



Technical Specification to Enquiry No 2660192E/OT-01

PART A

QUALIFYING CRITERIA FOR SUPPLY OF DIGITAL ULTRASONIC FLAW DETECTOR

The BIDDER/VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the DIGITAL ULTRASONIC FLAW DETECTOR

1.0	QUALIFYING CRITERIA	Vendor to confirm
1.1	The bidder / vendor (OEM) shall have a minimum of five years continuous experience in the design, manufacture and supply of "ULTRASONIC FLAW DETECTOR". Vendor may indicate the actual number of years of experience in the field. Only those vendors (OEMs), who have supplied and commissioned at least TWO numbers of ULTRASONIC FLAW DETECTOR Equipment similar to the machine specified above, in the past five years (as on date of opening of tender) and such machine is presently working satisfactorily for more than TWO year after commissioning. Vendor has to submit at least one Performance certificate from their customers, for satisfactory performance of similar of higher capacity "ULTRASONIC FLAW DETECTOR Equipment quoted against the enquiry. For obtaining the Performance certificate, a suggestive format is provided as Annexure I.	
1.2	Name of the customer/ company where referred machine is installed along with complete postal address and contact Number. Name and Designation of the contact person of the customer.	
1.3	Month and year of commissioning.	
1.4	Parameters of equipment supplied and application for which the equipment is supplied.	
1.5	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

Note: The BIDDER/VENDOR may be called (if required) for demonstration of their offered equipment at BHEL/BAP works during technical evaluation.

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ANNEXURE I

PERFORMANCE CERTIFICATE FORMAT

(On Customer's Letter Head)

1. Supplier of the Equipment:
2. Make & Model of the Equipment:
3. SI No. of the Equipment:
4. Month & Year of Commissioning:
5. Application for which Equipment is used :
6. Jobs Performed by the Equipment
 - a. a. Job material :
 - b. b. Job thickness :
7. Performance of the Equipment: Satisfactory/Not Satisfactory
(Strike off whichever is not applicable)
8. After Sales Service : Satisfactory/Not Satisfactory
9. Any other remarks :

**Contact details of issuing authority
Issuing the performance certificate**

Name & Designation:

Office No/Mobile no:

Signature and seal of authority

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Email Id:

PART B

Annexure II

TECHNICAL SPECIFICATION OF DIGITAL ULTRASONIC FLAW DETECTOR

Cl. No.	Particulars	BHEL SPECIFICATIONS	Bidder's offer with complete Technical details
1.0	Area of Application	Digital Ultrasonic Flaw detector is used for Testing of materials and welded structures made of Steel.	
2.0	Principle of operation	The Ultrasonic Flaw Detector works on the principle of Reflection of Ultrasounds at Interfaces of varying acoustic impedance. By using Piezoelectric Transducers, which can convert electric signals to ultrasonic vibrations, Ultrasound is sent to the test objects and the reflected Ultrasonic energy from the defects is converted back to electric signals, which in turn are displayed on the LCD screen.	
3.0	Design base	Compliant to EN 12668-1, IEC 60068-2-27, IEC-60068-2-6, IP 66	
4.0	Pulse	Spike or Tunable Square wave pulse. The pulse is to be electronically controlled on both rising and falling edges to maximize probe performance and increasing near surface resolution.	
4.1.	Pulse repetition frequency Transmitter –pulse rise time	15 Hz to 1000 Hz. <10ns with selectable high or low	
4.2.	Energy Settings	Supplier to specify	
4.3.	Pulse width	Adjustable from 30 to 1000ns (0.1MHz)	
4.4.	Damping	50 to 400 Ω	
5.0	Receiver		
5.1.	Gain	0 to 100 dB with 0.5,1,2,6,12,20dB steps & user defined gain step adjustments	

