 13200GrdY/7620, 95 KV BIL

DIMENSIONS (inches)

KVA	A - OVERALL HEIGHT	B - OVERALL WIDTH	C - OVERALL DEPTH	MAXIMUM WEIGHT (lbs)
15	33	20	24	310
25	37	30	24	425
37.5	41	30	26	570
50	45	36	28	725
75	50	36	32	880
100	56	36	32	1050
167	56	36	36	1350

WHERE:

DIMENSION "A" IS THE OVERALL HEIGHT AS MEASURED FROM THE TOP OF THE HV BUSHING TO THE BOTTOM OF THE TANK

DIMENSION "B" IS OVERALL WIDTH (DIAMETER)

DIMENSION "C" IS THE OVERALL DEPTH (DIAMETER); TYPICALLY IT IS THE MEASURED DIAMETER FROM THE HANGER TO THE LV TERMINAL ACROSS THE TOP OF THE TANK.

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VIII. SINGLE PHASE PADMOUNT SPECIFICATIONS

1. TANK – The padmount transformer shall consist of the transformer tank with a high and low voltage cable terminating compartment. The transformer tank and compartment shall be assembled as an integral unit, tamperproof and weatherproof. There shall be no exposed screws, bolts, or other fastening devices which are externally removable. There shall be no openings through which foreign objects such as sticks, rods, or wires might contact live parts. The construction shall limit the entry of water (other than flood water) into the compartment so as not to impair the operation of the transformer. Cable entrances shall be through the bottom of the compartment. The top of the transformer shall be ridged to assure water drainage. The tank coating shall meet all requirements in C57.12.28-2014 - IEEE Standard for Pad-Mounted Equipment - Enclosure Integrity. The transformer shall be sealed-tank construction with the main cover welded or bolted in place with adequate gasket. Cooling fins will NOT be acceptable.
2. COMPARTMENT – The high and low voltage bushing shall be located side by side in a single air-filled compartment, with the high voltage bushings on the left. The compartment shall be accessible by means of a hinged, lift-up cover. The cover shall be secured by means of a single, recessed penta-head bolt, with additional provision for a pad-lock having a 1/2" diameter shackle. Enclosure security shall meet all requirements in C57.12.28-2014 - IEEE Standard for Pad-Mounted Equipment - Enclosure Integrity.
3. RIGGING – Lifting, jacking and rolling provisions per 11) C57.12.25-1990 - American National Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With Separable Insulated High-Voltage Connectors; High Voltage, 34 500 Grdy/ 19 920 Volts and Below; Low Voltage, 240/120 Volts; 167 kVA and Smaller Requirements, shall be provided.
4. INSTRUCTION NAMEPLATE – The instruction nameplate is to be located in the low voltage segment of the compartment and shall be readable with cables in place. Where the nameplate is to be mounted on a removable part, the manufacturer's name and transformer serial number shall be permanently affixed to a non-removable part.
5. GROUNDING – Provisions for tank grounding shall be supplied in both high and low voltage segments of the compartment. These provisions shall consist of steel pads and a 1/2-13 UNC tapped hole 7/16" deep.
6. HV BUSHINGS & TAPS –
 - 6.1. 15KV: Transformers are to be dead-front, loop-feed with externally operable voltage or tap changer switches for safe operation. A universal type bushing well will be used that complies with C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers, Section 6.
 - 6.2. 25KV: Transformers are to be dead-front, loop-feed with externally operable voltage or tap changer switches for safe operation.
 - 6.2.1. An externally fastened field replaceable primary bushing installed in a universal type bushing well will be used that complies with C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers, Section 6.

