An ISO 9001 Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT / CAPITAL EQUIPMENT

ENQUIRY	Phone: +91 431 257 70 49 Fax : +91 431 252 07 19 Email : csguna@bheltry.co.in Web : www.bhel.com

	Enquiry Number:	**Enquiry Date:**	**Due date for submission of quotation:**
	2620900104	**09.05.2009**	**09.06.2009**
You 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 (Item required at BHEL on)**
10	High Temperature Z-ray Diffraction System as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.	30.11.2009

Note : Offer Should be
Foreign Bidders : CFR Chennai Port

Indigenous Vendors:
FOR, BHEL, Stores – 12
Fossil Boilers, BHEL
High Pressure Boiler Plant
Tiruchirapalli – 620 014
TamilNadu

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats 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 "2620900104**".**

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.Manager / MM / Capital Equipment

QUALIFYING CRITERIA

The BIDDER / VENDOR have to necessarily provide the following details, for making an assessment of the firm's capability and competency.

The bid consists of 3 parts namely Qualifying Criteria, Technical bid and Price bid. Vendor shall submit Qualifying Criteria & Technical bid together in a sealed cover. Price bid shall be in a separate sealed cover. BHEL will consider Technical bid only if the vendor/bidder qualifies. BHEL will consider Price bid only if the Technical bid is found acceptable.

[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]

Name of the product: BHEL uses the title "**CRC EQUIPMENT"** in this document. Please refer Technical Specification attached herewith for further details

S. No.	PARTICULARS	VENDOR's RESPONSE
1.0	The BIDDER / VENDOR shall have a minimum of **FIVE** Years of Continuous Experience in the Design, Manufacture & Supply of "**CRC EQUIPMENT"**. Please indicate the actual experience. **This is a qualifying criteria**.	
2.0	YEAR of launch of the Model quoted against this ENQUIRY	
3.0	Is there any other model launched after the quoted Model? Otherwise, indicate the likely year in which the next model is likely to be launched.	
4.0	Number of "**CRC EQUIPMENT"** supplied, installed and commissioned till date in India. Please furnish contact person name, address, phone number, fax number and mail id .Please mention that how many are used for coal analysis purpose.	
5.0	Number of "**CRC EQUIPMENT"** supplied, installed and commissioned till date outside India. Please furnish contact person name, address, phone number, fax number and mail id. Please mention that how many are used for coal analysis purpose.	

6.0	Please enclose Performance Certificate from atleast **Five** Indian customers for the model quoted. This certificate should not have been received prior to **01.Jan.2007**. **This is a qualifying criteria.**	
7.0	Details of Design Set-Up and Technology Back-Up assured from the PRINCIPAL Equipment Maker.	
8.0	Details on Service-after-Sales set-up in India including the addresses of Agents/Service Centre in India.	
9.0	The BIDDER / VENDOR shall assure a continuous support for SPARES and SERVICE for TEN Years, from the date of commissioning of the equipment at BHEL Works. **This is a qualifying criteria**	
10.0	The "Technical Bid" shall have vendor's responses along with Product Catalogue, Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue. All Technical & Commercial terms can be here. **NO PRICE DETAIL IS ENTERTAINED HERE.**	

11.0	The "Price Bid" shall have Price Part with following options. **In case the offered model requires PC with special hardware and software, then bidder should include the same in their scope. The scope includes 17" TFT monitor, Laser printer B/W, Windows XP+ services packages also.** **In case the offered model requires only general PC hardware and software, then bidder should include only the application software in their scope. Bidder should give detailed Hardware and Software specification for arranging at BHEL.** **Option 1(Incase bidder supplies PC):** Basic Equipment. All PC hardware and software. All software CDs (1 set) with valid license. Installation & Maintenance manuals (2 Hard copies & 1 set of CDs) Mandatory spares. Consumables. AMC **Option 2(Incase bidder does not supply PC)** Basic Equipment. Application software CDs 1 set with valid license. Responsibilities of interfacing BHEL supply PC with Basic Equipment(including interconnecting cables) Installation & Maintenance manuals (2 Hard copies & 1 set of CDs) Mandatory spares. Consumables. AMC	

