



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 7653
Email : karunanidhy@bhel.in
spsy@bhel.in
kmk@bhel.in
Web : www.bhel.com

TWO PART BID

Tender to be submitted in two Parts

Enquiry
Number:

2601800004

Enquiry
Date:

18.01.2018

Due date for submission
of quotation:

13.02.2018

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	(Indigenous Vendors) Matl. will be Delivered to
10	Universal Hardness Tester as per the technical specification & commercial conditions applicable (to be downloaded from web site (http://www.bhel.com) http://www.bhel.com/tender/tender_home.php or https://eprocure.gov.in/epublish/app)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014

Important points to be taken care during submission of offer

1. Material shall be delivered to: Indigenous Vendors: As stated above.
Foreign Vendors: CFR Chennai Seaport / CFR Chennai Airport
2. Delivery required 10 Weeks including PDI from the date of purchase order.
3. Erection & Commissioning period required 2 Weeks from the date of intimation by BHEL to vendor for deputation of their Engineers for E&C.
4. EMD for this Tender will be (INR) : 1,00,000.00
5. Compliance Form Nos.: TRY/IMP/02 & TRY/IND/02A to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
6. 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) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site (<http://www.bhel.com>) http://www.bhel.com/tender/tender_home.php or from the Government tender website <https://eprocure.gov.in/epublish/app> under above Enquiry reference.

(This is not an E-tender, please submit your offer in hard copies)

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.PARTHASARATHY
MANAGER
CAPITAL EQUIPMENT / MM
BHEL, TRICHY-620014.

‘UNIVERSAL HARDNESS TESTER’

PART A

SECTION – 1: Qualifying Criteria

The BIDDER has to compulsorily meet the following requirements to get qualified.

S No.	REQUIREMENTS	BIDDER’S RESPONSE
1.1	Only BIDDER/ Original Equipment Manufacturer (OEM) who have a minimum of TEN Years (as on the first date of opening of tender) of Continuous Experience in the Design, Manufacture & Supply of ‘UNIVERSAL HARDNESS TESTER’ are eligible to quote for this tender. The bidder shall indicate the actual no. of years of experience in the field and submit Purchase Orders (PO) copies or relevant documents as proof of experience.	
1.2	Bidder/OEM must have supplied same model universal hardness tester (quoted against the tender) in the last 5 (five) years to a minimum of 3 (three) customers in India/ abroad as on the date of tender opening mentioned in the enquiry.	
1.3	Bidder/OEM must also have supplied the universal hardness tester in the last 5 (five) years to at least 1 country outside the country of origin (manufacture).	
1.4	The Bidder shall submit a performance certificate for satisfactory performance of the Universal Hardness Tester (model quoted against this tender) for a minimum period of one years from the date of commissioning (as on the first date of opening of tender) from two of the customers ^a to whom such equipment was supplied in the last 5 years. Full contact details of the customer to be provided from whom the performance certificate is obtained. For obtaining the Performance certificate, a suggestive format is given in Annexure-1. (a) The customer mentioned above shall be a Government of India firm/PSU/CPSE/R&D institutes, manufacturing Industries, heavy industries/other industries outside India. Performance certificates from educational institutions shall not be acceptable.	
1.5	BHEL shall visit the referred customer’s works to verify the information provided by the vendor. It shall be the responsibility of the vendor to facilitate the visit of BHEL’s team at their referred customer works. The travel, boarding and lodging expenses for BHEL team shall be borne by BHEL.	
1.6	Country of OEM must also be the country of origin (manufacture). A declaration has to be submitted as a proof of compliance to this clause.	

BHEL reserves the right to verify the information provided by bidder. In case the information provided by bidder is found to be false/ incorrect, the offer shall be rejected.