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- 6.2.2. Bushing arrangement shall be per “Type 2” arrangement as specified in C57.12.25-1990 - American National Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With Separable Insulated High-Voltage Connectors; High Voltage, 34,500 Grd-y/ 19,920 Volts and Below; Low Voltage, 240/120 Volts; 167 kVA and Smaller Requirements.
7. 25KV: DUAL VOLTAGE SELECTOR SWITCH – Dual Voltage Units shall have an appropriately labeled and identified external selector switch for switching 14,400 volt – 7,200 volt. Selector switch shall have lockable provisions.
8. LV BUSHINGS & GROUNDING –
- 8.1.1. Low voltage bushings shall be provided with a 5/8”-11 UNC 1.25” (min) copper stud for units <= 75kVA, and shall be provided with a 1”-14 UNC 1.75” (min) copper stud for units from 100 – 167kVA per C57.12.25-1990 - American National Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With Separable Insulated High-Voltage Connectors; High Voltage, 34 500 Grd-y/ 19 920 Volts and Below; Low Voltage, 240/120 Volts; 167 kVA and Smaller Requirements, Figure 4C.
- 8.1.2. Leads from the windings to the secondary bushings shall have either copper or hard aluminum at the point of connection to the low voltage bushings. NOTE: Must note exceptions if not in compliance.
- 8.1.3. Grounding connectors shall be provided, two each installed in the tapped grounding holes as specified in C57.12.25-1990 - American National Standard for Transformers - Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers With Separable Insulated High-Voltage Connectors; High Voltage, 34,500 Grd-y/ 19,920 Volts and Below; Low Voltage, 240/120 Volts; 167 kVA and Smaller Requirements, Paragraph 6.6.4. Low voltage removable ground strap shall be as shown in item ‘BU-1’ of Informational Publication 202-1, March 2018 “List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers.
9. PRESSURE RELIEF – Transformers shall be equipped with an automatic pressure relief device per C57.12.21-2000 - American National Standard Requirements for Pad-Mounted, Compartmental-Type Self-Cooled, Single-Phase Distribution Transformers With High Voltage Bushings; High-Voltage, 34500 GRDY/19920 Volts and Below; Low-Voltage, 240/120 Volts; 167 kVA and Smaller.
10. NEUTRAL – The neutral end of the high voltage windings shall be securely grounded to the tank internally, and shall be independent of all other connections. The low voltage neutral terminal shall be a fully insulated bushing, connected to the tank grounding plate with a removable external strap.
11. FUSING – All transformers shall be equipped with a bayonet type expulsion fuse and drip shield immediately below the bayonet to prevent transformer oil from dripping onto the bushings and cable. The shield shall extend well beyond the bushings and shall be sloped downward to the sides and front of the compartment to prevent any accumulation of oil. Transformers shall be equipped with a stainless steel standoff bracket (parking stand).

