



Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

UTTAR GUJRAT VIJ COMPANY LIMITED

**Regd. & Corporate Office : Visnagar Road,
MEHSANA**

STANDARD TECHNICAL SPECIFICATION

FOR

SINGLE PHASE 11KV/ 250V

DISTRIBUTION TRANSFORMERS

(5 KVA RATING)

Signature of Tenderer

Company's Round Seal

Date

Place

Regd. & Corporate Office : Visnagar Road : Mehsana : 384 001 (North Gujarat)

Phone No: 02762- 222080-81

Fax No: 02762-223574/236254

Website : www.ugvcl.com

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**TECHNICAL SPECIFICATION FOR OUTDOORS TYPE SINGLE PHASE OIL
IMMERSED DISTRIBUTION TRANSFORMER WITH CRGO CORE. / AMORPHOUS
METAL CORE.**

1.0 SCOPE:

This specification covers, engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site of oil immersed, naturally cooled single phase 11KV/ 250V Distribution Transformers for outdoor use.

1.1 It is not the intent to specify completely herein all the details of the design and construction of equipment. However the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the Bidder's guarantee, in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to accept or reject any material or decision which, in his judgment is there or not in accordance therewith from technical point of view. The offered equipment shall be complete with all components necessary for their effective and trouble free operation. Such, components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and / or the commercial order or not.

1.2 Standard Ratings:

The Standard Ratings of 1 phase Transformers shall be 5 KVA.

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2.0 STANDARDS:

2.1 The materials shall conform in all respects to the relevant Indian / International Standard Specification, with latest amendments thereof, some of them are listed below:

Indian Standard	Title	International & Internationally recognized standard.
ISS-2026/(part-I to IV)	Specification for Power Transformer	IEC 76
ISS - 1180 (Part I&II) 1989	Outdoor distribution Transformer up to and including 100 kVA	IEC 76
IS 12444	Specification for Copper wire rod	ASTM B-49
ISS -3347/1967	Specification for porcelain Transformer bushing	DIN 42531,2,3
ISS-335/1983	Specification for Transformer Oil	BS 148/ASTMD 1275 D 1533, IEC Pub 296-1969
ISS 5/1961	Specification for colors for ready mixed paints	
ISS - 2099/1973	Specification for High Voltage Porcelain bushings	IEC 137
ISS - 7421/1974	Specification for Low Voltage bushings	
ISS - 1576	Specification for Insulating Press Board	IEC 641
ISS- 6600/1972	Guide for loading of oil Immersed Transformers	IEC 76
ISS-4257	Dimension for clamping arrangement for bushings (for porcelain and metal parts)	
ISS-3070/1974	Specifications for Lightening Arrestors	IEC 99-I

Material conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above, would also be acceptable. In case the Bidders who wish to offer material conforming to the other standards, salient points of difference between the standards adopted and the specific standards shall be clearly brought out in relevant schedule. Four copies of such standards with authentic English translations shall be furnished along with the offer.

3.0 System details:

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

The transformer shall conform to the following specific parameters.

Sl. No.	Item	Specification
1.	Continuous rated capacity	5 kVA
2.	System voltage (max.)	12 kV (Line to line)
3.	Rated voltage HV	11 KV
4.	Rated voltage LV	250 V
5.	Line current HV	0.454 A
6.	Line current LV	20.0 A
7.	Frequency	50 c/s +/- 5%
8.	No. Of Phases	Single
9.	Connection HV	Single
10.	Connection LV	Individual
10 A	Vector Group	--
11.	Type of cooling	ONAN
12.	Tap changing arrangement	Not applicable
13.	Permissible temperature rise over ambient	
	i) Of top oil measured By thermometer	30 Deg.C
	ii) Of winding Measured by Resistance	35 Deg.C.

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14.	Minimum clearances in air of bushing terminals with connectors fitted. a) HV phase to earth (mm) b) LV phase to phase (mm) c) LV neutral (bushing insulator) To Earth (mm)	As per IS 1180 latest -----140----- ----- 75 ----- -----75-----
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5.0. TECHNICAL REQUIREMENTS:

5.1.1 MATERIAL - CRGO/ AMORPHOUS METAL

a) CRGO Material:

Transformer core shall be shell type or core type wound core construction using new and high quality CRGO steel with heat resistant insulating coating. The core shall be properly stress relieved by annealing, bolted together and to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core losses with continuous working of the transformers. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated in the offer. The bidder shall give notice for inspection with the following documents as applicable as a proof. Towards use of prime core material

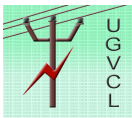
- a) Invoice of supplier
- b) Mills testing certificate
- c) Packing list
- d) Bill of lading
- e) Bill of entry certificate to customs

b) AMORPHOUS METAL:

i) The core shall be high quality Amorphous ribbons having very low loss formed into wound cores of rectangular shape, bolted together to the frames firmly to prevent vibration or noise. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the flux density allowed in the design shall be clearly stated in the offer. Curve showing the properties of the metal shall be attached with the offer.

ii) HV and LV winding shall be wound from super copper DPC. The winding shall be progressively wound in LV-HV coil design for better voltage regulation & mechanical strength. The interlayer insulation shall be of resin bond paper the type of winding shall be indicated in tender

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whether LV winding are of conventional type or foil wound. The core / coil assembly shall be securely held in position to avoid any movement under short circuit conditions.

Alternatively the tenderer can also offer the transformer with copper winding along with design, calculation for losses quoted, quantity of oil, copper, core etc. & guaranteed technical particular.

- iii) The transformers core shall be suitable for over fluxing (due to combined effect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and shall not get saturated. The Bidder shall furnish necessary design data in support of this situation.
- iv) No load current shall not exceed 2% of full load current and will be measured by energizing the transformer at 250 volts, 50 c/s on the secondary. Increase of voltage of 250 volts by 12.5% shall not increase the no load current by Max. 5% of full load current.

Flux density: Flux density should not be more than 1.55 Tesla at the rated voltage and frequency. Transformer core should be designed in such a way that it will not get saturated for any value of V/f (Voltage /frequency) ratio to the extent of 112.5 % of rated value of V/f ratio. Actual core design along with calculation in support of it should be enclosed with the offer. Material to be used for the transformer core shall be made of prime grade (M-4 or better) imported CRGO laminations and not from second grade steel laminations.

5.2 WINDINGS:

HV and LV windings shall be wound from copper conductors covered with DPC/ Enamel. The windings shall be progressively wound in LV-HV coil design for better voltage regulation and mechanical strength. The inter layer insulation shall be of epoxy resin bond paper. The type of winding shall be indicated in the tender whether LV windings are of conventional type or foil wound. The core/coil assembly shall be securely held in position to avoid any movement under short circuit conditions. Flux density of winding shall be such that there is a clear safe margin over the over fluxing limit of 12.5%.

5.2.a Materials: - Super enamel covered copper Conductor or double paper covered copper conductor shall be used for 11 KV class transformers.

5.2.b. Current density for HV and LV shall not be more than 1.65 A/sq.mm. For copper conductor. (However, +5% tolerance for LV winding is permissible)

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5.2.c. Insulation material & clearances:

5.2.c (i).

Materials Electrical grade insulating craft paper of Triveni/Ballarpur/Cauvery or equivalent make subject to approval of

The purchaser shall be used.

