PART 1 - GENERAL

1.1 REFERENCES

.1 CSA International
.1 CSA C9-17, Dry-Type Transformers.
.2 CAN/CSA-C802.2-18, Minimum Efficiency Values for Dry Type Transformers.
.3 CSA C22.1-18, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.
.4 CAN/CSA C22.2-47, Ontario Electrical Safety Code (27th edition) Transformer nameplate certification.(Add E-01)

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
.1 EEMAC GL1-3-1988, Transformer and Reactor Bushings.

.3 National Electrical Manufacturers Association (NEMA)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for transformers and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Indicate on drawings:
.1 Dimensions showing enclosure, mounting devices, terminals, taps, internal and external component layout.
.2 Technical data:
.1 kVA rating.
.2 Primary and secondary voltages.
.3 Frequency.
.4 Single Three phase.
.5 Polarity or angular displacement.
.6 Full load efficiency.
.7 Regulation at unity pf.
.8 BIL.
.9 Insulation type.
.10 Sound rating.

.4 Sustainable Design Submittals:
.1 Construction Waste Management:
.1 Submit project Waste Management Plan Waste Reduction Workplan highlighting recycling and salvage requirements.
.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.5 Factory Test Submittals:submit standard factory test certificates of each transformer and type test of each transformer in accordance with CSA C9.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for dry type transformers for incorporation into manual.

.3 Operation and maintenance instructions to include:

.1 Tap changing.

.2 Recommended environmental conditions.

.3 Recommended periodic inspection and maintenance.

.4 Bushing replacement.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect transformers from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacture of pallets, crates, padding and packaging materials as specified in Construction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 20.

1.6 EXTRA MATERIALS

.1 Supply maintenance materials in accordance with Section 01 78 00.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Dry-type transformers: to CSA C9.

.2 Bushings: to EEMAC GL1-3.

2.2 TRANSFORMER CHARACTERISTICS

.1 Type: ANN.

.2 Rating: 75kVA, 1 phase,60 Hz.

.3 105 insulation system class, 150 degrees C temperature rise.

.4 Impedance: 5% standard.

.5 Primary winding: 2.4kV, delta, BIL 30kV and with neutral brought out ungrounded.

.6 Secondary winding: 240V, deltastar, BIL 10kV, three-wire with neutral brought out and high low resistance effectively grounded ungrounded.

.7 No load losses not to exceed 5% of kVA rating.

.8 Full load losses not to exceed 1.3% of kVA rating.

.9 No load and full load losses to exceed those indicated in CAN/CSA-C802.2.

2.3 ENCLOSURE

.1 Fabricated from sheet steel with drip shield.

.2 Bolted hinged removable panels for access to tap connections, enclosed terminals.

.3 Conductor entry:
- .1 Knockouts.
- .2 Potheads.
- .3 Junction boxes.
- .4 Bushings.
- .5 Clamping rings.
- .6 Entry for cable.

.4 Designed for floor mounting.

.5 Indoor, ventilated, self-forced air cooled type. Temperature of exposed metal parts not to exceed 65 degrees C rise.

.6 Outdoor, ventilated, self-cooled type, CSA 3 enclosure.

.7 Pad mounted type:
- .1 Include conductor entry through bottom for underground distribution, with separate high and low voltage compartments divided by full length metal barrier.
- .2 Ensure each compartment includes access door with concealed hinges.
- .3 Secondary door to have 3-point latch, external operating handle, provision for padlocking and arranged so that secondary door must be open before access gained to primary compartment.

.8 Open type: no enclosure, for installation in switchgear enclosure.

2.4 VOLTAGE TAPS

.1 Standard 5 taps, 1 at nominal voltage, 2 at 2.5% intervals above nominal, 2 at 2.5% intervals below nominal.

2.5 TAP CHANGER

.1 Bolted-link type.

2.6 WINDINGS

.1 Primary and secondary coils:
.1 Copper.
.2 Vacuum cast epoxy.

.2 Coil and core assembly:
.1 Taps located at front of coils for accessibility.

.3 Sound level: not to exceed 50dB.

2.7 ACCESSORIES

.1 Wiring and terminal box for protective devices.

.2 Digital type winding temperature indicator with sequence 3 required.

.3 Grounding terminal: inside of enclosure.

2.8 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00.

.2 Equipment labels: nameplate size 7, labeled.

.3 Suitable high voltage warning sign shall be installed as required by the OESC 26-006, 36-100 4) and bulletin 36-6-21 (1) Warning sign "DANGER HIGH VOLTAGE" (Add E-01).

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for transformers installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Locate, install and ground transformers in accordance with manufacturer's instructions.

.2 Set and secure transformers in place, rigid plumb and square.

.3 Connect primary terminals to high voltage circuit.

.4 Connect secondary terminals to secondary feeder cable.

.5 Use flexible conduit to make connections to transformer.

.6 Energize transformers and check secondary no-load voltage.

.7 Adjust primary taps as necessary to produce rated secondary voltage at no-load.

.8 Wire one set of contacts on winding temperature detector relay to sound alarm, wire second set of contacts to trip transformer circuit interrupter.

.9 Wire alarm contacts on winding temperature indicator to sound alarm when excessive temperature reached.

.10 Locate and install cooling fans.
- .1 Connect thermostat control.
- .2 Connect sequence contacts of temperature indicator:
  - .1 First contact closure: start fan.
  - .2 Second contact closure: sound alarm.
  - .3 Third contact closure: trip secondary breaker.

.11 Use torque wrench to adjust internal connections in accordance with manufacturers' recommended values.

.12 Check transformer for dryness before putting it into service and if it has not been energized for some considerable time.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Energize transformers and apply incremental loads:
- .1 0% for 4 hours.
- .2 10% for next 1 hour.
- .3 25% for next 2 hours.
- .4 50% for next 3 hours.
- .5 Full load.
- .6 At each load change, check temperatures ambient enclosure ventilating air winding.
- .7 Adjust cooling fan controls if required.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by transformers installation.

END OF SECTION