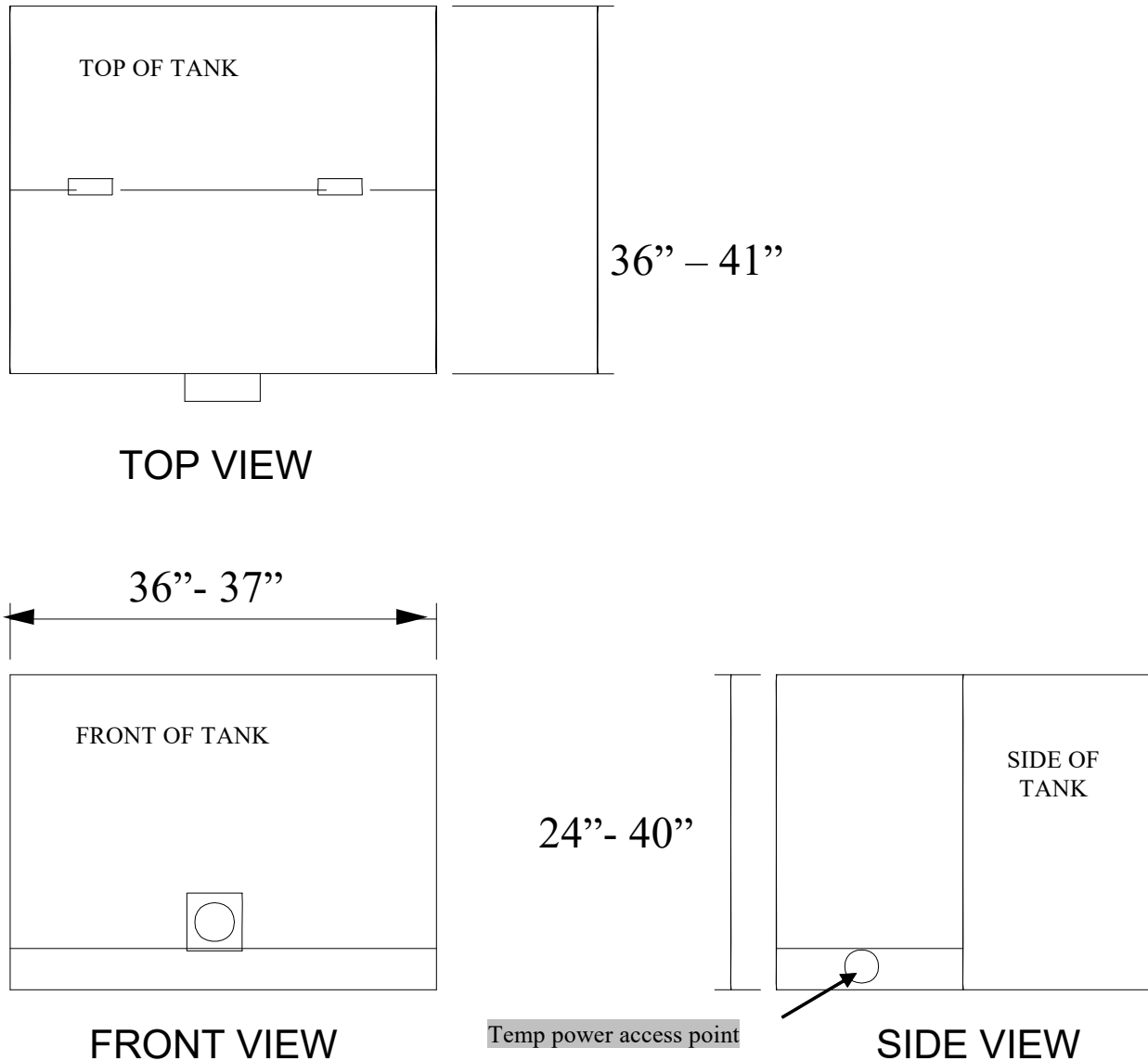
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- 11.1. STATED AT LINE ITEM LEVEL – Primary fusing shall consist of partial range current limiting fuse mounted under oil, in series with a “RTE Dual Sensing Bay-O-Net Fuse Link (RTE 358)” type draw-out expulsion fuse.
12. CORE-COIL DESIGN – The transformer core-coil shall be of either shell or core type interlaced design. Shell type non-interlaced designs are **not** acceptable
13. FILLING & DRAINING PROVISIONS – The following standard accessories are to be provided on all units:
- 13.1. One-half (1/2") inch filling provision
- 13.2. One-half (1/2") inch drain provision
14. SPECIAL PROVISIONS – The following special provisions are required:
- 14.1. Provide ½" mounting hole front / center in footprint.
- 14.2. Provide 2.25" temporary power access (knockout or cap insert) in right hand sill.
15. RATING SPECIFICATIONS –
All transformers shall be:
- 15.1. Dead Front
- 15.2. Dual Voltage (Where Applicable)
- 15.3. Loop Feed
- 15.4. Bay-o-net Fused
- 15.5. 7,200 Volts, or 7,620 Volts (as specified by line item) phase to ground primary, 95kV BIL
OR
7200/14,400 Dual Voltage & 14,400 Volts phase to ground primary, 125kV BIL
- 15.6. 120/240 Volts secondary, 30kV BIL
- 15.7. TAPS: NO TAPS unless STATED AT LINE ITEM LEVEL - Two 2-1/2% above and Two 2-1/2% below

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16. DIMENSIONS – The footprint for single phase padmount transformers shall be as shown below:



Suppliers shall provide the dimensions with the proposal for pad mount transformers.

