

**SPECIFICATION CUM COMPLIANCE CERTIFICATION FOR**  
**Eddy Current Testing equipment**

**NOTE:-**

1. Vendor must submit complete information against each clause. The offer meeting these clauses would only be processed.
2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
3. The offer and all documents enclosed with offer should be in English language only.
4. All dimensions are in mm unless otherwise stated.

ADDRESS OF THE SUPPLIER :

TELEPHONE NOS.:

FAX NOS.:

E-MAIL ADDRESS :

ADDRESS OF THE INDIAN AGENTS :

TELEPHONE NOS.:

FAX NOS.:

E-MAIL ADDRESS :

Specn.No. :QND/ECT/R00

**SUPPLY, ERECTION & COMMISSIONING ALONG WITH ITS ACCESSORIES FOR EDDY CURRENT TUBE INSPECTION EQUIPMENT AS PER SPECIFICATION**

SL NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	OFFERED	DEVIATIONS	REMARKS
1.0	PURPOSE				
1.1	Equipment for Tube Inspection using Eddy Current Testing (ECT) technology required for testing of Incoloy 800 and SS 304L tubes.	Vendor to furnish relevant documents			
2.0	ESSENTIAL ACCESSORIES :				
2.1	Bobbin probe for tube OD 12.6 mm and ID 10.6 mm stainless steel with cable attached or detachable cable of minimum 20 m length.	Vendor to furnish relevant probe details			
2.2	Bobbin probe for tube OD 12.6 mm and ID 10.3 mm incoloy 800 with cable attached or detachable cable of minimum 20 m length.	Vendor to furnish relevant probe details			
2.3	Automatic pusher -puller system for probe movement in tubes at constant speed. Capacity to maintain constant feed rate of 300 mm per second. Minimum and maximum feed rate to be specified.	Vendor to specify			
2.4	ECT calibration tube (As per attached Annexure-I). BHEL will supply 02 no. tubes after confirming order to the vendor in which the calibration holes, notches, pits will be made as per attached Annexure-I.	Vendor to specify			
2.5	Detail of software features/ configuration required for inbuilt computer or separate laptop attached with ECT equipment.	Vendor to furnish relevant documents			
3.0	TECHNICAL REQUIREMENT :				
	[A] Eddy current testing equipment complete in itself with inbuilt computer or separate Laptop for system operating software ,software for data acquisition, storage, analysis and reporting software.The Equipment should have the following features:	Vendor to specify			
	[B] Encoder : Two quadrature encoders and digital inputs.	Vendor to specify			
	[C] Output current : 1 A (peak)	Vendor to specify			

3.1.1	ECT Equipment	[D] Output voltage : 20 Vp-p per generator (2 outputs)	Vendor to specify			
		[E] The probe balancing should be true electronic and a separate external reference probe shall not be required for absolute channels.	Vendor to specify			
		[F] The equipment should have the universal connector supporting all standard differential and absolute bobbin, impedance, transmit-receive, and rotating probes to detect the degradation of the tubes due to service induced conditions like localized corrosion/erosion, fretting damage, wear, pitting, baffle cuts, wall loss and cracks and is in accordance with the requirements of SECTION XI Appendix IV.	Vendor to specify			
		[G] Acquisition rate : 40 kHz per channel (in conventional mode) and 14 kHz divided by the number of time slots (in multiplexed mode)	Vendor to specify			
		[H] Frequency range: adjustable from 20 Hz to 6 MHz.	Vendor to specify			
		[I] Number of frequencies: Eight frequencies	Vendor to specify			
		[J] IECT Channels: 16 simultaneously (4 inputs x 4 frequencies), 256 in supermultiplexed mode (with 16 time slots)	Vendor to specify			
		[K] Probe Input: Four independent differential input and up to 64 multiplexed inputs (16 time slots)	Vendor to specify			
		[L] Phase angle rotation for signal to be adjustable from 0 to 360 degree in 1 degree increments and amplitude measurements upto +/- 10 Volts with minimum of 0.1 Volts resolution.	Vendor to specify			
		[M] Adjustable signal amplitude magnification through gain control in 0.5 db/1 db increments.	Vendor to specify			
		[N] Real time raw data recording of eddy current data in hard drive/flash drive/similar recording media.	Vendor to specify			
		[O] Eddy current data presentation in phase amplitude form on X-Y for all channels (at least 2 at a time) and Y-T mode strip charts for all channels (at least 2 at a time).	Vendor to specify			
		[P] Replay of all channels of recorded data.	Vendor to specify			
		[Q] Feature to obtain printout of select combination of strip chart patterns.	Vendor to specify			
		[R] Data capture rate of at least 600 samples per channel per second and digital resolution of minimum 12 bits.	Vendor to specify			
		[S] The system shall have capability of performing online mixing for cancellation of tube support plate signal.	Vendor to specify			
		[T] Feed rate: Maximum and Minimum Feed rate of the puller pusher system to be specified.	Vendor to specify			
		[U] Calibration : 1 generic ECT calibration tube (12.6 mm OD) to be supplied along with the equipment.	Vendor to specify			
		[V] Data storage features : Required for easy storage & documentation in SD card/flash memory	Vendor to specify			
		[W] User interface features : The display and the system should be separate for noise reduction. The equipment should be connected to Laptop or Desktop via LAN/Ethernet and the LAN cable length should be approximately 20m.	Vendor to specify			