SECTION – 2:

The BIDDER shall write the following details in the ‘Bidder’s Response’ column:
:

S. No.	PARTICULARS	BIDDER’S RESPONSE
2.1	BIDDER shall write clearly the Country of Origin for the supply of the Universal Hardness Testing machine.	
2.2	YEAR of LAUNCH of the MODEL quoted against this ENQUIRY.	
2.3	Number of such ‘Universal Hardness Testing machines’ supplied, till date in the QUOTED MODEL	
2.4	A detailed list of customers with Purchase Order (PO) number and date of purchase, date of Erection and Commissioning (E&C), contact details of customers to whom these equipment were supplied in last 5 (five) years as on the date of tender opening mentioned in the enquiry.	
2.5	The BIDDER shall give details about supply of similar Hardness Testing Machines to BHEL units, if any, with Make, Model and Year of Supply & Commissioning etc.	
2.6	Details on International Standards followed in Design and Testing of the Universal Hardness Testing machine.	
2.7	Comprehensive Details, on Performance Testing of the quoted model carried out at the Factory, to be furnished with the Technical Offer.	
2.8	The service after sales set up should be available in India. The details on SERVICE-AFTER-SALES Set-Up including the Addresses of Agents / Service Centres in India, to be furnished compulsorily. The OEM or authorized supplier shall have a well-trained service network available in India to cater the service requirements of the offered Universal Hardness Testing machine. The details of the same shall be submitted along with the technical bid.	
2.9	Manufacturer’s Test Certificate for the offered machine should be provided before dispatch.	

SECTION – 3

The BIDDER to note and compulsorily adhere to the following:

S. No.	REQUIREMENTS	BIDDER's TO COMPLY
3.1	The BIDDER shall submit the offer in TWO PARTS – 1. Technical [with filled in PART A & PART B] 2. Commercial and Price Bid.	
3.2	The vendor should clearly indicate whether they are able to supply as per BHEL's specifications for each item. This should clearly be written in vendor compliance box of the enquiry as "Yes" or "No" and also key in the respective details. The vendor shall mention reasons for (i) deviations from specifications (ii) providing better than mentioned specifications wherever applicable (iii) for mentioning "No" in the compliance box of enquiry. Explicit Compliance statement for each and every point mentioned in the enquiry shall be provided indicating clearly the items/parts quoted against each point. This shall include compliance, technical details, part numbers, description and quantity being offered for each items quoted against each requirement. Also in case any point being optional, the item/part quoted against the same should also be mentioned as optional.	
3.3	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. No advance payment shall be encouraged in any context.	
3.4	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODEL of the Universal Hardness Testing Machine	
3.5	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid.	
3.6	BHEL reserves the right to take response from market field. Hence, BHEL end users will visit/contact customers in the market and take an opinion of the machine/similar machines they have in the laboratory (supplied by the OEM/bidder) and also get a feedback from them (like DRDO lab/HAL/IITs/NAL/ CSIR/SERC/any other laboratory including BHEL, etc) and if found that the supply or service is not up to mark or failing to attend the services on time, then the vendor will be disqualified.	

The performance certificate shall be produced on Customer's Letter Head only.

Format of Performance Certificate

(On Customer's letter head)

PERFORMANCE CERTIFICATE

1. Supplier of the equipment :

2. Make & Model of the m/c :

3. Month & Year of Commissioning :

4. Quantity :

5. Equipment Details

a) Type :

b) Capacity :

6. Application/Tests Conducted : (please tick the appropriate)

Test Description	YES	NO	NA
Brinell Hardness testing as per ASTM E 10			
Rockwell Hardness testing as per ASTM E 18			
Vickers Hardness testing as per ASTM E 92			
Hardness testing as per ASTM E 370			

7. Performance of the Machine : Satisfactory / Not Satisfactory
(Strike off whichever is not applicable)

8. After sales service : Satisfactory / Not Satisfactory
(Strike off whichever is not applicable)

9. Any Other remarks :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B

TECHNICAL SPECIFICATIONS FOR ‘UNIVERSAL HARDNESS TESTING MACHINE’

