NTPC LIMITED

SINGRAULI SUPER THERMAL POWER PROJECT
STAGE-III (2X800 MW)

TECHNICAL SPECIFICATION
FOR
OIL FILLED TRANSFORMERS

SPECIFICATION No. **PE-TS-512-302-E001A**
ISSUE NO. 01
REV NO. 0

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

	TECHNICAL SPECIFICATION OIL FILLED TRANSFORMER SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)	PE-TS-512-302-E001A Issue No: 01 Rev. No. 00 Date : 28-08-2025

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PROJECT INFORMATION

SL.NO	DESCRIPTION	DETAILS
1	**METEOROLOGICAL DATA**	
1.1	MAXIMUM TEMPERATURE	45.1°C
1.2	MINIMUM TEMPERATURE	4.0°C
1.3	MAXIMUM RELATIVE HUMIDITY	66
1.4	MINIMUM RELATIVE HUMIDITY	48
1.5	AVERAGE ANNUAL RAINFALL	1199.5mm
1.6	SEISMIC ZONE (AS PER IS 1893)	Zone II
1.7	HEIGHT ABOVE MSL	272m
2	**ELECTRICAL DATA**	
2.1	AMBIENT TEMPERATURE FOR DESIGN OF ELECTRICAL EQUIPMENT	50 deg. Centigrade
2.2	RELATIVE HUMIDITY	95%
2.3	RATED FREQUENCY	50 HZ
2.4	FREQUENCY VARIATION	+3% & -5%
2.5	AC VOLTAGE	11,3.3,0.415 kV
2.6	AC VOLTAGE VARIATION	6% for 11 and 3.3 kV; 10% for 0.415 kV
2.7	DC VOLTAGE	220V DC
2.8	DC VOLTAGE VARIATION	-15% to +10%
2.9	FAULT LEVEL (kA/SEC)	a) 11 KV systems - 50 kA rms for 1 second, b) 3.3 KV systems - 40 kA rms for 1 second, c) 415 V systems - 50 kA rms for 1 second

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SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Engineering, Manufacturing Of	YES
a)	Main Supply	YES
b)	Commissioning Spares	NO
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	NO
7	Supervision Of Erection & Commissioning	NO
8	Mandatory Spares	YES
9	O & M Service	NO
10	O & M Spares	NO

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	GENERAL TECHNICAL REQUIREMENT
1	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.
2	Bidder shall also ensure that the offered equipment shall comply with all applicable statutory and regulatory requirements.
3	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, the more stringent requirement as per the interpretation of the owner shall apply.
4	Drawing/document submission shall be through web based Document Management System (DMS) of BHEL. Bidder would be provided access to the DMS for drawing/document submission. Bidder to ensure internet connectivity of min speed of 2Mbps at their end.
5	Drawings/ documents submitted by vendor at any stage shall be complete in all respects. Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor. For any clarification/ discussion required to complete the drawings, the bidder shall depute his personnel to BHEL / Customer's Office as per the requirement for across the table submission/ finalizations of drawings.
6	Latest codes and standards shall be complied with as on date of tecnho-commercial bid opening.
7	Bidder shall submit Quality Plan (0000-999-QOE-S-010) on compliance/ endorsement route. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc.
8	Make of all BOIs & Raw material shall be subject to BHEL/NTPC acceptance and Vendor list for the same shall be submitted as annexure to Quality Plan.
9	In case, the bidder is sourcing the item/any component from outside India, the third party inspection (for tests applicable as per Quality Plan) shall be arranged by bidder at their cost and shall be deemed to be considered by the bidder in their offer.
10	Mandatory Spares: Wherever the quantities have been indicated for each type, size, thickness, material, radius, range etc., these shall cover all the items supplied and installed and the breakup for these shall be furnished in the bid. In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the mandatory spare list.
11	Nameplates shall be manufactured from stainless steel or aluminium with a matte or satin finish, and engraved with black lettering of a minimum 6 mm height or as per equipment standard whichever is higher
12	Equipment must be safe, reliable and easy to maintain at all operating condition.

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TECHNICAL DATA PART - A

1.0	**DESIGN CODES & STANDARDS**						
1.1	Transformers	a) IS: 2026 b) IS1180 c) IEC 60076 d) CBIP guidelines e) BEE guidelines f) CEA notifications g) Indian Electricity Act 2003					
1.2	Fittings and accessories for power transformers	IS: 3639					
1.3	Gas operated relays	IS: 3637					
1.4	Loading guide for mineral-oil-immersed power transformers	IEC 60076-7					
1.5	Insulating oils	IEC:60296					
1.6	Bushings	IS/IEC 60137					
1.7	Bushing CTs	1) IS: 2705 2) IEC: 60185					
1.8	Dimension for porcelain transformer bushings	IS 3347					
1.9	Degrees of protection provided by enclosures	IS/IEC 60529					
1.10	Colors for ready mixed paints & enamels	IS: 5					
1.11	Noise level	NEMA Standard-TR1					
1.12	Cable Glands	BS6121					
2.0	**DESIGN /SYSTEM PARAMETERS**						
	SERVCE TRANSFORMER	**UOM**	Aux-1	Service-1	Service-2	Service-3	Service-4
		Unit	Particulars				
2.1	Rating	kVA	2500	630	1600	2000	2500
2.2	Installation	-	Outdoor				
2.3	No. of phases	-	3-phase				
2.4	Frequency	Hz	50				
2.5	Allowable voltage variation	%	(+/-) 10				
2.6	Allowable frequency variation	%	(+3) to (-5)				
2.7	Combined voltage and frequency variation	%	10				
2.8	**Voltage level**	**Rated & Highest Voltage**					
2.8.1	HV Winding	kV	11 & 12				
2.8.2	LV Winding	kV	3.45 & 3.6	0.433	0.433	0.433	0.433
2.9	No Load transformation ratio	kV	11/3.45	11/0.433	11/0.433	11/0.433	11/0.433
2.10	Rated short-circuit impedance at 75°C	%	6	4.5	6.25	10	10
2.10.1	Tolerance on impedance		as per IS 2026				
2.11	Phase Connection		HV: Delta, LV: Star				
2.12	Vector group		Dyn1				
2.13	**Cooling requirement**						
2.13.1	Method of Cooling		ONAN				
2.13.2	Cooling Equipment details		Detachable tank mounted radiators				
2.14	**Loading capability**						
2.14.1	Continuous operation		Continuous operation at rated kVA on any tap with voltage variation of ± 10 % corresponding to voltage of the tap.				
2.14.2	Short duration overloading		As per IEC 60076-7.				
2.15	**System Fault Level**						
2.15.1	HV System	kA	50				
2.15.2	LV System	kA	40	50			
2.16	**System Earthing**						
2.16.1	HV System		Earthing through NGR (NGR not in scope of bidder)				
2.16.2	LV System		Earthing through NGR (NGR not in scope of bidder)	solidly earthed			
2.17	External Short circuit withstand time of transformer	seconds	2				
2.18	**Tap changing equipment**						
2.18.1	Type of tap changing equipment		Off-Circuit				
2.18.1	Total range of tappings and tapping steps	%	± 5% in steps of 2.5%				

TECHNICAL DATA PART - A

2.19	**Temperature rise**						
2.19.1	Top oil by thermometer		50 deg. C above ambient of 50 deg.C	40 deg. C above ambient of 50 deg.C			
2.19.2	Winding by resistance		55 deg. C above ambient of 50 deg.C	45 deg. C above ambient of 50 deg.C			
2.20	**Insulation Levels of winding**						
2.20.1	One-minute power frequency withstand voltage						
2.20.1.1	HV Winding	kVrms	28				
2.20.1.2	LV Winding	kVrms	10	3			
2.20.2	Impulse withstand voltage						
2.20.2.1	HV Winding	kVp	75				
2.20.2.2	LV Winding	kVp	40	-			
2.21	**Bushings**						
2.21.1	Type of Bushings		Porcelain				
2.21.2	**Bushing rated voltage and current#**						
2.21.2.1	HV Bushing rated voltage		≥ 12 kV				
2.21.2.2	HV Bushing rated current		To meet the rated current & short circuit requirements as per Cl. No. 4.3 of IEC 60137				
2.21.2.3	LV Bushing rated voltage		≥ 3.6 kV	≥ 1.1 kV			
2.21.2.4	LV Bushing rated current		≥ 630 A	≥ 1000 A	≥ 2500 A	≥ 3000 A	≥ 4000 A
2.21.2.5	LV Neutral Bushing rated voltage		≥ 3.6 kV	≥ 1.1 kV			
2.21.2.6	LV Neutral Bushing rated current		≥ 630 A	≥ 1000 A	≥ 2500 A	≥ 3000 A	≥ 4000 A
	# HV, LV & LVN bushing currnet & voltage rating mentioned is minimum, however same shall be selected to meet the dynamic short circuit requirement as per IEC 60076-5						
2.21.2.7	Rated Ith Short circuit current of bushing		Rated short circuit current to be selected as per Cl. No. 4.3 of IEC 60137				
2.21.3	**One-minute power frequency withstand voltage**						
2.21.3.1	HV Bushing	kVrms	30				
2.21.3.2	LV Bushing	kVrms	11	3			
2.21.3.3	LV Neutral Bushing	kVrms	11	3			
2.21.4	**Impulse withstand voltage**						
2.21.4.1	HV Bushing	kVp	75				
2.21.4.2	LV Bushing	kVp	40	-			
2.21.5	Creepage distance	mm/kV	25				
2.22	Overflux capability		Not to exceed 1.9 Wb/sq.m. at any tap position with +/-10% voltage variation from voltage corresponding to the tap.				
	Transformer shall also withstand following overfluxing conditions due to combined voltage and frequency fluctuations:		a) 110% for continuous rating.				
			b) 125% for at least one minute.				
			c) 140% for at least five seconds.				
2.23.1	Oil capacity limit		As per manufacturer	Oil capacity (excluding extra oil) of individual transformers should be less than 2000 litre.			As per manufacturer
2.23.2	Foundation Details		As per manufacturer	As per enclosed Foundation requirement			

TECHNICAL DATA PART - A

2.24	**Terminal details**						
2.24.1	HV Line	-	1) Type: Cable box 2) Cable size: 11kV, 3Cx185 sq. mm. Al XLPE armoured cable				
2.24.2	LV Line	-	Flange throat for TP segregated Al phase bus duct.	1) Type: Cable box 2) Cable size: 1.1kV, 2-1C-630 sq. mm./ph & 1C-300 sq. mm.-N Al XLPE armoured cable 3) LV Line & Neutral sssociated copper bus bar, support insulator, cable lug & hardware to be provided for cable connection.	Flange throat for TPN non-segregated Al Busduct.		
2.24.3	LV Neutral	-	NGR connection through Neutral earthing busbar 50x8 thk Copper flat with support insulator.	One neutral as part of LV busduct/Cable box throat and second neutral with copper earthing bar for system earthing brought near the base of the transformer			
2.25	**Type of insulating oil**	-	Mineral Oil (new and unused) - TYPE 1				
2.26	**Properties of insulating oil**		**Permissible values**				
2.26.1	Kinematic Viscosity	mm2/s	≤ 12 at 40 °C				
			≤ 1800.0 at (-)30 °C				
2.26.2	Flash Point	°C	≥ 140°C				
2.26.3	Pour point	°C	≤ (-)40 °C				
2.26.4	Appearance	-	Clear, free from sediment and suspended matter				
2.26.5	Density at 20 °C	kg/dm3	≤ 0.895				
2.26.6	Interfacial Tension at 25°C	N/m	≥ 0.04				
2.26.7	Neutralisation value	mgKOH/g	≤ 0.01				
2.26.8	Corrosive sulphur	-	Non Corrosive				
2.26.9	Water content	mg/kg	≤ 30 in bulk supply				
			≤ 40 in drum supply				
2.26.10	Anti oxidants additives	-	Not detectable				
2.26.11	Oxidation Stability of insulating oil						
2.26.11.1	Neutralization value	mgKOH/g	≤ 1.2				
2.26.11.2	Sludge	% by mass	≤ 0.8				
2.26.12	Breakdown voltage of insulating oil						
2.26.12.1	As delivered	kV	≥ 30				
2.26.12.2	After treatment	kV	≥ 70				
2.27.13	Dissipation factor, at 90° C and 40 Hz to		≤ 0.005				
2.27.14	PCA content	%	≤1%				
2.27.15	Impulse withstand Level	kVp	≥ 145				
2.27.16	Gassing tendency at 50 Hz after 120 min.	mm3/min	≤ 5				
3.0	**CONSTRUCTION FEATURES**	kVA	2500	630	1600	2000	2500
3.1	**Winding details**						
3.1.1	Type	Fully uniformly Insulated and made in dust proof & conditioned atmosphere					
3.1.2	Material of construction	Electrolytic grade copper					
3.1.3	Surface Finish	Free from scales and burrs					
3.2	**Core details**						
3.2.1	Isolation Type	Withstand voltage of 2KV (rms) for 1 minute in air					
3.2.2	Material of construction	High grade, non-ageing, cold rolled super grain oriented silicon steel laminations of M4 grade or better quality					

TECHNICAL DATA PART - A

3.3	**Tank Details**						
3.3.1	Type	Welded construction & fabricated from tested quality low carbon steel of adequate thickness					
3.3.2	Material of construction	Low carbon steel					
3.3.3	Mounting	four no. of bi-directional detachable flat rollers					
3.3.4	Additional hardware with mounting arrangement	Foundation bolt with suitable locking arrangement					
3.3.5	Inspection opening (for easy access to bushings and earth connections)	2 nos. adequately sized one at the each end of the tank					
3.3.6	Inspection cover	Protruded type					
3.3.7	Manhole required	Yes					
3.3.8	Lifting lugs required	Tank shall be provided with suitable lifting lugs					
3.3.9	Jacking Pad	Min 4 nos.					
3.4	**Oil Preservation**						
3.4.1	Conservator tank type	Conventional with dry air filling space above oil of adequate capacty					
3.4.2	Allowable oil expansion temperature	Ambient to 100 deg. C					
3.4.3	Breather	Cobalt free silica gel type (transparent enclosure)					
3.5	**Radiators**						
3.5.1	Material	Hot Dipped Galvanized Steel conforming to ISO 12944-5:2018, Table D.1, System no. G5.05					
3.5.2	Type	Detachable, tank-mounted					
3.5.3	Valves/ plug requirement						
3.5.3.1	Drain plug/valve at the bottom	To be provided					
3.5.3.2	Air release plug at the top	To be provided					
3.5.3.3	Shut off valve	To be provided at each point of connection with transformer tank					
3.6	**Bushing (HV & LV)**						
3.6.1	Clamps & Fittings	Hot dip galvanised steel					
3.6.2	Vent pipe connected to route any gas collection through the Buccholz relay	Yes					
3.6.3	LV bushing Palm	Silver/Tin plated					
3.6.4	Arcing horn	Not to be provided					
3.7	**Cable Box (HV & LV (for 630KVA only))**						
3.7.1	Type	Dust tight air insulated type, with suitable canopy					
3.7.2	Cable Glands	Double compression type cable glands for cable termination					
3.7.3	Inspection cover	To be provided with Rain hood/ Protruded type					
3.7.4	Body earthing of each cable box	Separate earthing pads suitable for bolted connection to galvanised mild steel flat of size (65x8 mm)					
3.7.5	Air insulated disconnecting chamber applicable	To be provided with Independent supporting arrangement with required hardware & foundation bolts					
3.7.6	Additional hardware	a) Lifting handles, b) Phase barrier, (for HV cable box) c) Rain Canopy profile (for HV cable box)					
3.8	**Cable Box (LVN)**	NA					
3.9	**Busduct Termination (LV)**						
3.9.1	Type	Flanged throat or equivalent connection to suit purchaser's busduct connection					
3.9.2	Winding termination	Outdoor type of bushing					
3.9.3	Inspection cover	Rain hood/ Protruded type					
3.10	**Neutral CT**						
3.10.1	Type	Cast Resin type					
3.10.2	Mounting arrangement	All CTs (except WTI) shall be mounted in the turret of bushings; Mounting inside tank is not permitted					
3.10.3	Bushing CT Applicable	Yes, suitable for operation at ambient temperature existing at its location on the transformer.					
3.10.4	Bushing NCT Details						
	Core 1 (adjasent to winding):		630/1, 5P20, 5 VA	1000/1, 5P20, 5 VA	2500/1, 5P20, 5 VA	3000/1, 5P20, 5 VA	4000/1, 5P20, 5 VA
	Core 2 (adjasent to earth):		630/1, CL-PS, Rct≤3.15Ω, Vk≥200V, Ie≤30mA at Vk/2	1000/1, CL-PS, Rct≤5Ω, Vk≥350V, Ie≤30mA at Vk/2	2500/1, CL-PS, Rct≤12.5Ω, Vk≥500V, Ie≤30mA at Vk/2	3000/1, CL-PS, Rct≤15Ω, Vk≥400V, Ie≤30mA at Vk/2	4000/1, CL-PS, Rct≤20Ω, Vk≥500V, Ie≤30mA at Vk/2
3.10.5	Additional details	The bushing shall be mounted so that it can be removed and replaced without disturbing the Current Transformer (CTs).					
3.11	**Valves**						
3.11.1	Type for size ≤ 50mm	Gun metal or cast steel type					
3.11.2	Type for size > 50mm	Gun metal or may have cast iron bodies with gun metal fittings					
3.11.3	Additional details	Sampling & drain valves should have zero leakage rate					

TECHNICAL DATA PART - A

3.12	**Gasket**	
3.12.1	Gasket - Type 1	
3.12.1.1	Material	Neoprene
3.12.1.2	Size	10mm
3.12.1.3	Additional requirement	Shall not deteriorate during the life of transformer if not opened for maintenance at site.
3.12.2	Gasket - Type 2	
3.12.2.1	Material	Weather proof, hot oil resistant, rubberized cork
3.12.2.2	Size	As per requirement
3.12.2.3	Joints of Gasket associated with oil	Flanged or welded
3.12.3	Additional requirement-1	Shall not deteriorate during the life of transformer if not opened for maintenance at site.
3.12.4	Additional requirement-2	No oil leakage or sweating should occur during the life of transformer
3.12.5	Additional hardware for gaskets	
3.12.5.1	Rain hood/Gasket Protection Cover	For HV Cable Box and Disconnecting Chamber, Disconnecting Chamber Box and Tank body, Front Inspection Cover for HV Cable Box
3.12.5.2	Metallic stops to prevent over compression	To be provided if gasket is compressible
3.13	**OCTC (OFF-CIRCUIT TAP CHANGER)**	
3.13.1	Type	Three phase
3.13.2	Operating Mechanism	Hand operated type with an external handle/ hand wheel for simultaneous switching of similar taps on all the three phases
3.13.3	Height	Such as to enable an operator standing on ground to operate the same with ease
3.13.4	Mechanical stops to prevent over-cranking of the mechanism	To be provided
3.13.5	Caution plate	To be provided, indicating that switch shall be operated only when the transformer is de-energised shall be fitted near tap switch
3.13.6	Labels	To be provided to show the direction of operation for raising secondary voltage & vice versa
3.13.7	Position markings	To be provided
3.13.8	Additional requirement	Arrangement shall be made for securing and padlocking the tap-changing switch at any working position. It shall not be possible to set and padlock in any intermediate position.
3.13.9	Indication	To be provided
3.13.9.1	Type	Tap position indicator
3.13.9.2	Range	+/- 5%
3.13.9.3	Step size	2.50%
3.14	**Marshalling box**	
3.14.1	Material of construction	Stainless steel (SS-316 or better)
3.14.2	Thickness	≥ 2.5mm
3.14.3	Type	Tank mounted, Vermin and dust proof type with rain canopy, domed or sloping roof, proper lighting and thermostatically controlled space heaters.
3.14.4	Internal wiring	1100 V grade, copper wire of size 2.5mm2.
3.14.5	Identification ferrules	To be provided
3.14.6	Cables and conduits for wiring between marshalling box and instruments on transformer	To be provided
3.14.7	Engraving of wiring scheme	Wiring scheme shall be engraved in a stainless steel plate with viewable font size and the same shall be fixed inside the Marshalling Box door
3.14.8	Standard terminal box numbering	As per Compliance drawings section for standard terminal block numbering
3.14.9	**Terminal blocks**	
3.14.9.1	Type	Clip-on type with insulating barriers
3.14.9.2	Wire size	2.5mm2 stranded copper wire
3.14.9.3	Current rating at rated voltage	15A min.
3.14.9.4	Spare requirement	20% spare terminals on each panel
3.14.9.5	Additional requirement	One dummy terminal block in between each trip wire terminal shall be provided
3.14.10	CT terminals inside M.box	
3.14.10.1	Type	Fixed stud type with ring type lugs
3.14.10.2	Shorting and disconnecting facility	To be provided
3.14.10.3	Special consideration	Plug In type connectors are not allowed for CT & Power connection
3.14.11	Cable Gland for M.Box	
3.14.11.1	Type	Double compression, heavy duty
3.14.11.2	Material	Brass
3.14.11.3	Finishing	Machine finished & nickel chrome plated
3.14.11.4	Thickness of plating	10 microns min.
3.14.11.5	Material of Gasket	Neoprene rubber
3.14.11.6	Gland plate height	Atleast 450mm above bottom of wheel level