Similarly Press Board of Senapaty, Whitelay or Raman make or equivalent subject to the approval of the purchaser shall be used. Perma wood or Haldi wood blocks shall be used for top and bottom yoke insulation.

5.2.c (ii) Radial clearance of LV coil to core (bare conductor) shall not Be less than

SR.NO	KVA RATING OF TRANSFORMER	MINIMUM RADIAL CLEARANCE OF COIL TO CORE for Stack / Conventional core	MINIMUM RADIAL CLEARANCE OF COIL TO CORE for Wound core
1	5	3.5mm	1.5mm

5.2.c (iii) Radial clearance between HV & LV shall not be less than-

SR.NO	KVA RATING OF TRANSFORMER	MINIMUM RADIAL CLEARANCE BETWEEN HV & LV for Stack / Conventional core	MINIMUM RADIAL CLEARANCE BETWEEN HV & LV for Wound Core
1	5	11mm	2.25 mm

5.2.c (iv) The minimum electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the windings) shall be 30 mm for 11 KV for Stack / Conventional core.

And for Wound Core The minimum electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the windings) shall be 20 mm for 11 KV .

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- 5.2. c (v) Minimum end insulation to earth shall be- 11 KV class - 25 mm for Stack / Conventional core
For Wound Core Minimum end insulation to earth shall be 11 KV class - 10 mm

5.2.1 OIL: The insulating oil shall comply with the requirements of relevant standards IS 335 / 1993. Oil shall be filled under vacuum of 250-tor +/- 5 %. Use of re-cycled oil is not permitted.

5.3 INSULATION MATERIAL:

a) Material: Electrical grade insulation Kraft Paper of standard make or better material subject to approval of the purchaser. Pressboards of standard make or better material subject to approval of purchaser.

b) All spacers, axial wedges / runners used in windings shall be made of pre-compressed Pressboard–solid, conforming to type B 3.1 of IEC 641-3-2. In case of crossover coil winding of HV all spacers shall be properly sheared and dovetail punched to ensure proper locking. All axial wedges / runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. Insulation shearing, cutting, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations.

5.4 TANK:

The transformer tank shall be with either round or rectangular.

a) For Rectangular plain tank:

- i. The transformer tank shall be of robust construction rectangular in shape and shall be built up of tested MS sheets.
- ii. The internal clearance of tank shall be such that, it shall facilitate easy lifting of core with coils from the tank without dismantling LV bushings.
- iii. All joints of tank and fittings shall be oil tight and no bulging should occur during service. The tank design shall be such that the core and windings can be lifted freely. The tank plate shall be of such strength that the complete transformers when filled with oil may be lifted bodily by means of lifting lugs. Inside of tank shall be painted with varnish / Hot oil.

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- iv. Manufacturer should carry out all welding operations as per the relevant ASME standards and submit a copy of the welding procedure qualifications and welder performance qualification certificates to the customer.
- v. The four walls of the tank shall be made of Two “L” shaped sheets (without joints) fully welded at the corners from inside and outside of the tank for withstanding a pressure of 0.8 kg/cm² for 10 minutes. Top cover plate shall be slightly slopping approx.10mm towards HV bushing and ends of cover plate shall be bent to 90° down towards so as to avoid entry of water through the cover plate gaskets.
- vi. The tank shall be reinforced by welded angle on all the outside walls on the edge of the tank to form two equal compartments. Permanent deflection when the tank without oil is subject to a vacuum of 525 mm of mercury for rectangular tank and 760 mm of mercury for round tank shall not be more than 5 mm up to 750 mm length and 6 mm up to 1250 mm length. The tank shall further be capable of withstanding a pressure of 0.8 kg/sq.cm (g) and a vacuum of 0.3 kg/sq.cm (g) without any deformation.
- vii. Lifting lugs: 2 Nos. welded heavy duty lifting lugs of MS plate 8 mm thick (min) suitably reinforced by vertical supporting flat welded edgewise below the lug on the side wall.
- viii. Pulling lugs: 2 Nos. of welded heavy duty pulling lugs of MS plate 8 mm thick (min) shall be provided to pull the transformer horizontally.
- ix. Top cover fixing bolts of G.I adequately spaced and 6 mm Neoprene bonded cork gaskets conforming to IS 4253 part-II shall be placed between tank and cover. The bolts outside tank shall have 2 flat washers & one spring washer.
- xi. The tank shall be made of prime quality MS sheet of thickness stated below with necessary stiffener to withstand the pressure built in during the expansion of oil due to temperature rise.

Rating	Minimum thickness of plate in mm	
	For sides	For Top & Bottom
5 KVA	3.15	5.0

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The exterior of the transformer tank and other ferrous fitting shall be thoroughly cleaned, scraped /sand blasted and given a priming coat and two finishing coats of durable oil and weather resistant paint of **dark admiralty gray** conforming to colour code No. 632 of IS-5/2978 with latest amendment.

- xii. Inside of the tank shall be thoroughly cleaned / scrapped/ sand blasted and coated with oil resistant paint or appoxy coat or phenolic/ melamine Varnish coat. These protective coats shall not contaminate the oil due to peeling or decomposition during the life of the transformers.
- xiii. All the screws, bolts and nuts exposed to atmosphere shall be hot dip Galvanized if diameter is 12mm or more. They shall be either electro Galvanized or hot dip galvanized if diameter is less than 12mm. The Screws and clamps for fixing HV bushing shall also be electro-Galvanized.
- xiv. The inside dimension of the tank and shape to be clearly indicated in the drawings. Only positive 5% tolerance will be allowed in actual fabrication of tank, no negative tolerance will be allowed.
- xv. **Heat Dissipation:**

The tendered should submit the calculation sheet of Heat dissipation.

b) For round tank:

- i) The oil volume inside the tank shall be such that even under the extreme operating conditions, the pressure generated inside the tank does not exceed 0.4 kg / sq. cm positive or negative. There must be sufficient space from the core to the top cover to take care of oil expansion.
- ii) The tank cover shall have plasticised surface at the top to guard against bird faults. Alternatively, suitable insulating shrouds shall be provided on the bushing terminals.

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- iii) The transformer tank shall be of robust construction round in shape and shall be built up of tested CRCA/MS sheet.
- iv) The tank shall be capable of withstanding a pressure of 1 kg/cm² (g) and a vacuum of 760mm of Hg for 30 minutes without any permanent deflection (Air pressure test shall conduct as per IS- 1180).
- v) The L- seam joint, C- seam joint and all fittings and accessories shall be oil tight and no deflection / bulging should occur during Service.
- vi) Manufacturer should carry out the all-welding operations as per the relevant ASME standards and submit a copy of the welding procedure qualifications and welder performance qualifications certificates to the purchaser.
- vii) The circular bottom plate edges of the tank should be folded Upward, for at least 25mm, to have sufficient overlap with vertical sidewall of the transformer.
- viii) Tank shall have permanent lugs for lifting the transformer bodily and there shall be facilities for lifting the coil assembly separately.
- ix) The transformer tank and the top cover shall be designed in such a manner as to leave no external pockets in which water can lodged.
- x) The under base of all transformers shall be provided with two 75 x 40 mm base channels with holes to make them suitable for fixing on platform/ Transformer should be provided with pole mounting adjustable brackets for single pole mounting.
- xi) Both mounting clamps are made with minimum 5mm thickness.
- xii) Minimum oil level mark shall be embossed inside the tank.
- xiii) Jump proof lips shall be provided for upper mounting lug.
- xiv) Mounting clamps shall be in one plane.
- xv) The top cover shall be fixed to the tank through clamping only.
- xvi) HV busing pocket shall be embossed to top side of the top cover so As to eliminate ingressing of moisture and water
- xvii) The edges of the top cover shall be formed, so as to cover the top end of the tank and gasket.
- xviii) Nitrile/ neoprene rubber gaskets confirming to latest IS 4253 part-II shall be provided between tank and top cover.