Coal Research Centre
Technical Specifications For High Temperature
X-Ray Diffractometer System
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Sl. No.	Particulars	BHEL specifications	Bidder's offer [With complete technical details]
1	Confirmation for each point of specification.	Vendor is requested to give specific confirmation for each point. Deviations if any shall be clearly indicated.	
2	Ambient Condition	The uncontrolled ambient room conditions are- a)Temperature: 10 to 50 ° C, b)Relative Humidity: 100 % c)Dusty	
3	Scope of Vendor	1. Design, Manufacture, Testing, at vendor's works. 2. Original software, Installation & Maintenance manuals, Consumables, Mandatory Spares. 3. UPS(if required) 4. Training, Installation, Commissioning & Proving performance at BHEL Trichy. 5. On-site Guarantee, On-site Annual Maintenance Contract.	
4.1	General	The XRD system should be a multi-purpose system that is able to perform quantitative and qualitative phase analysis of powder samples and should be upgradeable to do other XRD applications in future. Our application requirement is quantitative analysis of mineral phases present in powder samples of coal, ash, boiler deposit and water formed scales. The tentative list of mineral phase present in coal and water formed deposit are listed in Annexure-I and annexure-II The complete system to be supplied should include all hardware, software, accessories, consumables ,PC printer,UPS and standard samples (NIST /SRM) for evaluation / calibration applicable to above requirement	
4.2	X-ray Generator	Microprocessor controlled x-ray generator, including radiation enclosure, with following specifications • Maximum output power : 3.0 kW • Maximum high voltage : 60 kV • Maximum anode current : 80 mA **Stability** Less than 0.01 % per 10% mains variation.	

		Radiation safety Certificate for the radiation safety must be provided.	
4.3	X-ray tube	• X-ray tube should have a metal body containing earthed anode, a ceramic insulation with a filament and beryllium windows. It should be of long fine focus type with Cu anode, 60 kV, 55mA, 2200W or better. • The x-ray tube should have electronic tube identification & also the facility to rotate line & point focus without realignment. • The manufacturer must have the policy to allow the old X-ray tube to be returned to the factory for disposal.	
4.4	Goniometer	Goniometer should be of vertical type based on optical position sensors with independent theta – theta or theta-2theta drive based on DC motors or stepper motor. Supplier has to provide the technical information of how the goniometer is monitored. Supplier should provide data quality guarantee with SRM / NIST standard. Minimum step size :0.001 degree or better. Mode of operation: Theta – Theta or Theta – 2Theta operation. Theta range: -15 to +181 degrees or better 2 theta range: -40 to +220 degrees or better Diffractometer radius : 130 – 200 mm or better.	
4.5	Sample Stages	The system should be supplied one standard sample stage to hold flat rectangular sample holders that is used for flat solids and powders. Reflection and transmission spinner to be provided with variable speed. Pre-aligned sample stage for circular sample holders. Allows spinning of the sample or scanning and positioning the sample in Phi. Can be used in reflection or transmission mode, in combination with automatic sample changers for more samples.	
4.6	Phase Analysis Optics	X-ray diffractometer should be based on pre-aligned optics concept. Optics should include beta filters, divergence slits, receiving slits and anti scatter slits that meets the Bragg Brentano optics for phase analysis. Programmable divergent slit for assymetric and symmetric or constant area illumination of samples.	

4.7	Detectors	FAST Detector This fast detector should be based on advanced [Real Time Multiple Strip or any solid state] technology that has the capability of recording the diffractogram faster than conventional detector but without any loss in analytical performance (sensitivity and resolution). Able to detect with point or line focus Detector must display ability to perform static or scanning mode. Electronics controller should be able to monitor & control all diffractometer functions such as angles, counts, slits, generator, safety etc.	
4.8	Software	Software should have following features : - Simultaneous data collection & analysis. - Peak search and search – match. - Profile fitting. - Elaborate pattern treatment such as data smoothing, background subtraction, alpha-2 stripping, and correction functions such as systematic error, automated / fixed slit conversion, and outlier correction. - Math functions such as addition, subtraction, sum measured diffraction patterns and simulated scan is included. - The following calculator and function must be included : 1. Bragg Calculator 2. Periodic Table 3. Scherrer Calculator - ICDD PDF- full database including mineral should also be included. - The software allows searching for peaks and profile data together in one run. Automatic phase identification - the software “accepts” the most likely combination of candidate phases automatically after the search-match process. - The phase analysis software must allow the peak and/or profile matching, RIR Quantification, ICDD and user patterns, extensive reporting and % crystallinity. - The software must have the clustering capability that allows the software to go through all the scans and look similarity. - Library search on the ICDD Database, Rietveld and Crystallography.	
4.9	Water Cooling System	A suitable water cooling system must be supplied with the XRD.	
4.10	High Temperature Attachment	The vendor should quote High Temperature Attachment with temp. upto 1600 deg. C and ultra high Vacuum System for the same. The High	