TECHNICAL DATA PART - A

3.15	**Noise & Vibration**	
3.15.1	Type	The design and manufacture of transformer, fittings and accessories shall be such as to reduce noise & vibration.
3.15.2	Allowable limit	Noise level shall not be more than as specified in NEMA Standard Publication TR-1, when measured with transformer energised at normal voltage and frequency.
3.16	**Fittings and accessories**	
3.16.1	Conservator for main tank with	
3.16.1.1	MOG (with low oil level alarm contact)	To be provided
3.16.1.2	MOG contact rating	min. 5A/240VAC and 0.5A/220V DC
3.16.1.3	drain valve	To be provided
3.16.1.4	Indicating type free Cobalt free breather with transparent enclosure (maximum height 1400 mm above rail level)	To be provided
3.16.2	Buchholz relay	
3.16.2.1	Type	Magnetic type, Double float type
3.16.2.2	Contacts type	alarm and trip contacts (with plug and socket type arrangement)
3.16.2.3	Contacts rating	min. 5A/240VAC and 0.5A/220V DC
3.16.2.4	Suitable gas collecting device with two shut-off valve on both side	To be provided
3.16.3	Pressure Relief Device	To be provided for transformer ≥ 2MVA
3.16.3.1	Quantity	Minimum 2
3.16.3.2	Type	Spring operated
3.16.3.3	Trip contacts type	Plug and socket type arrangement
3.16.3.4	Trip contacts rating	min. 5A/240VAC and 0.5A/220V DC
3.16.3.5	Discharge arrangement for oil	To be provided
3.16.3.6	Cable between PRD and MB	Armoured
3.16.3.7	Connector	Plug in type (for proper sealing for terminating cables/ glands)
3.16.4	Diaphragm type explosion vent	To be provided for transformer < 2MVA
3.16.5	Oil temperature indicator (OTI)	
3.16.5.1	Type	Dial type
3.16.5.2	Size	150 mm
3.16.5.3	Alarm and trip contacts	Two sets of electrical potential- free contact rated for 2A, 220V DC
3.16.5.4	Anti vibration mounting	To be provided
3.16.5.5	Maximum reading pointer along with resetting device	To be provided
3.16.5.6	Contacts for remote metering	1 no. 4-20 mA contact to be provided
3.16.5.7	Height from bottom of wheel	1500mm maximum
3.16.6	Winding temperature indicator (WTI)	
3.16.6.1	Type	Dial type
3.16.6.2	Size	150 mm
3.16.6.3	Alarm and trip contacts	Two sets of electrical potential- free contact rated for 2A, 220V DC
3.16.6.4	Anti vibration mounting	To be provided
3.16.6.5	Maximum reading pointer along with resetting device	To be provided
3.16.6.6	Contacts for remote metering	1 nos. 4-20mA contact to be provided
3.16.6.7	Height from bottom of wheel	1500mm maximum
3.16.7	Oil level gauge	
3.16.7.1	Type	Prismatic & toughened glass
3.16.8	Pocket on tank cover for thermometer	3 nos. (1 for OTI, 1 for WTI and 1 spare)
3.16.9	Top & bottom filter valves with threaded male adapters	1 + 1 nos.
3.16.10	Bottom sampling valve	1 no.
3.16.11	Drain valve/sludge removal valve at bottom most point of tank	1 no.
3.16.12	Rating & Diagram plates	White non-hygroscopic material with engraved black lettering, bi- lingual with Hindi inscription first, followed by English. Alternatively, two separate plates with Hindi & English inscription shall be provided.
3.16.13	Valve schedule plate	
3.16.14	Earthing terminals	2 numbers (Stainless steel)
3.16.15	Jacking pads	4 nos.
3.16.16	Inspection cover	To be provided
3.16.17	Lifting lugs	2 sets (one for transformer with oil and other for tank cover)
3.16.18	Ground support for cable box	To be provided
3.16.19	Air release plug	1 no.
3.16.20	Rain hoods	To be provided on Buchholz, MOG & PRD, cable box, busduct chamber, cable box. Entry points of wires shall be suitably sealed.
3.16.21	Cover lifting eyes	4 nos.

TECHNICAL DATA PART - A

3.16.22	Towing holes	To be provided		
3.16.23	Core and winding lifting lugs	To be provided		
3.16.24	Manhole	To be provided		
3.16.25	Terminal marking plates	To be provided		
3.16.26	Bolts & nuts	Exposed to atmosphere shall be galvanized steel/SS		
	The fittings listed above are only indicative and other fittings, which generally are required for satisfactory operation of the Transformers are deemed to be included.			
3.17	**Degree of Protection of various equipment**			
3.17.1	LV busduct flange	IP:55		
3.17.2	Marshalling box	IP:55		
3.17.3	Pressure Relief Device	IP:67		
3.17.4	HV & LVN cable box	IP:55		
4.0	**PERFORMANCE PARAMETERS**			
4.1	Maximum guaranteed Losses at 75°C			
4.1.1	Maximum 50% Load losses at rated frequency and 100%voltage	kW	2.8	Losses as per Energy Efficiency Level-2 of IS-1180 (applicable starting from April 2022)/ STAR-2 rating or better as per BEE guideline
4.1.2	Maximum 100% Load losses at normal ratio, rated current and 75 deg. C	kW	30	
5.0	**INSPECTION/TESTING (only general testing requirement . Other inspection details as per QAP)**			
5.1	Validity of type test report	The vendor shall carry out the type tests as listed in the specification (Annexure-A to the Quality Plan) . The type tests charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the BHEL/NTPC. In case the Contactor has conducted such specified type test(s) on or after 24.12.2018, he may submit during detailed engineering the type test reports to the BHEL/NTPC for waival of conductance of such test(s). These reports should be for the tests conducted on the equipment identical in all respects to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. BHEL/NTPC reserves the right to waive conducting of any or all the specified type test(s) under this contract.		
5.2	Type test report (If valid type test reports are available as per 5.1 above)	The Type test reports should be of a transformer which is generally similar to the transformer being offered as per Annexure-B of IEC 60076-5 and also identical to the offered transformer in the following aspects:		
		1	Voltage ratio	
		2	MVA/KVA rating	
		3	Percentage impedance	
		4	Internal design	
		5	Type of tap changer equipment	
		6	Cooling arrangement	
		7	Temperature rise	
		8	Individual and total loss values of the offered transformer shall be same as that indicated in the PART-A of the transformer for which type test reports are submitted.	
5.3	Acceptance & Routine test	All acceptance and routine tests as per Quality plan (0000-999-QOE-S-010) shall be carried out. Charges for these shall be deemed to be included in the equipment price.		

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

TECHNICAL DATA PART B2 –(supplier data to be submitted after award of contract) (2500 KVA, 11/0.433 KV)
(Please note : All blank cells to be filled up by supplier)

S. No.	Description	Unit	Particulars
1	Work's address		
2	DESIGN CODES & STANDARDS		
	Transformers	IS: 1180, IEC 60076	
	Fittings and accessories for power transformers	IS: 3639	
	Gas operated relays	IS: 3637	
	Loading guide for mineral-oil-immersed power transformers	IEC 60076-7	
	Insulating oils	IEC:60296	
	Bushings	IS/IEC 60137	
	Bushing CTs	IS: 2705, IEC: 60185	
	Dimension for porcelain transformer bushings	IS 3347	
	Degrees of protection provided by enclosures	IS/IEC 60529	
	Colors for ready mixed paints & enamels	IS: 5	
	Noise level	NEMA, STANDARD-TR1	
	Cable Glands	BS6121	
	CBIP guidelines, BEE guidelines, CEA notifications, Indian Electricity Act 2003		
3	Rating (KVA)		2500
4	Voltage ratio (kV)		11/0.433 KV
5	Winding connection		to be filled as per requirement
6	Vector group		Dyn1
7	No. of phase	No(s)	3
8	Frequency	Hz	50
9	Type of cooling		ONAN
10	Guaranteed Short-circuit impedance at 75°C		
10.1	At Principal Tap	%	10
10.2	At Maximum Tap	%	
10.3	At Minimum Tap	%	
11	Guaranteed max. losses in KW at 100 % rated voltage at 75°C at principal tap		
	i) Losses at 50% Load		Losses as per Energy Level-2 of IS-1180 (applicable starting from April'2022)/ STAR-2 rating or better as per BEE guideline
	ii) Losses at 100% Load		
12	HV winding DC resistance at 75°C		
12.1	At Principal Tap	Ω	
12.2	At Maximum Tap	Ω	
12.3	At Minimum Tap	Ω	
13	LV winding DC resistance at 75°C	mΩ	
14	Thermal Data		
14.1	Temperature rise in top oil over an ambient of 50°C	°C	40
14.2	Temperature rise in winding by resistance measurement method over an ambient of 50	°C	45
14.3	Thermal time constant	Hours	
14.4	Hot Spot Temperature	°C	
15	Short Circuit data		
15.1	Fault level	kA	50(HV)/50(LV)
15.2	Withstand time for short circuit at terminals (sec.)	sec.	2
16	Over excitation withstand time at		± 5% in steps of 2.5%
16.1	110%	sec.	Continuous
16.2	125%	sec.	60 (minimum)
16.3	140%	sec.	5 (minimum)
16.4	150%	sec.	
16.5	170%	sec.	
17	Bushings		

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

	a) High voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	b) Low voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	c) Neutral		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
18	Tap changing equipment		
18.1	Make		
18.2	Type		OCTC
18.3	Voltage class & current	kV, A	
18.4	Number of steps		
18.5	Range & step		
18.6	Insulation level of the connecting leads between tap changer & transformer winding		
19	Insulation level		
	a) High voltage Windings		
	(i) Lightning impulse withstand voltage	kVp	75
	(ii) CW Impulse withstand voltage	kVp	82.5
	(iii) Power frequency withstand voltage	kVrms	28 kV
	(iv) HV winding insulation (Graded/ Uniform)		Uniform
	b) Low voltage		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
	c) Neutral		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
20	Permissible overloading		as per IEC:60076-7
21	Proposed method of transformer transportation		
21.1	Oil filled		
21.2	Road Freight/ Rail Freight		
22	Is vacuum filling required, if so state absolute pressure	(mm of Hg)	
23	Total quantity of oil	Liters	
24	Approximate Dimensions		
24.1	Tank (lxbxh)	mm x mm x mm	
24.2	Overall dimensions with coolers (lxbxh)	mm x mm x mm	
24.3	Height for un-tanking	mm	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

24.4	Shipping dimensions	mm x mm x mm	
24.5	Dimensions of largest package	mm x mm x mm	
25	Weights of Transformer Components		
25.1	Core	kg	
25.2	Windings (copper)	kg	
25.3	Weight of insulation	kg	
25.4	Tank and fittings	kg	
25.5	Oil	kg	
25.6	Total weight	kg	
25.7	Untanking weight (heaviest piece)	kg	
25.8	Weight of heaviest pkg.	kg	
25.9	Parts detached for transport(furnish list)		
26	Core		
26.1	Net core area	mm^2	
26.2	Core material and grade used		
26.3	Thickness of stamping	mm	
26.4	Maximum flux density in core at rated frequency and at		
	a) 90% voltage	Tesla	
	b) 100% voltage	Tesla	
	c) 110% voltage	Tesla	
27	Winding		
27.1	Type of winding		
	a) HV winding		
	b) LV winding		
	c) Tap winding		
27.2	Current density at rated load		
	a) HV winding	A/sqmm	
	b) LV winding	A/sqmm	
	c) Tap winding	A/sqmm	
27.3	No load current at rated frequency and at		
	a) 90% voltage		
	b) 100% voltage		
	c) 110% voltage		
27.4	Magnetising current at rated frequency and at rated voltage		
27.5	Magnetizing inrush current	A	
28	Tank		
28.1	Tank cover-Conventional/Bell Type		
28.2	Approximate thickness of		
	a) Side	mm	
	b) Bottom	mm	
	c) Cover	mm	
29	Vacuum withstand capability of		
29.1	Main tank		
29.2	Coolers and accessories		
30	Conservator		
30.1	Total volume	Liters	
30.2	Volume between highest and lowest levels	Liters	
31	NCT details		
31.1	Core-1 (adjasent to winding):		4000/1, 5P20, 5 VA
31.2	Core-2 (adjasent to earth):		4000/1, CL-PS, Rct≤20Ω, Vk≥500V, Ie≤30mA at Vk/2
32	PRD set pressure	N/m2	
33	Normal pressure of transformer	N/m2	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

TECHNICAL DATA PART B2 –(supplier data to be submitted after award of contract) (2000 KVA, 11/0.433 KV)
(Please note : All blank cells to be filled up by supplier)

S. No.	Description	Unit	Particulars
1	Work's address		
2	DESIGN CODES & STANDARDS		
	Transformers	IS: 1180, IEC 60076	
	Fittings and accessories for power transformers	IS: 3639	
	Gas operated relays	IS: 3637	
	Loading guide for mineral-oil-immersed power transformers	IEC 60076-7	
	Insulating oils	IEC:60296	
	Bushings	IS/IEC 60137	
	Bushing CTs	IS: 2705, IEC: 60185	
	Dimension for porcelain transformer bushings	IS 3347	
	Degrees of protection provided by enclosures	IS/IEC 60529	
	Colors for ready mixed paints & enamels	IS: 5	
	Noise level	NEMA, STANDARD-TR1	
	Cable Glands	BS6121	
	CBIP guidelines, BEE guidelines, CEA notifications, Indian Electricity Act 2003		
3	Rating (KVA)		2000
4	Voltage ratio (kV)		11/0.433 KV
5	Winding connection		to be filled as per requirement
6	Vector group		Dyn1
7	No. of phase	No(s)	3
8	Frequency	Hz	50
9	Type of cooling		ONAN
10	Guaranteed Short-circuit impedance at 75°C		
10.1	At Principal Tap	%	10
10.2	At Maximum Tap	%	
10.3	At Minimum Tap	%	
11	Guaranteed max. losses in KW at 100 % rated voltage at 75°C at principal tap		
	i) Losses at 50% Load		Losses as per Energy Level-2 of IS-1180 (applicable starting from April'2022)/ STAR-2 rating or better as per BEE guideline
	ii) Losses at 100% Load		
12	HV winding DC resistance at 75°C		
12.1	At Principal Tap	Ω	
12.2	At Maximum Tap	Ω	
12.3	At Minimum Tap	Ω	
13	LV winding DC resistance at 75°C	mΩ	
14	Thermal Data		
14.1	Temperature rise in top oil over an ambient of 50°C	°C	40
14.2	Temperature rise in winding by resistance measurement method over an ambient of 50	°C	45
14.3	Thermal time constant	Hours	
14.4	Hot Spot Temperature	°C	
15	Short Circuit data		
15.1	Fault level	kA	50(HV)/50(LV)
15.2	Withstand time for short circuit at terminals (sec.)	sec.	2
16	Over excitation withstand time at		± 5% in steps of 2.5%
16.1	110%	sec.	Continuous
16.2	125%	sec.	60 (minimum)
16.3	140%	sec.	5 (minimum)
16.4	150%	sec.	
16.5	170%	sec.	
17	Bushings		

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

	a) High voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	b) Low voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	c) Neutral		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
18	Tap changing equipment		
18.1	Make		
18.2	Type		OCTC
18.3	Voltage class & current	kV, A	
18.4	Number of steps		
18.5	Range & step		
18.6	Insulation level of the connecting leads between tap changer & transformer winding		
19	Insulation level		
	a) High voltage Windings		
	(i) Lightning impulse withstand voltage	kVp	75
	(ii) CW Impulse withstand voltage	kVp	82.5
	(iii) Power frequency withstand voltage	kVrms	28 kV
	(iv) HV winding insulation (Graded/ Uniform)		Uniform
	b) Low voltage		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
	c) Neutral		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
20	Permissible overloading		as per IEC:60076-7
21	Proposed method of transformer transportation		
21.1	Oil filled		
21.2	Road Freight/ Rail Freight		
22	Is vacuum filling required, if so state absolute pressure	(mm of Hg)	
23	Total quantity of oil	Liters	
24	Approximate Dimensions		
24.1	Tank (lxbxh)	mm x mm x mm	
24.2	Overall dimensions with coolers (lxbxh)	mm x mm x mm	
24.3	Height for un-tanking	mm	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

24.4	Shipping dimensions	mm x mm x mm	
24.5	Dimensions of largest package	mm x mm x mm	
25	Weights of Transformer Components		
25.1	Core	kg	
25.2	Windings (copper)	kg	
25.3	Weight of insulation	kg	
25.4	Tank and fittings	kg	
25.5	Oil	kg	
25.6	Total weight	kg	
25.7	Untanking weight (heaviest piece)	kg	
25.8	Weight of heaviest pkg.	kg	
25.9	Parts detached for transport(furnish list)		
26	Core		
26.1	Net core area	mm^2	
26.2	Core material and grade used		
26.3	Thickness of stamping	mm	
26.4	Maximum flux density in core at rated frequency and at		
	a) 90% voltage	Tesla	
	b) 100% voltage	Tesla	
	c) 110% voltage	Tesla	
27	Winding		
27.1	Type of winding		
	a) HV winding		
	b) LV winding		
	c) Tap winding		
27.2	Current density at rated load		
	a) HV winding	A/sqmm	
	b) LV winding	A/sqmm	
	c) Tap winding	A/sqmm	
27.3	No load current at rated frequency and at		
	a) 90% voltage		
	b) 100% voltage		
	c) 110% voltage		
27.4	Magnetising current at rated frequency and at rated voltage		
27.5	Magnetizing inrush current	A	
28	Tank		
28.1	Tank cover-Conventional/Bell Type		
28.2	Approximate thickness of		
	a) Side	mm	
	b) Bottom	mm	
	c) Cover	mm	
29	Vacuum withstand capability of		
29.1	Main tank		
29.2	Coolers and accessories		
30	Conservator		
30.1	Total volume	Liters	
30.2	Volume between highest and lowest levels	Liters	
31	NCT details		
31.1	Core-1 (adjasent to winding):		3000/1, 5P20, 5 VA
31.2	Core-2 (adjasent to earth):		3000/1, CL-PS, Rct≤15Ω, Vk≥400V, Ie≤30mA at Vk/2
32	PRD set pressure	N/m2	
33	Normal pressure of transformer	N/m2	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

TECHNICAL DATA PART B3 –(supplier data to be submitted after award of contract) (1600 KVA, 11/0.433 KV)
(Please note : All blank cells to be filled up by supplier)

