

BHARAT HEAVY ELECTRICALS LIMITED JHANSI TRANSFORMER TESTING LABORATORY

Annexure - A

SPECIFICATION FOR TAN DELTA AND CAPACITANCE MEASUREMENT SYSTEM FOR POWER TRANSFORMER

REF. NO. : DEBOTTLENECKING-CAPITAL/SPECS/2018-19/11 REV. 00 DATE: 16.01.19

Note : 1) Vendor must submit complete following information. The offer meeting the following requirements would only be processed.
2) The offered column and Deviation & Remarks column (where ever applicable) of this format shall be filled by the vendor and to be submitted along with the offer.
Inadequate / incomplete, ambiguous or unsustainable information against any of the clause of specification/requirement shall be treated as non-compliance.

Sl. No.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / CONFIRMED	VENDOR TO SPECIFY/CONFIRM	DEVIATION & REMARK
1.1	Purpose : Tan δ (dissipation factor) and capacitance test set is required for measuring the Capacitance, Tan delta, Power factor, Test Voltage, Test Current, Test Frequency of Power Transformers (Upto 315 MVA, 400 kV, 3 phase), Shunt Reactors, Instrument Transformers and Bushings etc.. The current capacity of measuring instrument should be minimum 4 A (With external source).	Vendor to Confirm & specify offered Equipment make and Model No.		
1.2	Quantity : 02 Nos.	Vendor to Note		
2	SPECIFICATION :			
2.1	Test Voltage			
2.1.1	Range : 0 to 12 KV source AC	Vendor to confirm		
2.1.2	Resolution : 1V	Vendor to confirm		
2.1.3	Accuracy : ± 1.0 % of reading (≥ 0.5 kV & above)	Vendor to confirm		
2.1.4	Measurement capability with external voltage : 0 to 400 kV AC (through standard capacitor)			
2.2	Test Current			
2.2.1	From Internal Source : 100 mA (Continuous)	Vendor to confirm		
2.2.2	From External/Test Object Cx : The power supply capacity can be extended upto 4A by using external source.	Vendor to confirm		
2.2.3	Resolution : 1 μ A (From Test Object Cx)	Vendor to confirm		
2.2.4	Accuracy : ± 1.0 % of reading (≥ 10 mA & Above)	Vendor to confirm		
2.3	Test Frequency			
2.3.1	Accuracy : 45 to 70 Hz @ 12 KV and 15 to 400 Hz @ 4 KV	Vendor to confirm		
2.3.2	Resolution : ± 0.1 % of rdg	Vendor to confirm		
2.4	Capacitance measurement			
2.4.1	Range : 1 pF to 100 μ F	Vendor to confirm		
2.4.2	Accuracy : ± 0.5 % of rdg or better	Vendor to confirm		
2.4.3	Resolution : 0.01 pF	Vendor to confirm		
2.5	Dissipation Factor measurement			
2.5.1	Range : 0 - 100 %	Vendor to confirm		

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21/01/19

19.01.19

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2.5.2	Resolution	: 0.00001 (0.001%)	Vendor to confirm		
2.5.3	Accuracy	: $\pm 0.5\%$ of rdg $\pm 0.01\%$ or better	Vendor to confirm		
2.6	Data Formats	: XML, CSV	Vendor to confirm		
2.7	Internal Reference				
	Reference Capacitance	: 100 pF	Vendor to specify		
	Tan Delta	: < 0.00002	Vendor to confirm		
2.8	The supplied instrument should have stray noise / external interference features.		Vendor to confirm		
2.9	The supplied instrument should be compatible for measurement with external source & standard capacitor having capacitance (20 pF - 100 pF). Supplied cables & connectors must be suitable for connection with standard capacitor.		Vendor to confirm		
2.10	Main supply cable shall be suitable for 230V $\pm 10\%$, 50Hz, 1-Ph supply of suitable length.		Vendor to confirm		
2.11	Two measuring inputs C_N (from standard capacitor) and C_x (from test Object) shall be provided for measurement.		Vendor to confirm		
2.12	Digital display system:				
2.12.1	Digital display systems are required for displaying the different test parameters either with inbuilt PC with 7 inch screen or more OR an external laptop shall be supplied by vendor (having minimum i3 processor, 15 inch TFT/ LCD screen, 4 GB RAM, 1 TB HDD, WINDOWS 10 or higher OS, optical mouse etc.).		Vendor to specify display system of offered instrument.		
2.12.2	In case of inbuilt 7 inch display screen, the offered equipment should also be suitable for its operation from an external PC or Laptop. Instrument software for connecting equipment with laptop and all manuals are to be supplied in USB Pen drive alongwith supply.		Vendor to confirm		
2.12.3	In case of laptop supplied with system (as per clause 2.12.1), it should have supplied with instrument software for connecting equipment with laptop, Licensed WINDOWS OS, Licensed Antivirus software & Licensed MS Office of minimum three years validity. Instrument software, Original WINDOWS CD, Original Antivirus software CD, Original MS Office CD shall be supplied alongwith LAPTOP.		Vendor to confirm		
2.12.4	Instrument software should be user friendly with data storage and data analysis & report generation are to be supplied along with supply.		Vendor to confirm		
2.12.5	Communication between measuring unit and Laptop unit should be made with generally available communication ports (Ethernet / USB / Serial Port) in present day laptop. Communication cable shall be supplied along with instrument.		Vendor to confirm		