		AA. APPLICATION :		
Sl.No.		FEATURES /BHEL SPECIFICATION	OFFER BIDDER	BY DEVIATIONS
AA.1	Scope of Supply and Testing	This specification is for : Supply, installation, commissioning, demonstration and user training to carry out fully automated hardness testing on different components and specimens of different materials, sizes and shapes. The testing shall compulsory cover all the following: • Brinell Hardness testing as per ASTM E 10 (with ball diameter 1 mm, 2.5 mm, 5 mm, 10 mm) • Rockwell Hardness testing as per ASTM E 18 • Vickers Hardness testing as per ASTM E 92 • Hardness testing as per ASTM E 370 The system shall include: • Essential accessories as per the specifications • Essential spares for two years trouble free Operation & Maintenance • Essential consumables two years trouble free Operation • Documents as specified		

		BB. MACHINE CONFIGURATION : [The scope of supply shall consist of the following]		
Sl.No.		FEATURES /BHEL SPECIFICATION	OFFER BIDDER	BY DEVIATIONS
BB.1	Application	Application shall include the following: • Ferrous and non-ferrous metals • Flat and cylindrical components • Hardness distribution mapping and curves for welded samples and components • Castings and forgings • Heat treated surfaces, hot and cold mount metallographic samples. • Fasteners, sheets, tubes and pipes.		

Universal Hardness Testing Machine

BB.2.	Capability	Equipment capability shall include: • Basic equipment shall be capable of carrying out Brinell, Vickers, Rockwell and Rockwell Superficial hardness complying with National/international standards as described in the subsequent specification. It shall have Computer controlled system with external monitor unit with provisions for exporting test results, printing and data connectivity. • Automatic loading with auto zoom focus module for automatic measurement of hardness • Automatic Heavy duty Turret system for holding multiple indenters (minimum three) and lenses (minimum three) which can be swiveled automatically, Motorized X-Y stage for fully automatic hardness measurement of multiple spots in a sample or multiple samples. • Safety systems like emergency stop button, limit switches or specimen protection sensor/alarm to be provided to avoid accidental collision of sample with test head, overloading, and to ensure safety of operating personnel. • Shall include manual mode of measurement where ever applicable.		
BB.3.	Loading System	• Loading system must be essentially automatic with load cell closed loop control and shall ensure highest possible degree of accuracy and repeatability. Details of loading system shall be provided. The test force error must be better than 1%. • Test load range: 20 kgf to 3000 kgf • Additional test force: To be specified • Test force selection: Both Automatic and manual		
BB.4.	Dimensions	• Test height: 200mm (minimum) excluding sample support anvil • Depth of throat: 150mm(minimum) • Height adjustment: Motorized Mode; can be fixed anvil/movable test head or fixed test head/movable anvil, both driven through motor. • Least count: Min 0.1 unit for Rockwell, 0.1 unit for Vickers and 1 unit for Brinell • Dwell time: To be specified • Vickers test procedure – Details to be provided like range of loads used, test cycle time for each indentation etc. • Brinell test procedure – Details to be provided like range of loads used, test cycle time for each indentation etc. • Rockwell test procedure – Details to be provided like range of loads used, test cycle time for each indentation etc.		

Universal Hardness Testing Machine

BB.5	Stage	• X-Y stage: Automatic Motorized X-Y stage movement. • X-Y stage size: 150X150mm (min.); X-Y stroke: 100 X 50mm (min.); X-Y stage accuracy: 1µm or better. Min. sample weight in XY stage: 50kg (min.). Details of movement control by Joystick or software etc. to be provided. • Z-Stage: Height adjustment by motorized mode; Z-stage movement resolution: To be specified		
BB.6	Turret System	• Turret position: 7 positions (minimum) able to hold at least 3 different indenters and 3 different lenses • Turret swivel: Automatic (motorized). Details of turret orientation, swiveling speed, technical documents to support turret durability etc. to be provided.		
BB.7.	Optics	• Optical system: High quality optical system to ensure highly accurate and repeatable image and hardness evaluation with integrated autofocus and auto-zoom module. Details of optical zoom to be provided. • Objective lenses: Lenses 1x, 2x, 5x, 10x and 20x. • Evaluation Camera: High resolution camera 4MP or better with electronic Zoom module, auto brightness adjustment/ auto illumination & integrated auto focus. • Overview camera/sample image camera/Second camera/Macro camera: To define test points, starting points etc. on the sample in X-Y stage for automatic hardness mapping. Details like field of view, resolution etc. to be provided.		
BB.8.	Illumination System	• Only LED system of illumination to be provided. A high quality, long life and automatic brightness adjustable illumination system is to be employed; Suitable illumination systems to be provided for softer and non-ferrous materials etc.		
BB.9.	Work Station	• Operating System(OS) : Windows 10 • Processor: Intel Core i7- Processor or better • RAM: 4 GB(min.) • Storage capacity: 500 GB or more • DVD reader cum writer • Monitor for computer: 22" LED (min) • Multimedia Keyboard, Optical mouse, Interconnecting cables, Software and OS CDs • Laser colour Printer to print A4 size papers and its accessories with latest specifications should be included in the supply		