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xix) **Tank Sealing:**

The space on the top of the oil shall be filled with dry air or nitrogen. The nitrogen plus oil volume inside the tank shall be such that even under extreme operating conditions, the pressure generated inside the tank does not exceed 0.4kg/ sq.cm positive or negative. The nitrogen shall conform to commercial grade of the relevant standard.

5.5 SURFACE PREPARATION & PAINTING:

5.5.1. General:

- 5.5.1.1 all paints shall be applied in accordance with the paint Manufacturer's recommendations. Particular attention shall be paid to the following:
- Proper storage to avoid exposure as well as extremes of temperature.
 - Surface preparation prior to painting.
 - Mixing and thinning
 - Application of paints and the recommended limit on time intervals between coats.
 - Shelf life for storage
- 5.5.1.2 All paints, when applied in a normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.
- 5.5.1.3 All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to manufacturer's recommendations. However, where ever airless spray is not possible, conventional spray be used with prior approval of purchaser.
- 5.5.1.4 The Supplier shall, prior to painting protect nameplates, lettering gauges, sight glasses, light fittings and similar such items.

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5.5.2 Cleaning and Surface Preparation

- 5.5.2.1 After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.
- 5.5.2.2 Steel surfaces shall be prepared by Shot blast cleaning or Chemical cleaning by Seven Tank process including Phosphate to the appropriate quality.
- 5.5.2.3 the pressure and volume of the compressed air supply for blast cleaning shall meet the work requirements and shall be sufficiently free from all water contamination to ensure that the cleaning process is not impaired.
- 5.5.2.4 Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale shall only be used where blast cleaning is impractical. Manufacturer to explain such areas in his technical offer clearly.

5.5.3 Protective Coating

- 5.5.3.1 As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anti-corrosion protection.

5.5.4 Paint Material

Followings are the types of paint that may be suitably used for the items to be painted at shop and supply of matching paint to site:

- 5.5.4.1 Heat resistant paint (Hot oil proof) for inside surface.
- 5.5.4.2 For external surfaces one coat of Thermo Setting Powder paint or 1 coats of Zinc chromate primer followed by 2 coats of Synthetic Enamel / Polyurethane base Paint These paints can be either air drying or stoving.
- 5.5.4.3 The color of the finishing coats shall be dark admiral gray conforming to No. 632 of IS-5 of 1961

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5.5.5. Painting Procedure

- 5.5.5.1 All painting shall be carried out in conformity with both Specification and with the paint manufacturer's recommendation. All paints in any one particular system, whether shop or site applied, shall originate from one paint manufacturer.
- 5.5.5.2 Particular attention shall be paid to the manufacturer's instructions on storage, mixing, thinning and pot life. The paint shall only be applied in the manner detailed by the manufacturer e.g. brush, roller, conventional or airless spray and shall be applied under the manufacturer's recommended condition. Minimum and maximum time intervals between coats shall be closely followed.
- 5.5.5.3 All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours, whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is still warm.
- 5.5.5.4 where the quality of film is impaired by excess film thickness (wrinkling, mud cracking or general softness) the Supplier shall remove the unsatisfactory paint coating and apply another. As a general rule, dry film thickness should not exceed the specified minimum dry film thickens by more than 25%. In all instances where two or more coats of the same paint are specified, such coatings may or may not be of contrasting colours.
- 5.5.5.5 Paint applied to items that are not be painted shall be removed at Supplier's expense, leaving the surface clean, unstained and undamaged.

5.5.6 Damaged Paintwork

- 5.5.6.1 Any damage occurring to any part of a painting scheme shall be made good to the same standard of corrosion protection and appearance as that originally employed.
- 5.5.6.2 Any damaged paintwork shall be made good as follows:
 - a) The damaged area, together with an area extending 25 mm around its boundary, shall be cleaned down to bare metal.
 - b) A priming coat shall be immediately applied, followed by a full paint finish equal to that originally applied and extending 50 mm around the perimeter of the original damage.

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- c) The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before and after priming.

5.5.7. Dry Film Thickness

- 5.5.7.1 To the maximum extent practicable the coats shall be applied as a continuous film of uniform thickness and free of pores. Over spray, skips, runs, sags and drips should be avoided. The different coats may or may not be of the same colour.
- 5.5.7.2 Each coat of paint shall be allowed to harden before the next is applied as per manufacturer’s recommendation.
- 5.5.7.3 Particular attention must be paid to full film thickness at edges.
- 5.5.7.4 The requirements for the dry film thickness (DFT) of paint and the materials to be used shall be as given below.

Sr no	Paint Type	Area to be painted	No. of coats	Total Dry film thickness (min.)
1.	Thermo setting paint.	Inside Outside	01 01	20 microns 60 microns
2.	Liquid paint a) Zinc chromate (Primer) b) Synthetic Enamel / Poly Urethane (Finish coat) c) Hot oil paint / Varnish	Outside Outside Inside	01 02 01	30 microns 25 microns each 35 / 10 microns

5.6 **LOSSES:** The bidder should guarantee individual No load loss and load loss without any positive tolerance.

Voltage Ratio	kVA Rating	No load losses in Watts (Max)		Full load losses in Watts (Max) At 75 Deg. c.
		AMT	CRGO	
11KV / 250 V	5	6.0 W	25W	140 W

The bidder should also guarantee the total losses at 50% load condition (50% of

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5.7 PENALTY FOR NON-PERFORMANCE:

5.7.1 During testing, if it is found that the actual measured losses are more than the values quoted by the bidder, the purchaser will have right to exercise one of the following options

- Reject the complete lot
- Penalty shall be recovered from the bidder for the excess losses as under

No load loss - @ Rs 395.00 per watt

Load Loss at 100% load - @79.00 per watt

5.7.2 Transformers with temperature rise and impedance beyond

Guaranteed values:

5.7.2.1. Purchaser reserves the right to reject the available lot of the transformer in any sample of the transformer during the test at supplier's works, if the temperature rise exceeds the guaranteed values.

5.7.2.2 Purchaser reserves the right to reject any transformer during the test

at supplier's works, if the impedance values differ from the Guaranteed values including tolerance.

5.7.2.3 Purchaser also reserves the right to retain the rejected transformer and take it into service until the Bidder replaces it with a new transformer at no extra cost. The delivery as per contract will be counted when the new transformer as per specification is provided by the manufacture.

5.8. Tests

5.8.1 The painted surface shall be tested for paint thickness.

5.8.2 The painted surface shall pass the Cross Hatch Adhesion test, Salt spray test and Hardness test as per the relevant ASTM standards.