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Sheet 2 of 6

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21.01.19

14.01.19

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2.12.6	Instrument should have atleast one Ethernet port / USB/Serial Port for easy data transfer to PC /laptop in compatible operating system.	Vendor to confirm		
2.12.7	Display/Recorded Parameters: Instrument should have option to display Capacitance, Tan Delta (Dissipation Factor), Test Voltage, Test Current (Cn and Cx), Test Frequency. The instrument should have option to select set of displayed parameters from above mentioned parameters.	Vendor to confirm		
2.13	Mode of measurement: UST, GST, GSTg (Selectable)	Vendor to confirm		
2.14	Trolley with tubeless wheels for transportation of Instrument along with power supply board.	Vendor to confirm		
2.15	The meter must supply with Min 20 meter high voltage leads, measurement lead, control leads each for carrying out complete measurement of capacitance and dissipation factor measurement on transformer and rectors. Suitable hard or soft carrying case is to be supplied with instrument to keep all cables and instrument in safe condition.	Vendor to confirm		
2.16	Meter should generate clean test signal which should be independent of power mains.	Vendor to confirm		
2.17	Meter should have automated noise suppression circuit to suppress and cancel interference.	Vendor to confirm		
2.18	Meter should be able to store history of result for equipment tested and display past results. Results should be able to record and store of test results with date and time.	Vendor to confirm		
2.19	The offer will be technically accepted after complying following for price bid opening :-			
2.19.1	Meeting all requirements mentioned in this technical specification	Vendor to confirm		
2.19.2	Live demonstration of offered instrument (if not supplied/demonstrated the offered unit earlier to BHEL Jhansi for large rating transformer) shall be given by supplier at BHEL Jhansi works during technical evaluation of offer. No extra charge shall be applicable for this live demonstration.	Vendor to confirm		
2.20	The meter should supply with software to control and monitor different parameters during testing. It should also have built in IEC/IEEE temperature correction tables to correct the dissipation factor values at 20 °C	Vendor to confirm		

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Sheet 3 of 6

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BHARAT HEAVY ELECTRICALS LIMITED, JHANSI TRANSFORMER TESTING LABORATORY

Annexure-4

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2.21	SAFETY ARRANGEMENTS:			
2.21.1	System should have adequate and reliable safety interlocks / devices e.g. Open Ground Detection, Security handheld switch, Internal warning indicator, Audible warning signal etc. for avoiding damage to the system, workpiece and operator due to the malfunctioning or mistakes.	Vendor to confirm		
2.21.2	All electronics parts shall be housed in shielded enclosures.	Vendor to confirm		
2.21.3	Instrument meets the requirement of IEC 61010	Vendor to confirm		
2.22	ENVIRONMENTAL PERFORMANCE OF THE SYSTEM:			
	The instrument shall confirm to following factors related to environment:			
2.22.1	If any safety / environmental protection enclosure is required it should be built in the system by the vendor.	Vendor to specify		
2.22.2	Offered equipment meets the requirement of IEC 61000-4-2/3/4/5/6/11.	Vendor to confirm		
3	ACCESSORIES:			
3.1	Vendor to furnish list and details of accessories (e.g. External calibrator, High Voltage Cable, Measuring cables, HV Ground Cable, Communication cable, Supply Cable, Safety Cables & Inter locks etc.) to be supplied along with offered instrument	Vendor to specify list of all accessories.		
4	SPARES:			
4.1	Vendor to include one set of the spare cable comprising of High Voltage Cable, Measuring cables, HV Ground Cable, Communication cable, Supply Cable, Safety Cables & Inter locks in main offer.	Vendor to specify list of all spares and leads in one set.		
4.2	All necessary spares for two years trouble-free operation are to be included in offer separately. Cost of all spare items are to be indicated separately in offer.	Vendor to furnish the spare list.		
4.3	Vendor to ensure after-sale services and availability of all spares item with OEM for at least 5 years of operation after warranty period.	Vendor to confirm.		
5	DOCUMENTATION:			
5.1	Vendor to submit the reference list of customers (where offered systems had been supplied) mentioning the customer, Model, major specifications of the supplied system, Year of Supply etc. along with offer.	Vendor to submit along with offer		
5.2	Vendor to submit detailed catalogues of offered equipment & its accessories along with the offer.	Vendor to submit along with offer		

