



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY

NOTICE INVITING TENDER

Phone: +91 431 257 4237/ 7421

Email : spsy@bhel.in, vkarna@bhel.in

Web : www.bhel.com

TWO PART BID

Tender to be submitted in two Parts

Enquiry
Number:

2731900009

Enquiry Date:

11.04.2019

Due date for submission of
quotation:

06.05.2019

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14:00 hrs on the Date of tender opening.

Item	Description	Quantity
10	Ultrasonic search unit probes as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or https://eprocure.gov.in/epublish/app)	1 set
20	Ultrasonic search unit probes – Long Wave as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or https://eprocure.gov.in/epublish/app)	1 set

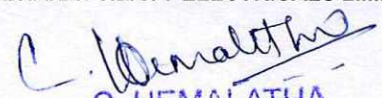
Important points to be taken care during submission of offer

1. Delivery terms shall be FOR BHEL Stores, Trichy for indigenous vendors and CFR Chennai Airport/ Seaport for foreign vendors.
2. Compliance Form No: MM/CE/TRY/IND/03 (foreign vendors) & MM/CE/TRY/IND/03A (indigenous vendors) to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
3. Delivery required: 3 months from the date of Purchase Order
4. Erection and commissioning (E&C) shall be done at BHEL, Trichy by the supplier.
5. Time period required for E&C shall be 3 weeks from the date of intimation by BHEL.
6. Applicable EMD for this tender is INR 40,000.00
7. All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.

BHEL's General guidelines / instructions (refer MM/CE/GENL/001 - EMD), compliance form and technical specification can be downloaded from BHEL web site <http://www.bhel.com> or from <https://eprocure.gov.in/epublish/app> under Enquiry reference "2731900009".

Tenders should reach us before 14:00 hours on the due date
Tenders will be opened at 14:30 hours on the due date
Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED


C. HEMALATHA

Senior Manager

Sr. Manager / Capital Equipment / MM
BHEL / Tiruchirappalli - 620 014

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications	

SECTION – I

The BIDDER / VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the ultrasonic search units.

S. No.	REQUIREMENTS	VENDOR's COMMENTS
1.0	The BIDDER / VENDOR shall have a minimum of last FIVE Years of Continuous. Experience in the Design, Manufacture and supply of ultrasonic probes and related accessories. Vendor to indicate the actual no. of years of experience in this field.	
2.0	Vendor has to submit at least one Performance Certificate from any of their customers, for satisfactory performance of the quoted model (or equivalent model) of ultrasonic probes and related accessories, supplied to them with in the last five years and is working satisfactory for a minimum period of one year from the date of commissioning (as on original date of opening of tender). For obtaining the Performance certificate, the format is provided as Annexure I.	
3.0	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.	

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DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications	

SECTION – II

Bidder to provide the following details:

S. No.	PARTICULARS	VENDOR's RESPONSE
4.0	Year of launch of the model quoted against this enquiry	
5.0	Number of "ultrasonic probes and related accessories" supplied and commissioned till date in the quoted model	
6.0	The Bidder/vendor to furnish reference list of customers.	
7.0	Details on SERVICE-after-SALES Set-Up in India including the addresses of Agents/Service Centers in India and Asia	

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications	

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 : Cladding ☐ Welding ☐ Materials ☐
(Tick the applicable)
6. Techniques applicable : DGS ☐ DAC ☐
7. Jobs Performed by the Equipment
 - a. a. Job material :
 - b. b. Job thickness :
8. Performance of the Equipment : Satisfactory/Not Satisfactory
(Strike off whichever is not applicable)
9. After Sales Service : Satisfactory/Not Satisfactory
10. Miscellaneous Remarks :

Contact details of issuing authority

Name & Designation:
Office No/Mobile no:
Email Id:

Signature and seal of authority
Issuing the performance certificate

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	
DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications	

A complete self-explanatory (including all the calculations involved) probe technical data sheets for each probe (required as per Table-1 to Table-9) having compliance certificate with the latest edition of EN12668-2, EN1330-4, ASTM E1065, EN 583-2 shall be furnished. Details of the required test samples/block including drawing & guidelines for probe optimization and required calibration have to be clearly furnished in the probe data sheet. In case of conflict between the Codes/Standards, with the requirements of this specification, the requirements which are more stringent shall govern. Probe housing shall be made of durable die cast based housing or equivalent. All the connectors and search units shall have optimum performance to the supplied equipment.

