



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 76 53

Email : skaruna@bheltry.co.in

Web : www.bhel.com

TWO PART BID

Tender to be submitted in two Parts

Enquiry
Number:

2601700001

Enquiry Date:

12.05.2017

Due date for submission of
quotation:

14.06.2017

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	Universal Testing Machine used for Static and Dynamic Testing as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	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: TRY/ IMP/ 02 (foreign vendors) and TRY/ IND/ 02A (indigenous vendors) to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
3. Delivery period required is 6 months including pre-despatch inspection.
4. Erection and commissioning shall be done at BHEL Trichy by the supplier
5. Time period required for Erection and Commissioning shall be 4 weeks from the date of intimation by BHEL
6. EMD applicable for this enquiry is INR 2,00,000/-
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 the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "2601700001".

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

DGM / Capital Equipment / MM

S. KARUNANIDHY
Dy. General Manager
Capital Equipment / MM
Tiruchirappalli - 620 014

PART A**QUALIFYING CRITERIA FOR THE SUPPLY OF*****Universal Testing Machine used for Static and Dynamic Testing*****SECTION – I**

The BIDDER is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details.

S. No.	PARTICULARS	VENDOR's RESPONSE
1.0	Number of Years of Experience of the BIDDER (Original Equipment Supplier) in the field of design, manufacture and supply of 'Universal testing machined used for Static and Dynamic testing' for static or dynamic testing of samples.	
2.0	YEAR of LAUNCH of the MODEL quoted against this ENQUIRY	
3.0	Number of 'Universal Testing machines' supplied, till date in the QUOTED MODEL	
4.0	Details on International Standards followed in Design and Testing of Universal Testing Machine.	
5.0	Comprehensive Details, on Performance Testing of 'Universal testing machined used for Static and Dynamic testing' carried out at the Factory, to be furnished with the Technical Offer.	
6.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India, to be furnished compulsorily. The agents / service centers claiming to provide 'Service after sales' shall have been registered as an authorized service agency of the OEM (Original Equipment Manufacturer) on or before the date of release of this tender. The OEM or authorized supplier shall have a well-trained service network available in India to cater the service requirements of the installed Video Gauge Extensometer. The Indian service network of OEM or authorized supplier shall have at least 02 years of experience in handling Universal testing machined used for Static and Dynamic testing. The details of the same shall be submitted along with the technical bid.	
7.0	BIDDER to indicate the Country of Origin for the supply of the Universal Testing Machine.	

SECTION – II

The BIDDER has to compulsorily meet the following requirements to get qualified for submitting an offer for the 'Universal testing machined used for Static and Dynamic testing'

S. No.	REQUIREMENTS	VENDOR's RESPONSE
8.0	The BIDDER shall have a minimum of TEN Years of Continuous Experience in the Design, Manufacture & Supply of 'Universal testing machined used for Static and Dynamic testing'	
9.0	The BIDDER should have supplied atleast one 'Universal testing machined used for Static and Dynamic testing' with Fatigue rating +/-25kN Load cell to an Indian (or) International customer. Also, indicate the number of such Universal testing machines sold internationally / within India.	
10.0	Reference list of the Customers and Performance Certificate (as per ANNEXURE-A) from minimum two customers, with full contact details of CONTACT PERSON, who are the End Users of the MODEL of 'Universal Testing Machine' that the bidder wishes to offer against the technical specifications provided in this tender	
11.0	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.	

SECTION – III

The BIDDER has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser:

S.No.	REQUIREMENTS	VENDOR's COMPLIANCE
12.0	The BIDDER shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial and Price Bid.	
13.0	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. A just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer. In case of any deviations in any of the technical specifications, such deviations should be clearly specified in the comparative statement.	