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NOTE: Supplier shall guarantee the painting performance requirement for a period of not less than 5 years.

5.9. BUSHINGS:

5.9.1 For 11 KV Transformers - 12 KV class bushings shall be used and further for LV side, viz 250 volts, 1.1KV terminal bushing shall be used. Bushing of the same voltage class shall be interchangeable bushing with plain shed as per IS 3347. H.V.Bushings shall be mounted on top plate only.

The HV bushings shall have to be installed on turret, flange and gaskets to prevent eventual entry of water.
The turret height should be minimum 30mm.

Bushings of following makes having type tested as per IS 3347 and approved By the GUVNL/UGVCL shall only be used & are acceptable.

H.V. BUSHINGS: 1) JAYASHREE

- 2) BEPCO.
- 3) W.S. INSULATORS
- 4) ASSOCIATED PORCELAIN
- 5) JAIPUR GLASS
- 6) SESHASAYEE
- 7) LUSTER CERAMICS
- 8) AGRAWAL SALT CO., BIKANER.
- 9) B.P.P.L., BIKANER.
- 10) VENKATESHWARA CERAMICS P.LTD.
- 11) CJI PORCELAIN INDIA LTD.
- 12) MAXWELL CERAMIC, WADHWAN
- 13) Ravikiran
- 14) VISHAL MALLEABLE LTD.,

Signature of Tenderer

Company's Round Seal

Date

Place

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

- L.V. BUSHINGS: 1) J.S.I. (RISHRA)
2) LUSTER CERAMICS
3) JAIPUR GLASS
4) AGRAWAL SALT CO., BIKANER.
5) B.P.P.L., BIKANER.
6) VENKATESHWARACERAMICS PVT.LTD,
7) CJI Porcelain
8) MAXWELL CERAMIC, WADHWAN.
9) Ravikiran
10) VISHAL MALLEABLE LTD.,

Note: Embossing on bushing showing the Manufacturer's name shall be clearly visible, even after fixing the same on Transformer.

5.9.2 The bi-metallic connectors shall have to be fitted on HV/LV terminals having capacity of double the size of rated HV/LV current of transformer.

5.9.3 Internal connection:

- a) HV winding:
i) In case of HV winding all jumpers from winding to bushing shall have cross section larger than winding conductor.
ii) Inter coil connection shall be done by brazing.
b) LV Winding:
LV winding shall be connected to the flat by brazing.

Firm connection of LV winding to bushing shall be made of adequate size of "L" shape flat. Connection of LV coil Brazing shall make lead to "L" shape flat. The "L"Shape flat shall be of copper clamped to LV bushing metal part by using nut, locknut and washer.

5.10. Tank Base Channel:

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

Two numbers of channels of size 75 x 40 mm are to be provided for 5 KVA Transformer.

5.11. Rating and Terminal plates

There shall be a rating plate on transformer containing the information given in the relevant IS. The HV winding terminals shall be marked 1U and 1V for 11 KV HV winding. The corresponding secondary terminal shall be marked as 2u and 2n. As per GUVNL/UGVCL's Standard practice S.S. Material plate shall be thickness 0.9 mm (with) +/- 1 mm tolerance made under through welding or riveting with following details

5.12 FITTINGS:

The following standard fittings shall be provided.

a)	Two Earthing terminals
b)	Two Lifting lugs
c)	HT side neutral earthing strip.
d)	Rating and terminal marking plates.
e)	Pressure release device
f)	HV fuse links
g)	Signal light.
h)	HV bushings.
i)	LV bushings
j)	HV and LV terminal connector.
k)	Top cover fixing clamps
l)	Mounting lugs- 2 Nos
m)	Bird guard.
n)	LV earthing arrangement.
o)	Any other fitting necessary for satisfactory performance of the manufacture.

5.13 FASTENERS:

All bolts, studs, screw threads, pipe threads, bolt heads and nuts shall comply with the appropriate Indian Standards for metric threads, or the technical equivalent. Bolts or studs shall not be less than 6 mm in diameter except when used for small wiring terminals.

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

All nuts and pins shall be adequately locked.

Wherever possible bolts shall be fitted in such a manner that in the event of failure of locking resulting in the nuts working loose and falling off, the bolt will remain in position.

All ferrous bolts, nuts and washers placed in outdoor positions shall be treated to prevent corrosion, by hot dip galvanizing, except high tensile steel bolts and spring washers which shall be electro-galvanized/ plated. Appropriate precautions shall be taken to prevent electrolytic action between dissimilar metals.

Each bolt or stud shall project at least one thread but not more than three threads through the nut, except when otherwise approved for terminal board studs or relay stems. If bolts nuts are placed so that they are inaccessible by means of ordinary spanners, special spanners shall be provided.

The length of the screwed portion of the bolts shall be such that no screw thread may form part of a shear plane between members.

Taper washers shall be provided where necessary. Protective washers of suitable material shall be provided front and back of the securing screws.

5.14. MOUNTING ARRANGEMENT:

The under base of all transformers shall be provided with two 75 x 40 mm base channels with holes to make them suitable for fixing on platform/ Transformer should be provided with pole mounting adjustable brackets for single pole mounting.

5.15. OVERLOAD CAPACITY

The transformers shall be suitable for loading as per latest IS: 6600 / 1972

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

5.16 LV ENCLOSURE :

1. The transformer shall have external mounted LT circuit breaker on the secondary side. The breaker shall be housed in an enclosure confirming to IP44 as per IS: 13947 forming integral part of the transformer. Suitable louvers fitted with wire gauze shall be provided to ensure circulation of air but not to allow ingress of rain water. An operating handle shall be provided outside the enclosure in such a way that ON & OFF operation of the breaker can be conveniently performed from the ground level by means of an operating rod. The ON & OFF position of the handle shall be clearly and bodily mark on the enclosure. This arrangement of ON & OFF Operation can be changed as per purchaser's requirement.

2. LT cable shall be connected to the outgoing terminals of MCCB. Detachable gland plate and provision for glands to be provided at the bottom of the enclosure.

3. The circuit breaker shall generally confirm to the requirement of IS : 13947. The electrical characteristics of the breaker shall be mentioned by bidder as follows.

Transformer rating (KVA)	Full load current of the transformer (Amp)	Rated thermal current of C.B. (Amp)	Current setting (Amp)	Minimum short circuit breaking current (KA)
05				
10				
16				

The circuit breaker shall confirmed to IS : 13947 part-II and short circuit test shall be carried out at a power factor not exceeding 0.4 (lagging).

4. The following makes of MCCB shall be acceptable.
- (1) Siemens
 - (2) L & T
 - (3) ABB
 - (4) GE POWER
 - (5) Shnider

Signature of Tenderer	Company's Round Seal	Date	Place



Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

- (6) Crompton Greaves
- (7) Heavells

and bidder shall have to mentions the make of MCCB to be provided with the offer. The bidder shall also submit the type test certificate.

5. The circuit breaker shall have the following time / current characteristics and test will be made with all the 3 Ph. Loaded. The reference calibration temperature of the breaker shall be 50 degree centigrade.

