

---

**Part 1            General**

**1.1            RELATED SECTIONS**

- .1    Common Work Results - Electrical - Section 26 05 01.
- .2    Wire and Cables (0-1000V) - Section 26 05 21
- .3    Connectors and Terminations - Section 26 05 22.
- .4    Excavating, Trenching and Backfilling - Section 33 23 33.01.
- .5    Direct Buried Underground Cable Ducts - Section 33 65 76.
- .7    Installation of Anchors: Refer to details on Electrical Site Plan Drawing.
- .8    Commissioning - Section 26 99 99.
- .9    Appendices D, E, F, and G.

**1.2            REFERENCES**

- .1    ANSI/IEEE 386-1985, Separable Insulated Connector Systems for Power Distribution Systems above 600V.
- .2    CSA C227.4-M1978 (R1987), Three Phase Dead Front Pad Mounted Distribution Transformers.
- .3    CAN/CSA-C802.1-00 (R2005) Minimum Efficiency Values for Liquid-filled Distribution Transformers.

**1.3            SOURCE QUALITY CONTROL**

- .1    Submit to the Departmental Representative standard factory test certificates of transformer and type test of each transformer with high voltage accessories in accordance with CSA C2.

**1.4            ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit shop drawings and product data in accordance with Section 26 05 01 Common Work Results - Electrical.
- .2    Indicate:
  - .1    Anchoring method and dimensioned foundation template.
  - .2    Dimensioned cable entry locations.
  - .3    Dimensioned cable termination height.
  - .4    Dimensioned transformer.
  - .5    TCC curve for the bayonet and current limiting fuses.

- .3 Identified internal and external component layout on assembly drawing.
- .4 Insulating liquid capacity.

## **1.5 CLOSEOUT SUBMITTALS**

- .1 Provide operation and maintenance data for pad mounted distribution transformers for incorporation into manual specified in Section 01 78 00.
- .2 Include insulating liquid maintenance data.

## **1.6 EXTRA MATERIAL**

- .1 Provide maintenance materials in accordance with Section 01 78 00.

## **Part 2 Products**

### **2.1 EQUIPMENT**

- .1 Three phase dead front radial feed pad mounted transformers: To CSA C227.4.
- .2 Transformer efficiency to meet or exceed CSA C802.1-00.
- .3 Separable insulated connectors for power distribution systems above 600V: to ANSI/IEEE 386.
- .4 Oil filled primary feed pad mounted distribution transformer complete with primary and secondary cable compartments completely separated from each other, another separate compartment for gang-operated load break switch with visible window, steel fabricated low profiles unit not exceeding 1.5 m in height for mounting on concrete pad.
  - .1 Transformer insulating fluid shall be supplied with the transformer.
- .5 High voltage bushing wells for connection to distribution system through separable insulated connectors for dead front operation.
- .6 Separable insulated connectors.
- .7 Spade type low voltage terminals.
- .8 Compression style connectors for and secondary cables.
- .9 Temperature Rise: 65°C average (winding).
- .10 Winding: Copper.
- .11 Primary transformer protection bayonet plus current limiting immersed fuse.
  - .1 Three Bay-O-Net fuses, three Bay-O-Net fuse holders and three spare Bay-O-Net fuses in transformer enclosure.

- .12 External visible gang-operated load break switch installed in a separate compartment capable of interrupting the transformer full load, factory installed.
- .13 Switch compartment shall be c/w viewing windows and padlocked.
- .14 The switch shall be interlocked with the fuse or the door of the compartment containing the fuses.
- .15 Load break switching 15-38 kV, 200A 2 positions.
- .16 Separate padlocking for primary compartment door.
- .17 Load break inserts for elbow connectors.
- .18 High voltage-parking stands for each high voltage bushing.
- .19 Stays to hold compartment doors in 110-degree open position.
- .20 Terminations and connectors suitable for radial feed.
- .21 All gauges and level indicators shall be installed inside the compartments.