3.1.2		[X] Auto Calibration: The equipment shall have provision for automatic calibration	Vendor to specify			
		[Y] Environment: the equipment shall be capable to withstand 0°C to 45°C for ambient operation; 95% relative humidity, noncondensing	Vendor to specify			
		[Z] Supply voltage: 220VAC +/- 10%, automatic selection, 48Hz to 63 Hz.	Vendor to specify			
		[AA] Power consumption <1000W/ to be specified	Vendor to specify			
		[AB] Weight and dimensions : To be specified	Vendor to specify			
	ECT Equipment Software	Software requirement for setup, acquisition, analysis and reporting Software for setup , acquisition, analysis and reporting with following features having lifetime validity:	Vendor to specify			
		Acquisition (data recording) mode with possibilities of manual mode with space bar operation to start and stop acquisition and also with special ECT scanner.	Vendor to specify			
		List of tubes that are editable in acquisition software or which can be imported from tube sheet mapping-drawing program.	Vendor to specify			
		Analysis (read back) mode should have mouse and keyboard interface with shortcut operation for maximum efficiency.	Vendor to specify			
		Instant automatic vector analysis in XY planes with manual angle measurement.	Vendor to specify			
		Depth sizing for automatic phase and voltage curves with a virtually unlimited quantity of curves.	Vendor to specify			
		Indication position recording for Advanced landmark-based feature that interpolates position between a minimum of two known locations	Vendor to specify			
		Data processing of real-time tube testing processes should include: mixes (virtually unlimited quantity), filters (high-pass, low-pass, average); CSCHEDULE TO FORM NUMBER C&MM 44(A) 1/22 (A)	Vendor to specify			
		Data read back for reported indications should be saved in data files in real time, which should be useful for future read back.	Vendor to specify			
		Report database (analysis report) with Logs all analysis calls; supports all previously mentioned technologies. Features tube ID (zone/row/column), vector analysis results (volts/phase), % wall loss, side (ID/OD), editable report code, channel, extent tested, comments, and accurate indication location and length recording.	Vendor to specify			
		Compatibility with other software for the report so that reports can be exported to tube sheet mapping-drawing program or exported into common formats such as .pdf, .txt, .xls, .doc	Vendor to specify			
		Screen capture for capturing any sub- window or adjustable range.	Vendor to specify			
		Indication recall: Instant access to any recorded indication from the report window.	Vendor to specify			
		Tube sheet mapping-drawing program should have 2-D Display and should include the Tube sheet mapping-drawing program with user-friendly interface, full reporting capability that supports acquisition software tube lists and report results, template support, Legend Editor, and database management system.	Vendor to specify			
		Tube Map Editor for Multiple-section, freely editable - rotates each section separately; supports 30°, 45°, 60°, 90°, triangular, rectangular, circular, and radial tube patterns; mirror and copy feature.	Vendor to specify			