17. INSIDE CABINET DANGER LABEL – Apply “**DANGER**” Sign per current ANSI Z535 requirements.

17.1. **Inside Cabinet** - Apply one (1) “DANGER” sign on the coil barrier as high in the cabinet as practical, avoiding areas where cables and accessories might block the sign from view.

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- 17.2. The sign shall be as manufactured by one of the RUS accepted sign manufacturers as shown in item 'U hw – Safety Signs' of Informational Publication 202-1, March 2018 "List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers".
18. OUTSIDE CABINET WARNING LABEL – Apply "**WARNING**" sign per current ANSI Z535 requirements.
- 18.1. **Outside Cabinet** - Apply one (1) "WARNING" sign just above the penta-head bolt locking mechanism.
- 18.2. The sign shall be as manufactured by one of the RUS accepted sign manufacturers as shown in item 'U hw – Safety Signs' of Informational Publication 202-1, March 2018 "List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers".
19. TRANSFORMER SIZE AND VOLTAGE LABEL – Provide reflective decal or stencil indicating kVA, and reflective decal or stencil indicating secondary voltage, front - center of unit over penta bolt.
20. 25KV (WHERE REQUIRED BY DUAL VOLTAGE SELECTION CAPABILITY):
DUAL VOLTAGE LABEL – Dual Voltage Label to be placed in center of unit over kVA decal.
21. NON-PCB LABEL – Non-PCB decal shall be placed on outside of unit.

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IX. THREE PHASE PADMOUNT SPECIFICATIONS

1. PRIMARY VOLTAGES
 - 1.1. 12470GrdY/7200 or 13200GrdY/7620, 95kV BIL
 - 1.2. 24940GrdY/14400 Volt, 125 kV BIL – 208y/120 Volt, 30kV BIL
 - 1.3. 24940GrdY/14400 x 12470GrdY/7200, 125kV BIL – 208y/120 Volt, 30kV BIL,
DUAL VOLTAGE
 - 1.4. 24940GrdY/14400 Volt, 125 kV BIL – 480y/277 Volt, 30kV BIL
 - 1.5. 24940GrdY/14400 x 12470GrdY/7200, 125kV BIL – 480y/277 Volt, 30kV BIL, DUAL
VOLTAGE
2. SECONDARY VOLTAGES – Secondary voltages shall be 208 GrdY/120 or 480 GrdY/277
3. TANK – The padmounted compartment-type transformer shall consist of the transformer tank with a high and low voltage cable terminating compartments. The transformer tank and compartment shall be assembled as an integral unit, tamperproof and weatherproof, for mounting on a pad. There shall be no exposed screws, bolts, or other fastening devices which are externally removable. There shall be no openings through which foreign objects such as sticks, rods, or wires might contact live parts. The construction shall limit the entry of water (other than flood water) into the compartment so as not to impair the operation of the transformer. Cable entrances shall be through the bottom of the compartment. The top of the transformer shall be ridged to assure water drainage. The tank coating shall meet all requirements in C57.12.28-2014 - IEEE Standard for Pad-Mounted Equipment - Enclosure Integrity. The transformer shall be sealed-tank construction with the main cover welded or bolted in place with adequate gasket.
4. COMPARTMENT – Full-height, air-filled incoming and outgoing terminal compartments with hinged doors shall be located side-by-side, separated by a steel barrier, with the incoming compartment on the left.
 - 4.1. The outgoing compartment shall be accessible by means of a single captive and recessed penta-head bolt, with additional provision for a pad-lock having a ½” diameter shackle. To facilitate making connections and permit cable pulling, the door and compartment hood shall be removable. A removable door sill on the compartments shall be provided to permit rolling or skidding of unit into place over conduit stubs in the foundation.
 - 4.2. The compartments shall have hinged doors equipped for latching in the open position. The hinge assemblies shall be made of corrosion resistant material with stainless steel hinge pins 3/8” min. diameter. Enclosure security shall meet all requirements in C57.12.28-2014 - IEEE Standard for Pad-Mounted Equipment - Enclosure Integrity.
 - 4.3. The high-voltage compartment shall be furnished with a minimum of one (1) parking stand per bushing.
 - 4.4. A drip shield for bayonet fuses shall be provided immediately below the bayonets to prevent transformer oil from dripping onto the bushings and cables. The shield shall extend well beyond the bushings and shall be sloped downward to the sides of the compartment to prevent any accumulation of oil. The bayonets shall be removable through the door opening without the removal of the top of cabinet.

