



BHARAT HEAVY ELECTRICAL LIMITED

UNIT'S ADDRESS: CFEF, HARIDWAR, INDIA

Specification No: CFE/QM/RMI/02 REV 01 DATE-11/05/18

Dated 11.05.2018

SPECIFICATION OF REFRACTORINESS UNDER LOAD (RUL) TESTER

NOTE:-

1. The vendor shall comply to the requirements of Qualifying Condition (Clause 3.0) and furnish all documents related with qualifying criteria along with technical bid. Offer submitted without required documents shall be treated as non-compliance and shall not be considered for further processing.
2. The vendor shall fill comments (as applicable) in column 4 of the specification against each clause. Offer submitted without this filled format shall be treated as non-compliance.
3. For filling of Column 4, following instructions shall be followed:
 - a) Where ever "confirm" is mentioned in column 3, the vendor shall fill "confirmed" in column 4 in case of compliance.
 - b) Where ever "Furnish" is mentioned in column 3, the vendor shall fill the reference of furnished document in column 4 and submit the relevant document along with technical bid.
 - c) Where ever "Specify" is mentioned in column 3, the vendor shall fill the required information against that clause.
 - d) In case of deviation from required specification, vendor shall clearly indicate the deviation in column 5 against the requirement.
4. Vendor shall essentially assign page nos. to their tender documents and in column 6 fill up the concerned page no. where the particular requirement/ documents is/are written or placed.
5. Inadequate / incomplete, ambiguous, or non-relevant information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
6. Any clarification asked by BHEL during evaluation of offer, shall be replied by vendor within a period of five days from the date of query. In case of no response, it will be treated as non-compliance and offer shall not be considered for further processing.
7. The offer and all documents enclosed with offer shall be in English/Hindi language only.

NAME & ADDRESS OF THE OEM :
TELEPHONE NO.:
FAX NO.:
E-MAIL ADDRESS :

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*(Sanjay Handwani)
BHEL, Bhopal*

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Clause No (1)	DESCRIPTION FOR BHEL REQUIREMENT (2)	To Confirm/ Specify/ Furnish by Vendor (3)	Comments of Vendor (4)	DEVIATIONS (5)	PAGE NO. (6)
1.0	APPLICATION				
1.1	The Refractoriness Under Load (RUL) tester shall be used for determination of refractoriness under load value of refractory brick specimen at temperature range of 1700 °C complying with IS 1528, part-2) or its equivalent international standard (i.e ISO 1893). This test determines the softening temperature of refractories under load indicated either by complete sloughing down or breaking of the test specimen.	Vendor to Confirm			
2.0	SCOPE OF SUPPLY				
2.1	With this equipment, the parameter Refractoriness under load (RUL) at working temperature of 1700 °C can be determined on refractory brick specimen. This equipment is applicable to all refractory bricks.				
3.0	QUALIFYING CONDITIONS:	Vendor to Confirm			
3.1	Vendor should be original equipment manufacturer (OEM) or authorized dealer/distributor of OEM. In case of dealer/distributor, they should furnish the details of OEM and valid authorization certificate from OEM.	Vendor to Confirm			
3.2	Vendor must have well functioning service center in India. Details to be submitted.	Vendor to Confirm			
3.3	Overview about OEM (When established, Product Range, market etc.) to be submitted.	Vendor to Confirm			
3.4	Only those vendors shall quote, who or their principal have supplied and commissioned at least one number of equipment for determination of Refractoriness under load for temp of 1650 °C or more capacity, for similar applications, within last 5 years. Following documents shall be furnished along with technical bid to support this qualification criteria.	Vendor to Confirm			
3.4.1	The list of supplied RUL tester having following information:	Vendor to Furnish			
3.4.2	Make & Model	Vendor to Furnish			
3.4.3	Capacity	Vendor to Confirm			
3.4.5	Month & Year of Supply	Vendor to Furnish			
3.4.6	Customer Name	Vendor to Furnish			
3.4.7	Customer Address	Vendor to Furnish			
3.4.8	Customer Contact Person	Vendor to Furnish			