S.No.	REQUIREMENTS	VENDOR's COMPLIANCE
14.0	The BIDDER shall assure a continuous support for SPARES and SERVICE for TEN Years, from the date of commissioning of the equipment at BHEL Works.	
15.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODELS of then Universal Testing Machine	
16.0	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation for the scope of supply.	
17.0	Earlier performance & field experience (service support) with BHEL (if any) will be a reckoning factor for the technical qualification of the OFFER.	

PERFORMANCE CERTIFICATE

The Performance of the subject model *Universal Testing Machine (UTM)* should be certified by the customer on Customer's Letter Head, in the following pattern/format and submitted along with the TECHNICAL OFFER positively.

- 1.0 Name of the Equipment Supplier (OEM) :
- 2.0 MODEL/MAKE of the Universal Testing Machine :
- 3.0 Month & Year of Commissioning of the Equipment :
- 4.0 Brief Details on the Application/Use of the U T M :
- 5.0 Performance of the Universal Testing Machine
stated above: Very Good /
Satisfactory /
Not Good
- 6.0 Availability of the Universal Testing Machine
stated above: Good / Poor
- 7.0 Service After Sales support given by the OEM /
Indian Representative, including spares supply : Satisfactory /
Not Satisfactory
- 8.0 Special Remarks / Recommendations :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

To

**DGM / Purchase
MM / CAPITAL EQUIPMENT
BHEL /TRICHY – 620 014**

PART B**TECHNICAL SPECIFICATIONS FOR 'UNIVERSAL TESTING MACHINE USED FOR STATIC AND DYNAMIC TESTING'**

AA. APPLICATION :			
Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
AA.1	This specification is for design, supply, installation, commissioning and demonstration of the dynamic servo-hydraulic Universal testing machine (complete in accessories) for evaluating tensile, compression, bending, fatigue and fracture properties. The system should run on single phase 220V power supply without the need for site preparation. The Material of Construction for the equipment shall able to withstand load requirement, corrosion environment. It is mandatory to provide suitable anti-corrosive coating on the equipment wherever possible. It is to be noted that the properties evaluated will be highly sensitive to the parameters like test control, sensitivity, alignment of the pull rods with the axis of the machine, etc. Hence, parties with adequate theoretical and practical knowledge and expertise in building such equipment on the above subject are only requested to quote.		

