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STEEL AUTHORITY OF INDIA LIMITED
ISSCO STEEL PLANT, BURNPUR

PROJECT SPECIFIC REQUIREMENTS, DATA SHEET AND ENQUIRY FORMAT
FOR POWER TRANSFORMER

APPLICABLE SPECIFICATIONS: GT57129
APPLICABLE STANDARD: IS2026

PART-1

1.0: SITE CONDITIONS:

	Maximum ambient temperature	48°C
1.2	Minimum ambient temperature	09°C
1.3	Design ambient temperature	40°C
1.4	Maximum relative humidity	100%
1.5	Minimum relative humidity	20%
1.6	Altitude above MSL	135m
1.7	Environment	Dusty and corrosive industrial
1.8	Seismic zone	Zone III of IS1893
1.9	Site location	XXXX

2.0: OPERATING CONDITIONS:

2.1	Primary voltage/fault level	33kV/31.5 kA for 3 sec.
2.2	System earthing	
	HV side	NA (Delta connected)
	LV side	Through NGR (600A, 6.35ohms)
2.3	AC auxiliary voltage	415V+/- 10% TPN AC
2.4	DC auxiliary voltage	220V+/- 10%

3.0: GENERAL DATA:

3.1	Transformer tag no.	
3.2	Quantity	01
3.3	Duty	Continuous
3.4	Painting	Epoxy
3.5	Colour	Shade 632 of IS5
3.6	Installation	Outdoor

4.0: TRANSFORMER DETAILS:

4.1	No. of windings	2
4.2	No. of phases	3
4.3	Frequency	50Hz +/- 5%
4.4	Rated MVA	5MVA
4.5	Rated voltage (No load)	
	HV	33kV
	LV	11kV

Ref. Doc	Revisions : Refer to record of revisions :	Prepared :	Approved :	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	<table border="1"> <tr> <td>4.6</td> <td>Connection: HV side LV side</td> <td>Delta Star</td> </tr> <tr> <td>4.7</td> <td>Phase sequence: HV side LV side</td> <td>UVW As per IS 8623</td> </tr> <tr> <td>4.8</td> <td>% impedance</td> <td>10% with +/-5% tolerance</td> </tr> <tr> <td>4.9</td> <td>Vector group</td> <td>Dyn11</td> </tr> <tr> <td>4.10</td> <td>Insulation class</td> <td>A</td> </tr> <tr> <td>4.11</td> <td>Type of cooling</td> <td>ONAN</td> </tr> <tr> <td>4.12</td> <td>Type of oil</td> <td>Mineral, as per IS 335</td> </tr> <tr> <td>4.13</td> <td>Insulation level: Power frequency withstand: HV winding LV winding Impulse withstand: HV winding LV winding</td> <td>70kV rms 28kV rms 175kV peak 75kV peak</td> </tr> <tr> <td>4.14</td> <td>Winding insulation type HV LV</td> <td>Uniform Uniform</td> </tr> <tr> <td>4.15</td> <td>Creepage distance: HV-Total LV-Total</td> <td>22mm/kV 22mm/kV</td> </tr> <tr> <td>4.16</td> <td>Clearances: Phase to phase Phase to neutral</td> <td>As per CBIP As per CBIP</td> </tr> <tr> <td>4.17</td> <td>Power flow</td> <td>Unidirectional, from HV to LV</td> </tr> <tr> <td>4.18</td> <td>Normal load</td> <td>100%</td> </tr> <tr> <td>4.19</td> <td>Min. efficiency at 0.8 p.f. at 100% of rating</td> <td>99.3%</td> </tr> <tr> <td>4.20</td> <td>Load at which max. efficiency occurs</td> <td>55 %</td> </tr> <tr> <td>4.21</td> <td>Temperature rise above design ambient at extreme tap having max. losses: Oil/Winding</td> <td>45°C /50°C</td> </tr> <tr> <td>4.22</td> <td>Maximum hot spot temperature</td> <td>55°C</td> </tr> <tr> <td>4.22</td> <td>Tap changer: Type Location Range No. of steps</td> <td>Off circuit tap changer (OFTC or OCTC) HV winding +/-5% @ 2.5% 5</td> </tr> </table>				4.6	Connection: HV side LV side	Delta Star	4.7	Phase sequence: HV side LV side	UVW As per IS 8623	4.8	% impedance	10% with +/-5% tolerance	4.9	Vector group	Dyn11	4.10	Insulation class	A	4.11	Type of cooling	ONAN	4.12	Type of oil	Mineral, as per IS 335	4.13	Insulation level: Power frequency withstand: HV winding LV winding Impulse withstand: HV winding LV winding	70kV rms 28kV rms 175kV peak 75kV peak	4.14	Winding insulation type HV LV	Uniform Uniform	4.15	Creepage distance: HV-Total LV-Total	22mm/kV 22mm/kV	4.16	Clearances: Phase to phase Phase to neutral	As per CBIP As per CBIP	4.17	Power flow	Unidirectional, from HV to LV	4.18	Normal load	100%	4.19	Min. efficiency at 0.8 p.f. at 100% of rating	99.3%	4.20	Load at which max. efficiency occurs	55 %	4.21	Temperature rise above design ambient at extreme tap having max. losses: Oil/Winding	45°C /50°C	4.22	Maximum hot spot temperature	55°C	4.22	Tap changer: Type Location Range No. of steps	Off circuit tap changer (OFTC or OCTC) HV winding +/-5% @ 2.5% 5
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	5.0 TERMINAL DETAILS:																																																									
	Ref. Doc	5.1	Terminal location: HV side LV side w.r.t. HV	Smaller side 180 degrees																																																						