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3.4.9	Customer Contact Nos/Email	Vendor to Furnish			
3.5	The party will have to submit minimum one number of unpriced copy of Purchase order of equipment supplied (working temperature- 1650 °C or higher capacity) as mentioned in clause 3.4 along with offer. The supplier should submit the list of users in India to which they have supplied in the last 5 years.	Vendor to Furnish			
3.6	Minimum one number of Performance Certificate (issued by customer for satisfactory performance of atleast one year) of RUL tester supplied mentioned in clause 3.4. The supporting documents relevant to satisfactory performance (in last one year) of equipment vide email also acceptable.	Vendor to Furnish			
3.7	BHEL reserves the right to verify the information provided by vendor. If the information provided by vendor is found to be false/incorrect at any point of time, the offer shall be rejected.	Vendor to Furnish			
4.0	GENERAL REQUIREMENTS				
4.1	The offer shall be submitted in two bids (Techno-commercial and Price Bid).	Vendor to Furnish			
4.2	Unit prices of the main equipment along with required accessories shall be indicated in the price bid. The basic price shall include all the essential items required essentially for fulfilling the purpose and complying the requirement of this specification.	Vendor to Confirm			
4.3	The vendor shall furnish unpriced copy of Price Bid along with technical Bid.	Vendor to Furnish			
4.4	Considering the specification requirement, vendor shall identify the quoted items in following category and clearly mention them in both, technical and price bid:	Vendor to Furnish			
4.4.1	List of Essential Items (Required essentially for fulfilling the purpose and complying the requirement of this specification) to be provided.	Vendor to Confirm			
4.4.2	List of Optional Items (Not required essentially but available with vendor for enhancement of performance/extension of machine capability/simplify the operations) to be provided. The vendor shall quote itemwise unit price for these optional items.	Vendor to Furnish			
4.5	The vendor shall furnish itemwise scope of supply along with technical bid.	Vendor to Furnish			
4.6	The bidder's technical representative shall visit BHEL, CFP, Hardwar for technical discussions and on the spot finalization of technical issues, if needed, within two weeks after technical bid opening. Exact date will be confirmed to vendor by BHEL.	Vendor to Confirm			
4.7	The system offered shall be complete in all respects. It shall contain all additional hardware / accessories/ software required for satisfactory operation of the system.	Vendor to Confirm			
5.0	TECHNICAL SPECIFICATION: The minimum specifications for RUL tester are given below-				
5.1	Furnace- Furnace with heating elements (grade= 1800 °C Molybdenum disilicide (MoSi2) heating element) capable of continuous operation at 1700 °C (at least 20 hours). Furnace temperature should be controlled with calibrated platinum-rhodium/ platinum Thermocouples (Type-B) connected to a digital temperature controller cum indicator. Calibration certificate with traceability should be enclosed. Heating rate: 1°C/min to 15 °C/min	Vendor to Confirm			
5.2	Test specimen dimension: Cylinder sample of diameter 50 mm (±0.5mm) and height 50 mm (±0.5mm) or as per testing standard requirement	Vendor to Confirm			
5.3	Measuring range : 20 mm (deformation)	Vendor to Confirm			

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5.4	Loading mode - Compression. Provision of constant load of 0.05, 0.1, 0.2 N/mm ²	Vendor to Confirm and specify			
5.5	Load range = 1N to 1000N (in steps of 1N to 100N), Measuring accuracy = $\pm 1\%$ or better	Vendor to Confirm and specify			
5.6	Test atmosphere= Static Air	Vendor to Confirm and specify			
5.7	Temperature range - Ambient to 1700 °C	Vendor to Confirm and specify			
5.8	Temperature uniformity : less than 5 °C	Vendor to Confirm			
5.9	Temperature control - Digital PID temperature programmer/ controller cum Indicator or PLC based with PC interfacing facility. Make- Eurotherm/Yokogawa/Chino/Siemens/ABB	Vendor to Confirm			
5.10.	Temperature sensor - Type-B thermocouple along with Recrystallized Al ₂ O ₃ beads and sheath with accuracy of $\pm 1^\circ\text{C}$ or better. Minimum two nos thermocouples to be used.	Vendor to Confirm and specify			
5.11.	There should be provision of proper insulation system to avoid heat loss during its operation. Equipment should guarantee sufficient zone of constant temperature.	Vendor to Confirm and specify			
5.12.	Skin temperature: +40 degC (maximum) above Ambient temperature, on any side of furnace	Vendor to Confirm and specify			
5.13.	Accuracy of measuring system: 1 micron or better	Vendor to Confirm and specify			
5.14.	Read out - Digital output as well as computerized	Vendor to Confirm			
5.15.	Instrument control : Suitable software to operate the instrument, data acquisition, analysis, data presentation and export to different formats (e.g. xls) operating on Microsoft Window XP/Window7 or higher operating system should be supplied. It can determine the softening points in accordance with IS/ISO/DIN standard. It should equipped with automatic indication of breaking of test specimen or sloughing down as per specimen requirement.	Vendor to Confirm			
5.16	Computer with laser Printer : Computer (Intel Core i5 processor, Window 7 professional 64 bit or better, 21 inch monitor, minimum 4 USB port, DVD ROM or equivalent specification) along with installed OS and MS office(Make- HP/Dell/Lenovo). Suitable UPS for electronic (minimum 30 minutes) backup should be supplied.	Vendor to Confirm			
6.0	ELECTRICAL SYSTEM :				
6.1	Power required: All the electricals should be designed to operate from a 3 phase A.C, power supply 415V , 50 Hz.	Vendor to Confirm			
6.2	The testing furnace (RUL tester) should be equipped with suitable isolation transformer designed for continuous operation at 1700 °C (for at least 20 hours).	Vendor to Confirm			
6.3	All type of cables, connectors, prefabricated communication cables etc. required for connecting different parts of the RUL tester /control cabinets, shall be supplied by vendor, whether specifically mentioned or not..	Vendor to Confirm			
6.4	All electrical & electronic control cabinets & panels should be dust, vermin, rodent proof & earthed when being installed.	Vendor to Confirm			
6.5	All power supply related devices (Protection devices, Stabilizers etc.) if required, shall be supplied along with the RUL tester.	Vendor to Confirm			

