



An ISO 9001  
Company

**Bharat Heavy Electricals Limited**  
(High Pressure Boiler Plant)  
Tiruchirappalli – 620014, TAMIL NADU, INDIA  
CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

<b>ENQUIRY</b>	Phone: +91 431 257 75 75 Fax : +91 431 252 07 19 Email : <a href="mailto:rrmanohar@bheltry.co.in">rrmanohar@bheltry.co.in</a> Web : <a href="http://www.bhel.com">www.bhel.com</a>
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	<b>Enquiry Number:</b>	<b>Enquiry Date:</b>	<b>Due date for submission of quotation:</b>
	<b>2620700016</b>	<b>04.06.2007</b>	<b>20.08.2007</b>

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

Item	Description	Quantity	Delivery Schedule
10	Thermal Cycle Simulator as per the technical specification & commercial conditions applicable (to be downloaded from web site <a href="http://www.bhel.com">www.bhel.com</a> )	1 No.	15.04.2008

**Note:**

- (1) Confirmation of acceptance for BHEL commercial terms & conditions and Price Bid formats have been posted in BHEL Corporate web site [www.bhel.com](http://www.bhel.com) under Enquiry reference “2620700016”. Your offer should be based on all the above documents.
- (2) Also, you are requested to fill in the Supplier Registration formats available in [www.bhel.com](http://www.bhel.com) (under Advancement – Supplier Registration) and send it along with your offer.

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  Sr. Dy. Genl. Manager / Capital Purchase / MM / Manufacturing
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**PART A****THERMAL CYCLE SIMULATOR SYSTEM****SECTION – I**

The BIDDER / VENDOR has to compulsorily meet the following requirements to get Qualified for submitting an offer for Thermal Cycle Simulator System.

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	The BIDDER shall have a minimum of THREE Years of Continuous Experience in the field of Design, manufacture and supply of Thermal Cycle Simulator System	
2	Only those vendors, who have supplied, and commissioned at least one such a <b>Thermal Cycle Simulator System</b> for similar applications in the past five years (on the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender), should quote. However, if such machine (s) has/ had been supplied to BHEL, then such machine should be presently working satisfactorily for more than six months after its commissioning and acceptance (on the date of opening of Tender) in BHEL.	
2.1	The vendor should submit the following information where similar machines have been supplied, for qualification of their offer.	
2.2	Name and postal address of the customer / company where similar machine is installed.	
2.3	Name and designation of the contact person of the customer.	
2.4	Phone, FAX no. and email address of the contact person of the customer.	
2.5	Month and Year of commissioning	
2.6	Application for which the machine is supplied.	
2.7	One Performance certificate from the customers regarding satisfactory performance of machine supplied to them. The certificate should be current and on the letterhead of the Customer. It should contain information regarding model of machine, year of commissioning and performance of system.	
2.8	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.	
3.0	BIDDER has to co-ordinate for the visit of BHEL Team (at BHEL Cost) to the Customer's Works, to witness the satisfactory working of the Thermal Cycle Simulator System supplied by the bidder, if warranted.	

## SECTION – I I

The BIDDER is expected to give complete details against each clause in the table given below, with additional sheets those may be attached (giving clear reference number) to furnish and cover the requisite details / documents.

S. No	PARTICULARS	VENDOR's RESPONSE
4	Profile of the Company bringing-out the years of Experience of the BIDDER in the field of machine design, manufacture and supply of Thermal Cycle Simulator System	
5	Number of Thermal Cycle Simulator Systems supplied, installed and commissioned till date for simulation and materials testing along with details of type of system, model no, configuration and customer details	
6	YEAR of supply of latest Thermal Cycle Simulator System and the Technical Specifications of the Machine supplied [Details to be furnished]	
7	Details on the Firm's Registration and the FINANCIAL STRENGTH of the COMPANY (Balance Sheet for the last 3 years) shall be submitted with the TECHNICAL OFFER	
8	Details on International Standards / Design Process Codes followed in Design and Manufacture of the Equipment.	
9	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centers in India. Competency & Experience of the Local Service Agency are to be provided	
10	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment	