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5.2	Terminal connection:	
	HV side LV side	Cable box Cable box
5.3	Cable sizes	
	HV side LV side	1R x 3C x 185sq.mm. Al.* 2R x 3C x 185sq.mm. Al per phase*

5.0 CT DETAILS:

6.1	Neutral CT details:	
	On HV side: On LV side:	Not applicable. SEF CT: 600/5A, 15VA, 5P10.* REF CT: 600/1A, CL PS, $V_k > 500V$, $I_m \leq 30mA$ at $V_k/2$, $R_{ct} \leq 5\Omega$ at $75^\circ C$.*
6.2	Phase CT details:	
	On HV side: On LV side:	Bushing CT: 300/1A, CL PS, $V_k > 500V$, $I_m \leq 30mA$ at $V_k/2$, $R_{ct} \leq 5\Omega$ at $75^\circ C$.* Not applicable.

*- Cable sizes and CT details are tentative only & shall be finalized during detailed engineering.

7.0 ACCESSORIES (IN ADDITION TO IS2026):

7.1	Sampling valve	Yes
7.2	Top oil filter valve	Yes
7.3	Drain cum bottom filter valve	Yes
7.4	Explosion protection	PRV
7.5	Marshalling box (IP 55)	Yes
7.6	Winding Temperature Indicator and Oil Temperature Indicator	Digital display type thermometer with alarm and trip settings, manual reset and maximum readings display along with provision of two independent potential free contacts for alarm and trip.
7.7	Conservator drain valve	Yes
7.8	Air bag for conservator	Yes
7.9	Double float Buchholz relay	Yes
7.10	Separate neutral bushing outside terminal box with connector assembly	Yes
7.11	Disconnecting chamber	Yes
7.12	Inspection cover	Yes
7.13	Cross channels with towing lugs	Yes
7.14	Bidirectional Rollers	Yes
7.15	Φ distance of flat rollers	Yes
7.16	Transformer rails	Yes
7.17	Bus duct flange on LV side	Yes
7.18	Lugs and cable glands	Yes
7.19	Foundation hardware	Yes
7.20	Support structure	Yes
7.21	Ladder	Yes
7.22	Anti-earthquake clamping device	Yes