BB. MACHINE CONFIGURATION : [The scope of supply shall consist of the following]			
Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.1	Load Frame 1.1. Frame rated for at least 25kN in tension / Compression. 1.2. Minimum stiffness better than 50kN/mm, precision aligned load frame with fixed lower platen and adjustable upper crosshead. 1.3. The minimum column clearance required is 400 mm and the maximum vertical daylight is 700 mm. 1.4. Load frame shall sit on an enclosure that houses pump and digital controls. 1.5. It shall have castors wheels with robust locking mechanisms for easy re-location of system 1.6. System shall be rated for indefinite operations		
BB.2.	Fatigue rated actuator assembly shall have 2.1. Linear dynamic/static capacity: $\pm 25\text{kN}$ 2.2. Minimum Stroke length: $\pm 25\text{mm}$ with resolution of $0.1\mu\text{m}$ 2.3. Shall include anti-rotation assembly 2.4. Servo valves of suitable rating and accumulators of suitable capacity.		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.3	Hydraulic power pack 3.1. Hydraulic power pack of sufficient capacity (atleast 4LPM) to run the system continuously shall be provided. 3.2. Proper size of accumulators shall be incorporated to avoid jerks/pressure transients in the event of power failure. 3.3. All safety provisions, pressure indicators, temperature indicators, relays shall be incorporated. 3.4. Hydraulic oil of sufficient quantity for the first time filling for the use of hydraulic power pack shall be provided. 3.5. Maximum working noise shall be 65 dB 3.6. Power pack shall be compact (and integrated.). 3.7. System shall be self-cooled. 3.8. It shall run on single phase 220V power supply. 3.9. Shall requires no site preparation		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.4	Digital Servo Controller shall include/ensure 4.1. 1 channel of digital p-encoder input, expandable to 2 channels 4.2. Up to 8 channels of conditioned analog inputs with suitable signal conditioners 4.2.1. 1 channel of load cell input 4.2.2. 1 channel of strain-bridge for [extensometer input (LCF) or extensometer input (Tensile Test) or crack-opening displacement gage] 4.2.3. 4 Spare Channels 4.3. 1 channel of digital servo-control with loop update frequency of at least 5 kHz 4.4. Synchronized data acquisition into host computer at 5 kHz from up to: 4.4.1. 2 channels of 32-bit digital encoder readouts 4.4.2. 8 channels of 24-bit analog feedback readouts 4.4.3. 1 channel of Set Point 4.4.4. 1 channels servo-output for monitoring purposes 4.4.5. 8-bits of digital I/O status for pump interface and test status. 4.5. User settable software safety limit interlocks on upper and lower limit readout on each of 2+8 feedback channels with individual option of Stop/Hold/Trip 4.6. Servo control of actuator with user settable/programmable: 4.7. Mode control (Load, Stroke, Strain) 4.8. Real-time automatic adaptive servo-gain adjustment to account for system stiffness variation as a function of specimen stiffness 4.9. Static ramping of Load / displacement/ strain with independently settable ramp rate. 4.10. Cyclic loading with ramp and sine waveform and user settable mean, amplitude and phase at frequency of up to 50 Hz and restricted as per the actuator performance curve, with better than 2% accuracy in loading through adaptive control.		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.4	Digital Servo Controller shall include/ensure 4.11. Provision for multi-step static and cyclic loading, with provision to switch control mode(s) as required. 4.12. User settable error limit on servo-control with option of Stop/Trip 4.13. Host computer (HP/Lenovo/Toshiba/Dell make only) with Windows 7 or higher version of operating system (Low power consumption CPU (~ 35-55 W) and at least 8 GB RAM) and suitable application software for ease of performing tests under specified conditions with provision for report generation by way of multiple worksheet XL-tables including raw data arranged suitably as columns for individual channels. Both host computer and application software should provide expansion of system capability including integrated control and data acquisition from other external devices including furnace. 4.14. Additional, easy to use Tablet/Smartphone with WiFi interface to host computer to permit easy stroke positioning by operator during specimen mount/dismount through local access to readouts and device control/status. Tablet mounting with power supply to be provided at convenient location on the machine frame. 4.15. One Hardwired E-Stops, located on the frame for easy access. 4.16. UPS to guarantee safe shut down and unloading in the event of power failure		
BB.5	Grips and Accessories for Room Temperature Applications 5.1. Universal (Main) Grips: ±25kN Manually Operated Grips Material of Construction: All grips, attachments for various tests shall be made with EN24.		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.6	Low Cycle Fatigue (LCF) Test Package 6.1. Threaded Cups A set of customized cups that directly integrated with the Universal Grip pull rod to test round specimens with threaded ends of size M8, M10 and M12. 6.2. Axial Extensometer for LCF Applications 6.2.1. Gage length: 12.5±0.01 mm 6.2.2. Measuring range: 0.5/-0.5 mm 6.2.3. Accuracy: ± 0.5% of read out value as per ASTM E83 6.2.4. Linearity: ≤0.15% of full scale measuring range 6.2.5. Excitation: 5 to 10 VDC 6.2.6. Sensitivity: 2 to 4 mv/V 6.2.7. Full bridge, 350 ohms strain gauged design The extensometers should be designed for testing wide range of materials including the metals. The dual flexural design extensometer should be supplied with standard quick attach kit, for easy mounting on the specimen mechanical over travel limits in both directions.		