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5.2.	Total instrument Bandwidth	0.5 to 18 MHz	
5.3.	Digital Filter settings	User selectable narrow band and broad band filter options to be provided to optimize receiver performance	
5.4.	Rectification	Full wave, Positive half wave, Negative Half wave, RF	
5.5.	System linearity	Horizontal, Vertical and amplifier shall meet the requirements of ASME section V	
5.6.	Reject	0 to 80 % full screen height (supplier to specify)	
6.0	Measurement		
6.1.	Types	Thickness, Sound path, Projection, Depth, Amplitude, Time of flight for both Gates.	
6.2.	Echo to Echo	Standard	
6.3.	DAC / TVG Standard	Up to 15 points to be captured, ASME Section I, Section III, 100 dB dynamic Range, full gain, range and delay adjustments during set up, view switchable between DAC / TVG	
6.4.	CUSTOM DAC	With multiple DAC curves	
6.5.	DGS probe data	For time varied gain applications. DGS set ups to be built from DGS/ AVG diagram with standard probe data and user defined probe data. Defect size evaluation to be performed with predefined probe settings. Defect size to be directly displayed. Data sheet for each probe giving all technical details shall be furnished.	
6.6.	Amplitude measurement	0 to 100% full screen height with 0.25% resolution	
6.7.	Curved Surface correction	For Angle measurements.	
6.8.	X-Value correction	Beam index point to front of transducer	
7.0	Gates	Two fully independent Gates for Echo Height and Time of flight.	
7.1.	Gate start	Variable over entire display range	
7.2.	Gate width	Variable from Gate start to end of displayed range	

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7.3.	Gate height	Variable from 2 to 95% full screen height	
7.4.	Alarms	Positive and Negative thresholds: Minimum Depth on Gate1 and Gate 2	
8.0	Display	"A" scan display (Rectified as well as RF mode) and Color Liquid Crystal Display with user defined, user selectable color schemes and brightness having split screen, full screen modes and Auto freeze facility. Supplier shall specify available display modes.	
8.1.	Base line break mode	All zero cross points on the RF wave form shall be shown as zero points in full wave mode.	
8.2.	Amplitude Grid mode	100% Amplitude display	
8.3.	Time base grid modes	Standard 0 to 10 major divisions, each having five equal minor divisions.	
9.0	Instrument Input / Output		
9.1.	USB port	For communication with PC/ Data cables /Flash drive/mouse etc.	
9.2.	SD card slot(optional)	SD card connector for easy data archival	
9.3.	LEMO Hardware I / O (optional)	Alarm outputs, Trigger In / Out	
9.4.	Data Storage	At least 200 "A scan" data files storage capacity should be available. Supplier to specify the size of data files and also number of data files that can be stored.	
10.0	Calibration	Supplier to specify the calibration set up memory. At least 50 different calibration setups should be stored and recalled.	
10.1	Automated distance Calibration	For velocity and zero offset	
10.2	Test modes	Pulse echo, Dual or through transmission	
10.3	Units	Millimeters, Inches	
10.4	Range	2 mm to 10000 mm	
10.5	Velocity	600 to 15000 m/s	
10.6	Zero offset	Supplier to specify	

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10.7	Display delay	Supplier to specify	
10.8	Refracted angles	10 ⁰ to 85 ⁰ in 0.1 ⁰ resolution	
11.0	Probes / Accessories	1) Longitudinal Probes a) 2MHz- Ø 24mm Qty: 1 Nos. b) 4MHz- Ø 10mm Qty: 1 Nos. Suitable standard cables (2m long) for above probes-Qty: 1 Nos.	
		2) Shear wave Probes a) 2MHz-45 ⁰ Size: 20x22mm Qty: 1 Nos. b) 2MHz-60 ⁰ Size: 20x22mm Qty: 1 Nos. c) 2MHz-45 ⁰ Size: 8 x 9mm Qty: 1 Nos. d) 2MHz-60 ⁰ Size: 8 x 9mm Qty: 2 Nos. e) 2MHz-70 ⁰ Size: 8 x 9mm Qty: 1 Nos. f) 4MHz-70 ⁰ Size: 8 x 9mm Qty: 1 Nos. Suitable standard cables (2m long) for above probes-Qty: 3 Nos.	
		3) Twin Crystal Probes a) 2MHz- Ø 10mm Qty: 1 Nos. b) 4MHz- Ø 10mm Qty: 1 Nos. Suitable standard cables (2m long) for above probes-Qty: 1 Nos.	
		Supplier should Furnish data sheet for probes with the crystal diameter, probe center frequency, Spectrum, roof angle of twin crystal probe etc. along with technical data sheet as per ASTM E-1065 with band width of operation for each probe shall be provided.	
11.1.	Cables	Supplier to specify the details of Power cables, Transducer connector cables etc.	
11.2.	Calibration Blocks	Vendor to provide the following blocks as per ASME standards and with calibration certificates for each block	
		1. V1 Steel block of Type-1 –Qty: 1 No.	
		2. V1 Steel block of Type-2 –Qty: 1 No.	
		3. V2 Steel Block-Qty: 1 No.	

