



1. APPLICATION

A. Single-phase, oil-filled, self-cooled, submersible transformers are installed in below grade vaults in the EWEB distribution system.

2. REFERENCE STANDARDS

A. The transformers supplied shall be manufactured and tested according to the latest editions, revisions, and amendments to IEEE C57.12.23, Department of Energy 10 CFR part 431, ASTM A-176, and all other applicable standards of NEMA, ANSI, and IEEE, except as modified herein.

3. PRODUCTS

A. Voltage Ratings.

- 1) The high voltage rating shall be 12470 grounded Y/7200 volts.
- 2) The low voltage rating shall be one of the following:
 - a) 120/240 volts
 - b) 240/480 volts
 - c) 277 volts

B. kVA Rating: EWEB standard ratings are 25, 37.5, 50, 75, 100, and 167 kVA. This rating is based on not exceeding either a 55°C average winding temperature rise or a 70°C hot-spot conductor temperature rise above a 30° ambient temperature.

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C. BIL Rating: All transformers supplied under this material specification shall have at least a 95 kV BIL on the high voltage side and a 30 kV BIL on the low voltage side.

D. Construction:

1) Tank

- a) Tank Material. The transformer tank and cover shall be fabricated from a grade of stainless steel equivalent to ASTM A-176, Type 409.
- b) The transformer shall be operable when submerged for periods of 48 hours under five (5) feet of water. No water shall be trapped in the transformer.

2) High Voltage Terminals.

- a) Provide either two or three bushing wells for loop primary cable feed as required on request for quotation or purchase order.
- b) Provide factory installed 200 ampere load break bushing well inserts in all bushing wells, Elastimold catalog # 1601A4, or equal. Bushing inserts shall be covered with dust caps prior to shipment.
- c) Provide one parking stand for each high voltage terminal.

3) Low Voltage Leads. The low voltage cable leads shall extend 24" above the top of the cover and shall be sealed against moisture for shipping and storage. These leads shall not allow the passage of air or moisture either through the conductor strands or between the conductor insulation and the entrance to the transformer tank.

4) Grounding

- a) Provide tapped hole per IEEE C57.12.23 with bronze vise-type grounding stud with stainless steel hardware, Hubbell Power Systems GC 207, or equal.
- b) All exposed surfaces of the primary terminators shall be at ground potential.

5) Arresters. Not required.

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- 6) Dimensions. The total overall transformer dimensions (excluding low voltage leads) shall not exceed a height of 52 inches and a diameter of 25 inches.

E. Accessory Equipment

1) High Voltage Tap Changer

- a) When required on the request for quotation or purchase order, provide primary winding taps of $\pm 5\%$ in four $2\frac{1}{2}\%$ steps.
- b) Tap changer handle shall be operable from above with the transformer installed in the vault.

2) High Voltage Overload Device:

- a) Provide oil cutout, "Bay-O-Net," type fusing capable of interrupting not less than 3500 AMPS asymmetrical fault current up to 8.3 kV.
- b) Provide Cooper Power Systems isolation link with the Bay-O-Net oil fuse cutouts as specified below, or equal.
- c) Provide Cooper Power Systems dual sensing link for protection of the transformer against excessive overload, secondary faults and for the protection of the system against transformer fault as specified below, or equal.

	12470 Grd. Y/7200	
kVA	358C series dual sensing fuse link	Isolation link
25	C05	A02
37.5	C08	A03
50	C08	A03
75	C10	A05
100	C10	A05
167	C12	A06

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3) High Voltage Switch.

- a) The high voltage switch, when required on the request for quotation or purchase order, shall be an oil immersed gang operated four-position loadbreak switch or two 2-position loadbreak switches. This switch shall allow for connection to either one or the other or both high voltage sources or to neither (off).
- b) The switch shall be operable with a hot line tool from above with the transformer installed in the vault.
- c) The switch shall have the following minimum ratings:
 - i. 15 kV line-to-line
 - ii. 95 kV BIL
 - iii. 200 amperes RMS, continuous
 - iv. 200 amperes RMS, interrupting at up to a 60% lagging power factor
 - v. 12,000 amperes asymmetrical momentary (30 cycles) make and latch

The switch positions shall be plainly visible and permanently marked.

- 4) Pressure Relief. Not required.
- 5) Oil drain and fill. Not applicable
- 6) The manufacturer or supplier shall not install informational warning signs on the equipment furnished under this material specification. EWEB has a policy to install their own custom-warning signs on all equipment. These signs will meet NEMA requirements.