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.6	6.3. Low Cycle Fatigue Testing Software (As per ASTM E606) The user interface should contain specimen description, loading parameters, pump controls, test run/stop, graph display, numeric readouts of multiple relevant test parameters. Tests should be either possible in stroke or strain control. Tests should be either possible in stress control, total strain control and plastic strain control. Online display of loading modulus, unloading modulus, K', n' yield stress, plastic strain, max-min stress and strain are required. 6.3.1. Limit settings on stroke and strain 6.3.2. Auto data acquisition settings. 6.3.3. Online graphs of stress vs strain and transients. 6.3.4. Offline post processing program to analyze the results in MS Excel. 6.3.5. Option to save the test profiles. 6.3.6. Option to remove residual strain. 6.3.7. Option to add strain to gage length. 6.3.8. Option to terminate the test at specified modulus drop, stress drop and/or increase in strain.		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.7	Tensile, Compression and Flexure Test Package 7.1. Wedge Grips (As per E8M) A set of customized collets that directly integrated with the Universal Grip pull rods to test flat specimens from 0.5 mm to 5 mm in thick and 25 mm wide (max). 7.2. Compression Platens (As per E9M) A set of customized platens that directly integrated with the Universal Grip pull rods to test specimens that can be accommodated within the 60 mm diameter of the platen. 7.3. Axial Extensometer for Tensile Test Applications 7.3.1. Gauge length: 12.5±0.01 mm 7.3.2. Measuring range: +6.25/-3.1 mm 7.3.3. Accuracy: ± 0.5% of read out value as per ASTM E83 7.3.4. Linearity: ≤0.15% of full scale measuring range 7.3.5. Excitation: 5 to 10 VDC 7.3.6. Sensitivity: 2 to 4 mv/V 7.3.7. Full bridge, 350 ohms strain gauged design The extensometer shall be supplied with standard quick attach kit		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.7	7.4. Tensile and Compression Testing Software (As per ASTM E8M and ASTM E9M) Software to perform Tensile and Compression test. The user interface should contain specimen description, loading parameters, pump controls, test run/stop, graph display, numeric readouts of multiple relevant test parameters. 7.4.1. Tests should be possible in stroke or strain control. 7.4.2. Online graphs of stress vs. strain and load vs. displacement. 7.4.3. Option to save the test profiles. 7.4.4. Auto data acquisition settings 7.4.5. Option to view multiple test graphs in one plot. 7.4.6. Option to run test in dual rate. 7.4.7. Option to remove the extensometer and continue the test in stroke control. 7.4.8. Option to stop the test after specified percentage load drop. 7.4.9. Limit settings on stroke, strain and load channels. 7.4.10. Offline post processing program to analyse the results in MS Excel. 7.5. Three Point Bend Fixture A set of customized fixtures that directly integrated with the Universal Grip pull rods to test specimens in flexure. It should be able to accommodate specimens within the span range of 30 to 150 mm with roller pins of 5 and 10 mm.		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.8	Fracture Mechanics Test Package 8.1. Clevis Grips (ASTM E647) A set of clevis grips that directly integrated with the Universal Grip pull rods to test specimens with pin holes. These set of clevis grips shall be suitable CT specimens of thickness 12.5 mm and 25.4 mm and width 50.4 mm, with 10 set of spare pins of each specimen aforementioned. 8.2. Grip to test tensile test on samples with thickness 0.25mm to 5 mm and friction clamping feature to perform fatigue test on miniature sample with thickness 0.25mm to 5 mm. 8.3. COD gauge 8.3.1. Gauge length: 5 ± 0.01 mm 8.3.2. Measuring range: $+3/-1$ mm 8.3.3. COD Gage for fracture mechanics studies, in compliance with ASTM E647 & E1820 8.3.4. High accuracy, full strain gauged bridge construction 8.3.5. Accuracy $\pm 0.5\%$ of readout value as per ASTM E 83 8.3.6. Sharp grooves as per ASTM E 83 for improved stability 8.3.7. Excitation: 5 to 10 VDC 8.3.8. Sensitivity: 2 to 4 mv/V 8.3.9. Linearity: $\leq 0.15\%$ of full scale measuring range		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.8	8.4. Fracture Toughness Software for K_{Ic}, J_{Ic} and CTOD Testing (As per ASTM E1820 and E399) The user interface should contain specimen description, loading parameters, pump controls, test run/stop, graph display, numeric readouts of multiple relevant test parameters. 8.4.1. Tests can be done in stroke or COD control. 8.4.2. Real time graphs of J vs. Δa and load vs. displacement. 8.4.3. Option to save the test profiles. 8.4.4. Auto data acquisition settings 8.4.5. Auto scaling of graph. 8.4.6. Option to see J and Δa value online. 8.4.7. Option to select the previous data file and export the data. 8.4.8. Data file storage in same settings file. 8.4.9. Option to stop the test after specified percentage load drop. 8.4.10. Offline post processing program to analyze the results in MS Excel 8.5. Fatigue Crack Growth Testing Software (As per ASTM E647) Tests shall be done in constant load control, K control, decreasing K control and combination of these with multiple steps. 8.5.1. Option to program multiple steps with different loading conditions and different frequencies.		