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5. RIGGING – Lifting, jacking and rolling provisions per 10) C57.12.34-2015 - 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, shall be provided.

6. INSTRUCTION NAMEPLATE – The instruction nameplate is to be located in the low voltage segment of the compartment and shall be readable with cables in place, AND shall be located on the exterior on the secondary side door. Where the nameplate is to be mounted on a removable part, the manufacturer’s name and transformer serial number shall be permanently affixed to a non-removable part.

7. HV WELLS AND BUSHINGS –
 - 7.1. 15KV: The transformer shall be provided with wells for externally fastened, field replaceable primary bushings, and field replaceable secondary bushings. A universal type bushing well will be used that complies with C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers, Section 6.
 - 7.2. 25KV: The transformer shall be provided with six (6) load break bushing wells for externally fastened, field replaceable primary bushings. A universal type bushing well will be used that complies with C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers, Section 6, and per the dimensioning provided for in C57.12.34-2015 - 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, Figure 16 page 29.

8. GROUNDING

Grounding connectors shall be provided, one each in the primary and secondary compartments, installed in the tapped grounding holes as specified in C57.12.34-2015 - 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, Section 8.11. Low voltage removable ground strap shall be as shown in item ‘BU-1’ of Informational Publication 202-1, March 2018 “List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers.

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9. LV TERMINALS – Low voltage terminals shall be provided per Figure 15(a) in C57.12.34-2015 - 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, and shall be reinforced and supported per Section 8.7.3.2. Support shall be insulated and disconnectable to prevent upward and downward movement of the terminal. The supports shall not extend beyond the bolted face of the spade (so as not to impede the attachment of connectors). All low voltage terminals shall have space to mount a 2.25 inch thick slip-on current transformer.
- 9.1. 45 kVA through 750 kVA shall have ten (10) hole NEMA spades.
- 9.2. 1000 kVA through 3000 shall have fourteen (14) hole NEMA spades.
10. NEUTRAL – For wye-wye connected units, the high-voltage and low-voltage neutrals shall be connected internally and brought out through an insulated bushing located in the secondary compartment and grounded to the tank with a removable ground strap.
11. FILLING & DRAINING PROVISIONS – The following standard accessories are to be provided on all units as per C57.12.34-2015 - 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, Section 8.10.2.
- 11.1. One (1) inch upper filling provision
- 11.2. One (1) inch drain and lower filter valve with side sampling device
- 11.3. Drain and lower filter valve to be located in the primary compartment of transformer.
12. GAUGES:
- 12.1. STATED AT LINE ITEM LEVEL: For units 45 – 300 KVA, if the Partner requires an oil temperature gauge, the description shall be stated in the item description at the line item level as follows: Include oil temperature gauge.
- 12.2. 300 KVA and greater units shall have an oil temperature gauge (dial type thermometer with maximum temperature indicating hand).
- 12.3. 500 KVA and greater units shall have an oil level gauge.
13. PRESSURE RELIEF – The transformer shall be supplied with a pressure relief device located on the low voltage side of the terminal compartment. The device shall operate in accordance with C57.12.00-2010 - IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers, Section 6.
14. IMPEDANCE – The minimum acceptable percent of impedance shall be per C57.12.34-2015 - 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, Section 5, Pages 3 & 4, and Table 2.