Universal Hardness Testing Machine

BB.10.	Data Connectivity	• Sufficient ports for Internet, Ethernet connection, RS232, USB shall be available in the machine or computer to ensure seamless data transfer and direct printout of test results. • Minimum of 2XUSB ports, 1XRS232 and suitable ports for LAN, WAN connection is required. • Other connectivity details like External digital(DVI) connectivity, HDMI etc. to be specified • Data connection (Communication) cable between the analyser and computer.		
BB.11.	Software	Software shall include: • Automatic hardness measurement • Hardness conversion module • Statistical data and processing tools like X-charts, histogram etc. • Report generator with images • Geometric correction factor for concave and convex surfaces • Defining automatic test cycles for hardness mapping • Facility to export data to other formats like .xls/.doc/.pdf etc. • Software shall be upgraded if there is an update at the time of supply – without cost implications. • System shall be preloaded with essential software like MS office, Adobe PDF reader, Notepad, system drivers, machine drivers etc. • All software shall be original and original CDs should be issued to BHEL.		
BB.12.	Spares and Consumables	• Indenters- must be supplied with certificates traceable to national/ International accreditation • Brinell indenter with indenter holder and tungsten carbide balls of Ø1, 2.5, 5.0 mm. • Vickers Square pyramid 136° diamond indenter with holder • Rockwell class A diamond cone indenter 120° with holder • Rockwell indenters for B scale and superficial hardness- Ø 1/16", 1/8", ¼" and ½" with holders • Anvil: Flat support to hold samples of at least 50kg weight. - 1 no. ; Test tables shall have suitable mounts to test large size components also. • Self-centering V-anvils/ prism anvils to support cylindrical components Ø10mm to Ø80mm– 1 no. • Spot anvil to hold thin specimens – 1 no.		

Universal Hardness Testing Machine

BB.12	Calibration test blocks	• Test blocks -must be supplied with certificates traceable to national/ International accreditation • Brinell Hardness blocks as per ASTM E10 ➤ Test block HBW 10/3000 (110-150 BHN) ➤ Test block HBW 10/3000 (550-600 BHN) ➤ Test block HBW 10/1500 (275-300 BHN) ➤ Test block HBW 10/1000 (175-200 BHN) ➤ Test block HBW 5/750 (300-350 BHN) ➤ Test block HBW 2.5/187.5 (500-600 BHN) ➤ Test block HBW 2.5/62.5 (100-150 BHN) ➤ Test block HBW 1/30 (200-250 BHN) • Rockwell Scale (As per ASTM E18) ➤ 20-30 HRC ➤ 35-55 HRC ➤ 60-65 HRC ➤ 40-59 HRBW ➤ 60-79 HRBW ➤ 80-100 HRBW ➤ 40-50 HR30N ➤ 55-73 HR30N ➤ 75-80 HR30N ➤ 43-56 HR30TW ➤ 57-70 HR30TW ➤ 70-82 HR30TW • Vickers Scale (As per ASTM E-92) ➤ 100 – 240 HV30 ➤ 240-600 HV30 ➤ 600-1000 HV30		
BB.14.	Safety System	• Basic equipment must be equipped with safety features like emergency stop button, limit switches etc. • Necessary protective measures to ensure safety of the equipment and the operator shall be taken care. • Details of safety systems to be provided		