S. No.	Description	Unit	Particulars
1	Work's address		
2	DESIGN CODES & STANDARDS		
	Transformers	IS: 1180, IEC 60076	
	Fittings and accessories for power transformers	IS: 3639	
	Gas operated relays	IS: 3637	
	Loading guide for mineral-oil-immersed power transformers	IEC 60076-7	
	Insulating oils	IEC:60296	
	Bushings	IS/IEC 60137	
	Bushing CTs	IS: 2705, IEC: 60185	
	Dimension for porcelain transformer bushings	IS 3347	
	Degrees of protection provided by enclosures	IS/IEC 60529	
	Colors for ready mixed paints & enamels	IS: 5	
	Noise level	NEMA, STANDARD-TR1	
	Cable Glands	BS6121	
	CBIP guidelines, BEE guidelines, CEA notifications, Indian Electricity Act 2003		
3	Rating (KVA)		1600
4	Voltage ratio (kV)		11/0.433 KV
5	Winding connection		to be filled as per requirement
6	Vector group		Dyn1
7	No. of phase	No(s)	3
8	Frequency	Hz	50
9	Type of cooling		ONAN
10	Guaranteed Short-circuit impedance at 75°C		
10.1	At Principal Tap	%	6.25
10.2	At Maximum Tap	%	
10.3	At Minimum Tap	%	
11	Guaranteed max. losses in KW at 100 % rated voltage at 75°C at principal tap		
	i) Losses at 50% Load		Losses as per Energy Level-2 of IS-1180 (applicable starting from April'2022)/ STAR-2 rating or better as per BEE guideline
	ii) Losses at 100% Load		
12	HV winding DC resistance at 75°C		
12.1	At Principal Tap	Ω	
12.2	At Maximum Tap	Ω	
12.3	At Minimum Tap	Ω	
13	LV winding DC resistance at 75°C	mΩ	
14	Thermal Data		
14.1	Temperature rise in top oil over an ambient of 50°C	°C	40
14.2	Temperature rise in winding by resistance measurement method over an ambient of 50	°C	45
14.3	Thermal time constant	Hours	
14.4	Hot Spot Temperature	°C	
15	Short Circuit data		
15.1	Fault level	kA	50(HV)/50(LV)
15.2	Withstand time for short circuit at terminals (sec.)	sec.	2
16	Over excitation withstand time at		± 5% in steps of 2.5%
16.1	110%	sec.	Continuous
16.2	125%	sec.	60 (minimum)
16.3	140%	sec.	5 (minimum)
16.4	150%	sec.	
16.5	170%	sec.	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

17	Bushings		
	a) High voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	b) Low voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	c) Neutral		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
18	Tap changing equipment		
18.1	Make		
18.2	Type		OCTC
18.3	Voltage class & current	kV, A	
18.4	Number of steps		
18.5	Range & step		
18.6	Insulation level of the connecting leads between tap changer & transformer winding		
19	Insulation level		
	a) High voltage Windings		
	(i) Lightning impulse withstand voltage	kVp	75
	(ii) CW Impulse withstand voltage	kVp	82.5
	(iii) Power frequency withstand voltage	kVrms	28 kV
	(iv) HV winding insulation (Graded/ Uniform)		Uniform
	b) Low voltage		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
	c) Neutral		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
20	Permissible overloading		as per IEC:60076-7
21	Proposed method of transformer transportation		
21.1	Oil filled		
21.2	Road Freight/ Rail Freight		
22	Is vacuum filling required, if so state absolute pressure	(mm of Hg)	
23	Total quantity of oil	Liters	
24	Approximate Dimensions		
24.1	Tank (lxbxh)	mm x mm x mm	
24.2	Overall dimensions with coolers (lxbxh)	mm x mm x mm	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

24.3	Height for un-tanking	mm	
24.4	Shipping dimensions	mm x mm x mm	
24.5	Dimensions of largest package	mm x mm x mm	
25	Weights of Transformer Components		
25.1	Core	kg	
25.2	Windings (copper)	kg	
25.3	Weight of insulation	kg	
25.4	Tank and fittings	kg	
25.5	Oil	kg	
25.6	Total weight	kg	
25.7	Untanking weight (heaviest piece)	kg	
25.8	Weight of heaviest pkg.	kg	
25.9	Parts detached for transport(furnish list)		
26	Core		
26.1	Net core area	mm^2	
26.2	Core material and grade used		
26.3	Thickness of stamping	mm	
26.4	Maximum flux density in core at rated frequency and at		
	a) 90% voltage	Tesla	
	b) 100% voltage	Tesla	
	c) 110% voltage	Tesla	
27	Winding		
27.1	Type of winding		
	a) HV winding		
	b) LV winding		
	c) Tap winding		
27.2	Current density at rated load		
	a) HV winding	A/sqmm	
	b) LV winding	A/sqmm	
	c) Tap winding	A/sqmm	
27.3	No load current at rated frequency and at		
	a) 90% voltage		
	b) 100% voltage		
	c) 110% voltage		
27.4	Magnetising current at rated frequency and at rated voltage		
27.5	Magnetizing inrush current	A	
28	Tank		
28.1	Tank cover-Conventional/Bell Type		
28.2	Approximate thickness of		
	a) Side	mm	
	b) Bottom	mm	
	c) Cover	mm	
29	Vacuum withstand capability of		
29.1	Main tank		
29.2	Coolers and accessories		
30	Conservator		
30.1	Total volume	Liters	
30.2	Volume between highest and lowest levels	Liters	
31	NCT details		
31.1	Core-1 (adjasent to winding):		2500/1, 5P20, 5 VA
31.2	Core-2 (adjasent to earth):		2500/1, CL-PS, Rct≤12.5Ω, Vk≥500V, Ie≤30mA at Vk/2
32	Explosion vent set pressure	N/m2	
33	Normal pressure of transformer	N/m2	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

TECHNICAL DATA PART B3 –(supplier data to be submitted after award of contract) (630 KVA, 11/0.433 KV)
(Please note : All blank cells to be filled up by supplier)

S. No.	Description	Unit	Particulars
1	Work's address		
2	DESIGN CODES & STANDARDS		
	Transformers	IS: 1180, IEC 60076	
	Fittings and accessories for power transformers	IS: 3639	
	Gas operated relays	IS: 3637	
	Loading guide for mineral-oil-immersed power transformers	IEC 60076-7	
	Insulating oils	IEC:60296	
	Bushings	IS/IEC 60137	
	Bushing CTs	IS: 2705, IEC: 60185	
	Dimension for porcelain transformer bushings	IS 3347	
	Degrees of protection provided by enclosures	IS/IEC 60529	
	Colors for ready mixed paints & enamels	IS: 5	
	Noise level	NEMA, STANDARD-TR1	
	Cable Glands	BS6121	
	CBIP guidelines, BEE guidelines, CEA notifications, Indian Electricity Act 2003		
3	Rating (KVA)		1000
4	Voltage ratio (kV)		11/0.433 KV
5	Winding connection		to be filled as per requirement
6	Vector group		Dyn1
7	No. of phase	No(s)	3
8	Frequency	Hz	50
9	Type of cooling		ONAN
10	Guaranteed Short-circuit impedance at 75°C		
10.1	At Principal Tap	%	4.5
10.2	At Maximum Tap	%	
10.3	At Minimum Tap	%	
11	Guaranteed max. losses in KW at 100 % rated voltage at 75°C at principal tap		
	i) Losses at 50% Load		Losses as per Energy Level-2 of IS-1180 (applicable starting from April'2022)/ STAR-2 rating or better as per BEE guideline
	ii) Losses at 100% Load		
12	HV winding DC resistance at 75°C		
12.1	At Principal Tap	Ω	
12.2	At Maximum Tap	Ω	
12.3	At Minimum Tap	Ω	
13	LV winding DC resistance at 75°C	mΩ	
14	Thermal Data		
14.1	Temperature rise in top oil over an ambient of 50°C	°C	40
14.2	Temperature rise in winding by resistance measurement method over an ambient of 50	°C	45
14.3	Thermal time constant	Hours	
14.4	Hot Spot Temperature	°C	
15	Short Circuit data		
15.1	Fault level	kA	50(HV)/50(LV)
15.2	Withstand time for short circuit at terminals (sec.)	sec.	2
16	Over excitation withstand time at		± 5% in steps of 2.5%
16.1	110%	sec.	Continuous
16.2	125%	sec.	60 (minimum)
16.3	140%	sec.	5 (minimum)
16.4	150%	sec.	
16.5	170%	sec.	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

17	Bushings		
	a) High voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	b) Low voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	c) Neutral		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
18	Tap changing equipment		
18.1	Make		
18.2	Type		OCTC
18.3	Voltage class & current	kV, A	
18.4	Number of steps		
18.5	Range & step		
18.6	Insulation level of the connecting leads between tap changer & transformer winding		
19	Insulation level		
	a) High voltage Windings		
	(i) Lightning impulse withstand voltage	kVp	75
	(ii) CW Impulse withstand voltage	kVp	82.5
	(iii) Power frequency withstand voltage	kVrms	28 kV
	(iv) HV winding insulation (Graded/ Uniform)		Uniform
	b) Low voltage		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
	c) Neutral		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
20	Permissible overloading		as per IEC:60076-7
21	Proposed method of transformer transportation		
21.1	Oil filled		
21.2	Road Freight/ Rail Freight		
22	Is vacuum filling required, if so state absolute pressure	(mm of Hg)	
23	Total quantity of oil	Liters	
24	Approximate Dimensions		
24.1	Tank (lxbxh)	mm x mm x mm	
24.2	Overall dimensions with coolers (lxbxh)	mm x mm x mm	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

24.3	Height for un-tanking	mm	
24.4	Shipping dimensions	mm x mm x mm	
24.5	Dimensions of largest package	mm x mm x mm	
25	Weights of Transformer Components		
25.1	Core	kg	
25.2	Windings (copper)	kg	
25.3	Weight of insulation	kg	
25.4	Tank and fittings	kg	
25.5	Oil	kg	
25.6	Total weight	kg	
25.7	Untanking weight (heaviest piece)	kg	
25.8	Weight of heaviest pkg.	kg	
25.9	Parts detached for transport(furnish list)		
26	Core		
26.1	Net core area	mm^2	
26.2	Core material and grade used		
26.3	Thickness of stamping	mm	
26.4	Maximum flux density in core at rated frequency and at		
	a) 90% voltage	Tesla	
	b) 100% voltage	Tesla	
	c) 110% voltage	Tesla	
27	Winding		
27.1	Type of winding		
	a) HV winding		
	b) LV winding		
	c) Tap winding		
27.2	Current density at rated load		
	a) HV winding	A/sqmm	
	b) LV winding	A/sqmm	
	c) Tap winding	A/sqmm	
27.3	No load current at rated frequency and at		
	a) 90% voltage		
	b) 100% voltage		
	c) 110% voltage		
27.4	Magnetising current at rated frequency and at rated voltage		
27.5	Magnetizing inrush current	A	
28	Tank		
28.1	Tank cover-Conventional/Bell Type		
28.2	Approximate thickness of		
	a) Side	mm	
	b) Bottom	mm	
	c) Cover	mm	
29	Vacuum withstand capability of		
29.1	Main tank		
29.2	Coolers and accessories		
30	Conservator		
30.1	Total volume	Liters	
30.2	Volume between highest and lowest levels	Liters	
31	NCT details		
31.1	Core-1 (adjasent to winding):		1000/1, 5P20, 5 VA
31.2	Core-2 (adjasent to earth):		1000/1, CL-PS, Rct≤5Ω, Vk≥350V, Ie≤30mA at Vk/2
32	Explosion vent set pressure	N/m2	
33	Normal pressure of transformer	N/m2	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

TECHNICAL DATA PART B2 –(supplier data to be submitted after award of contract) (2500 KVA, 11/3.45 KV)
(Please note : All blank cells to be filled up by supplier)

S. No.	Description	Unit	Particulars
1	Work's address		
2	DESIGN CODES & STANDARDS		
	Transformers	IS: 1180, IEC 60076	
	Fittings and accessories for power transformers	IS: 3639	
	Gas operated relays	IS: 3637	
	Loading guide for mineral-oil-immersed power transformers	IEC 60076-7	
	Insulating oils	IEC:60296	
	Bushings	IS/IEC 60137	
	Bushing CTs	IS: 2705, IEC: 60185	
	Dimension for porcelain transformer bushings	IS 3347	
	Degrees of protection provided by enclosures	IS/IEC 60529	
	Colors for ready mixed paints & enamels	IS: 5	
	Noise level	NEMA, STANDARD-TR1	
	Cable Glands	BS6121	
	CBIP guidelines, BEE guidelines, CEA notifications, Indian Electricity Act 2003		
3	Rating (KVA)		2500
4	Voltage ratio (kV)		11/3.45 KV
5	Winding connection		to be filled as per requirement
6	Vector group		Dyn1
7	No. of phase	No(s)	3
8	Frequency	Hz	50
9	Type of cooling		ONAN
10	Guaranteed Short-circuit impedance at 75°C		
10.1	At Principal Tap	%	10
10.2	At Maximum Tap	%	
10.3	At Minimum Tap	%	
11	Guaranteed max. losses in KW at 100 % rated voltage at 75°C at principal tap		
	i) Losses at 50% Load	KW (Max)	2.8
	ii) Losses at 100% Load	KW (Max)	30
12	HV winding DC resistance at 75°C		
12.1	At Principal Tap	Ω	
12.2	At Maximum Tap	Ω	
12.3	At Minimum Tap	Ω	
13	LV winding DC resistance at 75°C	mΩ	
14	Thermal Data		
14.1	Temperature rise in top oil over an ambient of 50°C	°C	50
14.2	Temperature rise in winding by resistance measurement method over an ambient of 50	°C	55
14.3	Thermal time constant	Hours	
14.4	Hot Spot Temperature	°C	
15	Short Circuit data		
15.1	Fault level	kA	50(HV)/40(LV)
15.2	Withstand time for short circuit at terminals (sec.)	sec.	2
16	Over excitation withstand time at		± 5% in steps of 2.5%
16.1	110%	sec.	Continuous
16.2	125%	sec.	60 (minimum)
16.3	140%	sec.	5 (minimum)
16.4	150%	sec.	
16.5	170%	sec.	
17	Bushings		

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

	a) High voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	b) Low voltage		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
	c) Neutral		
	(i) Manufacturer		
	(ii) Type		
	(iii) Voltage rating	kV	
	(iv) Rated current	A	
	(v) Lightning impulse withstand voltage	kVp	
	(vi) Power frequency withstand voltage	kVrms	
	(vii) Total creepage distance	mm	
18	Tap changing equipment		
18.1	Make		
18.2	Type		OCTC
18.3	Voltage class & current	kV, A	
18.4	Number of steps		
18.5	Range & step		
18.6	Insulation level of the connecting leads between tap changer & transformer winding		
19	Insulation level		
	a) High voltage Windings		
	(i) Lightning impulse withstand voltage	kVp	75
	(ii) CW Impulse withstand voltage	kVp	82.5
	(iii) Power frequency withstand voltage	kVrms	28 kV
	(iv) HV winding insulation (Graded/ Uniform)		Uniform
	b) Low voltage		
	(i) Lightning impulse withstand voltage	kVp	40
	(ii) CW Impulse withstand voltage	kVp	44
	(iii) Power frequency withstand voltage	kVrms	10 kV
	(iv) LV winding insulation (Graded/ Uniform)		Uniform
	c) Neutral		
	(i) Lightning impulse withstand voltage	kVp	-
	(ii) CW Impulse withstand voltage	kVp	-
	(iii) Power frequency withstand voltage	kVrms	3
20	Permissible overloading		as per IEC:60076-7
21	Proposed method of transformer transportation		
21.1	Oil filled		
21.2	Road Freight/ Rail Freight		
22	Is vacuum filling required, if so state absolute pressure	(mm of Hg)	
23	Total quantity of oil	Liters	
24	Approximate Dimensions		
24.1	Tank (lxbxh)	mm x mm x mm	
24.2	Overall dimensions with coolers (lxbxh)	mm x mm x mm	
24.3	Height for un-tanking	mm	

Vendor's Logo	Vendor's Name & Address	Customer Drg. No.	
		BHEL Drg. No.	Rev. No. 00
		Vendor Drg. No.	Date :

24.4	Shipping dimensions	mm x mm x mm	
24.5	Dimensions of largest package	mm x mm x mm	
25	Weights of Transformer Components		
25.1	Core	kg	
25.2	Windings (copper)	kg	
25.3	Weight of insulation	kg	
25.4	Tank and fittings	kg	
25.5	Oil	kg	
25.6	Total weight	kg	
25.7	Untanking weight (heaviest piece)	kg	
25.8	Weight of heaviest pkg.	kg	
25.9	Parts detached for transport(furnish list)		
26	Core		
26.1	Net core area	mm^2	
26.2	Core material and grade used		
26.3	Thickness of stamping	mm	
26.4	Maximum flux density in core at rated frequency and at		
	a) 90% voltage	Tesla	
	b) 100% voltage	Tesla	
	c) 110% voltage	Tesla	
27	Winding		
27.1	Type of winding		
	a) HV winding		
	b) LV winding		
	c) Tap winding		
27.2	Current density at rated load		
	a) HV winding	A/sqmm	
	b) LV winding	A/sqmm	
	c) Tap winding	A/sqmm	
27.3	No load current at rated frequency and at		
	a) 90% voltage		
	b) 100% voltage		
	c) 110% voltage		
27.4	Magnetising current at rated frequency and at rated voltage		
27.5	Magnetizing inrush current	A	
28	Tank		
28.1	Tank cover-Conventional/Bell Type		
28.2	Approximate thickness of		
	a) Side	mm	
	b) Bottom	mm	
	c) Cover	mm	
29	Vacuum withstand capability of		
29.1	Main tank		
29.2	Coolers and accessories		
30	Conservator		
30.1	Total volume	Liters	
30.2	Volume between highest and lowest levels	Liters	
31	NCT details		
31.1	Core-1 (adjasent to winding):		630/1, 5P20, 5 VA
31.2	Core-2 (adjasent to earth):		630/1, CL-PS, Rct≤3.15Ω, Vk≥200V, Ie≤30mA at Vk/2
32	PRD set pressure	N/m2	
33	Normal pressure of transformer	N/m2	

बी एच ई एल BHEL	TECHNICAL SPECIFICATION OIL FILLED TRANSFORMER LARA SUPER THERMAL POWER PROJECT STAGE-II (2X800 MW)	PE-TS-497-302-E001A Issue No: 01 Rev. No. 00 Date : 28-08-2025

	COMPLIANCE DRAWINGS
	Vendor need to follow standard terminal block numbering scheme as follows:-

Standard Terminal Numbers to be incorporated in Transformer Marshalling Box
For Outdoor Transformers (Oil filled)