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15. DIMENSIONS – Referring to C57.12.34-2015 - 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, the following specifications must be met or exceeded (Manufacturer shall provide footprint drawings at time of bid awarding):

15.1. **15KV (NOTE:** These specifications may exceed the dimension standards found in C57.12.34-2015):

15.1.1. **Primary Bushings:** Dimensioning shall meet or exceed Section 8.7.

15.1.2. **Secondary Bushings:** Referring to diagram found in Figure 4 of Pg 17, (A) Staggered Terminal Arrangement:

15.1.2.1. SECONDARY BUSHINGS SHALL BE STAGGERED, AND SHALL HAVE DIMENSION 'A' = 8" (MIN), AND DIMENSION 'B' = 8" (MIN).

15.1.2.2. A 6-inch min horizontal spacing from center of secondary bushings to enclosure walls is required.

15.1.2.3. 6-inch minimum spacing is required from front of secondary bushings to outside door.

15.1.2.4. 45KVA to 500 KVA - Minimum height of lowest secondary bushing to be 32 inches.

15.1.2.5. 750KVA to 3000 KVA - Minimum height of lowest secondary bushing to be 38 inches.

15.1.2.6. The high and low voltage compartments shall be:

-24" deep (45 through 300 KVA)

-30" deep (500 KVA and larger)

15.1.2.7. 51" cabinet height maximum (45 through 500KVA)

15.1.2.8. 65" cabinet height maximum (750 KVA and larger)

15.2. **25KV (NOTE:** These specifications may exceed the dimension standards found in C57.12.34-2015):

15.2.1. **Primary Bushings:** Dimensioning shall meet or exceed Section 8.7.

15.2.2. **Secondary Bushings:** Referring to diagram found in Figure 4 of Pg 17, (A) Staggered Terminal Arrangement:

15.2.2.1. SECONDARY BUSHINGS SHALL BE STAGGERED, AND SHALL HAVE DIMENSION 'A' = 8" (MIN), AND DIMENSION 'B' = 8" (MIN).

15.2.2.2. A 6-inch min horizontal spacing from center of secondary bushings to enclosure walls is required.

15.2.2.3. 6-inch minimum spacing is required from front of secondary bushings to outside door.

15.2.2.4. 45KVA to 500 KVA - Minimum height of lowest secondary bushing to be 27 inches.

15.2.2.5. 750KVA to 3000 KVA - Minimum height of lowest secondary bushing to be 38 inches.

15.2.2.6. The high and low voltage compartments shall be:

-24" deep (45 through 300 KVA)

-30" deep (500 KVA and larger)

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16. FUSING

16.1. 15KV: TRANSFORMER PROTECTIVE FUSING SHALL BE AS FOLLOWS

- 45kVA – C04 (6 Amp) bay-o-net fuse in series with 30 amp ELSP internal fuse
- 75kVA – C06 (10 Amp) bay-o-net fuse in series with 30 amp ELSP internal fuse
- 150kVA – C08 (15 Amp) bay-o-net fuse in series with 50 amp ELSP internal fuse
- 225kVA – C010 (25 Amp) bay-o-net fuse in series with 100 amp ELSP internal fuse
- 300kVA – C010 (25 Amp) bay-o-net fuse in series with 100 amp ELSP internal fuse
- 500kVA – C012 (40 Amp) bay-o-net fuse in series with 125 amp ELSP internal fuse
- 750kVA – C014 (65 Amp) bay-o-net fuse in series with 175 amp ELSP internal fuse
- 1000kVA – C014 (65 Amp) bay-o-net fuse in series with 175 amp ELSP internal fuse
- 1500kVA – C016 (100 Amp) bay-o-net fuse in series with parallel 100 amp ELSP internal fuse
- 2000kVA – C016 (100 Amp) bay-o-net fuse in series with parallel 100 amp ELSP internal fuse

For 2500 KVA and 3000 KVA, no fusing will be required.