Sl.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.8.	8.5.2. Online graphs of da/dN, load vs. COD, crack length vs cycles, K vs cycles, etc. 8.5.3. Online display of crack length, Kmax, Kmin, ΔK, Pmax, Pmin, ΔP, da/dN and more Option to stop the test at specified crack length, crack increment, Kmax, cycles etc. 8.5.4. Option to do variable amplitude test 8.5.5. Option to save the test profiles. 8.5.6. Auto data acquisition settings. 8.5.7. Auto scaling of graphs. 8.5.8. Option to enter material properties and specimen dimensions. 8.5.9. Option to measure crack length using remote LLD gage. 8.5.10. Offline post processing program to analyze the results in MS Excel. 8.6. Installation/Commissioning and training 8.6.1. Unloading the equipment at site including manpower requirement for such activities shall be borne by the prospective vendor.		

CC. OPERATION & MAINTENANCE (O&M) MANUALS :

S.No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
CC.1	No. of Copies	2 (Two) sets containing manuals of the equipment consisting of all the items mentioned in item numbers BB.1. to GG.1 to be sent along with the machine.		
CC.2	Language	English		
CC.3	Manual Details :	a. Manual shall contain all instructions for machine installation and for carrying out operation trial, testing in the correct sequence/ method b. Manual shall clearly describe the operation of the power source and all other items in item numbers BB.1. to BB.8. including extensometer, crack opening displacement transducer, etc. c. Manual shall contain general circuit diagrams, showing the interconnection of various elements and also details on PCBs [Printed Circuit Board] like tapping voltages, main electronic elements' specifications and ratings, etc. d. Manual to give other details like troubleshooting details etc. e. Master List of Parts & Spares used in the machine with Make, Model, Rating, etc.		

DD. GENERAL POINTS :

S.No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
DD.1.	Commissioning	The equipment shall be installed and commissioned at free of cost by the supplier/supplier's representative at BHEL Works.		
DD.2.	Pre-dispatch Inspection	The equipment shall be submitted for pre-dispatch inspection (PDI) at the manufacturer's works by BHEL Engineers before despatching the same to the BHEL, Trichy The equipment shall be submitted for pre-dispatch inspection (PDI) at the manufacturer's works by BHEL Engineers before despatching the same to the BHEL, Trichy. . During the PDI, a trial test is to be performed in both static and dynamic mode as per ASTM E 399 or ASTM 647 or ASTM E8 and the same shall be done in the presence of BHEL Engineer(s). The international air travel, boarding and lodging, in connection with the PDI mentioned above for two BHEL officials are in the scope of BHEL.		
DD.3.	Training	The Supplier's SERVICE ENGINEER shall give training in the Operation and Maintenance of the Machine for BHEL Staff (atleast FIVE), after the successful commissioning of the Universal Testing Machine.		
DD.4.	Warranty	The machine shall have warranty of atleast twelve months from the date of commissioning at WRI, BHEL		