Universal Hardness Testing Machine

BB.15.	Essential Accessories	• Essential accessories shall include flat anvil, indenter for HV, HBW, HRC and HRB along with suitable lenses, PC with software package, Motorized X-Y stage, Safety systems, supporting cables etc. to ensure trouble-free operation of the equipment after installation. • Essential Spares for 2 years trouble free operation:		
BB.16.	Additional Accessories	• Bidder to attach un-priced list (priced list with Unit Rate shall be attached in the commercial offer) of various Optional accessories like other indenters, test blocks, special anvils and fixtures etc. to be procured with the equipment to enhance the operating efficiency and features of the offered equipment, over and above those mentioned in the specifications. Details of the accessories to be specified. • Bidder to attach un-priced list (priced list with Unit Rate shall be attached in the commercial offer) of various essential spares to be procured with the equipment for two years of trouble free Operations and Maintenance. Ordering No. And Details/Specifications of the spares to be mentioned. • All types of spares for the equipment and its accessories should be available for minimum ten years, after supply of the equipment. If any spares or controls are likely to become obsolete within this period, the Bidder should inform BHEL and provide details of its suppliers to enable BHEL to procure them in advance • Consumables: Bidder to attach un-priced list (priced list with Unit Rate shall be attached in the commercial offer) of various consumables to be procured with the equipment for 10000 impressions. Details / specifications of the consumables to be mentioned.		
BB.17.	Calibration	• Vendors shall provide the NIST/NABL/equivalent International Standard traceable factory calibration report for test blocks, load cell, • Along with the original calibration certificates, complete details of calibration procedures & instructions, applicable standards, periodicity, acceptance criteria, methodology for corrections etc. shall be provided. • Details of Calibration Kit, if required shall be quoted separately in the commercial bid.		

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BB.18.	Electrical System	• 415V + 10% / -10%, 50Hz, 3 Phase AC (3 wire system without neutral) and / or 230V +/- 10%, 50HZ +/- 1.5 HZ, Single Phase AC through a 3 wire system (Phase, Neutral and Protective earthing) Power Supply Source will be provided by BHEL near the equipment. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to the equipment, shall be the responsibility of Bidder. • Tropicalisation: All electrical / electronic equipment shall be tropicalized. All control cables should be of copper. • All electrical & electronic control cabinets & panels should be dust and vermin proof and shall have IP 54 protection. • Bidder should ensure the proper earthing for the machine and its peripherals.		
BB.19.	Equipment Table	• Shall provide suitable table top to accommodate and withstand the weight of the basic equipment and accessories including work station and display unit.		
THE VENDOR SHALL MANDATORILY QUOTE FOR THE FOLLOWING				
CC.1.	Hot Hardness Testing stage	Shall include the following: • Furnace: High temperature programmable furnace with temperature adjustable from (100 – 900) deg-C in division/steps of temperature 1 C° • Power supply: Single-phase, 220 V, 50Hz • Sample capacity: diameter 50mm • Electronic panel control to adjust temperature and LCD display to indicate temperature • Thermocouple K-type installed on the furnace • Cover to protect furnace chamber in Atmosphere • External cooling system to reduce external temperature effect. • Suitable indenters and accessories.		
CC.2.	OEM/Bidder responsibility	• It shall be the sole responsibility of the OEM/bidder to integrate the hot hardness testing stage with the quoted model of the Universal hardness testing machine and demonstrate a test as requested in Annexure-2.		

DD. GENERAL POINTS :				
S.No.	PARTICULARS	BHEL SPECIFICATION	OFFER BIDDER	BY DEVIATIONS
DD.1.	Erection & Commissioning (E&C)	• E&C or Installation has to be carried BHEL's work site by the OEM or their authorized service agency/ personnel only. • Supplier should indicate the site requirements for E&C in the offer itself including the layout of the machine and associated accessories, electrical, civil requirements, etc • All cables, adapters, etc. required for integration of each and every component of Universal Hardness testing system must be supplied along with the system. It is the responsibility of the supplier to integrate all the systems and ensure the functionality of the entire Testing Machine and accessories, auxiliaries as per technical scope of the enquiry. • E&C report should be submitted to us after successful completion of the same.		
DD.2.	Pre-dispatch Inspection	The equipment(s) 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 OEM shall demonstrate basic operation of the machine to prove its compatibility with the requirements asked for. Acceptance of the machine will be based on the successful completion of prove out tests as listed in the Annexure-2, which shall be demonstrated by OEM during PDI. The OEM has to calibrate the equipment and its accessories by direct and indirect methods while performing the prove out. The international air travel (to and fro – both the ways inclusive), boarding and lodging in connection with the PDI mentioned above for BHEL officials shall be in the scope of the BHEL.		

