

Request for Proposal
Design, Manufacture, Supply, Testing and Commissioning of 750 KVA
Distribution Transformer at
Indian Institute of Astrophysics CREST campus Hoskote, Bangalore,
Karnataka.



TECHNICAL SPECIFICATIONS

OIL FILLED DISTRIBUTION TRANSFORMER

1.0 OIL FILLED DISTRIBUTION TRANSFORMER

1.0 SCOPE:

The transformer shall be manufactured to the relevant IS specifications. The transformer shall be supplied with first fill of oil.

- 1.1 Manufacturing, supply, storage, installation, testing and commissioning of power transformers of required ratings.
- 1.2 Supply & installation of soak pits with necessary piping & pits as per the transformer rating & standards.

2.0 CODES AND STANDARDS:

- 2.1 The design, material, construction, manufacture, inspection, testing and performance of power transformer shall comply with all currently applicable standards, regulations and safety codes in the locality where the equipment shall be installed. The equipment shall also conform to the latest applicable standards and codes of practice.
- 2.2 In case of conflict between the applicable standards and this specification, this specification shall govern.
- 2.3 The transformer shall generally conform to IS 1180 Part 1 to 4 latest editions.
- 2.4 The Transformer would be continuously rated for a full load temperature rise not exceeding 50°C by thermometer in oil and 55° C by resistance method. The transformer would be complete with the following but not limited to:

| Sl. | Description |
|-----|---|
| 01. | Oil conservator with filling hole and cap, oil level indicator, fresh dehydrated silica jelly salt. |
| 02. | Silica gel breather with first fill of charge. |

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| 03. | Plain oil level gauge with max. /min. level indication |
| 04. | One No. Drain valve |
| 05. | One No. Filter valve |
| 06. | Thermometer pockets |
| 07. | Diagram and Rating plate |
| 08. | Two earthing terminals |
| 09. | Lifting arrangement and jacking bolts |
| 10. | Four Nos. - Bi-directional rollers |
| 11. | First filling of filtered oil with di-electric strength 40KV/mm or more. |
| 12. | Double diaphragm explosion vent with Oil Sight Glass |
| 13. | Dial type oil temperature indicator with Maximum Reading Position [MRP] and Resetting Device [RSD]: With alarm and trip contacts |
| 14. | Dial type winding temperature indicator with: MRP & RSD and with alarm and trip contacts. |
| 15. | Double float bucholz relay with alarm and trip contacts and gas collecting hand cock |
| 16. | Thermo junction box. |
| 17. | Magnetic Oil Level gauge with low-level alarm contacts. |
| 18. | One No. Neutral CT shall be provided mounted inside the tank and its Secondary Winding connection wired up to-marshalling box. |
| 19. | Air Release Device on tank |
| 20. | Base channel with towing hook/hole |

3.0 TERMINAL ARRANGEMENT

HV SIDE:

Cable Box, suitable to receive one run of 11 KV, 3 Core, up to 240 Sq.mm. XLPE earthed, Al. Cable.

LV SIDE:

Shall be suitable for bus duct, Additional Neutral shall be brought out through an Outdoor Bare Bushing.

Above to be read in line with Power Distribution Scheme.

4.0 GENERAL CONSTRUCTIONAL FEATURES:

- a) All the materials used shall be of the best quality and of class most suitable for working under the conditions specified to withstand the variations of temperature and atmospheric condition without distortion, deterioration or setting up to undue stresses in any part.
- b) Pipes and pipe fittings, screws, studs, nuts and bolts used for external connections shall be as per the relevant standards. Steel bolts and nuts exposed to the atmosphere shall be either galvanized or zinc passivated.
- c) Materials in contact with oil shall be such as not to contribute to the formation of acid/sludge in oil.
- d) Rating and terminal marking plates indelibly marked shall be provided. All label plates shall be of non-corrosive material.
- e) All internal connections and fastenings shall be capable of operating under over load condition.

5.0 PAINTING:

- a) The interior of transformer tank and other oil filled chambers and internal structural steel work shall be cleaned of scale and dust by sandblasting. These surfaces shall be painted with heat resistant, oil insoluble and insulating varnish.
- b) Exposed surfaces of the transformer shall be painted with weatherproof paint of specified shade 631 of IS5 / any other required shade.

6.0 RATED OUTPUT:

- a) Transformer shall be capable of delivering the rated current at a voltage equal to 110 percent of the rated voltage without exceeding the limiting temperature rise.
- b) Transformer shall be capable of operation continuously, in accordance with the applicable standard loading guide at its rated KVA and at any of the specified voltage ratio.
- c) Transformer, complete with cable boxes, shall be designed and constructed to withstand without damage, the effects of external short circuits as per the specified Standards. Account shall be taken of

the different forms of system faults that can arise in service such as line to earth faults and line-to-line faults associated with the relevant system and transformer earthing conditions.

- d) The dynamic ability to withstand short circuit shall be demonstrated by tests or by reference to tests on identical transformers.
- e) All rated parameters such as voltage ratios, impedance, regulation, load losses, and no load losses subject to the suppliers' guarantees shall be within the tolerances given in applicable Standards.