		Database management to manage inspection reports, drawings, 3-D models, and tube defect data.	Vendor to specify			
		Template system for saving template files for reports, tube maps, and Legend files for quick reference in the future.	Vendor to specify			
		Documentary proofs such as test and calibration certificates.	Vendor to specify			
		Warranty terms and conditions shall be clearly mentioned in the offer.	Vendor to specify			
		Supply shall be made by OEM or its Authorized Dealer having well established service, repair and maintenance facility in India.	Vendor to specify			
3.1.3	Design & safety parameter :	Shall meet applicable national and international standard	vendor to provide relevant documents			
4.0	<b>GENERAL REQUIREMENT :</b>					
4.1	<b>Literature :</b>	<p>[1] Vendor to provide detail about quoted Device Model &amp; its accessories as mentioned in scope of supply of this specification. General catalogues for equipment and other recommended accessories may also be attached by the vendor along with the quotation.</p> <p>[2] 1 copy (in english) of the operation, maintenance &amp; service manuals containing electric schematics, circuit diagrams, drawings, trouble shooting charts, mechanical sub- assemblies, rating of bought- out items etc. shall be supplied, at the time of inspection by BHEL personnel. In addition, one soft copy in CDs to be supplied.</p> <p>[3] Maintenance Mannuals should be provided at the time of supply and they must provide detailed description of mechanical, electrical and electronic sub systems of the equipment with appropriate dimensions, drawing and circuit diagrams. This mannual should include the following: Preventive maintenance procedure and schedules. Fault tracing and troubleshooting guide. Detailed repair procedure for fault of all types.</p>	Vendor to confirm & provide relevant document			
4.2	<b>Warranty :</b>	The system and accessories (consisting of the items mentioned in the scope of supply) are to be guaranteed for its performance for 24 months or higher from the date of commissioning of the equipment at BHEL works.	Vendor to confirm & Agree			
4.3	<b>Supply of Spare parts:</b>	List of recommended spare parts with prices firm for 2 years for ensuring operations of the device for at least 5 years to be provided along with the offer. (NOTE: Price is to be quoted seperately and it will not be considered for evaluation of lowest bid)	Vendor to Quote seperatly but along with offer.			
4.4	<b>Training :</b>	Training should be imparted free of cost to our operators & maintenance staff on operation, routine maintainance and trouble shooting so that they should be in a position to run / maintain the system, independently at BHEL works. Operation of the equipment in one full length tube to be imparted as the part of training.	Vendor to confirm & Agree			
4.5	<b>Annual Maintainance Contract (AMC)</b>	BHEL Bhopal intends to award contract for Annual Maintenance contract (AMC) of the procured machines for an initial period of 2 years after completion of guarantee period,thereafter extendable mutually to 2 more years to the OEM/authorized service centre in India. Vendor to quote charges for annual maintenance contract (AMC) separately and mention the name and location of authorized Indian service centre. (NOTE:AMC is to be quoted seperately and it will not be considered for evaluation of lowest bid)	Vendor to Quote seperatly but along with offer.			



5.0	<b>PRE QUALIFYING CONDITIONS :</b>				
5.1	The supplier should either be an OEM or an authorized dealer of the OEM for the offered equipment. Dealers have to submit along with the offer a valid certificate of Authorisation from OEM for quoting the equipment along with declaration for support from OEM for erection & commissioning, after sales service & necessary spares.	Vendor to confirm & furnish relevant document			
5.2	Copy of Purchase Order in the name of OEM or an authorised dealer of the OEM for equipment must be submitted along with the offer. (NOTE: The item, type, make & model number should be clearly mentioned in the PO copy including other details).	Vendor to furnish relevant document			
5.3	Vendor must have service centre in India to support maintenance/ after sales service of the device as and when required by BHEL. Maintenance support /after-sales service to be available within 1 week of intimation to the vendor. Detail about which has to be provided along with offer.	Vendor to confirm and provide details			
5.4	The OEM/Authorized dealer will provide detail of atleast 1 customer in INDIA, where quoted device model/similar device model have been supplied in the past 3 years and the equipment is working satisfactorily for more than one year after commissioning.	Vendor to furnish relevant document			
5.5	<b>Financial POC:</b> Average turnover of the bidder should be a minimum of Rs. 11.85 Lakh per year for the past 3 financial years ending March 2021. Vendor to submit latest I.T.C.C, Annual Report (Balance sheet and Profit & Loss account of last three years as documentary evidence).	Vendor to furnish relevant document			
5.6	The Performance Certificate should be recently issued (i.e. its date of issue should not be more than 2 years old from the tender opening date) from the customers regarding satisfactory performance of the equipment supplied to them.	Vendor to furnish relevant document			
5.7	Service after sales of the equipment & supply of spare parts shall be guaranteed for atleast 5 years from date of commissioning of quoted device. In this regard, guarantee certificate should be provided by the bidder/OEM on its letter head along with offer for : [A] Guaranteed supply of spare parts of quoted device & its accessories for atleast 5 years from date of commissioning. [B] Guarantee for providing smoothly after sales service for atleast 5 years from date of commissioning.	Vendor to confirm & agree. Also furnish required document along with offer			
5.8	BHEL reserves the right to physically see and verify performance of referred machine for performance vis a vis its application and job accuracies.	Vendor to agree			
6.0	<b>DETAILS TO BE FURNISHED WITH THE OFFER :</b>				
6.1	The Documents required as per the qualifying conditions laid down in cl. 5.0 of this specification.	Vendor to confirm & furnish relevant document			
6.2	Detail about quoted Device Model & its accessories as mentioned in scope of supply of this specification along with its technical feature with catalogues.	Vendor to confirm & furnish relevant document			
6.3	Unit price of the equipment & accessories shall be quoted and only the unit price shall be considered.	Vendor to confirm & furnish relevant document			
6.4	Documents pertaining to Annual Maintenance Contract.	Vendor to confirm & furnish relevant document			
6.5	Point wise reply to each & every point of our specification is a must.	Vendor to reply			
7.0	<b>INSTALLATION &amp; COMMISSIONING :</b>		for elec...		