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6.6	Indications: (a) Ammeters and Voltmeters (b) Mains Indicator (c.) output Indicator	Vendor to Confirm			
7.0	CALIBRATION	Vendor to Confirm			
7.1	The measuring system (for load reading measurement, temperature, deformation measurement) fitted in RUL tester shall be calibrated in all ranges covering minimum and maximum measurable points by any accredited competent calibration agency/NMIs. The Calibration Certificate shall be comparable and traceable with relevant national/ international standard. Traceability certificate should be submitted.	Vendor to Confirm			
8.0	COMPLIANCE	Vendor to Confirm			
8.1	RUL tester shall be complied with the requirement of IS 1528 part-2 or equivalent international standard (i.e ISO1893 etc) standard.	Vendor to Confirm			
9.0	ENVIRONMENTAL PERFORMANCE OF THE RUL TESTER :	Vendor to Confirm			
	The RUL tester should conform to following factors related to environment :	Vendor to Confirm			
9.1	There shall not be any emissions from the RUL tester except particles of samples produced during testing. Suitable arrangement shall be there to ensure that the particles of tested samples do not enter in to RUL tester thereby interfering with its smooth operation. Vendor to provide details.	Vendor to Confirm			
9.2	If any safety / environmental protection enclosure is required it should be built in the RUL tester by the vendor.	Vendor to Confirm			
10.0	SAFETY ARRANGEMENTS:				
10.1	The following safety features in addition to other standard safety features should be provided on the RUL tester.	Vendor to Confirm			
10.2	RUL tester should have adequate and reliable safety interlocks / devices, guards to avoid damage to the RUL tester, work piece and the operator due to the malfunctioning or mistakes or any danger arising out of the general use. RUL functions should be continuously monitored and alarm / warning indications should be available. Details to be furnished.	Vendor to Confirm and specify			
10.3	All the pipes, cables etc. on the RUL tester should be well supported and protected.	Vendor to Confirm and specify			
10.4	Emergency Switch at suitable location as per International Norms are to be provided.	Vendor to Confirm			
11.0	SPARES, CONSUMABLES AND AMC	Vendor to Confirm			
11.1	In addition to essential items, the following spares are required additionally - (1) Heating Elements- One set (2) PID temperature controller cum indicator - one number (3) Type-B Thermocouple- 4 nos (4) Thyristor drive - One number	Vendor to Confirm			

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11.2	All types of spares required for RUL tester and accessories should be available with the vendor for at least ten years after supply of the RUL tester. If RUL tester or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide details of recommended spares & suppliers to enable BHEL to procure these in advance, if required.	Vendor to Confirm			
11.3	The vendor shall quote for recommended optional spares with unit prices. The spares may be procured by BHEL after the guarantee period.	Vendor to Confirm			
11.4	The vendor shall provide AMC services to be ordered after the guarantee/warranty period (if required by BHEL, Hardwar) for at least 2 years from date of commissioning.	Vendor to Confirm			
11.5	The vendor should provide special tools and tackles required for routine maintenance of furnace. List to be provided.	Vendor to Confirm			
12.0	PRE DESPATCH INSPECTION/ ACCEPTANCE OF RUL TESTER				
12.1	Pre dispatch inspection of the complete system including physical verification, functionality testing and accuracy verification shall be done by BHEL at OEM's works. Cost if any shall be quoted as a lumpsum amount. Four weeks advance information shall be furnished for inspection. Travel, boarding & lodging charges will be borne by BHEL.	Vendor to Confirm			
12.2	Specifications mentioned in clauses 5.0 & 6.0 shall be demonstrated by vendor to BHEL engineers during pre-dispatch inspection at OEM's works. The equipment is to be completely tested and inspected and duly verified by BHEL Engineers before dispatch. Four copies of inspection certificates are to be provided by vendor with RUL tester.	Vendor to Confirm			
13.0	ERECTION AND COMMISSIONING				
13.1	Erection & Commissioning is to be done by vendor at RML, QM, BHEL CFPP, Hardwar, India.	Vendor to Confirm			
13.2	Schedule of Commissioning shall be submitted with the offer.	Vendor to Confirm			
13.3	Supplier shall carry out erection, commissioning, testing of RUL tester, it's control & all types of other supplied equipment, demonstration of all the features of the RUL tester, testing of material samples and software etc. to the satisfaction of BHEL engineers without any price implication. In case there is price implication the same shall be quoted as lumpsum price which shall be loaded to vendor's offer. Per day price will not be acceptable.	Vendor to Confirm			
13.4	Service requirement like power shall be provided by BHEL at only one point to be indicated by supplier. Connectivity of the system with power supply from that point shall be the responsibility of the supplier. The Other requirements like crane and helping personnel shall be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to Confirm			
13.5	All tools and equipment required for erection of the RUL tester shall be brought by the vendor. The clearance between wall and platform required for the rolling facility of heating chamber to be installed shall be clearly mentioned by the supplier.	Vendor to Confirm			
13.6	Vendor shall submit the layout drawing for BHEL's information within two weeks from the date of P.O. The Layout should consist of all requirements pertaining to RUL tester and all accessories.	Vendor to Confirm			