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	8.1	Transducer for providing 4-20mA signal for OTI and WTI	Required
	8.2	Digital outputs from cooling control panel	Not required
	8.3	Fan ON (for each fan)	Not required
	8.4	Fan tripped (for each fan)	Not required
	8.5	Auto/Manual mode	Not required
	9.0 TESTS REQUIRED:		
	9.1	Frequency response analysis	Required (on each transformer)
	9.2	Impulse test	Not required
	9.3	Heat run test	Not required
9.4	Vacuum test on tank	Required	
9.5	Pressure test on tank	Required (Twice the normal head pressure or normal pressure plus 35kN/sq.m whichever is lower. The measurement is at the bottom of the tank.)	
9.6	Short circuit test	Not required	
10.0 NOTES:			
1. For other type tests, test certificates for transformers of similar ratings and type, not older than 5 years are to be submitted for BHEL/customer review.			
2. The makes of accessories shall be of reputed Indian make.			
3. Spares: i) List of spares as indicated in the price format are to be quoted. ii) The spares requirement will be finalized at a later date as per project requirements. BHEL reserves the right to order the spares along with the main equipment or separately. The bidder will keep the price for the spares valid till execution of order or till 12 months from the date of P.O., whichever is later.			
11.0 PRICE FORMAT:			
1. The bidders will provide price list of main equipment, test charges and operation and maintenance spares (as indicated) as per the price format given in this data sheet in the price part of their offers. The bidders will also provide original un-priced price format, strictly in the BHEL price format provided, with the techno-commercial part of their offers. No other un-priced price format will be considered.			
2. The evaluation shall be done considering unit prices quoted for Sl. No. 1.1 and Sl. No. 2.0, along with the respective quantities. In case of any change in quantity at a later stage, unit prices will prevail.			
Ref. Doc			



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<u>PRICE FORMAT</u>							
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	1.0	Main equipment					
	1.1	33/11 kV, 5000kVA transformer		01 no.			
	2.0	Test charges					
	2.1	Frequency response analysis		1 unit			
	2.2	Vacuum test on tank		1 unit			
	2.3	Pressure test in tank		1 unit			
	3.0	Spares					
	3.1	LT Bushing		01 no.			
	3.2	HT Bushing		01 no.			
	3.3	Neutral Bushing		01 no.			
	3.4	Set of gaskets		01 no.			
	12.0 DEVIATION SCHEDULE: Deviations if any shall be clearly brought out only in the deviation schedule format given below: Deviations specified elsewhere or in any other format will not be accepted. Deviations on account of orientation, efficiency and accessories required will not be acceptable.						
	Sl.No.	Clause no./Spec no.	Deviation				
Ref. Doc							



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PART-2

(TO BE FILLED BY VENDOR AND SUBMITTED ALONG WITH THE OFFER)

NOTE: The bidder has to submit a typical GA drawing for each rating of the transformer being quoted, along with the offer, otherwise the offer will not be accepted.

1.0	Make	
2.0	Performance	
2.1	No load loss at 100% voltage 110% voltage	
2.2	Full load copper loss at 75°C	
2.3	No load current at 100% voltage 110% voltage	
2.4	Efficiency at full load at 75°C at 0.8 p.f. at 1.0 p.f.	
2.5	Efficiency at 3/4 load at 75°C at 0.8 p.f. at 1.0 p.f.	
2.5	Efficiency at 1/2 load at 75°C at 0.8 p.f. at 1.0 p.f.	
2.6	Maximum efficiency	
2.7	Load at which maximum efficiency occurs	80-90%
2.8	Regulation at 75°C at 0.8 p.f. at 1.0 p.f.	
3.0	Mechanical data:	
3.1	Core and winding weight	
3.2	Tank and fitting weight	
3.3	Radiator without oil weight	
3.4	Total weight	
3.5	Total quantity of oil	
3.6	Quantity of oil in radiators	
3.7	Overall dimensions Length Breadth Height	




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