1	Comprehensive individual data sheet for each probe containing the details given below to be produced.	
	1.1	Detailed information about the near resolution flaw detectability
	1.2	Dead zone
	1.3	Half value limits
	1.4	The area of best flaw detectability in suitable units
	1.5	Minimum detectability and corresponding equivalent disc reflector in all the beam ranges
	1.6	Reduction in the flaw detectability due to the divergence of the sound beam and attenuation.
2	Following list of information shall be available for each probe:	
	2.1	Manufacture's Name
	2.2	Type of Probe
	2.3	Weight and Size of Probe
	2.4	Type of Connectors
	2.5	Whether possibility of TR connectors interchangeability exists
	2.6	Material of critical components of Transducers
	2.7	Material of wedge delay
	2.8	Material of wear plate
	2.9	Wear allowance
	2.10	Shape and size of the Transducers
	2.11	Working Temperature

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
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	2.12	Echo pulse duration
	2.13	Electrical connection
	2.14	Housing material
	2.15	Delay material(if any used)
3	For each probe-actual Measurement for the following details shall be reported:	
	3.1	Cross talk damping (if applicable)
	3.2	Pulse shape (time and frequency)
	3.3	Central frequency, Band width of frequency, Relative bandwidth at 6dB
	3.4	Pulse-echo sensitivity
	3.5	Impedance, static capacitance
	3.6	Probe index
	3.7	Angles axis offset
	3.8	Squint angle
	3.9	Focal length
	3.10	Physical aspects
	3.11	Element Size (D or a x b)
	3.12	Bandwidth (B) and Relative bandwidth @ 6dB
	3.13	Focal distance (F)
	3.14	Near field length (N)
	3.15	Focal diameter (FD6)
	3.16	Beam angle (β): angle between the main angle and normal axis of the test surface(equivalent to steel),
	3.17	Roof angle of twin crystal/element
	3.18	Element Shape
	3.19	Cross talk attenuation and distance (if applicable)
	3.20	Focal width perpendicular to barrier(if any) @ -6 dB

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
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3.21	Focal width parallel to barrier(if any) @ -6 dB
3.22	Deviation from flatness of contact surface
3.23	Echo Interference zone at ndB (n= 0 dB, 20 dB)
3.24	Echo resolution zone at ndB (n= 0 dB, 20 dB)
3.25	Short Duration Temperature
4	Measurement/Calculation for the following details shall be available:
4.1	Distance-amplitude curve (shall also include a distance-noise curve) as per clause 7.5 of DIN EN 12668-2:2010-06
4.2	Focal distance & Near field with calculation
4.3	Practical desired actual DGS-Diagram with legible font size & Colored (Different color for each CRR value) DGS Diagram in A4 sheet area for 0.5mm, 1mm, 1.5 mm, 2mm, 3mm up to 10mm CRR (Circular Reference Reflector) for range of 1000mm for 20MnMoni55 grade base material (equivalent to P3 group material)
4.4	Complete calculation (if any involved) guideline with suitable examples (including pictorial representation of sound path, probe placement etc.) of Attenuation Coefficient to develop the DGS curve
4.5	Calculations involved for any other inputs parameter to the equipment to develop the DGS & DAC curve.
4.6	Theoretical desired DGS curve shall be proven practically with the supplied equipment & search units. Also, these curves (theoretical and practical curve) shall be validated during the performance prove out of the order.
4.7	Parametric equations and calculations involved for the required correction in beam spread for length measurement of the discontinuities up to 12 dB drop.
5	Following Graphs/Diagram shall be furnished legibly in the probe data sheet:
5.1	Frequency Spectrum (Gain and Frequency)
5.2	Electrical Impedance (Ohm- MHz)
5.3	Schematic Probe Outer/ Housing Size
6	List of probes required and related accessories are tabulated below (Table 1 and 2). Any changes in specifications or equivalent models which may not affect desired performance are to be proved and supported with documentary evidence at the time of prove out of the order.

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
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7 All probes and cables listed in the table shall be covered by warranty for a period of two years from the date of acceptance.

Table 1 – List of UT probes					
Sl.No.	Type of probe	Probe Type ,Angle (deg.), Crystal size (mm)	Frequency MHz	Preferred range of use (mm)	Nos. required
1	MWB 35-2-EN or equivalent	Angle Beam probe, 35deg. 8X9mm	2		1
2	MWB 35-4-EN or equivalent	Angle Beam probe, 35deg. 8X9mm	4		1
3	WSY-45-2 or equivalent	Angle Beam probe, 45deg. 8X9mm	2		1
4	WSY-60-2 or equivalent	Angle Beam probe, 60deg. 8X9mm	2		1
5	WSY-70-2 or equivalent	Angle Beam probe, 70deg. 8X9mm	2		1
6	WSY-45-4 or equivalent	Angle Beam probe, 45deg. 8X9mm	4		1
7	WSY-60-4 or equivalent	Angle Beam probe, 60deg. 8X9mm	4		1
8	VSY 45-2 or equivalent	Dual Angle Beam probe, 45deg. 5X10mm	2		1