Multiple of normal current setting	Tripping time
1.05	More than 2.5 HRS.
1.1	Less than 2.5 HRS
1.15	More than 1 Hr. & less than 2 Hrs.
1.2	More than 0.5 Hrs. & less than 1 Hr.
1.3	Less than 20 minutes
1.4	Less than 10 minutes
2.5	Less than 1 minute
6.0	Less than 5 seconds
8.0	Less than 40 milli seconds
12.0	Instantaneous (less than 20 milli Sconds)

6. The LT circuit breaker and the associated terminals / wiring shall be designed with reference to ambient temperature of 55 ° C instead of 40 ° C due to operation in metallic enclosure installed outdoors. The permissible temperature rise limits stipulated in IS : 13947 shall be reduced accordingly and the supplier shall furnish necessary data to show that all the components are suitable for the expected temperature rise over and above the ambient temperature 55 ° C under various loading conditions. The bidder shall furnish all the type and routine test certificate of the circuit breakers in accordance with IS : 13947 pt. 2. The bidder shall also submit the drawing showing arrangement of LV Enclosure and the LT circuit breaker along with offer. The offer without type test certificate and routine test certificate and drawing may be considered invalid.

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

5.15.1 The inspection of proto type transformer.

The Manufacturer shall have to offer one no of transformer for prototype test along with relevant drawing as stated in tender specification clause, for approval of UGVCL before offering first lot.

The proto type shall be subjected to following test.

- 1) Verification of CRGO material documents and quality.
- 2) Verification of internal parameters with respect to drawing and GTP.
- 3) All Routine tests/ acceptance tests as per clause 6.1 & 6.4
- 4) Temperature rise test as per clause no.6.2 (1)
- 5) Verification of Air pressure test certificate from manufacturer of tank.

The manufacturer has to submit the following details along with offer of prototype transformers

- i) G.A. Drawing.
- ii) Internal Construction Drawing.
- iii) Name plate drawing
- iv) Technical detail sheet
- v) HT/LV Bi metallic connectors.
- vi) Drain cum sampling Valve Drawing.
- vii) Core details drawing
- viii) Short circuit capacity calculation sheet
- ix) Cooling capacity calculation
- x) Technical details as per UGVCL 's Prescribed Performa for design & Constructional details

The above drawings are illustrative. However, the bidder may submit their own drawing if they so desires. However, offer without drawings shall not be considered Also each pages of technical bid & price bid shall be provided with seal of manufacturer & duly signed.

5.15.2 GUARANTEE FOR THE TRANSFORMERS;

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

- 1) Guarantee period of tendered item shall be 60 months from the date of installation or 66 months from the date of receipt by purchaser whichever is earlier. If any transformer fails during this guarantee period, the supplier shall repair the same at his cost at his works.
- 2) The supplier situated outside Gujarat State shall have to establish suitable and adequate arrangement for repairing and testing of failed transformer in Gujarat State at his cost. This arrangement shall have to be continued up to the completion date of guarantee period of supply of last lot.
- 3) After intimation of failure of transformer failed within guarantee period, UGVCL will arrange for the dispatch of guarantee period failed transformer to firm's works at the cost of UGVCL. On receipt of guarantee period failed transformer at firm's works, the external inspection will be carried out by the representative of UGVCL not below the rank of Junior Engineer. The cost of any outer component damage not because of supplier's fault and required to be provided will be reimbursed to the supplier as per the approved rate of UGVCL on the strength of joint external inspection report. No. internal inspection of failed unit is to be carried out in presence of representative of UGVCL. However, the supplier may prepare an internal inspection report of failed unit for his study and analysis. If required, such analysis shall be furnished to UGVCL

After joint inspection, the failed transformer shall be repaired within one month and the repaired unit duly tested shall be dispatched by supplier at his cost to the concerned consignee from where the failed unit was received along with the test report. If the transformer is not repaired and delivered back or dispatched without complete test report within this period, than the cost of GP failed transformer shall be recovered from the supplier's pending / ensuing bill against the order or any other of order. In case, the supplier does not have further order, the cost of GP failed transformers shall be recovered from the Bank Guarantee furnished. Testing of transformer will be done in presence of Board's Engineer to ensure no change in losses as per GTP after repair. Transformer found with higher losses than GTP will not be accepted and cost thereof will be recovered.

6.0. TESTS:

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

a) All the equipment offered should be fully the bidder test type or his collaborator as per the relevant standards including the additional type tests mentioned at clause 6.2. The type test must have been conducted on a transformer of same design. The Bidder shall furnish four sets of type test reports along with the offer. Offers without type test reports will be treated as Non-responsive.

MOST IMPORTANT

All the necessary Type tests will have to be carried out before submission of the tender and to be submitted along with the Technical Bid. The Type Tests which are more than 05 (Five) years old will not be considered and such tenders will be rejected. All the required type tests should not be older than 5 (five) years from the due date of tender.

b) Special tests other than type and routine tests, as agreed between purchaser and Bidder shall also be carried out as per the relevant standards.

c) The requirements of site tests are also given in this clause.

d) The test certificates for all routine and type tests for the transformers and also for the bushings and transformer oil shall be submitted with the bid.

The successful bidder may submit the type test report of Temperature Rise Test within commencement period only on receipt of LOI. If successful bidder fails to submit the Temperature rise Test report within commencement period only on receipt of LOI. GUVNL / Purchaser / order placement authority / LOI placement authority may initiate penal action against such successful bidder.

6.1. ROUTINE TESTS:

1. Ratio, polarity tests.
2. No Load current and losses at service voltage and formal frequency
3. Load losses at rated current and normal frequency
4. Impedance Voltage test
5. Resistance of windings at cold (at or near the test bed temp.)
6. Insulation resistance

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

7. Induced over voltage withstand test.
8. Separate source voltage withstand test.
9. Oil samples (one sample per lot) to comply with IS 1866.
10. The acceptance test as per relevant IS shall be carried out on Ckt.Breaker

6.2 TYPE TESTS TO BE CONDUCTED ON ONE UNIT:

In addition to the Tests mentioned in para 6.1 following Tests shall be conducted.

1. Temperature rise test for determining the maximum temperature rise after continuous full load run. The ambient temperature and time of test should be stated in the test certificate.
2. Impulse voltage test: As per Clause No. 13 (With chopped wave) of IS - 2026 part-III Latest version. BIL for 11 kV shall be 95 kV Peak instead of 75 kV
3. Air Pressure Test: As per C1.24.5.1 of IS - 1180 / part-II/1989
4. Short Circuit withstand test: Thermal and dynamic ability.
5. Oil sample Test (Post short circuit &Temp rise test.)
6. Noise-level measurement
7. Permissible flux density &over fluxing withstand test.
8. Measurement of Harmonics of no-load current
9. Pressure relief device test (if provided)

For Rectangular Tank:

Transformer tank shall be subjected to specified vacuum. The tank designed for vacuum shall be tested at an internal pressure of 0.35 kg. Per sq.cm. Absolute (250 mm of Hg) for one hour.

Type test certificates for the tests carried out on prototype of same specifications shall be submitted along with the bid.
The purchaser may select the transformer for type tests randomly.

Signature of Tenderer

Company's Round Seal

Date

Place



Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

6.3. TESTS AT SITE:

The purchaser reserves the right to conduct all tests on Transformer after arrival at site and the manufacturer shall guarantee test certificate figures under actual service conditions.

In order to ensure quality the acceptance test shall be carried out even after installation of transformer within grantee period. If acceptance test standards are not met during such field test, 5% penalty may be imposed on all transformers supplied as per that proto type design.