## **2.2 TRANSFORMER CHARACTERISTICS**

- .1 Loop B transformer primary voltage: 4160V, 60 Hz, delta connected, 3 phase, 3 wire.
- .2 Loop B transformer secondary voltage: 600/347V, wye connected, 3 phase, 4 wire, neutral grounded.
- .3 Loop H transformer primary voltage: 4160/2400V, 60 Hz, wye connected, 3 phase, 4 wire.
- .4 Loop H transformer secondary voltage: 600/347V wye connected, 3 phase, 4 wire, neutral grounded.
- .5 Capacity: 225 kVA.
- .6 Basic impulse level: 95 kV.
- .7 Low voltage kV Class 1.2 kV.
- .8 Impedance: Not less than 3.1% and not more than 5.75%.
- .9 No load losses not to exceed 387 watts at 20°C.
- .8 Load losses: 2830 watts at 85°C.

## **2.3 VOLTAGE TAPS**

- .1 Five 2.5% taps. 2 – 2.5% taps above and 2 – 2.5% tap below normal.

## **2.4 TAP CHANGER**

- .1 Internally operated off-load tap changer, with provision for padlocking.

## **2.5 ACCESSORIES**

- .1 Liquid temperature thermometer with one set of contacts (contacts for future use).
- .2 Liquid level gauge with one contacts (contacts for future use).
- .3 Pressure relief valve.
- .4 Drip shield beneath bayonet fuse holders.
- .5 Drain valve.
- .6 Filter valve.
- .7 1" [25 mm] filler plug.
- .8 Tap selector switch.
- .9 Bolter cover.
- .10 Spare fuses.
- .11 Tank Accessories:
  - .1 IEEE standard one-hole ground pads (Qty: 3).
  - .2 Copper ground bus in HV & LV compartments.
  - .3 Seismic anchoring provisions welded to tank.

## **2.6 GROUNDING**

- .1 CSA copper grounding bus size 50 mm x 6 mm x length of transformer and mounting hardware.
- .2 Include connectors for grounding conductors.
- .3 Bond to the tank doors and non-current carrying metal parts.

## **2.7 FINISH**

- .1 Finish exterior of unit: green (Munsell 9GY 1.5/2.6) topcoat.
- .2 Corrosion-proof bushing clamp and hardware.

## **2.8 EQUIPMENT IDENTIFICATION**

- .1 Provide equipment identification in accordance with Section 26 05 01 – Common Work results - Electrical.
- .2 Aluminum CSA nameplate.
- .3 Nameplate showing information in accordance with CSA C227.4-06.

## **2.9 WARNING SIGNS**

- .1 Provide warning signs on exterior of high voltage door indicating: “DANGER HIGH VOLTAGE TRANSFORMER - DO NOT OPEN TRANSFORMER DOORS” decal sign, minimum size 175 mm x 250 mm (minimum).
- .2 Provide warning sign in interior of low voltage door indicating: “DANGER KEEP AWAY DO NOT TOUCH ANYTHING” decal sign, minimum size 175 mm x 250 mm (minimum).

## **Part 3 Execution**

### **3.1 INSPECTION**

- .1 Check factory made connections of transformer unit for mechanical security and electrical continuity.
- .2 Check transformer’s insulating liquid for correct quantity and specification according to manufacturer’s instructions.

### **3.2 INSTALLATION**

- .1 Ensure concrete pad has cured for a minimum of 48 hours before transformer is installed.
- .2 Set and secure transformer unit in place, rigid, plumb, and square.
- .3 Make connections.
- .4 Connect transformer unit ground bus to system ground.
- .5 Set taps to produce rated secondary voltage at no load.

### **3.3 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 01 – Common Work Results – Electrical and Section 26 99 99 - Commissioning.
- .2 Carry out following insulation tests using megger with 20,000 megohm scale and resulting insulation resistance corrected to base of 20°C Celsius.
  - .1 High voltage to ground with secondary grounded for duration of test.

- .2 Low voltage to ground with primary grounded for duration of test.
- .3 High to low voltage.
- .3 Inspect primary and secondary connections for tightness and for signs of overheating.
- .4 Inspect and clean bushings and insulators.
- .5 Check oil level and temperature indicators.
- .6 Set transformer taps to rated voltage as specified.
- .7 Inspect for oil leaks and excessive rusting.
- .8 Inspect oil level.
- .9 Check fuses for correctness of type and size.
- .10 Check for grounding and neutral continuity between primary and secondary circuits of transformer.

### **3.4 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by dry type transformers installation.

### **3.5 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
  - .1 Leave work area clean at the end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 – Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 Construction Demolition Waste Management.
  - .1 Remove recycling containers and bins from the site and dispose of materials at appropriate facilities.

**END OF SECTION**