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Sheet 4 of 6

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Annexure - A

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5.3	Vendor to submit soft copy of Operation and Instruction manual along with offer and subsequently two hard copies of manual along with the supply.	Vendor to confirm and submit as per		
5.4	Vendor to submit soft copy of Maintenance manual along with circuit diagrams & PCBs and schematics for trouble shooting along with offer and subsequently two hard copies of manual along with the supply.	Vendor to confirm and submit as per requirement		
5.5	Vendor to submit soft copy and two hard copies of Test Certificate & Guarantee Certificate along with the supply.	Vendor to confirm and submit along with supply.		
5.6	Calibration certificate to be submitted from laboratory having traceability with NABL : Vendor to submit Valid Calibration certificate from NABL accredited lab (having at least 8 to 9 months validity left at the time of supply) of offered instrument along with the supply.	Vendor to confirm and submit along with supply.		
6	SYSTEM INSPECTION:			
6.1	Inspection by BHEL at BHEL Works.	Vendor to confirm		
6.2	All routine & operational tests to verify this spec. and demonstration of all features of system including accessories as per PO specification shall be carried out at supplier's works/any other test lab/calibration agency before dispatch and submit the test report along with supply.	Vendor to confirm & specify list of tests to be carried out on system.		
6.3	Transportation, boarding & loading upto BHEL works shall be in vendor scope.	Vendor to confirm		
7	TRAINING AT BHEL WORKS :			
	Training to BHEL testing engineer & maintenance person shall be provided at BHEL Jhansi for following :			
	(a) Use of all system Features, programming of Measuring Systems & supplied accessories etc.	Vendor to confirm		
	(b) Electrical, Electronic & maintenance for system & other supplied equipments	Vendor to confirm		
8	INSTALLATION & COMMISSIONING AT BHEL WORKS :			
8.1	Supplier to take full responsibility for carrying out the start up and commissioning. Commissioning to be done in presence of technical expert from OEM.	Vendor to confirm		
8.2	Successful proving by demonstration on BHEL Transformer by the supplier shall be considered as part of commissioning. All operational tests deemed necessary for system acceptance and demonstration of all features shall form part the commissioning activity.	Vendor to confirm		
8.3	Demonstration by actual use of all supplied components and accessories to their full capacity.	Vendor to confirm		
8.4	Commissioning tools, required for commissioning of the system within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to confirm		
8.5	Schedule of delivery, installation & commissioning shall be submitted with the offer.	Vendor to submit		

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Sheet 5 of 6

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21/01/19
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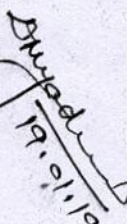
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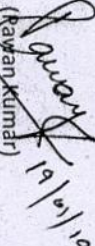
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9	AMBIENT CONDITIONS & THERMAL STABILITY :			
9.1	System and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies.	Vendor to confirm		
	Power Supply:			
	Voltage : 230 V $\pm$ 10%,			
	Frequency : 50 Hz $\pm$ 1.5 Hz	Vendor to confirm		
	Relative Humidity : 10% to 80%	Vendor to confirm		
	Operating Temperature : 10 Deg. C to 50 Deg. C	Vendor to confirm		
	Vendor to confirm that system is suitable for above and details of additional Provisions if any required on the system for the same are to be furnished by vendor.	Vendor to confirm		
10	PACKING: Air worthy/Sea worthy & rigid packing for all items of complete system, all accessories and other supplied items to avoid any damage/loss in transit. When system is despatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to confirm		
11	GUARANTEE/WARRANTY : 24 Months after commissioning at our works from the date of acceptance by BHEL irrespective of date of supply.	Vendor to confirm		
12	QUALIFYING REQUIREMENTS:			
12.1	Only those vendors who have supplied at least 5 Nos. of the offered model of the equipment within last 10 years from the date of tender opening shall be eligible for participating in the tender.	Vendor to confirm		
12.2	Following documents are required to be submitted along with the offer :-			
12.2.1	Reference list of customers mentioning the customer name, contact details and year of supply.	Vendor to submit		
12.2.2	Copy of Purchase Order of 5 nos. of offered model of equipment as referred in clause 12.1.	Vendor to submit		
12.2.3	Performance certificates along with Purchase Order copy of atleast 2 nos of the offered model of the equipment certifying 1 year or more of satisfactory performance. Performance certificate and purchase order issued by the user in the name of OEM or Authorised dealer of OEM are acceptable.	Vendor to submit		
13	BHEL reserves the right to verify information submitted by vendor. In case, information is found false / incorrect, the offer shall be rejected	Vendor to confirm		

Note: Supplier shall submit the technical compliance/comments against each point in above format. Technical bid without complete technical compliance sheet will not be considered for technical evaluation.


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