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Sl.No.	Type of probe	Probe Type ,Angle (deg), Crystal size (mm)	Frequency MHz	Preferred range of use (mm)	Nos. required
9	WSY-70-4 or equivalent	Angle Beam probe,70deg. 8X9mm	4		1
10	VSY 60-2 or equivalent	Dual Angle Beam probe 60deg. 5X10mm	2		1
11	VSY 70-2 or equivalent	Dual Angle Beam probe, 70deg. 5X10mm	2		1
12	MSWQC or equivalent	Normal probe, 0deg, Ø 10mm	4	Maximum 60 mm thickness	1
13	MSWQC or equivalent	Normal probe, 0deg, Ø 10mm	5	Maximum 60 mm thickness	1
14	WB 70 2 EN or equivalent	Angle Beam probe, 70deg. 20X22mm	2		
15	K2N or equivalent	Normal Probe, Ø 10mm	2		1

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Table 2 – List of UT accessories				
Sl. No.	Item Description	Description	Length (approx.) /Size (if applicable)	Nos. Required.
1	UT Cable	Lemo00 (small) to Lemo01(big) connectors at the ends.	1.5 meter	6
2	UT Cable	Lemo01 (big) to Lemo01(big) connectors at the ends.	1.5 meters	6
3	UT Cable	Dual Lemo00 (small, double plug) to dual Lemo01 (big x 2) for use with DL4R dual crystal probe or equivalent.	1.5 meter	2
4	Perspex sheet	Clear Perspex for use as replacement wedge in worn out probes due to wear and tear.	Thickness around 2-3mm, breadth around 15mm and length 1 meters	1
5	UT Cable	Lemo01 (big) to Lemo01(big) connectors at the ends.	2 meters	2
6	Perspex wedge	45 degree shear wave wedge (KBA or equivalent) for MSWQC or equivalent.	Suitable for item 15,16 of table 1	2
7	Perspex wedge	60 degree shear wave wedge (KBA or equivalent) for MSWQC or equivalent.	Suitable for item 15,16 of table 1	2
8	Data sheet	Applicable data sheets for probes as per conditions stated in points 1 to 6 of Annexure II.	Wherever applicable.	1 for each probe

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DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications (Long Wave)	

SECTION – I

The BIDDER / VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the ultrasonic search units.

S. No.	REQUIREMENTS	VENDOR's COMMENTS
1.0	The BIDDER / VENDOR shall have a minimum of last FIVE Years of Continuous. Experience in the Design, Manufacture and supply of ultrasonic probes. Vendor to indicate the actual no. of years of experience in this field.	
2.0	Vendor has to submit at least one Performance Certificate from any of their customers, for satisfactory performance of the quoted model (or equivalent model) of ultrasonic probes, supplied to them with in the last five years and is working satisfactory for a minimum period of one year from the date of commissioning (as on original date of opening of tender). For obtaining the Performance certificate, the format is provided as Annexure I.	
3.0	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.	

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DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications (Long Wave)	

SECTION – II

Bidder to provide the following details:

S. No.	PARTICULARS	VENDOR's RESPONSE
4.0	Year of launch of the model quoted against this enquiry	
5.0	Number of "ultrasonic probes" supplied and commissioned till date in the quoted model	
6.0	The Bidder/vendor to furnish reference list of customers.	
7.0	Details on SERVICE-after-SALES Set-Up in India including the addresses of Agents/Service Centers in India and Asia	

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications (Long Wave)	

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 : Cladding ☐ Welding ☐ Materials ☐
(Tick the applicable)
6. Techniques applicable : DGS ☐ DAC ☐
7. Jobs Performed by the Equipment
 - a. a. Job material :
 - b. b. Job thickness :
8. Performance of the Equipment : Satisfactory/Not Satisfactory
(Strike off whichever is not applicable)
9. After Sales Service : Satisfactory/Not Satisfactory
10. Miscellaneous Remarks :

Contact details of issuing authority

Name & Designation:
Office No/Mobile no:
Email Id:

Signature and seal of authority
Issuing the performance certificate

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
DEPT.-2350	Annexure-II Ultrasonic Search Unit Probes Specifications (Long Wave)	

A complete self-explanatory (including all the calculations involved) probe technical data sheets for each probe (required as per Table-1 to Table-9) having compliance certificate with the latest edition of EN12668-2, EN1330-4, ASTM E1065, EN 583-2 shall be furnished. Details of the required test samples/block including drawing & guidelines for probe optimization and required calibration have to be clearly furnished in the probe data sheet. In case of conflict between the Codes/Standards, with the requirements of this specification, the requirements which are more stringent shall govern. Probe housing shall be made of durable die cast based housing or equivalent. All the connectors and search units shall have optimum performance to the supplied equipment.