7.0 TESTS:

The tests listed below shall be carried out on the transformer and shall be deemed to be included in the contractor's scope.

- a) Routine tests as per IS.
- b) 2KV withstand test for all central-wiring circuits.
- c) Oil leakage test
- d) Dimensional Check
- e) Visual
- f) Bushing Creepage Measurement
- g) Vector group

8.0 DATA SHEET

| | | |
|---------------------------------|---|--|
| Installation | : | Outdoor |
| Rating | : | AS PER BOQ |
| Type | : | Two Windings |
| Phase | : | 3 Phase |
| Primary Voltage | : | 11000V |
| Secondary Voltage | : | 433 V |
| Type of loads | : | Transformer should be able to feed non-linear load of at least 50% (UPS loads), with 8%THD |
| Tap changeover | : | ON LOAD with RTCC panel. |
| Tapping on windings HV/LV | : | HV winding |
| Motorized load tap changer | : | +5% to -15% in step of 1.25% |
| RTCC panel | : | Required |
| Winding connection H.V | : | Delta |
| L.V | : | Star grounded |
| Winding material | : | Copper |
| Vector Group | : | Dyn 11 |
| Percentage Impedance | : | As per IS |
| Fault Level HV system | : | 350 MVA |
| Transformer Neutral | : | Effectively earthed through an additional bushing on LV side. |
| Routine test | : | Required as per BIS |
| Transformer Termination Details | : | |
| Primary side | : | Cable box to suit 1 run of 240 Sq.mm. 11KV XLPE Cable |

| | | |
|----------------|---|--------------------------|
| Secondary side | : | To suit Aluminum BUSDUCT |
| Standard | | IS:1180 Level 3 (Star 2) |
| Neutral CT | : | Suitable REF protection. |

9.0 INSTALLATION OF TRANSFORMER

Transformer shall be installed and commissioned as per the requirements of IS 1886 (latest edition) and regulations of local authorities.

a. HANDLING:

Transformer and all its accessories shall be handled carefully in its upright position as indicated on the packing case. Lifting lugs and jacking pads shall be used for lifting of the transformer. While using jacking pads utmost care shall be taken in proper application of jacks. Where transformer is dragged or pulled on sleeper or rollers the traction eyes provided at the bottom frame shall be used with suitable wire ropes and shackles.

b. STORAGE

Transformer shall be stored under shelter in a place free from fire and explosion hazards. Care should be taken to see that moisture will not contaminate oil inside the tank by checking all gaskets, bolts, nuts and accessories.

c. CABLING AND EARTHING:

Cable shall be terminated at cable boxes only after IR values are measured and found to be in order. Cable termination shall be carried out with utmost care and H.T.cable box shall be filled with compound after jointing and termination. Neutral of the transformer shall be connected to two separate and distinct earth station through double run of G.I. / copper flats of suitable size. The body of the transformer shall also be provided with effective earthing as per the drawings and specifications.

d. PRECOMMISSIONING TESTS

General inspection of bolts, nuts, gaskets and checking of all accessories and checking of oil level.

e. MOUNTING AND ERECTION:

Necessary civil works shall be considered for erection of transformer.

The transformer shall be lifted by lugs or shackles or by any other suitable means (such as dragging on rollers) and mounted on the rails, which are embedded in concrete prepared for the purpose. Care shall be taken to see that transformer is not tilted during lifting and erection of transformer. The rollers shall be checked to prevent movement of the transformer after being positioned on the rails. Adequate and necessary clearance from walls, other equipments, etc. shall be provided as indicated in the drawing and as per regulation of local inspection authorities. After positioning of the transformer stoppers is to be welded to the rails so that transformer is finally fixed at its place.

All the accessories and parts such as conservator tank, breather, radiators, explosion vent, thermometer etc. should be mounted on the transformer. Tighten all bolts and nuts and check for any leakages. Any leakages shall be rectified. Check the oil level and top it up, if necessary, with new oil.

Phasing out test with 415 Volts applied to HV windings and voltage across LV winding being checked.

Measurement of neutral and body earth resistance with earth testing megger. The values shall not exceed 1 to 2 Ohms respectively.

Functioning of thermometers, oil level indicator, Bucholz relay shall be checked and adjusted, if necessary. The transformer shall be charged only after the above tests are conducted and approval of local authorities is obtained. The earthing of neutral and body of the transformer shall be done as per I.E. regulations and the requirements and of local authorities.

However, general mode of earthing arrangement is indicated on the drawings. The contractor shall supply all the material and labour for erection and commissioning of transformer.

f. WARRANTY AND MAINTENANCE

The installation shall be guaranteed against faulty workmanship for minimum of 3 years from the date of practical completion. All faulty workmanship shall be replaced and restored to full operation at no cost to the Employer within the guarantee period.

Manufacturer's guarantees and warranties shall be obtained as agreed. The warranty period shall be for eighteen months commencing from the date of installation or twelve months from the date of practical completion, whichever is the first to occur.