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14.0	FINAL ACCEPTANCE				
14.1	Three nos of refractory specimens at temp of 1700 °C will be tested at BHEL, CFPF, HARIDWAR, INDIA in accordance with relevant IS/ISO/international standard.	Vendor to Confirm			
14.2	Capacity, accuracy, software performance etc. will be rechecked at BHEL, CFPF, HARIDWAR.	Vendor to Confirm			
14.3	Final acceptance of the RUL tester at BHEL will be given after verification and ensuring that all the clauses of this specification are duly complied and the required training as per clause 17.0 has been provided to the BHEL personnel.	Vendor to Confirm			
15.0	GUARANTEE				
15.1	The equipment should be guaranteed with respect of design, material construction, operation and any manufacturing defects for a period of 24 months from the date of receipt of complete equipment at BHEL, Haridwar or 18 months from the date of commissioning, whichever is later. Four copies of Test certificates and Guarantee certificates are to be furnished before dispatch.	Vendor to Confirm			
15.2	Free after sales service including spares is to be provided during the guarantee period at BHEL, Haridwar. Prompt service during guarantee period is to be ensured. The company should have factory trained service engineer with service office in India.	Vendor to Confirm			
16.0	PACKAGING	Vendor to Confirm			
16.1	Rigid and proper packing for all items of complete equipment, all accessories and other supplied items to avoid any damage / loss in transit shall be done.	Vendor to Confirm			
17.0	TRAINING	Vendor to Confirm			
17.1	BHEL Persons shall be trained at BHEL, CFPF, Haridwar immediately after installation in the area of (a) use of all the aspects of RUL tester and the controlling Software, Hardware and its accessories. (b) Electrical, Electronic, Mechanical & general maintenance for RUL tester & other supplied equipment and accessories. (c) Operation of the RUL tester & other supplied equipment. (d) Training and demonstration should be done using at least 3 samples after completion of installation. Training should be imparted only by factory trained engineers of principle company.	Vendor to Confirm			
17.2	Competent, Hindi speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel without any price implication	Vendor to Confirm			
17.3	Expenditure of training cost if any shall be quoted as total consolidated training cost (Inclusive of travel Lodging & boarding of Expert) which will be loaded to the vendor's offer. Per day charges are not acceptable.	Vendor to Confirm			
18.0	LITERATURE WITH OFFER	Vendor to Confirm			
18.1	The following documents amongst other shall be enclosed with offer by vendor.	Vendor to Confirm			
18.1.1	Supplier shall enclose the leaflets/ catalogue/ brochure having detail specification, photograph, Model No & Manufacturers, Name of offered equipment. The supplier must submit supporting documents, such as technical brochure/data sheet/ research article etc which should have quantitative figures for major specifications enlisted as above. Attaching a mere technical compliance statement by the bidder without supporting documents will automatically lead to rejection of the technical bid.	Vendor to Confirm			
18.1.2	A detailed sketch/ drawing of the RUL TESTER has to be submitted showing its dimensions.	Vendor to Confirm			

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19.0	DOCUMENTATION TO BE SUPPLIED WITH THE RUL TESTER	Vendor to Confirm			
19.1	Four sets of Operation and Service Manual shall comprise of operating procedure, calibration procedure, applicable calibration certificates, trouble shooting charts, circuit/block diagram and parts list etc. have to be supplied. The documents should also be provided in soft copy (in pen drive also). Vendor shall also submit test certificate of Heating elements used in furnace, Thermocouples material, Sheath material, relevant certificates etc and calibration certificates of all measuring instruments along with supply.	Vendor to Confirm			

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