F. Oil

- 1) Dielectric fluid shall be natural ester-based that meets minimum acceptance testing requirements described in the latest edition of IEEE C57.147 Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers. New transformers provided with natural ester-based fluid shall meet the National Electrical Code requirements for less-flammable liquid-insulated transformers. Fluid shall be Cargill Envirotemp FR3, or equal.

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- 2) Provide a label indicating the transformer is filled with natural ester-based fluid.
- 3) The nameplate shall be stamped certified “NO DETECTABLE PCB. LESS THAN ONE PART PER MILLION PCB”. The manufacturer shall provide non PCB certification.

4. TESTS

A. Factory Tests: In addition to the ANSI and IEEE specified test, each unit shall successfully pass the following tests:

- 1) No load and Load Losses Tests. Each individual transformer manufactured shall be tested for No Load (core) losses at 100% rated voltage, and for load (copper) losses at 85° and full load current. These tests shall be conducted at the nominal tap setting.
- 2) Full wave impulse test on high-voltage terminals at 95 kV, as specified in IEEE C57.12.90.
- 3) Suitable test to verify sealed tank construction.
- 4) Certification that each unit was subjected to and successfully passed all tests as specified shall be forwarded via SMTP email, to EWEB’s Transformer Shop not later than transformer shipment.
- 5) A durable test tag, sticker or stamp, shall be attached to each transformer; stating that the transformer, after final assembly, has been tested and is suitable for normal use at rated voltage.

B. EWEB Acceptable Tests

- 1) Upon receipt, all transformers will be inspected for leaks, breakage, or damage, and checked for adherence to EWEB’s material specification. All transformers will be turns-ratio-tested and meggered. Transformers failing these tests will be rejected and returned at the supplier’s expense.
- 2) EWEB will complete inspections and testing within five (5) business days after delivery of transformers. Transformers will be accepted after they pass inspections and tests.
- 3) If EWEB finds goods furnished to be incomplete or not in compliance with the Contract, EWEB, at its sole discretion, may either reject the

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goods, require Vendor to sell the goods to EWEB at a reduced price, whichever EWEB deems equitable under the circumstances.

5. WARRANTY

- A. Provide a warranty period of eighteen (18) months, minimum after the date of acceptance.
- B. Unless otherwise stated, all equipment shall be free and clear of any lien or encumbrances and shall be new and the current model and shall carry full manufacturer warranties.
- C. Vendor warrants to EWEB that any transformers furnished will operate and function in the manner represented by Vendor and will achieve the performance stated in the material specification when operating within the design conditions described therein.
- D. Vendor warrants the transformers furnished are free from defects in material and workmanship, and agrees to repair or replace any unit that is unsuitable for operating or fails in operation during normal and proper use, including all parts and labor at no cost to EWEB.

6. PACKAGING AND DELIVERY

- A. EWEB's Transformer Shop shall be notified a minimum of two working days (48 hours) before delivery day. The successful bidder will be given the name and phone number of the Transformer Shop contact person at the time of the award of the contract.
- B. Delivery hours are 9:00 a.m. until 2:00 p.m., Monday through Friday.
- C. All transformers shall be secured to a hardwood pallet rated to support its weight.
- D. Transformers shall be covered during transit to protect them from dirt and grime, either by covered van or tarped open flatbed truck. Transformers shipped in enclosed vans shall not exceed 4,500 lbs. each.
- E. Transformers that are delivered in trucks that do not meet the instructions above may be assessed damages and supplier shall be required to correct damage. A minimum charge of \$50 per transformer may be assessed for each transformer delivered improperly.

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7. SUBMITTALS

A. Submit the information required in Exhibit A.

8. EWEB STORES INFORMATION

A. This material specification shall be used to purchase the material with the following stock codes:

496-0001963 through 496-0001974

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EXHIBIT A

SPECIFIC INFORMATION REQUIRED WITH BID
SINGLE PHASE SUBMERSIBLE TRANSFORMERS
(Submit Separate Sheets for Each Item)

Manufacturer: _____

kVA _____ High voltage _____ Low voltage _____

- | | | | |
|----|--|-------|--------|
| 1. | No load losses at 100% rated voltage
(Core losses) | _____ | watts |
| 2. | Load losses at 85°C and full-load current
(Copper losses) | _____ | watts |
| 3. | Impedance | _____ | % |
| 4. | Number of primary bushings | _____ | |
| 5. | Quantity of oil per transformer | _____ | gal. |
| 6. | Total weight with oil | _____ | lbs. |
| 7. | Limiting overall dimensions: | | |
| | Height | _____ | inches |
| | Width | _____ | inches |
| | Depth | _____ | inches |
| 8. | Type of tank material and thickness | _____ | inches |
| 9. | Tap changer voltage steps
(If supplied) | _____ | % |

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