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Cl. No.	Particulars	BHEL SPECIFICATIONS	Bidder's offer with complete Technical details
11.3.	Calibration Certificate and Test Certificate	Supplier shall supply these certificates along with the equipment.	
12.0	Software	DAC, DGS / AVG	
13.0	General features:		
13.1.	Weight	Shall be less than 5kg	
13.2.	Transducer connections	LEMO type connections (Equipment side and transducer side)	
13.3.	Battery	Lithium ion / Nickel Metal Hydride / Alkaline C-Cells preferably. The system shall have the provision for Internal rechargeable battery with charger adapter. The battery after charging should work for minimum 5 hours before next recharging.	
13.4.	Power requirement	AC – mains, 200 – 240V (50Hz)	
13.5.	Environmental ratings	Temperature: 5 to 50 degree C Humidity: RH 20 - 80%	
14.0	Scope of Supply	1) Total Number of Ultrasonic flaw detectors (UFD) meeting BHEL Part A- technical specifications - 2 Nos. 1) Probes as per clause 11.0 2) Cables as per Clause 11.0 and 11.1 3) Calibration blocks as per Clause 11.2 4) Calibration & Test Certificates as per Clause 11.3 5) Service tool kit 6) Installation, Commissioning & Performance Prove-Out and Training on Operation, Trouble Shooting & Maintenance 7) Operation and Maintenance manuals	
15.0	Documentation in ENGLISH Language	Three Copies (In English) of the Operation, Maintenance & 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 Engineers. In addition, two soft copies in CDs to be supplied.	

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16.0	Pre dispatch Inspection	The system and accessories (consisting of the items) shall be offered for pre dispatch Inspection by BHEL at supplier's works.	
17.0	Installation and commissioning	The system and accessories (consisting of the items mentioned) is to be installed & commissioned at BHEL Works, by the Service Engineer of the SUPPLIER.	
18.0	Performance Prove out	Vendor to perform the job trails and to prove the performance of the equipment at BHEL works	
19.0	Training on Operation & Maintenance	Complete Training for BHEL Engineers is to be given on Operation & Maintenance of the OFFERED equipment at BHEL, after the successful commissioning of the Equipment & Accessories.	
20.0	Guarantee	The system and accessories (consisting of the items mentioned in the scope of supply) are to be guaranteed for its performance for 24 months from the date of commissioning of the equipment at BHEL Works.	
21.0	Service and Spares Support Requirements	Vendor shall ensure after the guarantee period, through trained service personnel in India for next 5 years as and when need arise. Spares to be made available within the shortest time.	
22.0	Annual Maintenance Contract - AMC	Vendor to indicate whether Annual Maintenance services can be provided on contract after the guarantee period is completed	
23.0	Safety and Quality Standards	Supplier to ensure that Safety and Quality of system and accessories (consisting of the items mentioned in the scope of supply) shall conform to International Standards. Conformance certificate to be provided along with the equipment.	
24.0	Price for accessories	Separate rate shall be quoted for Optional / Compulsory Accessories	

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BHEL BAP RANIPET

Price Bid Format against Enquiry No 2660192E/OT-1

SL NO	DESCRIPTION	QTY (Nos.)	Price to be Quoted by supplier
01	Ultrasonic Flaw detector	2	
02	List of Essential Accessories		
03	Probe:		
	Longitudinal Probes	1	
	a. 2 MHz – Ø 24 mm		
	b. 4 MHz- Ø 10 mm	1	
	Shear Wave Probes		
	a. 2 MHz- 45 ⁰ size: 20x22 mm,	1	
	b. 2 MHz- 60 ⁰ size: 20x22 mm	1	
	c. 2 MHz- 60 ⁰ size: 8x9 mm	2	
	d. 2 MHz- 45 ⁰ size: 8x9 mm	1	
	e. 2 MHz-70 ⁰ sizes: 8x9mm,	1	
	f. 4 MHz- 60 ⁰ size: 8x9 mm	1	
Twin crystal Probes			
a. 2 MHz- Ø 10mm	1		
b. 4 MHz- Ø 10mm	1		
04	Cable Connection(LEMO Type)	5	
05	V1 steel block of type- 1	1	
06	V1 steel block of type- 2	1	
07	V2 steel block	1	

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