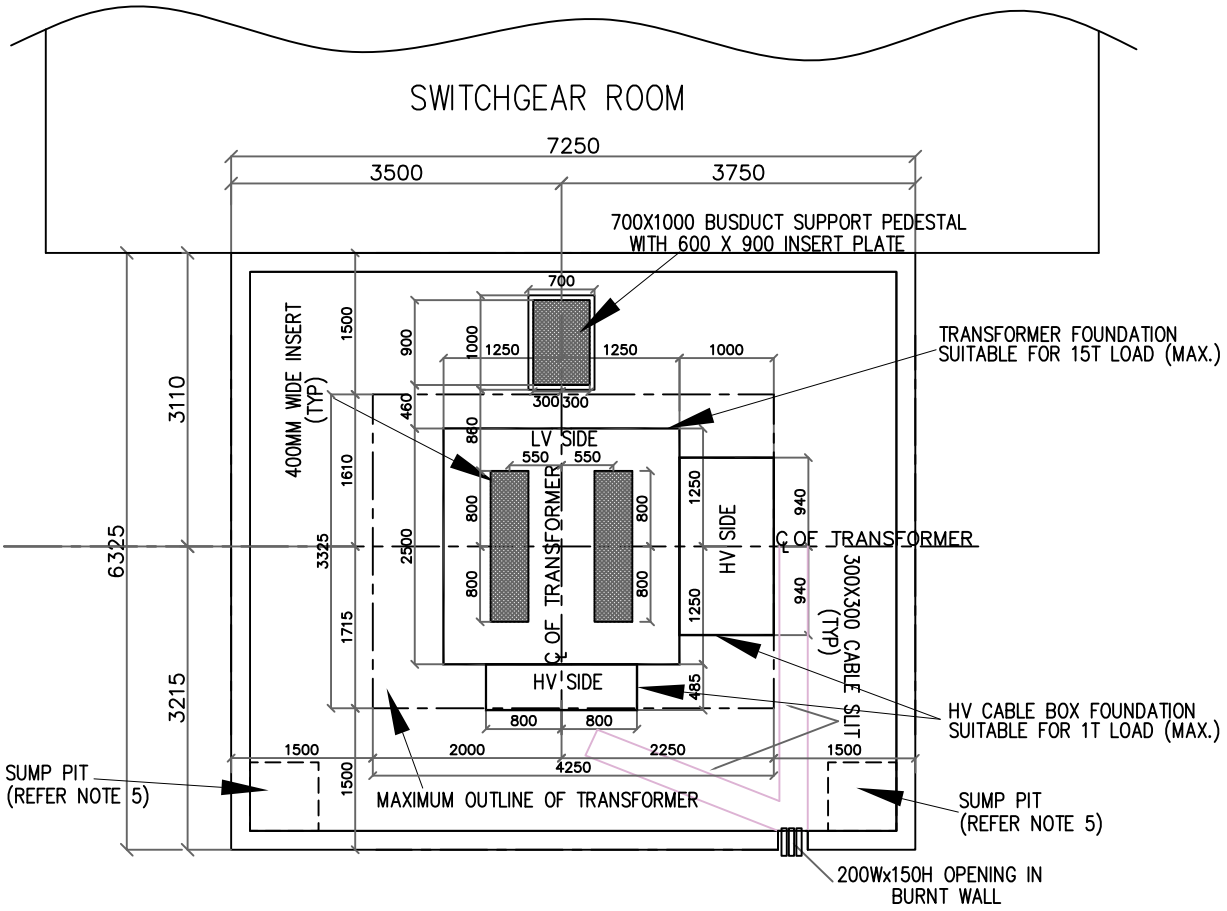
Terminal No.	Description
T-01	230V, Single Phase, 50Hz, AC Supply
T-02	
T-03	
T-04	
T-05	MOG (Oil Level) Alarm
T-06	
T-07	Buchholz Relay Alarm
T-08	
T-09	OTI Alarm
T-10	
T-11	WTI-1 Alarm
T-12	
T-13	WTI-2 Alarm
T-14	
T-15	PRV-1 Alarm
T-16	
T-17	PRV-2 Alarm
T-18	
T-19	
T-20	
T-21	Buchholz Relay Trip
DUMMY	
T-22	
T-23	PRV-1 Trip
DUMMY	
T-24	
T-25	PRV-2 Trip
DUMMY	
T-26	
T-27	OTI Trip
DUMMY	
T-28	
T-29	WTI-1 Trip
DUMMY	
T-30	
T-31	WTI-2 Trip
DUMMY	
T-32	
T-33	
T-34	
T-35	Neutral CT (for REF Protection) 64
T-36	
T-37	Neutral CT (for Earth Fault Protection) 51N
T-38	
T-39	CT Shorting Terminal
T-40	CT Shorting Terminal
T-41	Spare Terminals for NTPC use
T-42	
T-43	
T-44	
T-45	220V DC Supply (If required)
T-46	

Notes:

1. The Terminals from T-01 to T-46 shall be designated as indicated in the chart for all outdoor auxiliary transformers (upto 16MVA)

2. The Terminals which are not used for a particular Transformer shall be left as spare. e.g. in case there is only one PRV, then terminals T-17, T-18, T-25 & T-26 shall be left as spare terminals.

Drg. Title	Standard Terminal Numbers for Marshalling Box of oil filled transformers		
Drg. No.	0000-203-PVE-B-001		



LT SERVICE TRANSFORMER STANDARD FOUNDATION
(FOR UPTO & INCLUDING 2.5MVA OIL FILLED TRANSFORMER)

NOTES:–

1) TOP OF TRANSFORMER FOUNDATION/ INSERT & PEDESTALS FOR HV CABLE BOX & NSPBD SHALL BE AT FFL OF SWITCHGEAR ROOM.
2) LOAD OF TRANSFORMER FOR DESIGNING FOUNDATION SHALL BE CONSIDERED AS 15 TON (MAX). HV CABLE BOX FOUNDATION SHALL BE SUITABLE FOR 1 TON LOAD (MAX).
3) FIXING OF TRANSFORMER ROLLERS AND HV BOX SHALL BE DONE WITH THE HELP OF ANCHORS & FASTENERS (UNDER BIDDER'S SCOPE OF SUPPLY). NO POCKET ON TRANSFORMER FOUNDATION SHALL BE PROVIDED.
4) ORIENTATION OF TRANSFORMERS SHALL & FIRE BARRIER WALL DETAILS SHALL BE AS PER EQUIPMENT LAYOUT DRAWING.
5) SUMP PIT LOCATION SHALL BE AS PER PROJECT SPECIFIC ELECTRICAL INPUT DRAWING.

REV	DATE	ALTD	CHD	APPVD.

TITLE: STANDARD TRANSFORMER FOUNDATION (FOR UPTO & INCLUDING 2.5MVA OIL FILLED SERVICE TRANSFORMER)

JOB NO. 100

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA(U.P) INDIA

DPT CODE–E

	NAME	SIGN	DATE
DRN	AnA		12.03.25
DSN	AnA		12.03.25
CHD	AS		
APP	PD/DR		

DWG. NO. PE–DG–100–999–S002

SHT. 01 OF 02 REV. 0

	ITEM (MATERIAL, CLASS, GRADE, RATING, RANGE, SIZE ETC.) : **मद** (सामग्री, वर्ग, ग्रेड, रैंटिंग, रेंज, आकार **LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.**	**STANDARD QUALITY PLAN** स्टैण्डर्ड क़्वालिटी प्लान	**QP NO / क्यूपी सं..:**	**0000-999-QOE-S-010**
			REV NO / संशोधित सं..:	**01**
		CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	**DATE/** तिथि	**30.08.2022**

REVIEWED BY: द्वारा समीक्षा की गई:	**APPROVED BY:** द्वारा अनुमोदित:
S.N. TRIPATHI SHAKTI NATH TRIPATHI	
S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:41:14 +05'30'	**S S MISHRA** SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	**COMPONENT & OPERATIONS** अवयव व संचालन	**CHARACTERISTICS** / विशेषताएं	**CLASS** वर्ग	**TYPE OF CHECK** जांच के प्रकार	**QUANTUM OF CHECK** जांच के परिमाण		**REFERENCE DOCUMENT** संदर्भ दस्तावेज#	**ACCEPTANCE NORMS/** स्वीकृत मानदंड	**FORMAT OF RECORD/** रिकॉर्ड का प्रारूप		**AGENCY/** एजेंसी			**REMARKS/**टिप्पणियां
					M एम	**C/ N** सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
NOTE: RAW MATERIL AND BOI MAKE LIST IS TO BE FURNISHED ALONG WITH THIS SQP FOR THE ENDORSEMENT FOR THE SPECIFIC PROJECT AND PACKAGE.														
1.0	RAW MATERIAL													
1.01	STEEL PLATE AND PIPE	A) SURFACE FINISH	MAJOR	VISUAL	AS PER RELEVANT IS		IS:2062-1992(R4A2) / IS:1239/REL. STD.	IS:2062-1992(R4A2) / IS:1239/REL. STD	SUPPLIER TC REVIEW		P	V	V	1-SUPPLIER TC FOR ALL BOI SHALL BE MAINTAINED BY MANUFCATURER FOR NTPC VERIFICATION. 2-MAKE OF ALL BOIs AND RAW MATERIAL SHALL BE SUBJECT TO NTPC ACCEPTANCE AND SAME TO BE FURNISHED ALONG WITH MQP FOR ENDORSEMENT FOR THE SPECIFIC PROJECT AND PACKAGE.
		B) THICKNESS	MAJOR	TESTING	"		-DO-	-DO-	TC	√	P	V	V	
		C) CHEMICAL COMPOSITION	MAJOR	-DO-	ONE SAMPLE PER HEAT/ LOT		-DO-	-DO-	TC	√	P	V	V	
		D) MECHANICAL PROPERTIES	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		E) HYDRAULIC TEST OF PIPES	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
1.02	CRGO STEEL	A)MAKE, THICKNESS, GRADE & FINISH	MAJOR	MEASURE	100%		IS:3024-1997(R1)/IS: 649/MFR. PLANT STD.	IS:3024-1997(R1)/IS: 649/MFR. PLANT STD.	TC	√	P	V	V	
		B)SPECIFIC LOSS	MAJOR	TESTING	ONE SAMPLE PER HEAT/LOT		-DO-	-DO-	TC	√	P	V	V	
		C)BEND TEST/DUCTILITY	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		D)AGEING TEST	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		E)SURFACE RESISTIVITY	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		F)STACKING FACTOR	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		G)PERMEABILITY AT 800 A/M	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		H)CHEMICAL COMPOSITION	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	

	ITEM (MATERIAL, CLASS, GRADE, RATING, RANGE, SIZE ETC.) : मद (सामग्री, वर्ग, ग्रेड, रैंटिंग, रेंज, आकार	STANDARD QUALITY PLAN स्टैण्डर्ड क़्वालिटी प्लान	QP NO / क्यूपी सं..:	0000-999-QOE-S-010	REVIEWED BY: द्वारा समीक्षा की गई:	APPROVED BY: द्वारा अनुमोदित:
			REV NO / संशोधित सं..:	01	S.N. TRIPATHI SHAKTI NATH TRIPATHI	
	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:43:54 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
1.03	PAPER INSULATED COPPER CONDUCTOR (PICC)	A)CONDUCTOR FINISH	MAJOR	VISUAL	ONE SAMPLE SUPPLIER'S DIFFERENT SIZES OF CONDUCTOR		IEC:317-27-1990	IEC:317-27-1990	TC	√	P	V	V	
		B)DIMENSIONS (BARE & INSULATED)	MAJOR	MEASURE	-DO-		AS PER IS /PLANT STANDARD	AS PER IS /PLANT STANDARD	TC	√	P	V	V	
		C)RESISTIVITY/CONDUCTIVITY & PAPER COVERING	MAJOR	TESTING	-DO-		IS: 13730/IEC: 60554 /PLANT STANDARD	IS: 13730/IEC: 60554 /PLANT STANDARD	TC	√	P	V	V	
		D)TENSILE STRENGTH	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		E)ELECTRIC PROOF STRENGTH	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		F)ELONGATION AT BREAK POINT	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		G)0.1 % PROOF STRESS	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		H)ASH CONTENT OF PAPER	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		I)CHEMICAL COMPOSITION (CU PURITY AND O2 CONTENT)	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		J)VOLTAGE TEST BETWN STRANDS FOR BUNDLED CONDUCTOR	MAJOR	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	FOR CTC
1.04	INSULATING PAPER	A)MAKE, TYPE & DIMENSIONS	MAJOR	MEASMNT	ONE SAMPLE PER LOT		IS:1060(P-I) 1966	IS:1060(P-I) 1966	SUPPLIER	√	P	V	V	REVIEW OF TC
		B)DENSITY	-DO-	TESTING	-DO-		IS:9335(P-I)-1979	IS:9335(P-I)-1979	TC	√	P	V	-	
		C)TENSILE STRENGTH	-DO-	-DO-	-DO-		IS:9335(P-II)-1981	IS:9335(P-II)-1981	TC	√	P	V	-	
		D)OIL ABSORPTION	-DO-	-DO-	-DO-		IS:9335(P-III) SEC-I - 1984(A1)	IS:9335(P-III) SEC-I - 1984(A1)	TC	√	P	V	-	
		E)WATER ABSORPTION	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		F)MOISTURE CONTENT	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	

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			REV NO / संशोधित सं..:	01	S.N. TRIPATHI SHAKTI NATH TRIPATHI	
	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:44:29 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		G)SHRINKAGE IN AIR & OIL	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		H)PH VALUE	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		I)ASH CONTENT	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		J)ONE MINUTE WITHSTAND VOLTAGE AT 90+2 DEG. C	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		K)AIR PERMEABILITY	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		L)TEAR INDEX	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
		M)CONDUCTIVITY	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	
1.05	PRESS-BOARD (PRE-COMPRESSED & SELF CALENDERED)	A)MAKE , TYPE AND DIMENSIONS	MAJOR	MEASMNT	ONE SAMPLE PER LOT		IS:1576-1992(R1)	IS:1576-1992(R1)	TC	√	P	V	V	
		B)COMPRESSIBILITY	-DO-	TESTING	-DO-		-DO-	-DO-	TC	√	P	V	-	
		C)DENSITY	-DO-	-DO-	-DO-		-DO-	-DO	TC	√	P	V	-	
		D)TENSILE STRENGTH	-DO-	-DO-	-DO-		DIN-7735	DIN-7735	TC	√	P	V	-	
		E)ELONGATION	-DO-	-DO-	-DO-		-DO	-DO	TC	√	P	V	-	
		F)PH VALUE/ CONDUCTIVITY OF WATER EXTRACT	-DO-	-DO-	-DO-		-DO	-DO	TC	√	P	V	V	
		G)ELECTRICAL STRENGTH IN AIR AND OIL	-DO-	-DO-	-DO-		IEC:641-3-1-1992	IEC:641-3-1-1992	TC	√	P	V	V	
		H)ASH CONTENT	-DO-	-DO-	-DO-		DIN-7735	DIN-7735	TC	√	P	V	-	
		I)MOISTURE CONTENT	-DO-	-DO-	-DO-		DIN-7735	DIN-7735	TC	√	P	V	-	
		J)WATER ABSORPTION	-DO-	-DO-	-DO-		DIN 7735	DIN-7735	TC	√	P	V	-	
		K)SHRINKAGE IN AIR & OIL	-DO-	-DO-	-DO-		DIN:7735	DIN:7735	SUPPLIER	√	P	V	-	
		L)COHESION BETWEEN PLIES	MAJOR	MEASMNT	SAMPLE PER LOT		IS:1576-1992(R1)	IS:576-1992(R1)	TC	√	P	V	-	
		M) OIL ABSORPTION	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	-	

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			REV NO / संशोधित सं..:	01	S.N. TRIPATHI SHAKTI NATH TRIPATHI	
	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:44:50 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
1.06	INSULATORS FOR BUSHINGS	A)MAKE, DIMENSION	-DO-	-DO-	-DO-		IS:3347-(P-I/SEC-I)	IS:3347-(P-I/SEC-I)	TC	√	P	V	V	
		B)VISUAL	-DO-	VISUAL	100%		-1979(A1)	-1979(A1)	TC	√	P	V	V	
		C)TEMPERATURE CYCLE TEST	-DO-	TESTING	-DO-		IS:5621-1980(R1A2)	IS:5621-1980(R1A2)	TC	√	P	V	V	
		D)ELECTRICAL TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		E)POROSITY TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		F)DRY POWER FREQUENCY TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		G)MEASUREMENT OF PARTIAL DISCHARGE LEVEL	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
1.07	CONDENSER BUSHING	A)MAKE, RATING AND DIMENSIONS	MAJOR	MEASMNT	SAMPLE		IS-2099-1986(R2A2)	IS-2099-1986(R2A2)	TC	√	P	V	V	
		B)VISUAL	-DO-	VISUAL	PER LOT		IEC-137	IEC-137	TC	√	P	V	V	
		C)MEASUREMENT OF CAPACITANCE AND TAN DELTA	-DO-						TC	√	P	V	V	
		a)BEFORE DIELECTRIC TEST	-DO-	TESTING	100%		-DO-	-DO-	TC	√	P	V	V	
		b)AFTER DIELECTRIC TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		D)DRY POWER FREQUENCY WITHSTAND VOLTAGE TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		E)MEASUREMENT OF PARTIAL DISCHARGE LEVEL	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	

	ITEM (MATERIAL, CLASS, GRADE, RATING, RANGE, SIZE ETC.) : **मद** (सामग्री, वर्ग, ग्रेड, रैंटिंग, रेंज, आकार **LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.**	**STANDARD QUALITY PLAN** स्टैण्डर्ड क़्वालिटी प्लान	**QP NO /** क्यूपी सं..:	**0000-999-QOE-S-010**
			REV NO / संशोधित सं..:	**01**
		CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	**DATE/** तिथि	**30.08.2022**

REVIEWED BY: द्वारा समीक्षा की गई:

S.N. TRIPATHI SHAKTI NATH TRIPATHI

S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:45:12 +05'30'

APPROVED BY: द्वारा अनुमोदित:

S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11

		F)POWER FREQUENCY TEST ON TEST TAP INSUALTION	MAJOR	TESTING	100%	IEC-137	IEC-137	TC	√	P	V	V	
		G)TEST FOR LEAKAGE OF INTERNAL FILLING	-DO-	-DO-	-DO-	-DO-	-DO-	-DO-	√	P	V	V	
1.08	GASKET/RUBBER BONDED CORK SHEET	A)DIMENSIONAL/VISUAL	MAJOR	MEASMNT	100%	IS:4253 P-II-1980	IS:4253 P-II-1980	SUPPLIER	√	P	V	-	
		B)HARDNESS	-DO-	TESTING	SAMPLE	IS:3400(P-II)995(R2)	IS:3400(P-II)995(R2)	TC	√	P	V	V	
		C)TENSILE STRENGTH	-DO-	-DO-	-DO-	IS:4253 P-II-1980	IS:4253 P-II-1980	TC	√	P	V	-	
		D)FLEXIBILITY	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	-	
		E)COMPRESSIBILITY	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	V	
		F)RECOVERY	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	-	
		G)COMPRESSION SET	-DO-	-DO-	-DO-	IS:3400(P-X)1970	IS:3400(P-X)1970	TC	√	P	V	-	
		H)RESISTANCE TO TEMPERATURE, AGEING AND OIL	-DO-	-DO-	-DO-	IS:4253 P-II-1980	IS:4253 P-II-1980	TC	√	P	V	-	
		I)AGEING IN AIR AND OIL	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	-	
1.09	INSULATING OIL	A) MAKE, APPEARANCE OF OIL	-DO-	VISUAL	-DO-	NTPC SPECIFICATION/IEC: 296/ IS:335-2018	NTPC SPECIFICATION/IEC: 296/ IS:335-2018	TC	√	P	V	V	
		B)DENSITY	MAJOR	TESTING	-DO-	-DO-	-DO-	TC	√	P	V	V	
		C)KITNEMATIC VISCOSITY	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	V	
		D)INTERFACIAL TESNION	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	V	
		E)FLASH & POUR POINT	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	V	
		F)BDV AS DELIVERED	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	V	
		G)TAN DELTA AT 90 DEG.C	-DO-	-DO-	-DO-	-DO-	-DO-	TC	√	P	V	V	

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			REV NO / संशोधित सं..:	01	S.N. TRIPATHI SHAKTI NATH TRIPATHI	
	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:45:40 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		H)NEUTRALISATION VALUE	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		I)COROSSIVE SULPHUR TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		J)OXIDATION STABILITY, NEUTRALISATION VALUE IN mgKOH/g AND SLUDGE%	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		K)RESISTIVITY AT 27 & 90 DEG.CENTIGRADE	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		L)WATER CONTENT	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		M)PRESENCE OF INHIBITOR/ANTI - OXIDANT ADDITIVES	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		N) PCA CONTENT	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		O)IMPULSE WITHSTAND LEVEL	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		P)GASSING TENDANCY	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		Q)AGEING CHARACTERSTICS AT 115 DEG.FOR 96 HOURS	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	FOR REFRENCE
		R)S.K. VALUE	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	FOR REFRENCE
1.10	MARSHALLING KIOSK	A)DIMENSIONAL/VISUAL CHECK FOR WIRING	MAJOR	VISUAL	100%		NTPC APPROVED DRAWING	NTPC APPROVED DRAWING	SUPPLIER		P	V	V	
		B)CHECK FOR MAKE OF INSTRUMENT	-DO-	-DO-	SAMPLE		AS PER DRAWING	AS PER DRAWING	TC		P	V	V	
		C)2 KV INSULATION TEST ON AUXILIARY WIRING	-DO-	TESTING	-DO-		SHOULD WITHSTAND FOR ONE MINUTE	SHOULD WITHSTAND FOR ONE MINUTE	TC	√	P	V	V	
		D)CHECK FOR PAINT AND THICKNESS	-DO-	-DO-	-DO-		IS:101(P-IV/SEC-2)-1988(R3)	IS:101(P-IV/SEC-2)-1988(R3)	TC	√	P	V	V	