## SECTION – III

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

<b>S. No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's RESPONSE</b>
11	The BIDDER / VENDOR shall submit the offer in TWO PARTS-Technical [with PART A & PART B] & Commercial and Price Bid.	
12	The Technical Offer shall be supported by Product Catalogues and description.	
13	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 mere 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement [without any supporting technical write-ups, photos and datasheets] may lead to disqualification of the Technical Offer.	
14	The BIDDER / VENDOR shall assure a continuous support for the supply of SPARES and SERVICE for TEN Years, from the date of commissioning of equipment at BHEL Works.	
15	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 of the inclusion of all the accessories, tooling, attachments, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements.	
16	Soft copy if any, giving the salient features of the proposed machine with all sub-systems and auxiliaries, and /or showing live-demo of an existing and working machine of similar configuration and capacity may be provided.	
17	BIDDER has to indicate the Country of Origin for the supply of equipment.	
18	The reference List of Customers shall be accompanied with (Phone Number and E-Mail ID) of the CONTACT PERSON for cross reference by BHEL	
19	In case of preliminary qualification of the offer, on technical grounds, the BIDDER may be called for a detailed technical discussion on the original technical offer at BHEL Works, with a sufficient notice period.	

## **PART B**

### **TECHNICAL SPECIFICATION FOR THERMAL CYCLE SIMULATOR SYSTEM**

1.0	<b>Purpose</b>	
	<b>Simulation of thermal cycles associated with welding and heat treatment and study of its influence on mechanical properties in engineering material samples for optimization of processes.</b>	
2.0	<b>Scope of supply</b>	
	<p>Integrated Thermal cycle simulator and testing equipment consisting of</p> <p><b>Physical simulation of welding and heat treatment process in standard sized material samples including</b></p> <ol style="list-style-type: none"> <li>1. Weld and HAZ cycles</li> <li>2. Upset butt welding</li> <li>3. Diffusion bonding</li> <li>4. Heat treatment</li> <li>5. Quenching</li> <li>6. Forging</li> <li>7. Hot rolling</li> </ol> <p><b>Conventional and advanced testing of the samples in the same machine.</b></p> <ol style="list-style-type: none"> <li>1. Hot tensile test</li> <li>2. Hot compression testing [uni axial and plane strain]</li> <li>3. Strain induced crack opening test</li> <li>4. Nil strength test</li> <li>5. Thermal cycling /heat treatment</li> <li>6. Fatigue test [thermal and thermal/mechanical]</li> <li>7. Creep/stress rupture test</li> <li>8. Dilatometry /phase transformation on heating /cooling, continuous and non-continuous, isothermal,</li> <li>9. Stress relaxation studies.</li> <li>10. Melting and solidification</li> </ol> <p>Accessories like grips, jaws etc for specific tests envisaged as given below.</p>	
3.0	<b>Thermal simulation system</b>	
	<b>Parameters &amp; BHEL specifications</b>	<b>Bidder's offer (With Complete Technical Details)</b>
3.1	<u><b>Heating method</b></u> Direct resistance heating method	
3.2	<u><b>Heating rate</b></u> The rate of heating achievable shall be up to 10,000 °C per second	
3.3	<u><b>Holding of temperature</b></u> The system shall have capability to maintain temperature up to 1600 °C over steady state equilibrium conditions for specified duration of time.	