Universal Hardness Testing Machine

DD.3.	Training	- Detailed training at BHEL's works has to be provided by factory engineers of OEM/bidder to BHEL staffs on working of all modes of the equipment along with the accessories, handling the software for operation or data acquisition and maintenance procedures. - Training should also be provided on safety features, tasks to be performed in case of emergency, etc. - Detailed scope and daily schedule and duration of training has to be indicated. - Training charges, if any, have to be quoted. - Training certificate and report should be submitted to BHEL officials after successful completion of the same.		
DD.4.	Performance Guarantee	The equipment and its accessories (including bought-out Items) are to be guaranteed for its performance for a minimum period of One year from the date of performance acceptance at BHEL works.		
DD.5.	After sales support and Annual Maintenance Contract (AMC)	- OEM or Indian agent must take up responsibility for service of the Universal Hardness Testing Machine along with accessories, auxiliaries, etc. when requested for. - Bidder shall quote for service AMC charges for 5 years after expiration of the standard guarantee/ warranty, separately. - BHEL reserves the right to place a separate order/ orders for service AMC contract before expiry of standard guarantee/ warranty period at the rates quoted. - During service AMC visit, 4 routine visits per year for general service and maintenance, calibration, etc. and one breakdown/ emergency visits (if any) per year have to be made for continuous operation of the equipment. - The service personnel should report within 7 days for attending the problem during breakdown/ emergency visit as a part of service AMC. - No advance payment shall be encouraged in any context.		

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DD.6.	Documents to submitted	• Manufacturer's Test Certificate required and should be provided before dispatch. • Brochures/ Technical details/ supporting information compliance to all the item, specifications for the equipment along with its accessories, auxiliaries, etc. in English language shall be provided. (3 hard copies and 1 soft copy in CD) • Operation & Maintenance manuals containing electric schematics, circuit diagrams, PCB drawings, Troubleshooting charts, mechanical sub-assemblies, Bill of materials etc. • List of bought out items with their specifications / catalogues.		
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Universal Hardness Testing Machine

Annexure-2

Pre-dispatch inspection shall to be carried out by BHEL representatives before dispatch of machine.

The OEM shall perform the below said tests during the PDI. The machine shall be acceptable only if the said tests are completed successfully and reports are submitted. This shall remain a main criteria for the acceptance of the machine.

DESCRIPTION	TESTING I	TESTING II	TESTING III	TESTING IV
Material	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
No of samples: (excluding test blocks)	2	2	2	2
Condition of Test:	Room temperature	Room temperature	Room Temperature	Elevated temperature
Nature of Test	- Brinell Hardness testing as per ASTM E 10 (with ball diameter 1 mm, 2.5 mm, 5 mm, 10 mm) on the 2 samples - Brinell hardness testing as per ASTM E 10 (with ball diameter 1 mm, 2.5 mm, 5 mm, 10 mm) on the test blocks requested.	- Rockwell Hardness testing as per ASTM E 18 on the 2 samples - Rockwell Hardness as per ASTM E 18 on the test blocks requested	- Vickers Hardness testing as per ASTM E 92 on the 2 samples. - Vickers Hardness testing as per ASTM E 92 on the test blocks requested	Hot hardness test: Brinell, Rockwell and Vickers hardness testing on 2 samples at 600 deg-C

The above test shall include demonstration of all the features, listed through BB.2 to BB.18 of this tender specification, of the quoted Universal Hardness Tester.