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			REV NO / संशोधित सं..:	**01**
		CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	**DATE/** तिथि	**30.08.2022**

REVIEWED BY: द्वारा समीक्षा की गई:	**APPROVED BY:** द्वारा अनुमोदित:
S.N. TRIPATHI SHAKTI NATH TRIPATHI	
S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:46:04 +05'30'	**S S MISHRA** SUDHAN SHU SEKHAR MISHRA

SL. NO क्र.सं.	**COMPONENT & OPERATIONS** अवयव व संचालन	**CHARACTERISTICS** / विशेषताएं	**CLASS** वर्ग	**TYPE OF CHECK** जांच के प्रकार	**QUANTUM OF CHECK** जांच के परिमाण		**REFERENCE DOCUMENT** संदर्भ दस्तावेज#	**ACCEPTANCE NORMS/** स्वीकृत मानदंड	**FORMAT OF RECORD/** रिकॉर्ड का प्रारूप		**AGENCY/** एजेंसी			**REMARKS/**टिप्पणियां
					M एम	**C/ N** सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		E)IP-55 DEGREE OF PROTECTION	-DO-	-DO-	-DO-		IS:2147-1962	IS:2147-1962	TC		P	V	V	
		F)FUNCTIONAL/CONTINUITY CHECKING OF WIRING	-DO-	-DO-	100%		FUNCTIONAL CHECKS OF COMPONENT	FUNCTIONAL CHECKS OF COMPONENT	TC		P	V	V	
1.11	RADIATORS	A)WELDING PROCEDURE & WELDERS QUALIFICATION	-DO-	REVIEW	-DO-		APROVED WPS & WELDERS QUALIFICATION ON AS PER ASME SEC-IX	APROVED WPS & WELDERS QUALIFICATION ON AS PER ASME SEC-IX	TC	√	P	V	-	
		B)WELDING ELECTRODE MECHANICAL & CHEMCIAL PROPERTIES	-DO-	-DO-	-DO-				TC	√	P	V	-	
		C)SURFACE CLEANING /PREPARATION	-DO-	VISUAL	-DO-		AS PER MANUFACTURER'S STANDARD	AS PER MANUFACTURER'S STANDARD	TC	√	P	V	-	
		D)MAKE,TYPE, MODEL, RATING, DIMENSION AND AIR PRESSURE TEST ON ELEMENT	-DO-	TESTING	-DO-		-DO-	-DO-	TC	√	P	V	V	
		E)AIR PRESSURE TEST ON RADIATOR ASSEMBLIES	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		F)PAINT FILM THICKNESS	-DO-	-DO-	-DO-		IS:101(P-IV/SEC 2)	IS:101(P-IV/SEC 2)	TC	√	P	V	V	
		G)PAINT FILM ADHESION TEST	-DO-	-DO-	-DO-		-1983 (R3)	-1983 (R3)	TC	√	P	V	V	
1.12	BUCHOLZ RELAY	A)DIMENSION/VISUAL CHECK	MAJOR	VISUAL	100%		IS:3637-1966(A1)	IS:3637-1966(A1)	TC	√	P	V	V	
		B)2 KV INSULATION TEST FOR ONE MINUTE	-DO-	TESTING	-DO-		SHOULD WITHSTAND	SHOULD WITHSTAND	TC	√	P	V	V	
		C)INSULATION RESISTANCE TEST	-DO-	-DO-	-DO-		IS:3637-1966(A1)	IS:3637-1966(A1)	TC	√	P	V	V	

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			REV NO / संशोधित सं..:	01	S.N. TRIPATHI SHAKTI NATH TRIPATHI	
	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:46:32 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		D)POROSITY AND ELEMENT TEST AT 3 KG/CM SQ. FOR 30 MINUTES	-DO-	-DO-	-DO-		-DO-	-DO-	SUPPLIER		P	V	V	
		E)STATIC RESPONE CHARACTERISTICS FOR GAS AND VOLUME SURGE TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC		P	V	V	
1.13	OTI & WTI	A)INSULATION TEST AT 2 KV FOR ONE MINUTE FOR ALL ELECTRICAL TERMINAL	-DO-	-DO-	-DO-		-DO-	-DO-	TC		P	V	V	-DO-
		B)ACCURACY	-DO-	-DO-	-DO-		-DO-	-DO-	TC		P	V	V	-DO-
		C)SWITCH SETTING	-DO-	-DO-	-DO-		-DO-	-DO-	TC		P	V	V	-DO-
		D)SWITCH DIFFERENTIAL	-DO-	-DO-	-DO-		-DO-	-DO-	TC		P	V	V	-DO-
		E)CALIBRATION AND OPERATION OF CONTACTS	-DO-	-DO-	-DO-		-DO-	-DO-	TC		P	V	V	-DO-
1.14	PRESSURE RELIEF VALVE	A)FUNCTIONAL TEST WITH COMPRESSED AIR	MAJOR	TESTING	100%		AS PER APPROVED DRAWING/MANUFACTUER'S PLANT	AS PER APPROVED DRAWING/MANUFACTUER'S PLANT	TC	√	P	V	V	REVIEW OF TC
		B)SWITCH OPERATION	-DO-	-DO-	-DO-				TC					-DO-
		C)SWITCH CONTACT POSITION	-DO-	-DO-	-DO-		STANDARD	STANDARD	TC		P	V	V	-DO-
		D)2 KV TEST FOR ONE MINUTE	-DO-	-DO-	-DO-		SHOULD WITHSTAND	SHOULD WITHSTAND	TC	√	P	V	V	-DO-
1.15	MAGNETIC OIL LEVEL GAUGE	A)DIMENSIONS/VISUAL CHECK	-DO-	VISUAL	100%		AS PER DRAWING SHOULD WITHSTAND	AS PER DRAWING SHOULD WITHSTAND	SUPPLIER		P	V	V	REVIEW OF TC
		B)2 KV INSULATION TEST FOR ONE MINTUE	-DO-	TESTING	-DO-				TC		P	V	V	-DO-

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			REV NO / संशोधित सं..:	**01**		
		CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	**DATE/** तिथि	**30.08.2022**	**S.K. LAL** SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:47:17 +05'30'	**S S MISHRA** SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	**COMPONENT & OPERATIONS** अवयव व संचालन	**CHARACTERISTICS** / विशेषताएं	**CLASS** वर्ग	**TYPE OF CHECK** जांच के प्रकार	**QUANTUM OF CHECK** जांच के परिमाण		**REFERENCE DOCUMENT** संदर्भ दस्तावेज#	**ACCEPTANCE NORMS/** स्वीकृत मानदंड	**FORMAT OF RECORD/** रिकॉर्ड का प्रारूप		**AGENCY/** एजेंसी			**REMARKS/**टिप्पणियां
					M एम	**C/ N** सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		C)OPERATION OF CONTACTS	-DO-	-DO-	-DO-		CONTINUITY CHECKING	CONTINUITY CHECKING	TC		P	V	V	-DO-
		D)CALIBRATION OF SWITCH CONTACTS	-DO-	-DO-	-DO-		FUNCTIONAL CHECK	FUNCTIONAL CHECK	TC		P	V	V	-DO-
1.16	OFF LOAD TAP CHANGER	A)DIMENSION/VISUAL CHECK	MAJOR	VISUAL	100%		AS PER DRAWING	AS PER DRAWING	TC		P	V	V	REVIEW OF TC
		B)TORQUE TEST	-DO-	TESTING	-DO-		IS:8468-1977/	IS:8468-1977/	TC		P	V	V	-DO-
		C)OPERATION TEST	-DO-	-DO-	-DO-		MANUFACTUERER'S PLANT STANDARD	MANUFACTUERER'S PLANT STANDARD	TC		P	V	V	-DO-
1.17	GATE VALES, CAST IRON/GUN METAL VALVES/BUTTERFLY VALVES	A)TYPE, MAKE, SIZE, DIMENSION/VISUAL	-DO-	-DO-	-DO-		AS PER APPROVED DRAWING IS:778-1984	AS PER APPROVED DRAWING IS:778-1984	TC	√	P	V	V	
		B)LEAK/PRESSURE TEST FOR BODY & SEAT AT 1.5 TIMES OF DESIGN PRESSURE.	-DO-	-DO-	-DO-		IS:778-1984	IS:778-1984	TC	√	P	V	V	DRAIN AND SAMPLE VALVE SHOULD HAVE ZERO LEAKAGE RATE.
		C)SEEPAGE TEST AT ONE TIME OF DESIGN PRESSURE FOR 12 HRS WITH OIL.	-DO-	-DO-	-DO-		NO SEEPAGE	NO SEEPAGE	TC	√	P	V	V	
1.18	BUSHING CT	A)DIMENSION/VISUAL CHECK	MAJOR	MEASMNT	SAMPLE		IS:2705-1992	IS:2705-1992	TC	√	P	V	V	
		B)CLASS OF ACCURACY	-DO-	TESTING	100%		-DO-	-DO-	TC	√	P	V	V	
		C)RATIO & PHASE ANGLE ERROR TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		D)HIGH VOTAGE POWER FREQUENCY DRY WITHSTAND TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		E)OVER VOTAGE POWER INTER TURN TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	

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			REV NO / संशोधित सं..:	01	S.N. TRIPATHI SHAKTI NATH TRIPATHI	
	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:47:43 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		F)VERIFICATION OF TERMINAL MARKING & POLARITY TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		G)COMPOSITE ERROR TEST MARKING & POLARITY TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
		H)CALIBRATION OF SWITCH CONTACTS	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	V	V	
1.19	TANK & COVER ASSEMBLY	A)WELDERS, WPS & WELD PROCEDURE QUALIFICATION	-DO-	REVIEW TESTING	-DO-		ASME SEC-IX APPROVED WPS	ASME SEC-IX APPROVED WPS	TC	√	P	V / W *	V/W *	WPS APPROVAL, WELDER & PQR QUALIFICATION SHALL BE DONE AS PER FOLLOWING: 1)UP TO 2MVA: BY TRANSFORMER MANUFACTURER. 2) MORE THAN 2MVA AND LESS THAN 5MVA: BY MAIN CONTRACTOR, 3) 5MVA & ABOVE : BY NTPC.
		B)DIMENSION/VISUAL	-DO-	MEASURE	-DO-		WELDERS WILL BE	WELDERS WILL BE	TC	√	P	V	V	
		C)JACKING TEST ON TANK FOLLOWED BY DP TEST ON WELDING	-DO-	TESTING	-DO-		QUALIFIED BT NTPC MANUFACTUER'S PLANT STANDARD	QUALIFIED BT NTPC MANUFACTUER'S PLANT STANDARD	TC	√	P	V	V	
		D)PRESSURE TEST/DEFLECTION ON TANK	-DO-	-DO-	SAMPLE		CBIP SEC-A	CBIP SEC-A	TC	√	P	V	V	
		E)VACUUM TEST/DEFLECTION MEASUREMENT ON TANK	-DO-	-DO-	SAMPLE		-DO-	CBIP SEC-A	TC	√	P	V	V	
		F)SHOT BLASTING OF SURFACE PRIOR TO PAINTING	-DO-	-DO-	100%		MANUFACTUER'S PLANT STANDARD	MANUFACTUER'S PLANT STANDARD	TC	√	P	V	V	
		G)PRIMER APPLICATION ON SURFACE EXCEPT FOR LOAD BEARING MEMBER WHERE TAPING IS DONE	-DO-	PHYSICAL	-DO-		-DO-	-DO-	TC	√	P	V	V	

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					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
2.0	TERMINAL CONNECTOR	A)DIMENSION/VISUAL	-DO-	VISUAL	100%		APPROVED DRAWING	APPROVED DRAWING	TC	√	P	W	V	
		B)TENSILE TEST	-DO-	TESTING	SAMPLE		IS:5561-1970	IS:5561-1970	TC	√	P	W	V	
		C)RESISTANCE TEST	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	W	V	
		D)GALVANISING TEST (WHERE APPLICABLE)	-DO-	-DO-	-DO-		-DO-	-DO-	TC	√	P	W	V	
2.00	CORE													
2.01	CORE STAMPING	A)CHECK ON BURR & BOW	-DO-	MEASMNT	100%		CHECK LIST OF MANUFACTURER	CHECK LIST OF MANUFACTURER	RECORD		P	V	-	
		B)CHECK DIMENSIONS	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		P	V	-	
2.02	CORE BUILDING	A)DIMENSIONS	-DO-	VISUAL	-DO-		-DO-	-DO-	-DO-		P	V	V	
		B)LEANING OF CORE (I.E. CORE VERTICALITY)	-DO-	CHECKING	-DO-		-DO-	-DO-	-DO-		P	V	-	
		C)DIA OVER RESIGLASS TAPE	-DO-	MEASMNT	-DO-		-DO-	-DO-	-DO-		P	V	-	
2.03	TEST ON CORE	A)INSULATION TEST AT 2KV FOR ONE MINUTE BETWEEN CORE AND END FRAME TO YOKE BOLTS, CORE CLAMP TO YOKE BOLT.	-DO-	TESTING	-DO-		-DO-	-DO-	-DO-	√	P	V	V	
		B)MAGNETISING CHARACTERISTICS OF CORE MATERIAL	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		P	V	-	
		C)PRE CORE LOSS MEASUREMENT OF BUILT CORE	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	V	-	
		D)DIMENSION/VISUAL CHECK	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	V	-	
3.00	WINDING													

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					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
3.01	WINDING OF COILS	A)DIMENION/VISUAL	-DO-	-DO-	100%		WELDING SCHEDULE OF MANUFACTURER	WELDING SCHEDULE OF MANUFACTURER	-DO		P	V	-	
		B)NO. OF TURNS	-DO-	-DO-	-DO-		-DO-	-DO	-DO		P	V	-	
		C)OIL DUCTS	-DO-	-DO-	-DO-		-DO-	-DO	-DO		P	V	-	
		D)INSULATION	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		P	V	-	
		E)PRESSED LENGTH AFTER DRYING IN CHAMBER	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		P	V	-	
3.02	CORE COIL ASSEMBLY	A)DIMENSION/VISUAL	-DO	VISUAL	100%		MANUFACTURER'S CHECK LIST FOR THE ACTIVITY	MANUFACTURER'S CHECK LIST FOR THE ACTIVITY	-DO-		P	V	-	
		B)ASSEMBLY OF WINDING ARRANGEMENT ON CORE	-DO	-DO	-DO		-DO-	-DO-	-DO-		P	V	-	
		C)ASSEMBLY OF INSULATION ITEMS	-DO	-DO	-DO		-DO	-DO	-DO-		P	V	-	
		D)TOP YOKE ASSEMBLY	-DO	VISUAL	-DO		-DO	-DO	-DO-		P	V	-	
		E)2KV INSUALTION TEST ON CORE BOLT AND EARTHING OF CORE	-DO	TESTING	-DO		SHOULD WITHSTAND	SHOULD WITHSTAND	-DO-		P	V	V	
		F)INTERNAL CLEARANCE MEASUREMENT	-DO	MEASMNT	-DO		MANUFACTUER'S CHECK LIST FOR THE ACTIVITY	MANUFACTUER'S CHECK LIST FOR THE ACTIVITY	-DO-		P	V	-	
		G)OTHER CHECKS AS PER DRAWINGS	-DO-	VISUAL	-DO		-DO-	DO-	-DO-		P	V	-	
		H)CLEANLINESS	-DO-	-DO	-DO		-DO-	DO-	-DO-		P	V	-	
3.03	CONNECTION	A)DIMENSION/VISUAL	-DO-	MEASMNT	-DO-		-DO-	-DO-	-DO-		P	V	-	
		B)ASSEMBLY OF BUSHING ON THE LID	-DO-	VISUAL	-DO-		-DO-	-DO-	-DO-		P	V	-	

	ITEM (MATERIAL, CLASS, GRADE, RATING, RANGE, SIZE ETC.) : मद (सामग्री, वर्ग, ग्रेड, रैंटिंग, रेंज, आकार	STANDARD QUALITY PLAN स्टैण्डर्ड क़्वालिटी प्लान	QP NO / क्यूपी सं..:	0000-999-QOE-S-010	REVIEWED BY: द्वारा समीक्षा की गई:	APPROVED BY: द्वारा अनुमोदित:
			REV NO / संशोधित सं..:	01	S.N. TRIPATHI SHAKTI NATH TRIPATHI	
	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:49:04 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		C)CONNECTION TO TH EBUSHING TERMINALS	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		P	V	-	
		D)INSULATION OF BRAZED JOINTS	-DO-	TESTING	-DO-		-DO-	-DO-	-DO-		P	V	-	
		E)CLEARANCES	-DO-	VISUAL	-DO-		-DO-	-DO-	-DO-		P	V	-	
		F)PRELIMINARY RATIO TEST	-DO-	TESTING	-DO-		-DO-	-DO-	-DO-		P	V	-	
		H)VACOTOR GROUP AFTER CONNECTIONS	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		P	V	-	
		H)OTHER CHECKS AS PER DRAWINGS	-DO-	VISUAL	-DO-		-DO-	-DO-	-DO-		P	V	-	
		I)BRAZING												
		A)CONTACT RESISTANCE	-DO-	MEASMNT	-DO-		MANUFACTUER'S CHECK LIST FOR THE ACTIVITY	MANUFACTUER'S CHECK LIST FOR THE ACTIVITY	RECORD		P	V	-	
		B) SOLDERABILITY	-DO-	-DO-	-DO-				-DO-		P	V	-	
		C)STRENGTH OF THE BRAZED JOINT	-DO-	TESTING	-DO-				-DO-		P	V	-	
3.04	ACTIVE PART COMPLETION	A)DIMENION/VISUAL CHECK	-DO-	VISUAL	-DO-		-DO-	-DO-	-DO-		p	V	-	
		B)DRYING OF ACTIVE PART IN VACUUM	-DO-	MONITORING	-DO-		-DO-	-DO-	-DO-		p	V	-	
		C)CLAMPING OF WINDINGS, CORE, CONNECTION ETC.	-DO-	VISUAL	-DO-		-DO-	-DO-	-DO-		p	V	-	
		D)CLEARANCE & CLEANING BEFORE ASSEMBLY IN TANK	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		p	V	-	
		E)ASSEMBLY IN TANK	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		p	V	-	
		F)ASSEMBLY OF ACCESSORIES	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		P	V	-	
		G)OIL FILLING	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		V	V	-	

	ITEM (MATERIAL, CLASS, GRADE, RATING, RANGE, SIZE ETC.) : **मद** (सामग्री, वर्ग, ग्रेड, रैंटिंग, रेंज, आकार **LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.**	**STANDARD QUALITY PLAN** स्टैण्डर्ड क़्वालिटी प्लान	**QP NO /** क्यूपी सं..:	**0000-999-QOE-S-010**	**REVIEWED BY:** द्वारा समीक्षा की गई: **S.N. TRIPATHI** SHAKTI NATH TRIPATHI **S.K. LAL** SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:49:30 +05'30'	**APPROVED BY:** द्वारा अनुमोदित: **S S MISHRA** SUDHANSHU SEKHAR MISHRA Digitally signed by SUDHANSHU SEKHAR MISHRA
			REV NO / संशोधित सं..:	**01**		
		CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	**DATE/** तिथि	**30.08.2022**		