3.4	<b><u>Cooling rate</u></b> The cooling rate at the specimen surface shall be up to 10,000 °C per second	
3.5	<b><u>Temperature measurement</u></b> The thermal system shall have suitable feedback control to check and modify pre-programmed heating and cooling rates. The temperature measurement and feedback shall be made using contact thermocouples and non-contact infrared pyrometer. The thermocouples shall be of Platinum-Rhodium and chromel-Alumel types.	
3.6	<b><u>Accessories for thermal simulation system</u></b> Suitable thermocouple attachment unit for fixing the thermocouples elements to the test specimens. Suitable copper grips and nuts for round/rectangular specimen clamping Water chiller /cooling system to control and maintain the heating and cooling rates for a continuous operation of 8 hours. CCT-dilatometer with Kit, LVDT with signal conditioner module and Quench fixture for generation of weld and HAZ CCT studies.	
3.7	<b><u>Accessories for thermal simulation system</u></b> Suitable thermocouple attachment unit for fixing the thermocouples elements to the test specimens. Suitable copper grips and nuts for round/rectangular specimen clamping Water chiller /cooling system to control and maintain the heating and cooling rates for a continuous operation of 8 hours. CCT-dilatometer with Kit, LVDT with signal conditioner module and Quench fixture for generation of weld and HAZ CCT studies.	
4.0	<b>Mechanical loading system</b>	
4.1	<b><u>Loading system</u></b> Hydraulic servo system to apply static force in tension and compression of 10,000 kg. The system should be fully integrated type Shall have feed back system to ensure accurate repeatability of the mechanical loading program. The system shall have capability to apply displacement rate of 1000 mm /sec.	
4.2	<b><u>Modes of testing</u></b> Mechanical system should be operatable in different control modes such as displacement, force, true stress, true strain, engineering stress and engineering strain. The system should be capable of switching from	

	one control mode to another during a given test.	
4.3	<b><u>Type of specimens &amp; grips for simulation and testing</u></b> Rectangular cross section specimens of size 11x 11 x 55 mm Round tensile type specimens of diameter 6 and 10 mm.	
4.4	<b><u>Accessories for testing</u></b> Necessary grips and jaw carriers for flat and round specimens to carry out the tests and specimens listed above. Calibrated Extensometer for generation of stress strain curve. Strain kit for measuring strain to generate stress strain curve. Should have suitable accessories to carry out fatigue , creep tests at ambient and elevated temperature. Variation stress and strain shall be possible	
5.0	<b>Control System &amp; Software</b>	
5.1	<b><u>Hardware</u></b> Digital closed loop system to control thermal and mechanical test variables <b>simultaneously</b> for simulation and testing with following features. Windows based workstation with powerful embedded processor for Control of the thermo-mechanical system, Entire operation shall be possible with Manual and /or computer control. Multi tasking capability for programming while tests are running. Configuration of measurement unit by the user. The hardware shall have adequate memory storage capacity to store test parameters and data for minimum of 1000 tests and high-speed data acquisition system. A compatible laser printer for hard copy generation of the input parameters and results	
5.2	<b><u>Software</u></b> User-friendly software to pre-program test parameters thro table form, software and other means. View the set parameters in off-line mode. Acquisition of data & Monitoring of test progress during simulation & testing. Processing of data & display in graphical/tabular format in real time mode.	

	The output should be made available in windows spreadsheet or other user-friendly formats for post processing.	
6.0	<b>Power supply</b>	
6.1	The power supply for the mechanical, thermal and other sub systems shall be through 440V/ 50Hz three phase supply.	
7.0	<b>Installation and commissioning</b>	
7.1	<p>Inspection and short training of the system and trials to demonstrate the total operation and tests at suppliers works.</p> <p>The system shall be installed and commissioned at WRI by the supplier at no extra cost.</p> <p>The supplier shall indicate through drawings the water line connections, power line connections etc required for the installation of the system in advance.</p>	
8.0	<b>Spares &amp; warranty</b>	
8.1	<p>Critical spare parts for three years of trouble free operation.</p> <p>Warranty for two years and free updates as and when the software is updated</p>	
9.0	<b>Documentation and Training</b>	
9.1	Free training by experts for WRI engineers at WRI for 5 days.	
9.2	<p>Hard copy and soft copy of 3 full sets of operating manuals &amp; instruction manuals, reference manuals, users guide, wizards and maintenance manuals.</p> <p>3 Full sets of tutorials with step by step examples, case studies and technical literature for understanding and operation of the equipment.</p> <p>A set of technical literatures that have been published using the equipment for the analysis of similar applications.</p> <p>3 sets of documentation for the hardware and software.</p>	