16.2. 25KV AND DUAL VOLTAGE (15/25KV): TRANSFORMER PROTECTIVE FUSING SHALL BE AS FOLLOWS:

- 16.2.1. Primary fusing shall consist of a bayonet-type fuse in an oil-immersed draw-out expulsion fuse - RTE Dual Sensing Bay-O-Net Fuse Link (RTE 358). The fuse shall be designed to protect the transformer in the event of internal or secondary faults or under overload conditions. An isolation link shall be included. The bayonet fuse holder shall be hook-stick operable.
- 16.2.2. DREMC: Primary fusing (for 1000 KVA and smaller only) shall consist of partial range current limiting fuse mounted under oil, in series with a "RTE Dual Sensing Bay-O-Net Fuse Link (RTE 358) type draw-out expulsion fuse. The fuse shall be designed to protect the transformer in the event of internal or secondary faults or under overload conditions. The bayonet fuse holder shall be hook-stick operable.
- 16.2.3. For 1500 KVA and larger, no fusing will be required.

17. RATING SPECIFICATIONS – All three (3) phase transformers shall be:

- 17.1. Dead Front
- 17.2. Loop Feed
- 17.3. Bay-o-net Fused
- 17.4. Primary Voltage (as specified, see '1' above)
- 17.5. 480y/277 Volts, or 208y/120 Volts (as specified by line item) phase to phase/phase to ground
- 17.6. TAPS:
 - 17.6.1. Two 2-1/2% above and Two 2-1/2% below rated voltage with externally operated tap changer
 - 17.6.2. STATED AT LINE ITEM LEVEL: if the Partner requires NO TAPS, the description shall be stated in the item description at the line item level as follows:
TAPS: NO TAPS

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18. INSIDE CABINET DANGER LABEL – Apply “**DANGER**” Sign per current ANSI Z535 requirements. **Inside Cabinet** - Apply one (1) “DANGER” sign on the coil barrier as high in the cabinet as practical, avoiding areas where cables and accessories might block the sign from view.
- 18.1. The sign shall be as manufactured by one of the RUS accepted sign manufacturers as shown in item ‘U hw – Safety Signs’ of Informational Publication 202-1, March 2018 “List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers”.
- 18.2. OUTSIDE CABINET WARNING LABEL – Apply “**WARNING**” sign per current ANSI Z535 requirements.
- 18.3. **Outside Cabinet** - Apply one (1) “WARNING” sign just above the penta-head bolt locking mechanism.
- 18.4. The sign shall be as manufactured by one of the RUS accepted sign manufacturers as shown in item ‘U hw – Safety Signs’ of Informational Publication 202-1, March 2018 “List of Materials Acceptable for Use on Systems of USDA Rural Development Electrification Borrowers”.
19. TRANSFORMER SIZE AND VOLTAGE LABEL – Provide reflective decal or stencil indicating kVA, and reflective decal or stencil indicating secondary voltage, front - center of unit over penta bolt.
20. NON-PCB LABEL – Non-PCB decal shall be placed on outside of unit.

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X. TRANS-SPEC SPECIFICATION TEAM

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XII. REVISION LOG

15KV:

Rev. 0	April 1997	The following power distributors approve and partner in this Specification: LCUB and HUB
Rev. 1	July 1999	The following power distributors approve and partner in this Specification: LCUB, HUB, LUB, AED, MED, LED
Rev. 2	July 2002	Complete review and revision by specification team in Order to go to market with solicitation on behalf of 32 power distributors. Loss evaluation completely revised standardizing to current assumptions and best projections available.
Rev. 3	June 2004	Revised Section 1.R and 1.T.a)3 to clarify Morristown Addendum for fusing their three phase padmounts with oil Immersed current limiting fuses in series with bayonet fuses. Specification Team revised to drop K. Mayfield and add Mark Kimbell. Other editorial changes included.
Rev. 4	Nov 2004	Added new partners. Added note in Pole-Mounted Section noting line item descriptions contain some specific requirements and supersede herein, as applicable. Added 1 Phase Padmount requirement to identify kVA size and Temp Power Access Point, also in Dimensions for 1 phase padmounts.
Rev. 5	Sept. 2006	Complete review and revision by Partners in preparation for Group Bids. Added and updated references; Present Worth-Total Ownership Cost updated, standardization effort for polemounts and padmounts; added General