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		H) MAGNETIC BALANCE TEST, RATIO TEST AND 2KV CORE BOLT HV TEST	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-		V	V	-	
4.0	FINAL INSPECTION													
TYPE TEST: TYPE TEST APPROVAL / CLEARANCE BY NTPC-PE SHALL BE VERIFIED BY NTPC RIO BEFORE TAKING UP THE FINAL INSPECTION.														
4.01	ROUTINE TEST	A)MAJOR DIMENSIONS	CRITICAL	DIMNL	ONE PER OFFERED LOT PER TYPE AND RATING		IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.)	RECORD	√	P	W	W	EACH TRANSFORMER SHALL BE ASSEMBLED WITH ALL THE FITTINGS AND ACCESSORIES MEANT FOR THE PARTICULAR TRANSFORMER BEFORE OFFERING FOR INSPECTION AND TESTING TO NTPC.
		B)OIL SAMPLE TEST (BDV & WATER CONTENT BEFORE AND AFTER DIELECTRIC TEST)	CRITICAL	TESTING	100%		IS:1866-1983(R2A2)	IS:1866-1983(R2A2)	RECORD	√	P	W	W	
		C)VOLTAGE RATIO TEST AT ALL TAPS	-DO-	-DO-	-DO-		IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.)	-DO-	√	P	W	W	
		D)VECTOR GROUP & POLARITY	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
=		E)MEASUREMENT OF IMPEDANCE VOLTAGE AND SHORT CIRCUIT IMPEDANCE AT PRINCIPAL TAP & TWO EXTREME TAPS & LOAD LOSSES	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	p	W	W	

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	LT AUX. OIL FILLED TRANSFORMER UP TO 10 MVA, 33KV/11KV /6.6KV/ 3.3KV/0.433 KV RATING.	CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	DATE/ तिथि	30.08.2022	S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:50:21 +05'30'	S S MISHRA SUDHANSHU SEKHAR MISHRA

SL. NO क्र.सं.	COMPONENT & OPERATIONS अवयव व संचालन	CHARACTERISTICS / विशेषताएं	CLASS वर्ग	TYPE OF CHECK जांच के प्रकार	QUANTUM OF CHECK जांच के परिमाण		REFERENCE DOCUMENT संदर्भ दस्तावेज#	ACCEPTANCE NORMS/ स्वीकृत मानदंड	FORMAT OF RECORD/ रिकॉर्ड का प्रारूप		AGENCY/ एजेंसी			REMARKS/टिप्पणियां
					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		F)MEASUREMENT OF WINDING RESISTANCE ON ALL TAPS	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		G)MEASUREMENT OF CAPACITANCE AND TAN DELTA FOR WINDING AND BUSHING**	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	**IN CASE OF OIP/RIP BUSHINGS
		H)MEASUREMENT OF NO LOAD LOSSES & MAGNETISING CURRENT AT RATED FREQUENCY & 90%, 100% AND 110% RATED VOLTAGE	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		I)DIELECTRIC TEST POWER FREQUENCY/SEPARATE SOURCE AC WITHSTAND VOLTAGE TEST	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		J)INDUCED OVER VOLTAGE WITHSTAND TEST	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		K)MEASUREMENT OF NO LOAD LOSS/IRON LOSS (REPEAT AFTER INDUCED OVER VOLTAGE WITHSTAND TEST.	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		L)MEASUREMENT OF INSULATION RESISTANCE	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	

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			REV NO / संशोधित सं..:	**01**
		CONFORMING TO CODE: कोड के अनुरूप: IS:2026-2011/ IS:1180-2014/ IEC:60076 AND NTPC TECH. SPECN.	**DATE/** तिथि	**30.08.2022**

REVIEWED BY: द्वारा समीक्षा की गई:	**APPROVED BY:** द्वारा अनुमोदित:
S.N. TRIPATHI SHAKTI NATH TRIPATHI	
S.K. LAL SUNIL KUMAR LAL Digitally signed by SUNIL KUMAR LAL Date: 2022.09.01 22:50:50 +05'30'	**S S MISHRA** SUDHANSHU SEKHAR MISHRA

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					M एम	C/ N सी/एन					M	C	N	
1.	2.	3.	4.	5.	6.		7.	8.	9.	D*	** 10			11
		M)MAGNETIC BALANCE TEST	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		N)OIL LEAKAGE TEST	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		O)JACKING TEST ON ASSEMBLY TRANSFORMER FOLLOWED BY D.P. TEST	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	100% WITNESS BY MAIN CONTRACTOR AND 10% WITNESS BY NTPC ON THE OFFERED LOT.
		P) MARSHALLING BOX i-FUNCTIONAL CHECK, CONTINUITY, IR AND HV ii-IP-55 DEGREE OF PAPER BY THIN PAPER INSERTION iii-FUNCTIONAL AND CONTINUITY CHECKING OF WTI, OTI , PRV AND BUCKHOLTZ RELAY	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
		Q) PAINT SHADE, DFT, AND ADHESSION TEST OF MARSHALING BOX AND TRANSFORMER TANK	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	W	W	
5.00	PRE-SHIPMENT CHECKS	CHECK ON COMPLETENESS OF ASSEMBLED TRANSFORMER	-DO-	-DO-	-DO-		-DO-	-DO-	-DO-	√	P	V	-	

BHEL	TECHNICAL SPECIFICATION OIL FILLED TRANSFORMER SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)	PE-TS-512-302-E001A Issue No: 01 Rev. No. 00 Date : 28-08-2025

ANNEXURE-A TO QUALITY PLAN

Following are the applicable Type/ Special tests:

1. Lightning impulse (Full & Chopped Wave) test on windings (as per IEC 60076-3)
2. Lightning impulse test on Neutral (applicable for 2.5 MVA 11/3.45kV transformer only)
3. Short circuit test (special test) as per IEC 60076-5.
4. Temperature Rise test at a tap corresponding to maximum losses. Gas Chromatography shall be conducted on oil sample taken before & immediately after temp. rise test. Gas analysis shall be as per IS: 9434 (based on IEC: 60567), results will be interpreted as per IS: 10593 (based on IEC: 60599). Result shall be recorded for future reference.
5. Measurement of acoustic noise level as per NEMA TR-1 (special test)
6. Tank Pressure test (As per CBIP/IS-1180 norm)
7. Tank vacuum test (As per CBIP/IS-1180 norm) ($)

NOTE: -

i) All the type/ special tests & temperature rise test shall be conducted after performing Short Circuit Test. If Tank Vacuum & Pressure Test is to be carried out, then it shall be conducted before SC test.

ii) ($) The permanent deflection of the plate after the vacuum has been released shall not exceed the values specified below:

Horizontal Length of Flat Plate (in mm)	**Permanent deflection(in mm)**
Up to and including 750	5
751 to 1250	6.5
1251 to 1750	8
1751 to 2000	9.5
2001 to 2250	11
2251 to 2500	12.5
2501 to 3000	16
Above 3000	19

BHEL	TECHNICAL SPECIFICATION OIL FILLED TRANSFORMER SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)	PE-TS-512-302-E001A Issue No: 01 Rev. No. 00 Date : 28-08-2025

PAINTING REQUIREMENT

Package	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (in Microns)	Intermediate Coat (in Microns)	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT
a) Inside of tank and accessories (except M. Box)	Plain Area/Coastal Area		Oil & heat resistant fully glossy white,	1	30							30
c) Internal Radiator surface			Hot oil proof, low viscosity varnish			subsequent flushing with transformer oil						0
d) External surface of Transformer and accessories including M Box (except radiators)			Chemical resistant epoxy zinc phosphate primer	1	100	MIO (Micaceiousiron oxide) as intermediate paint	1	100	polyurethane finish paint (RAL 5012 Blue)	1	100	300
e) External Radiator surface			ISO 12944-5:2018, Table D.1, System no. G05.05 of priming	As per ISO 12944-5:2018, Table D.1, System no. G5.05	As per ISO 12944-5:2018, Table D.1, System no. G5.05				Painting with high quality full glossy outer finish paint (RAL 5012 Blue)	As per ISO 12944-5:2018, Table D.1, System no. G5.05	As per ISO 12944-5:2018, Table D.1, System no. G5.05	

Notes

1	Stainless Steel, Non- Ferrous and Galvanised item/portion will not be painted except radiator.
2	Anti tracking paint to be provided inside HV cable box.

बी एच ई एल BHEL	TECHNICAL SPECIFICATION OIL FILLED TRANSFORMER SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)	PE-TS-512-302-E001A Issue No: 01 Rev. No. 00 Date : 28-08-2025

PACKING REQUIREMENT

Sl. No.	DESCRIPTION
	Transportation of transformer shall be N2/Dry Air/Oil filled. Necessary arrangement to be done to maintain N2/Dry air pressure (if applicable) during transit and storage.
1	**Type of Packing:**
1.1	OPEN type: Items, which are not affected by water, dust & do not require protection and are generally not machined e.g. Transformer tanks with core and windings., Marshalling Kiosk, bushings mounted on tank . Blanking shall be provided at suitable points as per requirement
1.2	PARTIALLY PACKED: Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene film. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film. Items required partially packing is Conservator fitted with MOG.
1.3	Crate packing: Items Assembles, which need physical protection e.g. Radiator, Roller Assy., Pipe work, Cable Box etc.
1.4	CASE PACKING: Delicate components likely to be damaged e.g. MOG, Buccholz Relay, OTI & WTI,breather,PRD etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. The cartons shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel. Empty space in the cartons shall be filled with rubberized coir to get proper cushioning effect. Small and medium size components/assemblies/equipment due to size/ weight & to avoid handling & pilferage problems i.e. , All hardware's, Gaskets, Conservator Isolation Valve, Gun Metal/Butterfly/CI Valves.Cable Glands, Terminal Connector, All copper & Brass items like Connectors, Breather, Loose items of Tap Changers, Silica-gel, Paint, Cables, Cleating belts etc. shall be despatched in case packing.
1.5	Transformer Oil for first filling including Spare Oil (which maybe required for refilling at site) to be dispatch along with transformer, in case Non-Returnable Sealed Drums used sam shall having label mark of transformer rating & S. No. as per manufacturer's practice & to be dispatch along with transformer. Extra Oil shall be dispatched in Non-Returnable Sealed Drums with proper marking of Volume, Vendor details and label mark of Extra Oil.
1.6	Maximum 4 radiators shall be stacked inside a crate.
1.7	**CRATE PACKING DETAILS : PREPARATION OF PACKING CASES:**
1.7.1	**DIMENSIONS**
a	Minimum number of planks shall be used for a crate.
b	Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm.
c	Horizontal, vertical, diagonal planks shall be given for binding.
d	Suitable Width of binding planks shall be provided.
e	Suitable distance between any 2 binding planks shall be provided.
f	Diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm.
g	Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

1.7.2	**JOINTING OF PLANKS**
	Single length planks shall be used for cubicles whose overall length is less than 2400mm.
1.7.3	**TONGUE AND GROOVE JOINTS**
	Two consecutive planks shall be joined by tongue and groove joint. Suitable depth and thickness of tongue shall be provided. The groove dimensions shall be such that the tongue fits tightly into the groove to make a good joint. This type of joint can be done based on the product requirement wherever required
1.7.4	**PERMISSIBLE DEFECTS**
	Wood shall be free from knots, bows, visible sign of infection and any kind of decay caused by insects, fungus, etc. Surface cracks: Surface cracks with a maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.
1.8	**OTHER MATERIALS**
1.8.1	**NAILS**
	Adequate diameter and length of nails shall be provided.
1.8.2	**BLUE NAILS**
	These are used for nailing bituminized Kraft paper/hessian cloth to the planks. Suitable length to be provided.
1.8.3	**HOOP IRON STRIPS**
	These are used for strapping the boxes. The material shall be free from rust. If sufficient nailing is done for bigger boxes, strapping need not be done.
1.8.4	**CLIPS**
	These shall be used for strapping the hoop iron strips on the boxes.
1.8.5	**BRACKETS**
	These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of suitable. The brackets shall be of “L" shape. Two holes shall be provided towards the end of each side for screwing /nailing.
1.8.6	**MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM**
	100GSM (Colourless) Multi Layered Cross Laminated Polyethylene Film are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.
1.8.7	**RUBBERISED COIR**
	The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir.
1.8.8	**FASTENERS**
	Bolts, double nuts, spring washers will have to be used to hold the job that there shall be no jerk.
1.8.9	**PACKING SLIP**
	Packing slip kept in the polyethylene bag shall be placed in the box at appropriate place. In addition, one more packing slip covered in polyethylene cover and packing slip holder shall be nailed to front / rear of case.
1.8.10	**MARKING PLATE**
	Marking on the packing case shall be done as per the manufacturer standard.

DOCUMENTATION REQUIREMENT

11 (a) DRAWINGS & DOCUMENTS TO BE SUBMITTED ALONG WITH THE BID

S. NO.	DOCUMENT TITLE
1	PQR CREDENTIALS (along with dully filled Sub-Vendor Questionnaire with supporting documents & ATTACHMENT - 3K)
2	COMPLIANCE SHEET

11 (b) DRAWINGS & DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT

S. NO.	BHEL/NTPC DRG/DOC NUMBER	CATEGORY	DRG/DOC TITLE	Vendor submission (days) *	BHEL comment (days)	Vendor submission (days) #	BHEL and Customer comment/ approval (Days)	Remarks
1	PE-V0-512-302-E901/ 1150-001-215-QVE-Q-212	PRIMARY	MANUFACTURING QUALITY PLAN FOR SERVICE TRANSFORMERS	21	8	8	18	Vendor endorsed NTPC Quality plan (0000-999-QOE-S-010) along with Annexure-A to quality plan & sub-vendor list to be signed and stamped and submitted.
2	PE-V0-512-302-E014/ 1150-001-215-PVE-B-009A	PRIMARY	2500 KVA SERVICE TRANSFORMER (11/0.433KV) OUTLINE GENERAL ARRANGEMENT DRAWING & FOUNDATION PLAN	21	8	8	18	
3	PE-V0-512-302-E013/ 1150-001-215-PVE-Y-2013	PRIMARY	2500 KVA SERVICE TRANSFORMER (11/0.433KV) TECHNICAL DATA SHEET AND RATING & DIAGRAM PLATE	21	8	8	18	
4	PE-V0-512-302-E015/ 1150-001-215-PVE-Y-2014	PRIMARY	MISCELLANEOUS DOCUMENTS FOR 11/0.433 KV, 2.5 MVA, OIL FILLED TRANSFORMER	21	8	8	18	
5	PE-V0-512-302-E011/ 1150-001-215-PVE-B-065	PRIMARY	2000 KVA SERVICE TRANSFORMER (11/0.433KV) OUTLINE GENERAL ARRANGEMENT DRAWING & FOUNDATION PLAN	21	8	8	18	
6	PE-V0-512-302-E010/ 1150-001-215-PVE-Y-053	PRIMARY	2000 KVA SERVICE TRANSFORMER (11/0.433KV) TECHNICAL DATA SHEET AND RATING & DIAGRAM PLATE	21	8	8	18	
7	PE-V0-512-302-E012/ 1150-001-215-PVE-Y-157	PRIMARY	MISCELLANEOUS DOCUMENTS FOR 11/0.433 KV, 2 MVA, OIL FILLED TRANSFORMER	21	8	8	18	
8	PE-V0-512-302-E002/ Later	PRIMARY	2.5 MVA AUXILIARY TRANSFORMER (11/3.45KV) OUTLINE GENERAL ARRANGEMENT DRAWING & FOUNDATION PLAN	21	8	8	18	
9	PE-V0-512-302-E001/ Later	PRIMARY	2.5 MVA AUXILIARY TRANSFORMER (11/3.45KV) TECHNICAL DATA SHEET AND RATING & DIAGRAM PLATE	21	8	8	18	
10	PE-V0-512-302-E003/ Later	PRIMARY	MISCELLANEOUS DOCUMENTS FOR 11/3.45 KV, 2.5 MVA, OIL FILLED AUXILIARY TRANSFORMER	21	8	8	18	

11	PE-V0-512-302-E008/ 1150-001-215-PVE-B-061	PRIMARY	1600 KVA SERVICE TRANSFORMER (11/0.433KV) OUTLINE GENERAL ARRANGEMENT DRAWING & FOUNDATION PLAN	35	8	8	18	
12	PE-V0-512-302-E007/ 1150-001-215-PVE-Y-050	PRIMARY	1600 KVA SERVICE TRANSFORMER (11/0.433KV) TECHNICAL DATA SHEET AND RATING & DIAGRAM PLATE	35	8	8	18	
13	PE-V0-512-302-E009/ 1150-001-215-PVE-W-158	PRIMARY	MISCELLANEOUS DOCUMENTS FOR 11/0.433 KV, 1.6 MVA, OIL FILLED TRANSFORMER	35	8	8	18	
14	PE-V0-512-302-E002/ 1150-001-215-PVE-B-056	PRIMARY	630 KVA SERVICE TRANSFORMER (11/0.433KV) OUTLINE GENERAL ARRANGEMENT DRAWING & FOUNDATION PLAN	35	8	8	18	
15	PE-V0-512-302-E001/ 1150-001-215-PVE-Y-052	PRIMARY	630 KVA SERVICE TRANSFORMER (11/0.433) TECHNICAL DATA SHEET AND RATING & DIAGRAM PLATE	35	8	8	18	
16	PE-V0-512-302-E003/ 1150-001-215-PVE-Y-2012	PRIMARY	MISCELLANEOUS DOCUMENTS FOR 11/0.433 KV, 0.63 MVA, OIL FILLED TRANSFORMER	35	8	8	18	
17	PE-V0-512-302-E805E/ 1150-001-215-PVE-W-2021	## PRIMARY/ SECONDARY (refer note 2)	2500 KVA SERVICE TRANSFORMER TYPE TEST REPORTS	** Refer Note 1	-	-	-	
18	PE-V0-512-302-E805D/ 1150-001-215-PVE-W-2020	## PRIMARY/ SECONDARY (refer note 2)	2000 KVA SERVICE TRANSFORMER TYPE TEST REPORTS	** Refer Note 1	-	-	-	
19	PE-V0-512-302-E805C/ 1150-001-215-PVE-W-2019	## PRIMARY/ SECONDARY (refer note 2)	1600 KVA SERVICE TRANSFORMER TYPE TEST REPORTS	** Refer Note 1	-	-	-	
20	PE-V0-512-302-E805A/ 1150-001-215-PVE-W-2017	## PRIMARY/ SECONDARY (refer note 2)	630 KVA SERVICE TRANSFORMER TYPE TEST REPORTS	** Refer Note 1	-	-	-	
21	PE-V0-512-302-E805A/ Later	## PRIMARY/ SECONDARY (refer note 2)	2.5 MVA AUXILIARY TRANSFORMER TYPE TEST REPORTS	** Refer Note 1	-	-	-	
22	PE-V0-512-302-E804/ 1150-001-215-PVE-W-2016	SECONDARY	SERVICE/AUXILIARY TRANSFORMER (UP TO 2.5MVA) TYPE TEST PROCEDURE	&& 60	8	8	18	
23	PE-V0-512-302-E017/ 1150-001-215-PVE-H-007A	SECONDARY	PAINTING PROCEDURE FOR OIL TYPE TRANSFORMERS	35	8	8	18	
24	PE-V0-512-302-E802/ 1150-001-215-PVE-X-2015	SECONDARY	SERVICE/AUXILIARY TRANSFORMER (UP TO 2.5MVA) O & M MANUAL	Refer remarks	8	8	18	within 60 days of final primary drawing approval or within 14 days of last Type/Special test report approval (as applicable).
25	PE-V0-512-302-E044	SECONDARY	PACKING LIST (2.5 MVA, 11/0.433 KV)	Refer remarks	8	8	8	before 30 days of final routine inspection of first transformer.
26	PE-V0-512-302-E045	SECONDARY	PACKING LIST (2.0 MVA, 11/0.433 KV)	Refer remarks	8	8	8	before 30 days of final routine inspection of first transformer.
27	PE-V0-512-302-E046	SECONDARY	PACKING LIST (1.6 MVA, 11/0.433 KV)	Refer remarks	8	8	8	before 30 days of final routine inspection of first transformer.