1	Comprehensive individual data sheet for each probe containing the details given below to be produced.	
	1.1	Detailed information about the near resolution flaw detectability
	1.2	Dead zone
	1.3	Half value limits
	1.4	The area of best flaw detectability in suitable units
	1.5	Minimum detectability and corresponding equivalent disc reflector in all the beam ranges
	1.6	Reduction in the flaw detectability due to the divergence of the sound beam and attenuation.
2	Following list of information shall be available for each probe:	
	2.1	Manufacture's Name
	2.2	Type of Probe
	2.3	Weight and Size of Probe
	2.4	Type of Connectors
	2.5	Whether possibility of TR connectors interchangeability exists
	2.6	Material of critical components of Transducers
	2.7	Material of wedge delay
	2.8	Material of wear plate
	2.9	Wear allowance
	2.10	Shape and size of the Transducers
	2.11	Working Temperature

	BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Undertaking) TIRUCHIRAPPALLI-620014 NON-DESTRUCTIVE TESTING	NDTL
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	2.12	Echo pulse duration
	2.13	Electrical connection
	2.14	Housing material
	2.15	Delay material(if any used)
3	For each probe-actual Measurement for the following details shall be reported:	
	3.1	Cross talk damping (if applicable)
	3.2	Pulse shape (time and frequency)
	3.3	Central frequency, Band width of frequency, Relative bandwidth at 6dB
	3.4	Pulse-echo sensitivity
	3.5	Impedance, static capacitance
	3.6	Probe index
	3.7	Angles axis offset
	3.8	Squint angle
	3.9	Focal length
	3.10	Physical aspects
	3.11	Element Size (D or a x b)
	3.12	Bandwidth (B) and Relative bandwidth @ 6dB
	3.13	Focal distance (F)
	3.14	Near field length (N)
	3.15	Focal diameter (FD6)
	3.16	Beam angle (β): angle between the main angle and normal axis of the test surface(equivalent to steel),
	3.17	Roof angle of twin crystal/element
	3.18	Element Shape
	3.19	Cross talk attenuation and distance (if applicable)
	3.20	Focal width perpendicular to barrier(if any) @ -6 dB



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Annexure-II
Ultrasonic Search Unit Probes Specifications (Long Wave)

3.21	Focal width parallel to barrier(if any) @ -6 dB
3.22	Deviation from flatness of contact surface
3.23	Echo Interference zone at ndB (n= 0 dB, 20 dB)
3.24	Echo resolution zone at ndB (n= 0 dB, 20 dB)
3.25	Short Duration Temperature
4	Measurement/Calculation for the following details shall be available:
4.1	Distance-amplitude curve (shall also include a distance-noise curve) as per clause 7.5 of DIN EN 12668-2:2010-06
4.2	Focal distance & Near field with calculation
4.3	Complete calculation (if any involved) guideline with suitable examples (including pictorial representation of sound path, probe placement etc.) of Attenuation Coefficient to develop the DGS curve
4.4	Calculations involved for any other inputs parameter to the equipment to develop the DAC curve.
4.5	Parametric equations and calculations involved for the required correction in beam spread for length measurement of the discontinuities up to 12 dB drop.
5	Following Graphs/Diagram shall be furnished legibly in the probe data sheet:
5.1	Frequency Spectrum (Gain and Frequency)
5.2	Electrical Impedance (Ohm- MHz)
5.3	Schematic Probe Outer/ Housing Size
6	List of probes required and related accessories are tabulated below (Table 1 and 2). Any changes in specifications or equivalent models which may not affect desired performance are to be proved and supported with documentary evidence at the time of prove out of the order.
7	All probes and cables listed in the table shall be covered by warranty for a period of two years from the date of acceptance.



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TIRUCHIRAPPALLI-620014
NON-DESTRUCTIVE TESTING

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Annexure-II
Ultrasonic Search Unit Probes Specifications (Long Wave)

Table 1 – List of UT probes

Sl.No.	Type of probe	Probe Type ,Angle (deg.), Crystal size (mm)	Frequency MHz	Preferred range of use (mm)	Nos. required
1	70° TRL2-Aust-2 (Ø18-R150)-FS~18 or equivalent	Long Wave UCC probe,70deg. 40x40x32mm	2	About 6 mm	1
2	70° TRL2-Aust-2 (7x10)1/4L-FS~10 or equivalent	Long Wave - Dual Element probe,20x20x20mm	2	About 3 mm	1
3	70° TRL2-Aust-2 (10x18)1/4L-FS~30 or equivalent	Long Wave - Dual Element probe, 30x30x25mm	2	About 10 mm	1
4	70° TRL2-Aust-2 (15x25)1/4L-FS~40 or equivalent	Long Wave - Dual Element probe, 40x40x32mm	2	Approx. 12 – 14 mm	1
5	70° TRL2-Aust-2 (15x25)1/4L-FS~70 or equivalent	Long Wave - Dual Element probe, 40x40x32mm	2	Approx. 20 – 25 mm	1