1.0 GENERAL TECHNICAL SPECIFICATION FOR DRY TYPE 11/433 KV, 750 KVA TRANSFORMER:

2.1 Supply of Transformer:
The specifications given below relates to the design, manufacture, testing and supplying of Step Down Vacuum process Impregnated Dry Type Indoor Transformer.

2.2 Standards:
A. The design, manufacture and performance of equipment shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specifications shall be construed to relieve the Vendor of this responsibility.

B. Unless otherwise specified equipment shall conform to the following latest applicable Indian Standards.

(a) IS:11171 - Transformer
(b) IS:3639 - Fittings and Accessories for Power Transformer
(c) IS: 2099 - High Voltage Porcelain Bushings.

2.3 System of Supply:
11 kV, 3 phase, 50 cycles solidly earthed system.

2.4 Rating:
Suitable for continuous rating.

2.5 Ratio:
11000 / 433 Volts.

2.6 kVA Rating:
750 kVA

2.7 Connections:
Delta on H.V. Side and star on L.V. side with neutral terminal brought out for solid earthing in addition to the neutral terminal in the L.V. cable box.

2.8 Vector Groups:
Corresponding to the Vector Symbols Dyn-11, Impedance shall not exceed 6.25%.

2.9 Type:
Indoor.

2.10 Constructional Features:
A. Similar parts, particularly removable ones, interchangeable.
B. Exposed parts shall not leave pockets where water can collect.
C. Internal design of transformer shall ensure that air is not trapped in any location.
2.11 Core:
A. The magnetic circuit shall be of “Core Type” construction. The core shall be
built out of high grade, non-aging, low loss, high permeability, cold rolled grain
oriented silicon steel laminations.
B. The finally assembled core shall be free from distortion. It shall be rigidly
clamped to ensure adequate mechanical strength and to prevent vibrations during
operation.
C. The core shall be provided with lugs suitable for lifting the complete core and
coil assembly.
D. The core and coil assembly shall be so fixed in the enclosure that shifting will not
occur during transport or short circuits.
E. The core must be treated with high temperature resistant paint to prevent
corrosion at edges of the core plates.

2.12 Internal Earthing:
All internal metal parts of transformers shall be earthed.

2.13 Winding:
A. Winding shall be subjected to shrinking and seasoning process, that, no further
shrinkage occurs during service. Adjustable devices shall be provided for taking
up possible shrinkage in service.
B. Materials used in the insulation and assembly of the windings shall have high
tensile and dielectric strength. These shall not soften or otherwise get affected
under the operating conditions.
C. In case of Dyn-11 transformers, neutral shall be brought out in open for solid
earthing on the secondary side.
D. The windings shall be copper wound.

2.14 Transformer Losses:
The Maximum allowable losses shall be within IS Tolerance.

2.15 Enclosure:
Steel enclosure with screens of metal at top and bottom for indoor type transformer and
ventilation required from the top.

2.16 Impregnation:
A. Coils to be impregnated with epoxy resin by vacuum pressure impregnation
process to ensure void free impregnation.
B. The process shall consist of but not limited to preheating, vacuum drying, under
vacuum entry of resin, vacuum submersion, pressurization, draining, transfer to
oven and curing.
C. Class of Insulation: Type ‘H’.
2.17 Tappings:
Off load tap changing arrangement on H.V. side. The tappings to be provided for variation of H.V. voltage from +5% to -5% in steps of 2.5%, with arrangement interlocking with HT breakers with door opening including 2 sets of keys.

2.18 Temperature Rise:
Continuously rated for full load; temperature rise not to exceed 115°C over ambient.

2.19 Cooling:
Natural air cooling.

2.20 Fittings:
The following accessories and fittings shall be provided with the transformers:

A. **Inspection covers:**
   Hinged type inspection cover on side of the transformer shall be provided.

B. **Lifting lugs:**
The arrangement of lifting the active part of the transformer along with the cover of the tank by means of lifting lugs without disturbing the connections. Also complete transformer lifting lugs shall be provided. Lifting arrangement for core and coils shall also be provided.

C. **Jacking pads:**
Jacking pads shall be provided on the transformer.

D. **Earthing terminal:**
Two nos. earthing terminals shall be provided of copper of non-corrosive material on transformer enclosure and one earthing terminal of neutral on the cable boxes.

E. **Diagram and rating plate:**
One diagram and rating plate indicating the details of transformer, connecting diagram vector group, tap changing diagram etc. shall be provided.

F. **Rollers:**
4 Nos. bi-directional type roller shall be provided to the transformers on cross channels to facilitate the movement of transformers in both the directions.

G. **Temperature Indicator:**
Winding temperature indicator with contacts for operating trip circuits as well as for alarm shall be provided. Also suitable thermistors or RTD sensors shall be provided in all three windings.

2.21 Cable End Boxes:

A. **On H.V. Side**
Cable end box suitable for 11 kV, 3C x 150 sq.mm. XLPE cable. The size of box should be sufficient for termination using cable jointing kit.
B. **On L.V. Side**

On L.V. Side cable end box shall be provided suitable to accept 6 Nos. 3.5 x 300 sq mm XLPE, armoured, Al conductor cables.

The cable terminal box shall be provided with suitable cable glands of proper size and number of lugs shall be provided on the terminal for all cables.

2.22 **Thermo Junction Box:**

A thermo junction box shall be provided on the transformer to have *Alarm contacts for temperature Indicator*.

The above box shall be suitably mounted on transformer and shall have a glass window for viewing purpose.

2.23 **Painting:**

The interior of transformer enclosure and internal structural steel work shall be painted with heat resistant insulating varnish after thorough cleaning of all scales and dust.

2.24 **Testing:**

The transformer shall be subjected to the following tests at the factory before dispatching the same and test certificates, in quadruplicate, shall be furnished:

A. Measurement of winding resistance.

B. Ratio polarity and phase relationship.

C. Measurement of Impedance of Voltage (Principle Tapping), short circuit impedance and load loss.

D. Load losses.

E. No load loss and no load current.

F. Insulation resistance.

G. Induced over voltage withstand.

H. Separate source voltage withstand.

I. Temperature rise by no load plus short circuit method.

2.25 **Type test:**

The following Type test reports shall be submitted

A. lightning impulse test

B. Measurement of acoustic noise level

C. Partial Discharge Measurement

D. Short Circuit Test

The routine and other tests to be performed as per IS:11171-1985 and IS:2026-1977.
2.26 **Instruction Manual:**

The contractor shall submit three copies of manual of complete instructions for the installation, operation, maintenance and repairs, circuit diagram and foundation details shall be provided with the transformers.

2.27 **Drawings:**

Four sets of drawings of the transformers being supplied shall be furnished within two weeks of placement of order for approval to the P.M.C./ Architects.