28	PE-V0-512-302-E047	SECONDARY	PACKING LIST (0.63 MVA, 11/0.433 KV)	Refer remarks	8	8	8	before 30 days of final routine inspection of first transformer.
29	PE-V0-512-302-E043	SECONDARY	PACKING LIST (2.5 MVA, 11/3.45 KV)	Refer remarks	8	8	8	before 30 days of final routine inspection of first transformer.
30	PE-V0-512-302-E048	SECONDARY	CALCULATION & PACKING LIST FOR EXTRA OIL	Refer remarks	8	8	8	Within 15 days after approval of last Type Test report.
31	PE-V0-512-302-E049	SECONDARY	DESIGN CALCULATIONS FOR SHORT CIRCUIT CAPABILITY (as applicable)	35	8	8	18	Along with Type/Special Test Report of Transformer (only required if short circuit test is not conducted).
32	PE-V0-512-302-E155	SECONDARY	FINAL ROUTINE TEST REPORT OF TRANSFORMERS	Refer remarks	-	-	-	After completion of Routine Test.

Note:

1	* 1st submission within indicated days from date of purchase order. # Submission (within indicated days) after incorporating all BHEL comments. Drawing/Document No. mentioned 'Later' shall be provided after award of contract, further for BHEL other unit, Drawing/Document No. (if applicable) to be provided after award of contract. There will be no chagne in Drawing/Document submission/re-submission for same. In case there are minor changes required w.r.t. cable size, CT parameters, foundation etc. by BHEL other unit, same to be implemented without any time & cost implication.
2	## Case 1: If Type/Special Test Report is available and Type/Special test conduction is not required as per technical Specification, Type/Special test report to be submitted as below: R-0 within days mentioned for primary documents from date of PO & subsequent revisions within 8 days of comments received from BHEL. BHEL shall furnish comments/ approval on each submission within 18 days from receipt. Case 2: If Type/Special Test Report is not available as per technical Specification and/or Type/Special Test Report submitted as per Case 1 is not approved by BHEL/NTPC, newly conducted test report to be submitted as below: R0 within 3 weeks of conduction of last Type/Special/Special test & revisions within 8 days of comments received from BHEL. BHEL shall furnish comments/ approval on each submission within 18 days from receipt. ** For Case 1 above, the document shall be "PRIMARY" and for Case - 2 the document shall be "SECONDARY" && In case Type/Special Test Report for all rating is available & same is approved by BHEL/NTPC, document becomes NA.
3	Vendor shall submit the dates for drawing/document submission/BHEL comments/resubmission after approval of documents.
4	In BOM each of the item to be uniquely identified with item code no. or item Sl. no. Supplier to ensure that all the items which will find separate mention in the packing list are covered in detailed BOM.Supplier to give following undertaking in BOM: " The BOM provided here completes the scope (in content and intent) of material supply under PO no. ---- dtd ----- Any additional material which may become necessary for the intended application of supplied item/package will be supplied free of cost in most reasonable time."
5	Primary documents shall be considered for Delay analysis
6	Vendor to submit OGA & Foundation drawing of each rating transformer in AutoCad format for internal use of BHEL.

11 (c) DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT

Sl. No.	DOCUMENT TITLE
1	GA and foundation drawings (if applicable)

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/stamping this compliance certificate and furnishing same with the offer

1	It is hereby confirm that the technical specification (sheet 1 to 70) has been read, understood. We confirm compliance to the tender specification including any clarification and amendments without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked for in NIT shall stand withdrawn.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder :

Date:

SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)
OIL FILLED AUXILIARY SERVICE TRANSFORMERS
PRICE SCHEDULE

Sr. No.	Item code	Item Description	Unit	Total Quantity	Quantity (PEM)	Quantity (ISG)	Quantity (TBG)	Unit Ex-Works Price (INR)
	COMPLETE TRANSFORMER WITH ACCESSORIES & OIL AS PER SPECIFICATION (Type & Nos. of Transformers, as below)							
1.0	302-0110006-00-A	630 KVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=4.5%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NOS	4	2	0	2	
2.0	302-0110008-00-A	1600 KVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=6.25%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NOS	8	8	0	0	
3.0	302-0110009-00-A	2000kVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=10.0%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NOS	14	14	0	0	
4.0	302-0110010-00-A	2500kVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=10.0%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NOS	13	7	6	0	
5.0	302-0110069-00-A	2500kVA, 11kV/3.45kV, 3 phase, 2 winding, outdoor, ONAN, Z=6.0%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with resistance grounded busbar type LVN termination)	NOS	2	2	0	0	
6.0	302-0110937-00-A	TYPE TEST FOR 630 KVA, 11/0.433kV Transformers Details as per Annexure-I S. No. 1	LOT	1				
7.0	302-0110202-00-A	TYPE TEST FOR 1600 KVA, 11/0.433kV Transformers Details as per Annexure-I S. No. 2	LOT	1				
8.0	302-0110205-00-A	TYPE TEST FOR 2000 KVA, 11/0.433kV Transformers Details as per Annexure-I S. No. 3	LOT	1				
9.0	302-0110203-00-A	TYPE TEST FOR 2500 KVA, 11/0.433kV Transformers Details as per Annexure-I S. No. 4	LOT	1				
10.0	302-0110943-00-A	TYPE TEST FOR 2500 KVA, 11/3.45kV Transformers Details as per Annexure-I S. No. 5	LOT	1				
	EXTRA OIL (5%) OF TOTAL VOLUME FOR ALL TRANSFORMERS IN SEALED NON RETURNABLE STANDARD DRUMS							
11.0	302-0110942-00-A	EXTRA OIL (5%)	LOT	1				
12.0	302-0110000-00-B	OIL FILLED SERVICE TRANSFORMER - Mandatory Spares Details as per Annexure-II	SET	1				
Total (1 to 12)								

NOTES

1. BIDDER TO NOTE THAT THE COST OF TRANSFORMER SHALL INCLUDE THE COST OF ROUTINE TESTS AND SHALL BE CARRIED OUT ON ALL TRANSFORMERS WITHOUT ANY ADDITIONAL COST. BIDDER SHALL QUOTE ACCORDINGLY.
2. BIDDER SHALL SUPPLY 5% EXTRA OIL AS PER THE QUOTED PRICE. QUANTITY OF EXTRA OIL SHALL BE SUBJECT TO APPROVAL DURING DETAIL ENGINEERING.
3. **CHARGES FOR CARRYING OUT SHORT CIRCUIT TEST SHALL BE PAYABLE BASED ON ACTUAL INVOICE FROM DESIGNATED LABORATORIES (CPRI, BHOPAL/ CPRI, BANGLORE / ERDA, VADODARA) WITH AN ADDITIONAL LUMP SUM AMOUNT OF 5% OF EX-WORKS PRICE OF TRANSFORMER BEING TESTED TO COVER HANDLING COSTS (TRANSPORTATION, INSURANCE ETC.).
4. IN CASE TYPE/ SPECIAL TESTS ARE WAIVED, THE TYPE/ SPECIAL TEST CHARGES SHALL NOT BE PAYABLE TO THE BIDDER.
5. CHARGES FOR ALL TYPE/ SPECIAL TESTS EXCEPT SHORT CIRCUIT TEST SHALL BE CONSIDERED FOR PRICE COMPARISON PURPOSE.
6. IN CASE ANY OF THE TYPE/ SPECIAL TESTS ARE REQUIRED TO BE REPEATED THE SAME SHALL BE CARRIED OUT BY THE VENDOR WITHOUT ANY COMMERCIAL / DELIVERY IMPLICATION TO BHEL.
7. PRICE VARIAION FOR TRANSFORMER SHALL BE APPLICABLE FOR THIS ENQUIRY AS PER IEEMA FORMULAE MENTIONED IN NIT, BASE MONTH BE **(Refer Enquiry), 2025** WITH UPPER CEILING LIMIT OF 20% & NO NEGATIVE CEILING LIMIT. PRICE VARIATION IS NOT APPLICABLE FOR EXTRA OIL, MANDATORY SPARES & TYPE TEST.

ANNEXURE-I

SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)
OIL FILLED AUXILIARY SERVICE TRANSFORMERS
PRICE SCHEDULE (TYPE/ SPECIAL TEST)

Sr. No.	Description of Type/ Special Test	Unit	Quantity	Unit Prices (INR)
1.0	630 KVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=4.5%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NO.		
1.a	TANK PRESSURE TEST	NO.	1	
1.b	TANK VACUUM TEST	NO.	1	
1.c	MEASUREMENT OF ACOUSTIC NOISE LEVEL AS PER NEMA TR-1 (SPECIAL TEST)	NO.	1	
1.d	TEMPERATURE RISE TEST AT A TAP CORRESPONDING TO MAXIMUM LOSSES. (Gas Chromatography shall be conducted on oil sample taken before & immediately after temp. rise test. Gas analysis shall be as per IS: 9434 (based on IEC: 60567), results will be interpreted as per IS: 10593 (based on IEC: 60599). Result shall be recorded for future reference).	NO.	1	
1.e	LIGHTNING IMPULSE (FULL & CHOPPED WAVE) TEST ON WINDINGS (AS PER IEC 60076-3)	NO.	1	
1.f	SHORT CIRCUIT TEST (SPECIAL TEST) AS PER IEC 60076-5**	NO.	1	AS PER NOTE 1
2.0	1600kVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=6.25%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NO.		
2.a	TANK PRESSURE TEST	NO.	1	
2 b	TANK VACUUM TEST	NO.	1	
2 c	MEASUREMENT OF ACOUSTIC NOISE LEVEL AS PER NEMA TR-1 (SPECIAL TEST)	NO.	1	
2 d	TEMPERATURE RISE TEST AT A TAP CORRESPONDING TO MAXIMUM LOSSES. (Gas Chromatography shall be conducted on oil sample taken before & immediately after temp. rise test. Gas analysis shall be as per IS: 9434 (based on IEC: 60567), results will be interpreted as per IS: 10593 (based on IEC: 60599). Result shall be recorded for future reference).	NO.	1	
2 e	LIGHTNING IMPULSE (FULL & CHOPPED WAVE) TEST ON WINDINGS (AS PER IEC 60076-3)	NO.	1	
2 f	SHORT CIRCUIT TEST (SPECIAL TEST) AS PER IEC 60076-5**	NO.	1	AS PER NOTE 1

Sr. No.	Description of Type/ Special Test	Unit	Quantity	Unit Prices (INR)
3.0	2000kVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=10.0%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NO.		
3.a	TANK PRESSURE TEST	NO.	1	
3 b	TANK VACUUM TEST	NO.	1	
3 c	MEASUREMENT OF ACOUSTIC NOISE LEVEL AS PER NEMA TR-1 (SPECIAL TEST)	NO.	1	
3 d	TEMPERATURE RISE TEST AT A TAP CORRESPONDING TO MAXIMUM LOSSES. (Gas Chromatography shall be conducted on oil sample taken before & immediately after temp. rise test. Gas analysis shall be as per IS: 9434 (based on IEC: 60567), results will be interpreted as per IS: 10593 (based on IEC: 60599). Result shall be recorded for future reference).	NO.	1	
3 e	LIGHTNING IMPULSE (FULL & CHOPPED WAVE) TEST ON WINDINGS (AS PER IEC 60076-3)	NO.	1	
3 f	SHORT CIRCUIT TEST (SPECIAL TEST) AS PER IEC 60076-5**	NO.	1	AS PER NOTE 1
4.0	2500kVA, 11kV/0.433kV, 3 phase, 2 winding, outdoor, ONAN, Z=10.0%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with solidly grounded LVN termination)	NO.		
4.a	TANK PRESSURE TEST	NO.	1	
4 b	TANK VACUUM TEST	NO.	1	
4 c	MEASUREMENT OF ACOUSTIC NOISE LEVEL AS PER NEMA TR-1 (SPECIAL TEST)	NO.	1	
4 d	TEMPERATURE RISE TEST AT A TAP CORRESPONDING TO MAXIMUM LOSSES. (Gas Chromatography shall be conducted on oil sample taken before & immediately after temp. rise test. Gas analysis shall be as per IS: 9434 (based on IEC: 60567), results will be interpreted as per IS: 10593 (based on IEC: 60599). Result shall be recorded for future reference).	NO.	1	
4 e	LIGHTNING IMPULSE (FULL & CHOPPED WAVE) TEST ON WINDINGS (AS PER IEC 60076-3)	NO.	1	
4 f	SHORT CIRCUIT TEST (SPECIAL TEST) AS PER IEC 60076-5**	NO.	1	AS PER NOTE 1

Sr. No.	Description of Type/ Special Test	Unit	Quantity	Unit Prices (INR)
5.0	2500kVA, 11kV/3.45kV, 3 phase, 2 winding, outdoor, ONAN, Z=6.0%, Dyn1, OFF Circuit taps ±5% in steps of 2.5% (with cable box type HV, with bus-duct type LV and with resistance grounded busbar type LVN termination)	NO.		
5.a	TANK PRESSURE TEST	NO.	1	
5 b	TANK VACUUM TEST	NO.	1	
5 c	MEASUREMENT OF ACOUSTIC NOISE LEVEL AS PER NEMA TR-1 (SPECIAL TEST)	NO.	1	
5 d	TEMPERATURE RISE TEST AT A TAP CORRESPONDING TO MAXIMUM LOSSES. (Gas Chromatography shall be conducted on oil sample taken before & immediately after temp. rise test. Gas analysis shall be as per IS: 9434 (based on IEC: 60567), results will be interpreted as per IS: 10593 (based on IEC: 60599). Result shall be recorded for future reference).	NO.	1	
5 e	LIGHTNING IMPULSE (FULL & CHOPPED WAVE) TEST ON WINDINGS (AS PER IEC 60076-3)	NO.	1	
5 f	LIGHTNING IMPULSE ON NEUTRAL	NO.	1	
5 g	SHORT CIRCUIT TEST (SPECIAL TEST) AS PER IEC 60076-5**	NO.	1	AS PER NOTE 1
Total				

NOTES

1 **CHARGES FOR CARRYING OUT SHORT CIRCUIT TEST SHALL BE PAYABLE BASED ON ACTUAL INVOICE FROM DESIGNATED LABORATORIES (CPRI, BHOPAL/ CPRI, BANGLORE / ERDA, VADODARA) WITH AN ADDITIONAL LUMP SUM AMOUNT OF 5% OF EX-WORKS PRICE OF TRANSFORMER BEING TESTED TO COVER HANDLING COSTS (TRANSPORTATION, INSURANCE ETC.).

2 IN CASE TYPE/ SPECIAL TESTS ARE WAIVED, THE TYPE/ SPECIAL TEST CHARGES SHALL NOT BE PAYABLE TO THE BIDDER

3 CHARGES FOR ALL TYPE/ SPECIAL TESTS EXCEPT SHORT CIRCUIT TEST SHALL BE CONSIDERED FOR PRICE COMPARISONS PURPOSE.

4 IN CASE ANY OF THE TYPE/ SPECIAL TESTS ARE REQUIRED TO BE REPEATED THE SAME SHALL BE CARRIED OUT BY THE VENDOR WITHOUT ANY COMMERCIAL / DELIVERY IMPLICATION TO BHEL.

ANNEXURE-II

SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)
OIL FILLED AUXILIARY SERVICE TRANSFORMERS
PRICE SCHEDULE (MANDATORY SPARE)

Sr. No.	Item code	Item Description	Unit	Total Quantity	Quantity (PEM)	Quantity (ISG)	Unit Ex-Works Price (INR)
1		HV bushing with metal parts & gaskets	NO EACH RATING				
1 a		11.0/0.433kV, 630KVA	NO.	3	3	0	
1 b		11.0/0.433kV, 1600 KVA	NO.	3	3	0	
1 c		11.0/0.433kV, 2000 KVA	NO.	3	3	0	
1 d		11.0/0.433kV, 2500 KVA	NO.	6	3	3	
1 e		11.0/3.45kV, 2500 KVA	NO.	3	3	0	
2		LV bushing with metal parts & gaskets	NO EACH RATING				
2 a		11.0/0.433kV, 630KVA	NO.	3	3	0	
2 b		11.0/0.433kV, 1600 KVA	NO.	3	3	0	
2 c		11.0/0.433kV, 2000 KVA	NO.	3	3	0	
2 d		11.0/0.433kV, 2500 KVA	NO.	6	3	3	
2 e		11.0/3.45kV, 2500 KVA	NO.	3	3	0	
3		LV Neutral bushing with metal parts & gaskets	NO EACH RATING				
3 a		11.0/0.433kV, 630KVA	NO.	1	1	0	
3 b		11.0/0.433kV, 1600 KVA	NO.	1	1	0	
3 c		11.0/0.433kV, 2000 KVA	NO.	1	1	0	
3 d		11.0/0.433kV, 2500 KVA	NO.	2	1	1	
3 e		11.0/3.45kV, 2500 KVA	NO.	1	1	0	
4		WTI with contacts	NO EACH RATING				
4 a		11.0/0.433kV, 630KVA	NO.	1	1	0	
4 b		11.0/0.433kV, 1600 KVA	NO.	1	1	0	
4 c		11.0/0.433kV, 2000 KVA	NO.	1	1	0	
4 d		11.0/0.433kV, 2500 KVA	NO.	2	1	1	
4 e		11.0/3.45kV, 2500 KVA	NO.	1	1	0	
5		OTI with contacts	NO EACH RATING				
5 a		11.0/0.433kV, 630KVA	NO.	1	1	0	
5 b		11.0/0.433kV, 1600 KVA	NO.	1	1	0	
5 c		11.0/0.433kV, 2000 KVA	NO.	1	1	0	
5 d		11.0/0.433kV, 2500 KVA	NO.	2	1	1	
5 e		11.0/3.45kV, 2500 KVA	NO.	1	1	0	
6		Pressure relief Device	NO EACH RATING				
6 a		11.0/0.433kV, 630KVA	NO.	1	1	0	
6 b		11.0/0.433kV, 1600 KVA	NO.	1	1	0	
6 c		11.0/0.433kV, 2000 KVA	NO.	1	1	0	
6 d		11.0/0.433kV, 2500 KVA	NO.	2	1	1	
6 e		11.0/3.45kV, 2500 KVA	NO.	1	1	0	

SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)
OIL FILLED AUXILIARY SERVICE TRANSFORMERS
PRICE SCHEDULE (MANDATORY SPARE)

Sr. No.	Item code	Item Description	Unit	Total Quantity	Quantity (PEM)	Quantity (ISG)	Unit Ex-Works Price (INR)
7		MOG	NO EACH RATING				
7 a		11.0/0.433kV, 630KVA	NO.	1	1	0	
7 b		11.0/0.433kV, 1600 KVA	NO.	1	1	0	
7 c		11.0/0.433kV, 2000 KVA	NO.	1	1	0	
7 d		11.0/0.433kV, 2500 KVA	NO.	2	1	1	
7 e		11.0/3.45kV, 2500 KVA	NO.	1	1	0	
8		Buchholz relay complete	NO EACH RATING				
8 a		11.0/0.433kV, 630KVA	NO.	1	1	0	
8 b		11.0/0.433kV, 1600 KVA	NO.	1	1	0	
8 c		11.0/0.433kV, 2000 KVA	NO.	1	1	0	
8 d		11.0/0.433kV, 2500 KVA	NO.	2	1	1	
8 e		11.0/3.45kV, 2500 KVA	NO.	1	1	0	
9		Set of gaskets (see Note 1)	SET EACH RATING				
9 a		11.0/0.433kV, 630KVA	SET	1	1	0	
9 b		11.0/0.433kV, 1600 KVA	SET	1	1	0	
9 c		11.0/0.433kV, 2000 KVA	SET	1	1	0	
9 d		11.0/0.433kV, 2500 KVA	SET	2	1	1	
9 e		11.0/3.45kV, 2500 KVA	SET	1	1	0	
10		Set of valves	NO OF EACH TYPE/SIZE				
10 a		11.0/0.433kV, 630KVA	NO.	2	2	0	
10 b		11.0/0.433kV, 1600 KVA	NO.	2	2	0	
10 c		11.0/0.433kV, 2000 KVA	NO.	2	2	0	
10 d		11.0/0.433kV, 2500 KVA	NO.	4	2	2	
10 e		11.0/3.45kV, 2500 KVA	NO.	2	2	0	
Total							

NOTES

1 set consists of gaskets required for 1 No. transformer for the following
1 (a) protection and monitoring devices
(b) cooler circuit, if applicable
(c) largest inspection cover, if applicable
(d) HV/LV turret, if applicable
(e) OCTC inspection cover, if applicable

	PRE-QUALIFYING REQUIREMENTS FOR OIL FILLED SERVICE TRANSFORMERS SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)	DOC. NO. PE-PQ-512-302-E001 REV. 0 DATE: 19/08/2025 SHEET 1 OF 1

ITEMS: OIL FILLED AUXILIARY AND SERVICE TRANSFORMERS

SCOPE:

Supply : YES

Erection & Commissioning : No

1. The Bidder should have manufactured & supplied at least one number (one installation) of 16 MVA, 11 kV or higher rating oil filled transformers which should have been in successful operation for a period of at least two (2) years before the date of **05.03.2024**.
2. Bidder should have his own facilities for conducting all routine and type tests as per IS: 2026 (except short circuit test).
3. 16 MVA, 11 kV or higher rated oil filled transformer manufactured by bidder should have been successfully short circuit tested.
4. Minimum two (2) nos. purchase orders for oil filled transformers (500 KVA or above, HV Wdg - 3.3 kV or above & LV Wdg - 415/433 V or above) shall be submitted which should not be more than five (5) years old from the date of techno- commercial bid opening for establishing continuity in business.