6.4. ACCEPTANCE TESTS:

The transformers shall be subjected to the following routine/ acceptance test in presence of purchaser's representative at the place of manufacture before dispatch without any extra charges. The testing shall be carried out in accordance with IS: 1180 and IS: 2026.

1. Checking of weights, dimensions, fitting and accessories, tank sheet thickness, oil quality, material, finish and workmanship as per GTP / QA Plan and contract drawings.
2. Physical verification of core coil assembly and measurement of flux density of one unit of each rating, in every inspection with reference to short circuit test report
3. All tests as specified in clause 6.1
4. Temp.Rise Test will be carried out at Supplier's works & at his cost on any Transformer in the following slab.
 - (a) up to 100 nos.- 1 nos.
 - (b) Further each lot of 100 nos. of Transformer offered- 1 no.
5. **Acceptance test for MCCB.**

As per relevant IS Acceptance test on random sample shall be carried out.

 - a. Overall Dimensional checking
 - b. H.V. Test at 3 KV for one minute
 - c. Insulation resistance test

6.5 TOLERANCES:

Unless otherwise specified herein the test value of the transformers supplied would be within the tolerance permitted in the relevant standards. No positive tolerance is allowed on guaranteed No Load and Load losses.

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

7.0. INSPECTION:

All tests and inspection shall be made at the place of manufacturer and unless other wise especially agreed upon the manufacturer and the purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge to satisfy him that the material is being furnished in accordance with specification.

The manufacturer shall provide all services to establish and maintain quality of workman ship in his works and that of his sub-contractors to ensure the mechanical / electrical performance of components, compliance with drawings, identification and acceptability of all materials, parts and equipment as per latest quality standards of ISO 9000.

Along with the bid the manufacturer shall prepare Quality Assurance Plan identifying the various stages of manufacture, quality checks performed at each stage and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of purchaser or his representative before proceeding with manufacturing. However, purchaser or his representative shall have the right to review the inspection reports, quality checks and results of manufacturer's in house inspection department which are not customer hold points and the manufacturer shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection etc. Manufacturer should submit the list of equipment for testing along with latest calibration certificates to the purchaser.

Purchaser shall have every right to appoint a third party inspection to carryout the inspection process. The purchaser has the right to have the test carried out at his own cost by an independent agency wherever the dispute regarding the quality of supply. Purchaser has right to test 1% of the supply selected either from the stores or field to check the quality of the product. In case of any deviation purchaser have every right to reject the entire lot or penalize the manufacturer, which may leads to blacklisting among other things.

8.0. QUALITY ASSURANCE PLAN:

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

- 8.1. The Bidder shall invariably furnish following information along with his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of equipment offered.
- i.) Statement giving list of important raw materials, names of sub-Suppliers for the raw materials, list of standards according to which the raw materials are tested. List of tests normally carried out on raw materials in the presence of Bidder's representative, copies of test certificates.
 - ii.) Information and copies of test certificates as in (I) above in respect Of bought out accessories.
 - iii.) List of manufacturing facilities available.
 - iv.) Level of automation achieved and lists of areas where manual processing exists.
 - v.) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspection.
 - vi.) List of testing equipment available with the bidder for final testing of equipment along with valid calibration reports shall be furnished with the bid. Manufacturer shall possess 0.1 class instruments for measurement of losses.
 - vii.) Quality Assurance Plan (QAP) with hold points for purchasers inspection as per Annexure.
- 8.2 The successful Bidder shall within 30 days of placement of order submit following information to the purchaser.
- i.) List of raw materials as well as bought out accessories and the names of sub-suppliers selected from those furnished along with offer.
 - ii.) Type test certificates of the raw materials and bought out accessories.
- 8.3 The successful Bidder shall submit the routine test certificates of bought out accessories and central excise passes for raw material at the time of routine testing.
- 9.0. DOCUMENTATION:
- a) Completely dimensioned drawings indicating general arrangement and details of fittings, clearances and winding details shall accompany the tender.
 - b) Drawings of internal constructional details, fixing details of coils should also be indicated. Tank dimensions, position of fittings, clearances

Signature of Tenderer	Company's Round Seal	Date	Place
-----------------------	----------------------	------	-------



Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

between leads within the transformer, core grade of laminations, distance of core centers, area of conductor bare and with insulation. No. Of coils, No. of turns per coil material of bushing metal parts etc., shall also be furnished with tender.

10.0 PACKING & FORWARDING:

10.1 The packing shall be done as per the manufacturer's standard practice. However, it should be ensured that the packing is such that, the material would not get damaged during transit by Rail / Road / Sea.

10.2 The making on each package shall be as per the relevant IS.

11.0 MANADATORY SPARES:

Mandatory spares shall be supplied as per the purchaser's requirement.

12.0 CHALLENGE TESTING:

The other manufacturer can also request challenge testing for any test based on specification and losses. The challenger would request for testing with testing fee. The challenge test fees are proposed at least three times the cost of testing. This is likely to deter un-necessary challenges. The challenger would have the opportunity to select the sample from the store and any such challenge should be made within the guaranty period. The party challenged, challenger and the utility could witness the challenged testing.

The challenged testing would cover the

- 1) Measurement of magnetizing current.
- 2) No load losses test.
- 3) Load losses test (at 50% loading or as per acceptance test).
- 4) Temperature rise test.

The challenge test could be conducted at NABL accredited laboratory, like ERDA and CPRI Bhopal. If the values are within limit the product gets confirmed else not confirmed. No positive tolerance in losses be permitted. If the product is not confirmed the manufacturer would pay the challenge fee and challenger would get the fee refunded. However as a redressal system the challenger would be allowed to ask for fresh testing of two more samples from the store and the same be tested in NABL laboratory in presence of party challenged, challenger and the

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Company's Round Seal

Date

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

utility. If any one or both sample does not confirm the test then the product is said to have failed the test. In such cases the manufacturer will be declared as un-successful manufacturer for the said product with wide publicity and would not be allowed to compete in tenders of the Board for the period of three years and heavy penalty would be imposed.

13.0. Drawings:

One copy of the dimensional drawing and internal construction drawing of each rrating transformer shall be submitted with the tender. These drawings shall be of A-3 (420 x 297 mm) size only. Guaranteed and other technical particulars of the transformers as per the A/T shall also be submitted in A-4 size for our approval. In the Performa attached with tender only.

14.0 GTP-. Guaranteed and other particulars for transformers.

To be filled in and submitted by the tenderer in the Performa attached with the tender.

15.0. Schedule:

15.1 The tenderer shall fill in the following Schedules which from part of the tender specification and offer. In schedule 'A' the specific values shall be furnished and only quoting of IS reference is not sufficient. If the schedule is not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule 'A'	Guaranteed Technical Particulars (Annexure- I, II & III).
Schedule 'B'	Schedule of Deviations from Specification.
Schedule 'C'	Schedule of Tenderer's Experience.
Schedule 'D'	Schedule of Deviation from specified standards.
Schedule 'E'	Schedule of Deviations from specified Test requirements.
Schedule 'F'	Schedule of Deviations from specified Test requirements For MCCB.

