



## 1. APPLICATION

- A. Three-phase, oil filled self-cooled, padmounted transformers are installed outdoors on pads 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 C57.12.26, Department of Energy 10 CFR Part 431, 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) 208Y/120 volts
  - b) 480Y/277 volts

- B. kVA Rating. EWEB standard ratings are 75, 112.5, 150, 225, 300, 500, 750, 1000, 1500, 2000 and 2500 KVA. This rating is based on not exceeding either a 65°C average winding temperature rise or an 80°C hot-spot conductor temperature rise above 30°C ambient temperature.

- C. BIL Rating. All transformers shall have at least a 95 kV BIL on the high voltage side and 30 kV BIL on the low voltage side.

**MATERIAL SPECIFICATION**  
EUGENE WATER & ELECTRIC BOARD

October 31, 2014    **REV.**

**THREE PHASE PADMOUNTED TRANSFORMERS**

**ES5-6.1600    1**

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D. Construction: Shall conform to items in IEEE C7.12.26 and the requirements listed below.

1) Enclosure

- a) The transformer shall be weather and tamper resistant
- b) Drip shield shall be provided
- c) Each compartment door shall be tamper resistant in accordance with the latest ANSI and IEEE standards and hinged with stainless steel pins that cannot be removed when the compartment doors are closed. The doors shall have a latch or hasp that will allow for locking the cover(s) with a padlock. Minimum one captive and recessed pentahead bolt shall be provided for additional security of the compartment door.
- d) For transformers 500 kVA and greater, do not provide lifting handles on the inside surface of compartment doors.
- e) The tank finish shall be resistant to chipping and shall be powder coated with a high corrosion resistant material. The color shall be Munsel 7GY 3.29/1.5 Bell Green or equal.
- f) The tank shall be equipped with a removable inspection plate which will allow access to the primary and secondary compartment.

2) High Voltage Terminals

- a) Provide either three (3) high voltage bushing wells for radial primary cable feed or six (6) high voltage bushing wells for loop primary cable feed as required on the request for quotation or purchase order.
- b) Provide primary bushing wells secured with studs or bolts on the outside of the transformer tank. No welded or internally fastened bushing wells shall be accepted.
- c) 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.

3) Low Voltage Terminals

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- a) “Staggered” arrangement of four-hole or six-hole NEMA pad. See Figures 4(a) and 9 of IEEE C57.12.26.
- b) No tank-welded bushings. Bushings shall be bolted or stud-connected to the tank only.
- c) For transformers 500 kVA and greater provide low voltage terminal supports rated for 500 lbs. per terminal and insulated for 10 kV per IEEE C57.12.00 Table 8.

4) Grounding

- a) Exposed surfaces of the primary terminals shall be grounded.
- b) High voltage compartment. Provide a fitting for grounding the concentric neutral strands.
- c) Provide grounding pads per IEEE C57.12-26. In one tapped hole of each pad provide a bronze vise-type grounding stud with stainless steel hardware, Hubbell Power Systems GC 207 or approved equal.

5) Arresters. Not required.

- 6) Dimensions. The height of transformer shall not exceed the following:  
 75 kVA thru 500 kVA – height 63”  
 750kVA thru 2500 kVA – height 77”

- 7) Core-Coil Assembly. The transformer core and coil assembly shall be either five legged or triplex construction.

E. Accessory Equipment

1) High Voltage Tap Changer

- a) Transformers shall be provided with taps of +/- 5 percent in four, 2 ½ percent steps.
- b) The tap changer handle shall be mounted in the high voltage compartment and be operable from outside the transformer tank.

- 2) High Voltage Overload Device: Oil cutout, “Bay-O-Net,” type fusing shall be provided. These overcurrent devices shall be capable of interrupting not less than 3500 AMPS asymmetrical fault current up to 8.3 kV.

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- a) Provide Cooper Power Systems isolation link with the Bay-Net oil fuse cutouts as specified below, or equal.
- b) For transformers rated 1500 KVA or smaller, 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.
- c) Transformers larger than 1500 KVA shall be protected by high current Cooper Power Systems Bay-O-Net links with appropriate isolation link as specified below, or equal along with silver-plated Flapper Bay-O-Net assembly.

KVA	358C Series Dual Sensing Fuse Link	Isolation Link
75	C05	A02
112.5	C08	A03
150	C08	A03
225	C10	A05
300	C10	A05
500	C12	A06
750	C14	A07
1000	C14	A07
1500	C18	A07
	High Current Fuse Link Cooper 4038361-	
2000	C05CB	A06
2500	C05CB	A06

- 3) High Voltage Switch. The high voltage switch shall be an oil-immersed gang operated four-position loadbreak switch, or two two- position loadbreak switches. This arrangement shall allow for connection to either one or the other or both high voltage sources or to neither (off). The switch or switches shall be operable with a hot line tool, shall be plainly visible and permanently marked and have the following minimum ratings:
  - a) 15 kV line-to-line
  - b) 95 kV BIL

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- c) 200 amperes RMS, continuous
  - d) 200 amperes RMS, interrupting at up to a 60% lagging power factor
  - e) 12,000 amperes asymmetrical momentary (30 cycles) make and latch
- 4) Pressure Relief. A pressure relief device that automatically opens at 8-10 PSIG and automatically reseats at a positive pressure of between 2 and 8 PSIG shall be provided on all units.
  - 5) Accessory Equipment Location. All high-voltage accessories shall be located in the high-voltage compartment and all low voltage accessories shall be located in the low voltage compartment.
  - 6) Oil Drain and Fill. In one of the compartments, all sizes of transformers shall have a one-half inch NPT upper filter press and filling plug, and a lower drain valve with built-in sampling device.
  - 7) Oil Level Gauge. Provide an oil level gauge in the secondary compartment.
  - 8) 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 the 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.
- 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

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A. Factory Tests: In addition to the ANSI and IEEE specified tests, 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°C 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 Transformer Department 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 Acceptance 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 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.

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- 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 Packing and Delivery 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

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.

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496-0001935 through 496-0001936  
496-0001938 through 496-0001942  
496-0001944 through 496-0001959  
496-0001961 through 496-0001962

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**EXHIBIT A**

**SPECIFIC INFORMATION REQUIRED WITH BID  
THREE PHASE PAD MOUNTED 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. Number of Primary Bushings \_\_\_\_\_
4. Impedance \_\_\_\_\_ %
5. Quantity of oil per transformer \_\_\_\_\_ gal.
6. Total weight with oil \_\_\_\_\_ lbs.
7. Limiting overall dimensions:
  - Height \_\_\_\_\_ inches
  - Width \_\_\_\_\_ inches
  - Depth \_\_\_\_\_ inches
  - Cable Entry Length \_\_\_\_\_ inches
  - Cable Entry Width \_\_\_\_\_ inches
8. Type of tank material and thickness \_\_\_\_\_ inches
9. Type of finish \_\_\_\_\_
10. Tap changer voltage steps \_\_\_\_\_ %

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