Notes:

1. Equipment designed by the Bidder by itself or through its collaborator/associate/technology provider/licensor for reference plant, shall also be considered meeting the requirement of design.
2. Cut-off date for credentials shall be considered same as date of techno-commercial bid opening.
3. **Consideration of offer shall be subject to customer's approval of bidders**.
4. PQR Clauses 1, 2 & 3 are customer's requirement. Further, Note No. 1 is specified by customer & are applicable for PQR Clauses 1, 2 & 3 only.
5. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
6. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
7. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.
8. Attached Annexure-1 to be filled by the bidders on quality & general terms. Requisite Documents (like factory registration certificate, R&D set-up details etc.) asked in the Annexure-1, shall also be attached as Annexure-F2.1 to Annexure F2.17 along with the filled response in the Annexure-1.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
19/08/25	22/8/25	23/8/25	27/8/25
SURYA DEV (MGR.)	SOURABH TIWARI (SR. MGR.)	PRAVEEN DUTTA (AGM)	DEBASISA RATH (GM & DH ELECTRICAL)

ANNEXURE-I

SUB-VENDOR QUESTIONNAIRE

i.	***Item/Scope of Sub-contracting***			
ii.	***Address of the registered office***	***Details of Contact Person (Name, Designation, Mobile, Email)***		
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured***	***Details of Contact Person: (Name, Designation, Mobile, Email)***		
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting***			
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting***			
vi.	***Details of proposed works***			
1.	***Year of establishment of present works***			
2.	***Year of commencement of manufacturing at above works***			
3.	***Details of change in Works address in past (if any)***			
4.	***Total Area***			
	Covered Area			
5.	***Factory Registration Certificate***	***Details attached at Annexure – F2.1***		
6.	***Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)***	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)***		
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)***	***Details attached at Annexure – F2.3***		
8.	***After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)***	***Applicable / Not applicable Details attached at Annexure – F2.4***		
9.	***Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any***	***Details attached at Annexure – F2.5***		
10.	***Sources of Raw Material/Major Bought Out Item***	***Details attached at Annexure – F2.6***		
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing***	***Details attached at Annexure – F2.7***		

ANNEXURE-I

SUB-VENDOR QUESTIONNAIRE

12.	***Manufacturing facilities*** ***(List of machines, special process facilities, material handling etc.)***	***Details attached at Annexure – F2.8***
13.	***Testing facilities*** ***(List of testing equipment)***	***Details attached at Annexure – F2.9***
14.	***If manufacturing process involves fabrication then-*** ***List of qualified Welders*** ***List of qualified NDT personnel with area of specialization***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.10*** ***(if applicable)***
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses***	***Applicable / Not applicable*** ***Details attached at Annexure. –F2.11*** ***(if applicable)***
16.	***Supply reference list including recent supplies***	***Details attached at Annexure – F2.12*** ***(as per format given below)***

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback***	***Attached at annexure - F2.13***
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)*** ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.14*** ***(if applicable)***
19.	***Statutory / mandatory certification for the proposed product***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.15*** ***(if applicable)***
20.	***Copy of ISO 9001 certificate (if available)***	***Attached at Annexure – F2.16***
21.	***Product technical catalogues for proposed item (if available)***	***Details attached at Annexure – F2.17***

Name:		***Desig:***		***Sign:***		***Date:***	

Company's Seal/Stamp:-

Sub QR Data to be filled in to meet the proveness requirements (Refer Clause No. 5.12.1 of Sub-Section-IA provenness , Part-A, Section-VI. **for AUXILIARY OIL FILLED TRANSFORMERS AND HT TRANSFORMERS**

(I) We hereby confirm that We/Subvendor M/s ..... have manufactured & supplied atleast one (1) number (One installation) of 16MVA, 11 KV or higher rating oil filled transformers which have been in successful operation for a period of atleast two (2) years as per stipulated requirements mentioned at Clause No.5.12.1 of Sub-Section- IA provenness, Part-A of Section-VI. The details of the same are given below:

Sl. No.	Item Description	Installation No. 1
1.00.00	Name of the Installation and its location	
1.01.00	Client name and its address, Fax and Tel. No., email id	
1.02.00	Name and designation of the responsible person in client's organization	
1.03.00	Contract No. & Date	
1.04.00	Voltage Ratio	
1.05.00	MVA Ratings	
1.06.00	Voltage Class of Transformers	

Sl.	Item Description	Installation

Signature **of authorized signatory.....**

No.			No. 1
1.07.00	Date of Com-missioning of transformers		
1.08.00	Date of commencement of successful operations		
1.09.00	Scope of work executed for aforesaid trans-formers included the following :		
	(i)	Manufactured	Yes/No
	(ii)	Supplied	Yes/No
1.10.00	No. of years in successful operation		

Signature **of authorized signatory.....**

Sl. No.	Item Description	Installation No. 1
2.00.00	Certificate(s) from the client(s) are enclosed along with the bid at Annexure-…….to this Attachement-3K.	

II. We hereby further confirm that we/sub-vendor M/s ..... have our/his own facilities for conducting all routine and type tests on transformers as per IS:2026 (except short circuit test) as per Clause No. 5.12.2 of Sub-Section- IA provenness Part-A of Section-VI. The details of the same are given below:

Sl. No.	Name of Test	Yes/No

Note :

1) Sub-vendor to use their own performa for giving details of all routine and type test facilities available with them.

2) Certificates from client(s) must also be attached as Annexure..... to this Attachment-3K.

Signature **of authorized signatory.....**

III. We/sub-vendor ..... hereby confirm that 16MVA, 11KV Class or higher rated oil filled transformer manufactured by We/sub-vendor have been successfully short circuit tested as per requirement of Clause No. 5.12.3 of Sub-Section- IA provenness, Part-A of Section-VI. The details of the same are given below:

Sl. No.	Item Description	Details
1.00.00	Name of the station and its location	
1.01.00	Client name and its address, Fax and Tel. No. ., email id	
1.02.00	Name and designation of the responsible person in client's organisation	
1.03.00	Contract No. & Date	
1.04.00	Voltage Ratio	
1.05.00	MVA Ratings	

Signature **of authorized signatory.....**

Sl. No.	Item Description	Details
1.06.00	Voltage Class of transformers	
1.07.00	Short Circuit Test Carrying Agency (Test Lab) Name and Address	
1.08.00	Date of Short Circuit Test	
1.09.00	Short circuit test conducted successfully	Yes/No
2.00.00	Certificate(s) from the client(s) / Lab are enclosed along with the bid at Annexure-…… to this Attachement-3K.	

Note :

1) Sub-vendor may provide any additional information regarding short circuit test on transformers and enclose along with the proposal at Annexure..... to this Attachment-3K.

2) If needed Sub-vendor may use own performa for giving necessary details regarding short circuit test conducted on transformers and enclose with the proposal at Annexure..... to this Attachment-3K.

Date :

(Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature **of authorized signatory.....**

CIN No. U99999MH1970GAPO14629

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IEEMA/PVC/DIST_CU_upto 2.5 MVA/2021 Effective from: 01 September 2021

PRICE VARIATION CLAUSE FOR COPPER WOUND DISTRIBUTION TRANSFORMERS COMPLETE WITH ALL ACCESSORIES AND COMPONENTS (For single & three phase of ratings up to and including 2,500 KVA and voltage class up to 33 KV) supplied against domestic contracts

This price variation clause is applicable for 'Copper Wound Distribution Transformers', with rating up to and including 2,500 KVA and voltage class up to 33 KV supplied against domestic contracts. A separate price variation clause IEEMA/PVC/DIST_CU_upto 2.5 MVA/DE/2021 has been evolved for above types of Transformers supplied against export/deemed export contracts under special imprest licensing scheme.

The price quoted/confirmed is based on the input cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices/indices, the price payable shall be subject to adjustment, up or down in accordance with the following formula:

$$P = \frac{P_o}{100}\left(7 + 41\ \frac{C}{C_o} + 23\ \frac{ES}{ES_o} + 10\ \frac{IS}{IS_o} + 5\ \frac{IM}{IM_o} + 8\ \frac{TO}{TO_o} + 6\ \frac{W}{W_o}\right)$$

Wherein,

P = Price payable as adjusted in accordance with the above formula.

P_0 = Price quoted/confirmed.

C_0 = Price of CC copper rods (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of tendering.

ES_o = Price of CRGO Electrical Steel Lamination (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of tendering.

IS_o = Price of HR Coil of 3.15 mm thickness (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of tendering.

IM_0 = Price of Insulating Materials (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of tendering.

TO_0 = Price of Transformer Oil (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of tendering.

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CIN No. U99999MH1970GAPO14629

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W_0 = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100)
This index number is as applicable for the month, **THREE** months prior to the date of tendering.

For example, if date of tendering falls in December 2021, applicable prices of Copper (C_0), Transformer Oil (TO_0), CRGO Steel Sheets (ES_0), HR Coil (IS_0) and Insulating material (IM_0) should be as on 1st November 2021 and all India average consumer price index no. (W_0) should be for the month of September 2021.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC)/PWR_DIST_TRF (R-1)/_/_ **ONE** month prior to the date of tendering.

C = Price of CC copper rods (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of delivery.

ES = Price of CRGO Electrical Steel Lamination (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of delivery.

IS = Price of HR Coil of 3.15 mm thickness (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of delivery.

IM = Price of Insulating Materials (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of delivery.

TO = Price of Transformer Oil (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2016 = 100)
This index number is as applicable for the month, **THREE** months prior to the date of delivery.

For example, if date of delivery in terms of clause given below falls in December 2022, applicable prices of Copper (C), Transformer Oil (TO), CRGO Steel Sheets (ES), HR Coil (IS) and Insulating material (IM) should be as on 1st November 2022 and all India average consumer price index number (W) should be for the month of September 2022.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC)/PWR_DIST_TRF (R-1)/_/_ **ONE** month prior to the date of delivery.

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The date of delivery is the date on which the transformer is notified as being ready for inspection/dispatch (in the absence of such notification, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

Notes:

(a) All prices are exclusive of GST amount and exclusive of any other central, state or local taxes etc.

(b) Date of Tendering is as defined in enquiry. ~~the due date of tender submission or date of tender opening whichever is earlier~~

(c) The details of prices are as under:

1. Price of 8 mm CC copper rods (in Rs/MT) is ex-works price as quoted by the primary producer.

2. The price of CRGO Electrical Steel Lamination suitable for Transformers of voltage up to 33 KV is the average price as quoted by processing centres of mills and lamination suppliers

3. Price of steel is the average retail price of HR Coil 3.15 mm thickness as published by Joint Plant Committee (JPC) in Rs./MT.

4. The average price of Insulting materials (in Rs./Kg) of pre-compressed pressboards of size 3 mm and 10 mm thick, 3200 mm x 4100 mm C&F price in free currency per MT converted into Indian Rupees with applicable exchange rates prevailing as on 1st working day of the month as quoted by primary suppliers. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.

5. The price of Transformer Oil (in Rs./K.Ltr) is the average price on ex-refinery basis as quoted by primary producers for supply in drums.

(d) Some purchasers are purchasing oil immersed Transformers from manufacturers without first filling of oil. Oil for first filling is procured and filled by the purchasers. For such supplies PVC formula, excluding Oil will apply as under:

$$P = \frac{P_o}{92}\left(7 + 41\,\frac{C}{C_o} + 23\,\frac{ES}{ES_o} + 10\,\frac{IS}{IS_o} + 5\,\frac{IM}{IM_o} + 6\,\frac{W}{W_o}\right)$$

Where description of P, P_0, C, ES, IS, IM, W etc. remains same as mentioned earlier.

Director

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	PRE-QUALIFYING REQUIREMENTS FOR OIL FILLED SERVICE TRANSFORMERS SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW)	DOC. NO. PE-PQ-512-302-E001 REV. 0 DATE: 19/08/2025 SHEET 1 OF 1

ITEMS: OIL FILLED AUXILIARY AND SERVICE TRANSFORMERS

SCOPE:

Supply : YES

Erection & Commissioning : No

1. The Bidder should have manufactured & supplied at least one number (one installation) of 16 MVA, 11 kV or higher rating oil filled transformers which should have been in successful operation for a period of at least two (2) years before the date of **05.03.2024**.
2. Bidder should have his own facilities for conducting all routine and type tests as per IS: 2026 (except short circuit test).
3. 16 MVA, 11 kV or higher rated oil filled transformer manufactured by bidder should have been successfully short circuit tested.
4. Minimum two (2) nos. purchase orders for oil filled transformers (500 KVA or above, HV Wdg - 3.3 kV or above & LV Wdg - 415/433 V or above) shall be submitted which should not be more than five (5) years old from the date of techno- commercial bid opening for establishing continuity in business.

Notes:

1. Equipment designed by the Bidder by itself or through its collaborator/associate/technology provider/licensor for reference plant, shall also be considered meeting the requirement of design.
2. Cut-off date for credentials shall be considered same as date of techno-commercial bid opening.
3. **Consideration of offer shall be subject to customer's approval of bidders**.
4. PQR Clauses 1, 2 & 3 are customer's requirement. Further, Note No. 1 is specified by customer & are applicable for PQR Clauses 1, 2 & 3 only.
5. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
6. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
7. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.
8. Attached Annexure-1 to be filled by the bidders on quality & general terms. Requisite Documents (like factory registration certificate, R&D set-up details etc.) asked in the Annexure-1, shall also be attached as Annexure-F2.1 to Annexure F2.17 along with the filled response in the Annexure-1.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
19/08/25	22/8/25	23/8/25	27/8/25
SURYA DEV (MGR.)	SOURABH TIWARI (SR. MGR.)	PRAVEEN DUTTA (AGM)	DEBASISA RATH (GM & DH ELECTRICAL)

ANNEXURE-I

SUB-VENDOR QUESTIONNAIRE

i.	***Item/Scope of Sub-contracting***			
ii.	***Address of the registered office***	***Details of Contact Person (Name, Designation, Mobile, Email)***		
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured***	***Details of Contact Person: (Name, Designation, Mobile, Email)***		
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting***			
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting***			
vi.	***Details of proposed works***			
1.	***Year of establishment of present works***			
2.	***Year of commencement of manufacturing at above works***			
3.	***Details of change in Works address in past (if any)***			
4.	***Total Area***			
	Covered Area			
5.	***Factory Registration Certificate***	***Details attached at Annexure – F2.1***		
6.	***Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)***	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)***		
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)***	***Details attached at Annexure – F2.3***		
8.	***After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)***	***Applicable / Not applicable Details attached at Annexure – F2.4***		
9.	***Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any***	***Details attached at Annexure – F2.5***		
10.	***Sources of Raw Material/Major Bought Out Item***	***Details attached at Annexure – F2.6***		
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing***	***Details attached at Annexure – F2.7***		

ANNEXURE-I

SUB-VENDOR QUESTIONNAIRE

12.	***Manufacturing facilities*** ***(List of machines, special process facilities, material handling etc.)***	***Details attached at Annexure – F2.8***
13.	***Testing facilities*** ***(List of testing equipment)***	***Details attached at Annexure – F2.9***
14.	***If manufacturing process involves fabrication then-*** ***List of qualified Welders*** ***List of qualified NDT personnel with area of specialization***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.10*** ***(if applicable)***
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses***	***Applicable / Not applicable*** ***Details attached at Annexure. –F2.11*** ***(if applicable)***
16.	***Supply reference list including recent supplies***	***Details attached at Annexure – F2.12*** ***(as per format given below)***

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback***	***Attached at annexure - F2.13***
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)*** ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.14*** ***(if applicable)***
19.	***Statutory / mandatory certification for the proposed product***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.15*** ***(if applicable)***
20.	***Copy of ISO 9001 certificate (if available)***	***Attached at Annexure – F2.16***
21.	***Product technical catalogues for proposed item (if available)***	***Details attached at Annexure – F2.17***

Name:		***Desig:***		***Sign:***		***Date:***	

Company's Seal/Stamp:-

	PRE - QUALIFYING REQUIREMENTS
PROJECT:	**2X800 MW NTPC SINGRAULI**
PACKAGE:	**OIL FILLED SERVICE TRANSFORMER**

CRITERIA FOR EVALUATION - FINANCIAL :

	Amount (in Rs.)
Average annual financial turnover value during any three out of last six Financial Years as on tender due date should not be less than	**16,70,00,000**

Rs.Sixteen Crore Seventy Lakh only

Notes:-

a) The bidder has to submit financial accounts (audited, if applicable comprising of Audit report, Balance Sheet, Profit & Loss A/c Statement and Notes/Schedules pertaining to Turnover/Sales/Revenue), for any three out of last six Financial Years (or from the date of incorporation, whichever is less) as on tender due date to review the above criteria. In case the incorporation of vendor is less than 3 years, average annual financial turnover shall be calculated based on available information as below:-

i) If the accounts are available for <= 1 Financial Year, the Average Annual Turnover shall be calculated based on available information divided by 1 (One).

ii) If the accounts are available for >1 but < = 2 Financial Years, the Average Annual Turnover shall be calculated based on available information divided by 2 (Two).

iii) If the accounts are available for >2 but <= 3 Financial Years, the Average Annual Turnover shall be calculated based on available information divided by 3 (Three).

b) Foreign bidder is to submit a latest report from reputed third party business rating agency like Dun & Bradstreet, Credit reform etc. in addition to the documents mentioned at point (a) above for review of above criteria.

c) Other Income shall not be considered for arriving at Annual Turnover/Sales.For evaluation purpose,turnover figure excluding taxes shall be considered.

d) For evaluation of foreign bidder, exchange rate (TT selling rate of SBI) as on scheduled date of tender opening (Part-I bid in case of two part bid) shall be considered.

e)Bidder who is 50% or above subsidiary of any other company including those registered outside India and does not meet any of the above Financial Criteria, such bidder may be qualified based on credentials of its holding company provided such holding company meets the above PQR criteria. In such case, the Bidder would be required to furnish a Letter of Support from its Holding Company, pledging unconditional and irrevocable financial support for the execution of the Contract by the Bidder in case of award.

f)In cases where audited results for the last financial year as on the date of Techno Commercial bid opening are not available, a Certificate would be required from CEO/CFO stating that the financial results of the Company are under audit as on the date of Techno-commercial bid opening and are not available.