15.2. All deviations from the specifications shall be brought out in the schedules of deviation (Schedules 'B', 'D' 'E' & 'F'). The discrepancies between the specification and the catalogues, literatures and indicative drawings which are subject to change, submitted as part of the offer, shall not be considered and representation in this regard will not be

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

entertained. If it is observed that there are deviations in the offer in G.T.P. of elsewhere other than those specified in the deviation schedule 'B' then such deviations should be treated as deviations.

15.3. For any deviation from the specification, which is not specifically brought out in the schedule of deviations, the offer may be liable for rejection. The deviation brought out in the schedule shall be supported by authentic documents, standards and clarifications; otherwise the offer may be liable for rejection.

15.4. The tenderer shall submit the list of orders for similar type of equipments, executed or under execution during the last three years, with full details in the schedule of Tender's experience (Schedule 'C') to enable the purchaser to evaluate the tender.

16 Tender Drawings to be enclosed:

- i) G.A. Drawing.
- ii) Internal Construction Drawing.
- iii) Name plate drawing
- iv) Technical Details Sheet.
- v) HT/LV Bimetallic connectors.
- vi) Drain cum sampling Valve Drawing.
- vii) Drawing for month & year to be written on body.
- viii) Core details drawing
- ix) Short circuit capacity calculation sheet
- x) Cooling capacity calculation
- xi) LV Enclosure with MCCB with wiring drawing

The tenderer may submit their own drawing for approval. The bidder shall submit above details along with offer as well as before offering the prototype transformer for testing.

16.A AUDIT INSPECTION:

After inspection of ordered transformer by the User Department Inspector, field engineer may pick up samples from the lots supplied at RSOs/Power Stations Stores/ or other stores of the Board or from the works of party, for quality check at random. The samples picked up will be tested for Acceptance Test / Type Tests or the tests as decided by Company, at Government approved laboratory, in presence of representatives of supplier and MGVCL, as per relevant ISS/BIS/GEB Specification and GTP, as under:

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

- (i) One number of each rating of transformer shall be picked up at random by field engineer from RSO's / Power Station Stores and will be tested for Acceptance Tests & Temperature Rise Test.
- (ii) One number of each rating of transformer sealed at party's works by field engineer will be tested for (a) Impulse Test (b) Short Circuit Test (c) other Type Tests(if decided by the Board).

As regard bearing test charges,

- (i) For transformers picked up for testing from RSOs/Power Station Stores, MGVCCL will bear total expenses. However, for witnessing the tests, successful tenderer shall have to bear their own expenses.
- (ii) For transformers sealed at party's works for Type Tests, if sample passes in all tests, MGVCCL will bear only testing charges.

However, if sample fails in any of the tests, cost of testing charges including transportation, loading unloading etc. will have to be paid by supplier. Alternatively, it will be recovered from supplier's bills.

In case, if the materials do not conform to specifications or fails at Government approved laboratory or other laboratory decided by the Board for testing and if subsequent testings are to be carried out (which will solely at company's discretion), all Testing fees, expenses of the inspector & other expenses incurred by the company will be to successful tenderer's account. For acceptance as above, the decision of the company shall be final & will be binding to successful tenderer.

The test results will be binding on the suppliers. Company in general will not allow re-sampling. If the material fails in any of the acceptance tests carried out (except for no load and load losses), the materials supplied till date will be considered as rejected and if replacement is not possible due to consumption of the materials Company will deduct penalty @ **1%** of the end cost prices of all transformers supplied till date of receipt of failure report. If the same are not utilized / consumed, Company at sole discretion may ask for

Signature of Tenderer

Company's Round Seal

Date

Place

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

replacement or may accept the material with penalty as above. For failure in No Load and or Load Losses, transformers supplied till date of receipt of failure report shall be rejected or penalty @ Rs.395.00 per watt for No Load Losses and penalty @ Rs.79.00 per watt for Load Losses for the transformers supplied till date of receipt of failure report shall be charged. The decision of the Company will be binding on the successful tenderer.

In the event of transformer failing during any of the type tests (temperature rise test is part of type test), following recovery shall be made.

Recovery, equivalent to **1%** of end cost of particular rating transformers supplied against the order till receipt of test reports.

Further in case, any transformer taken for type testing, fails either in short circuit test or impulse test or temp. rise test, or other type tests (if decided by the Company), supplier will be allowed for modification in their design and other technical parameters. In that case, supplier will have to obtain prior approval from MGVCCL for such proposed changes / modifications desired to be effected, by submitting revised drawings and other technical details, clearly indicating the changes proposed to be made, compared to previous design.

In case, if transformers shall fail in testing and same are rejected or accepted with penalty, Company shall pick up another transformer for Acceptance Tests / Type Tests (as the case may be) of same rating from replaced and or subsequently supplied lots for testing to have verification of the quality of other transformers supplied.

In case of any dispute for testing, the Company's decision will be final and binding to the supplier. If supplier will not agree to accept the Company's decision, the order for balance quantity will be cancelled without any clarification and material will be purchased by the Company at risk and cost of the supplier.

The minimum lot to be offered for inspection shall be as under:

- i) Atleast 33% of each rating or as mentioned in delivery schedule of the order, whichever is less, for the ordered quantity up to 100 Nos.
- ii) Minimum 50 Nos. of each rating or as mentioned in delivery schedule of the order, whichever is less, for the ordered quantity above 100 Nos.

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**Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans**

17. The Tender shall offer either conventional core type of Transformer or Wound core type of Transformer. Tender shall not offer or quote the rate for both type of Transformer at a time with this Tender.

SEAL & SIGNATURE OF THE TENDERER

SCHEDULE -A

ANNEXURE-I

GUARANTEED TECHNICAL PARTICULARS FOR COMPLETELY SELF PROTECTED DISTRIBUTION TRANSFORMERS:**(To be furnished by the Manufacturer)**

Sr. No.	Description	5 KVA
1	Name of the manufacturer and place of manufacturer	
2	Continuous max. Rating as per this specification.	
3	Normal ratio of transformer	11KV/ 250V
4	Method of Connection HV/LV	
5	Max. Current density in Windings. a) Higher voltage Amps/sq.mm b) Lower voltage Amps/sq.mm	
6	Max. Hot Spot Temp. Deg.C. (Ambient air temp. on which above is based) Deg.C.	
7	a) Max. Observable Oil temp. Deg.C. (ambient air temp. on which above is based) Deg.C. b) Max. Winding Temperature at an ambient temp.	
8	No Load losses at Rated voltage (watts)	
9	Full Load losses at 75° C (watts)	
10	Total Losses at 50% load (watts)	
11	Total Losses at 50% load (watts)	
12	Efficiency at normal voltage	
	(i) Unity Power Factor	
	a) At 50% Load	
	b) At 75% Load	
	c) At full Load	
	(ii) 0.8 Power Factor	
	a) At 50% Load	
	b) At 75% Load	

Signature of Tenderer

Company's Round Seal

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	c) At full Load	
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Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

Sr. No.	Description	5 KVA
13	Regulation as percentage of normal voltage	
	a) At unity power factor %	
	b) At 0.8 power factor lagging %	
14	% Impedance voltage at normal ratio between HV & LV winding	
15	Type of transformers, shell type / core type wound core	
16	Type of Insulation used in	
	a) HV Winding	
	b) LV Winding	
17	Type of Insulation used in	
	a) Core bolts	
	b) Core bolt washers	
	c) End plates	
	d) Core lamination	
18	Impulse test voltage level HV Windings LV Windings	
19	Characteristics of transformer oil	
20	Total content of oil in liters	
21	Whether transformer will be transported with oil?	
22	Type of transformer tank	
23	i) Approx. overall dimensions	
	a) Height mm	
	b) Breadth mm	
	c) Width mm	
	ii) Tank Dimention	
	a) Diameter mm	
	b) Height mm	
24	Weight of Insulated Conductor	
	a) HV (Min.) Kg.	
	b) LV (Min.) Kg.	