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Requirements-All Transformers; reworded bushing standards and grounding requirements; revised polemount labeling; added max dimension for polemount; deleted voltage 2400 x 7200 for padmounts; added min acceptable percent of impedance for three phase pads; identified "ADDERS" for those items outside of base transformer or special requirement for a Partner need; new Spec Team named; Manufacturer review performed, subsequent feedback considered.

Rev. 6 Jan 2009 Complete review and revision by TRANS-SPEC specification team in preparation for new Group Bids in 2009 due to the new DOE Efficiency Standards which go into effect January 2010

Rev. 7 Oct-Dec 2013

- All 22 Pages: established this as "Rev 7, 2013" as work began to prepare the Specification for bidding in winter 2013/2014.
- All 22 Pages: format change, re bulleting and numbering
- Multiple Pages: revised standards references
- Multiple Pages: revised language of and layout of specifications
- Page 1: removed TVA logo; removed "Customer Procurement Partnerships"; added "TVPPA Member Purchasing Alliance".
- Page 3: removed/added partners as applicable.
- Page 4: updated references
- Page 5: removed sentence in paragraph 2 (below losses chart) as follows "The QUOTED LOSSES shall be the average of the production line losses for the full quantity of transformers ordered per item, based on the same KVA and type."
- Page 5 & 6: revised loss evaluation/liquidated damages
- Page 7: revised manufacturers and suppliers
- Page 7: "Engineer" to "PARTNER (OWNER)S"
- Page 15: revised dimensions for single phase padmounted transformers
- Page 18: revised spade space requirements
- Page 20: revised bay-o-net fusing for three phase padmounted transformers
- Page 22: revised Specification Team members and contact information.

25KV:

Rev. 0 MTEMC Specification under annual review/revision by MTEMC Standards Engineer.

Rev. 1 April 2002 Complete review and revision by 14400 specification team in Preparation to go to market with solicitation on behalf of 32 Power Distributors. MTEMC and SVEC approve and partner in this Specification.

Rev. 2 Aug 2006 Complete review and revision by specification team in preparation for new Group Bids in 2007. Added dual voltage. **Standardization effort** by Group: Cost of Losses; padmount features and material requirements; danger and warning labels; arrester type; bushing choice; cabinet depth dimensions; overall general edit.; Manufacturer review performed, subsequent feedback considered.

Rev. 3 Jan 2009 Complete review and revision by specification team in preparation for new Group Bids in 2009 due to the new DOE Standards' which go into affect January 2010
Made partial range current limiting fuse an alternate

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Three Phase specification changes: Low Voltage terminals; Cabinet Depth; fusing designation to "A" & "B" (deleted as an adder)

Rev. 4 Jan 2014 Complete review and revision by specification team, including reformatting.

REVISION 0 OF COMBINED SPECIFICATION, MAR 2017 (COMBINED TRANS1 & TRANS2)

Rev. 1 Sep 2017 Updated SPEC Team; Updated Loss Evaluation Factors

Rev. 2 Mar 2018 Updated IEEE and all relevant standards to newest available revisions. Prepared specification for final review by Spec Team/Committee

Rev. 2018-05-31 Revised Sections 3 & 4, 'A' & 'B' factors, formulas, added table back to Section 3.

Revised Partners List, fixed error in spelling of Sequachee Valley EC.

Changed Revision Tracking Enumeration to:
'Rev. YYYY-MM-DD'