7.1	Vendor to arrange for installation & commissioning within 2 weeks from date of information from BHEL Bhopal, after receipt of the equipment at BHEL Bhopal. Visual inspection of supplied equipments & accessories for its identification and any damage will be done in presence of vendor's representative.		Vendor to agree			
7.2	Vendor will make installation & commissioning of quoted device in BHEL Bhopal and demonstrate all parameters of its performance.		Vendor to agree			
8.0	<b>ACCEPTANCE CRITERIA AT BHEL BHOPAL :</b>					
8.1	At the time of installation & commissioning at BHEL Bhopal, following points will be checked and has to be satisfied.		Vendor to agree			
8.1.1	Visual inspection of the equipment & its accessories for identification & any damage.		Vendor to agree			
8.1.2	Supply as per the scope of supply and as quoted by the bidder.		Vendor to agree			
8.1.3	Calibration of the equipment with ECT calibration tube.		Vendor to agree			
8.1.4	Operation of the equipment in one full length tube.		Vendor to agree			
8.1.5	All product features as claimed by the product brochure and this specification for smooth operation.		Vendor to agree			
8.1.6	Supply of hard & soft copy of operational / instructional manual and maintenance manual in English language of quoted device and applicable accessories.		Vendor to agree			
9.0	<b>SCOPE OF SUPPLY :</b>					
	<b>Main Equipments :</b>		<b>QUANTITY</b>			
9.1	Eddy current testing equipment complete in itself with inbuilt computer or separate laptop for data acquisition, storage, analysis and reporting software.		01 No.	Vendor to furnish relevant documents		
	<b>Essential Accessories :</b>					
9.2	Bobbin probe for tube OD 12.6 mm and ID 10.6 mm stainless steel with cable attached or detachable cable of minimum 20 m length.		04 Nos.	Vendor to furnish relevant documents		
9.3	Bobbin probe for tube OD 12.6 mm and ID 10.3 mm incoloy 800 with cable attached or detachable cable of minimum 20 m length.		04 Nos.	Vendor to furnish relevant documents		
9.4	Automatic pusher -puller system for probe movement in tubes at constant speed.		02 Nos.	Vendor to furnish relevant documents		
9.5	ECT calibration tubes (As per attached Annexure-I).		02 No.	Vendor to furnish relevant documents		

**CALIBRATION OF ECT TUBES:**

The calibration standard shall be manufactured from a defect free length of 02 no. tubes (**12.6 mm OD and 1.00 mm/1.15 mm wall thickness**) which will be provided by BHEL Bhopal to the vendor after confirmation of the order of procurement of ECT machine and its accessories. The following artificial defects are to be created for reference.

- a) Through-wall drill hole of size [0.052" (1.3 mm)].
- b) Flat-bottomed drill hole 5/64" (2.0 mm) dia. 80% through from the outer tube wall surface.
- c) Flat-bottomed drill hole 7/64" (2.7 mm) dia. 60% through from the outer tube wall surface.
- d) Flat-bottomed drill hole 3/16" (4.8 mm) dia. 40% through from the outer tube wall surface.
- e) Four flat-bottomed drill holes spaced 90 degrees apart around the circumference 3/16" (4.8 mm) dia. 20% through from the outer tube wall surface.
- f) Circumferential groove 10% deep by 1/16" (1.6 mm) wide by 360 degrees on the inside tube wall surface.
- g) Four holes of size 0.026 in. (0.65 mm) diameter spaced 90 deg apart in a single plane around the tube circumference.

**NOTES:**

[1] The depth of the artificial discontinuities, at their center, shall be within 10% of the specified depth or 0.04 mm, whichever is less. All other dimensions shall be within 0.04 mm.

[2] The axial distance between artificial defect and distance of defect from end of the tube should be sufficient so as to avoid interference between the signals.

[3] The axial distance between consecutive artificial defects will be provided later by BHEL Bhopal.

[4] The calibration requirements mentioned above will likely to be the same, however if some changes are made that will be minor changes.