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

Sr. No.	Description	5 KVA
25	Weight of Core (Min.) Kg. (CRGO)	
26	Weight of complete transformer arranged for transport. Kg.	
27	Resistance at rated current & Frequency (a) H.V. (B) L.V.	
28	Details of CB	
	a)Make of MCCB	
	b)Type of MCCB	
	c)Rated thermal current of C.B. (Amp)	
	d)Current setting (Amp)	
	e)Minimum short circuit breaking current (KA)	
	f)The circuit breaker shall generally conform to the requirement of IS : 13947	

NOTE: The following shall be specifically confirmed

1. Whether the offer conforms to the limits of impedance mentioned in the specification
2. Whether the offer conforms to the limits of temperature rise mentioned in the specification
3. Whether the losses of the transformers offered are within the limits specified
4. Whether the transformer offered is already type tested for the design and test reports enclosed.

SEAL & SIGNATURE OF THE TENDERER

Signature of Tenderer	Company's Round Seal	Date	Place
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**Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans****SCHEDULE -A****ANNEXURE-II****ADDITIONAL DETAILS**

Sl.No.	Description	Offered by Bidder
1.	Core Grade	
2.	Core diameter	mm
3.	Gross Core area	cm
4.	Net Core area	cm
5.	Flux density	Tesla
6.	Wt. of Core	kg.
7.	Loss per kg. of Core at the specified Flux density	
8.	Core window height	Watts
9.	Center to center distance of the core	mm
10.	No. of L.V. Turns	mm
11.	No. of H V turns	
12.	Size of LV Conductor bare/ covered	mm
13.	Size of HV conductor bare/covered	mm
14.	No. of parallels	
15.	Current density of LV winding	amps/sq.mm.
16.	Current density of HV winding	amps/sq.mm
17.	Wt. of the LV winding for Transformer	Kg.
18.	Wt. of the HV winding for Transformer	Kg.
19.	No. of LV Coils/phase	
20.	No. of HV coils / phase	
21.	Height of LV Windings	mm
22.	Height of HV winding	mm
23.	ID/OD of LV winding	mm
24.	ID/OD of LV winding	mm
25.	Size of the duct in LV winding	mm
26.	Size of the duct in HV winding	mm
27.	Size of the duct between HV & LV	mm
28.	HV winding to LV winding clearance	mm
29.	HV winding to tank clearance	mm
30.	Calculated impedance	%
31.	HV to earth creep age distance	mm
32.	LV to earth creep age distance	mm

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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

SCHEDULE - A

ANNEXURE-III

SOURCE OF MATERIALS/PLACES OF MANUFACTURE, TESTING AND INSPECTION

Sl.No	Item	Offered by bidder		
		Source of Material	Place of Manufacture	Place of testing and inspection
1.	Laminations			
2.	Copper Conductor			
3.	Insulated winding wires			
4.	Oil			
5.	Press Boards			
6.	Kraft Paper			
7.	MS Plates / Angles / Channels			
8.	Gaskets			
9.	Bushing HV / LV			
10.	Paints			
11.	Lightening Arrestor			
12.	LT over current relay/ MCB.			

SEAL & SIGNATURE OF THE TENDERER

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

SCHEDULE-B

DEVIATIONS FROM SPECIFICATION

SR.NO.	CLAUSE NO.	DETAILS OF DEVIATION

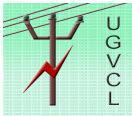
NAME OF FIRM-----

NAME & SIGNATURE
OF TENDERER -----

DESIGNATION -----

Signature of Tenderer	Company's Round Seal	Date	Place
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SCHEDULE - C

SCHEDULE OF TENDERER'S EXPERIENCE

Sr. No	Name of Client & Description	Value of order along with capacity of transformer	Period of supply and commissioning	Name & address to whom reference may be made
1	2	3	4	5

NAME OF FIRM-----

NAME & SIGNATURE
OF TENDERER -----

DESIGNATION -----

DATE -----

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

SCHEDULE - D

SCHEDULE OF DEVIATION FROM SPECIFIED STANDARDS

Sr. No.	Particulars	Stipulation of Specified standards		Stipulation of Specified standards adopted by tenderer		Remarks
		Standard Reference	Stipulations	Standard Reference	Stipulations	

NAME OF FIRM-----

NAME & SIGNATURE
OF TENDERER -----

DESIGNATION -----

DATE -----

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

SCHEDULE - E

DEVIATION FROM SPECIFIED TEST REQUIREMENTS SPECIFIED IN RELEVANT AND PRESENT SPECIFICATIONS.

Sr. No.	Name of Test	Standard No. and clause no	Requirement of standards	Proposed deviation	Reason for deviation
1	TYPE TEST				
2	ADDITIONAL TEST				
3	ACCEPTANCE TEST				
4	ROUTINE TEST				

NAME OF FIRM-----

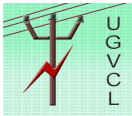
NAME & SIGNATURE
OF TENDERER -----

DESIGNATION -----

DATE -----

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

SCHEDULE - F

DEVIATION FROM SPECIFIED TEST REQUIREMENTS SPECIFIED IN RELEVANT AND PRESENT SPECIFICATIONS FOR MCCB.

Sr. No.	Name of Test	Standard No. and clause no	Requirement of standards	Proposed deviation	Reason for deviation
1	TYPE TEST				
2	ADDITIONAL TEST				
3	ACCEPTANCE TEST				
4	ROUTINE TEST				

NAME OF FIRM-----

NAME & SIGNATURE
OF TENDERER -----

DESIGNATION -----

DATE -----

Signature of Tenderer	Company's Round Seal	Date	Place
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Tender No:-UGVCL/SP/CPC/284/5-10-16-25-63-100-200KVA Amorphous Trans

1. Minor: The characteristics of a component, process or operation whose failure neither materially reduce the usability of the product in operation, nor does it affect the aesthetic aspects.
2. Major: The characteristics of a component, process, or operation whose failure may cause operation failure which cannot be readily corrected, at site cause substandard performance, increase erection and maintenance cost, reduce life or seriously affect aesthetics.
3. Critical: The characteristic of a component, process, or operation failure of which will surely cause operating failure or intermittent troubles which is difficult to rectify at site or render the unit unfit for use or safety hazards.
4. “Failure” of a characteristic means failure to meet the ‘accepted norms’
5. Sampling: Generally sampling will be done in accordance with IS: 2500. Sampling will be as under:-

If 100% “Witness” of tests is carried out by Prime supplier, Customer will witness on sample basis or if 100% “Witness” of tests is carried out by Sub Vendor, Manufacturer will witness on sample basis.

Signature of Tenderer

Company’s Round Seal

Date

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