		Temperature System should be complete in all sense and to be supplied with all necessary software & hardware for controlling the temp. at various gradient along with Turbo-Molecular pump to maintain high level vacuum	
4.11	Data System	In case the offered model requires PC with special hardware and software, then bidder should include the same in their scope. The scope includes 17" TFT monitor, Laser printer B/W, Windows XP+ services packages also. In case the offered model requires only general PC hardware and software, then bidder should include only the application software in their scope. Bidder should give detailed Hardware and Software specification for arranging at BHEL.	
4.12	Power supply	230V +/- 10% AC/1 Ph/50Hz- 1 Feeder	
5	Along with offer the following details in hard copies shall be indicated.	a) Scope and interconnection diagrams-2 copies. b) Catalogs-2 copies. c) Dimensional details for preparing Civil Engg Drawings-2 copies. d) Mandatory spares with Unit price if applicable. e) Consumables along with unit price if applicable. f) Power supply requirement. g) Instrument air and compressed air if required. h) PC configuration. i) Vents and drains if required. j) Space requirement around the equipment. k) List of software.	
6	Installation and Commissioning	The Equipment with all Accessories is to be installed & commissioned at BHEL Works, free of cost, by the service engineer of the supplier.	
7	Performance Prove-Out at BHEL	The Supplier's Service Engineer has to conduct demonstration & calibration of the Equipment with Accessories.	
8	Inspection & Training at Vendor works.	BHEL's Inspection is applicable. Complete Training for BHEL Engineers is to be given on Operation & Maintenance free of cost.	
9	Training on Operation & Maintenance at BHEL works.	Complete Training for BHEL Engineers is to be given on Operation & Maintenance of the offered equipment at BHEL works, free of cost.	
10	Onsite Performance Guarantee	The Equipment & 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.**	
11	Draft and Final Installation and O&M manual in ENGLISH	1No Draft Installation, Operation & Maintenance Manual. It shall contain Electric Schematics, Circuit Diagrams, PCB Drawings, Trouble Shooting	

	Language	Charts, Mechanical Sub-Assemblies, Rating of Bought-Out Items, etc. BHEL will review its completeness and inform supplier to make necessary corrections if applicable and ask to furnish 2 more final sets. In addition, one soft copy in CD to be supplied.	
12	Annual Maintenance Contract - AMC	The bidder has to quote for AMC through trained service personnel in India for a period of three years after the expiry of ORIGINAL WARRANTY period. Technical Service for **Preventive and breakdown Maintenance,** Trouble Shooting and Re- Commissioning of the Equipment INCLUDING the Cost of SPARES and Consumables .Please consider **4** visits per year.	
13	AMC - RESPONSE	The bidder has to furnish / indicate the response time for the service engineer to be at BHEL works, from the time of reporting breakdown through e-mail or telefax.	

Annexure-I/Mineral phases in coal

Mineral name	Formula	Description
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$	Calcium magnesium iron silicate a member of the amphibole group
Anatase	TiO_2	Polymorph of titanium dioxide
Anhydrite	$CaSO_4$	Anhydrous calcium sulphate
Anorthite	$CaAl_2Si_2O_8$	Calcium aluminium silicate a member of the plagioclase feldspar group
Apatite	$Ca_5(PO_4)_3(OH,F,Cl)$	Calcium phosphate
Arrojadite	$Na_2(Fe,Mn)_5(PO_4)_4$	Sodium iron manganese phosphate, a member of the triphylite group
Barium feldspar	$BaAl_2Si_2O_8$	Barium aluminium silicate a member of the feldspar group
Bassanite	$CaSO_4{\cdot}0.5H_2O$	Hydrous calcium sulphate
Boehmite	γ-AlO(OH)	Polymorph of aluminium oxy-hydroxide
Brownmillerite	$Ca_2(Fe,Al)_2O_5$	Calcium iron aluminium oxide
Calcite	$CaCO_3$	Calcium carbonate
Calcium iron aluminium oxide	$CaAl_8Fe_4O_{19}$	Calcium iron aluminium oxide
Chamosite	$(Fe,Mg,Al)_6(Si,Al)_4O_{10}(O,OH)_8$	Hydrous iron magnesium aluminium silicate, a member of the clay group
Corundum	γ-Al_2O_3	High temperature polymorph of aluminium oxide
Cristobalite	SiO_2	High temperature polymorph of silicon dioxide
Diopside	$CaMgSi_2O_6$	Calcium magnesium silicate a member of the clinopyroxene group
Ferrian spinel	$(Mg,Fe)Al_2O_4$	Iron magnesium aluminium oxide belonging to the spinel group
Gehlenite	$Ca_2AlSi_2O_7$	Calcium aluminium silicate a member of the melilite group
Gibbsite	$Al(OH)_3$	Aluminium hydroxide
Gypsum	$CaSO_4{\cdot}2H_2O$	Hydrous calcium sulphate
Hauyne	$(Na,Ca)_{4-8}(Al_6Si_6O_{24})(SO_4,S)_{1-2}$	Sodium aluminium silicate, a member of the sodalite group
Hedenbergite	$CaFeSi_2O_6$	Calcium iron silicate a member of the clinopyroxene group
Hematite	α-Fe_2O_3	Polymorph of ferric iron oxide
Hercynite	$FeAl_2O_4$	Iron aluminium oxide belonging to the spinel group
Hexahydrite	$MgSO_4{\cdot}6H_2O$	Hydrous magnesium sulphate
Illite	$KAl_2(Si_3Al)O_{10}(OH)_2$	Hydrous potassium aluminium silicate, a member of the clay group
Jarosite	$KFe_3(SO_4)_2(OH)_6$	Hydrous potassium iron sulphate
Kaolinite	$Al_2Si_2O_5(OH)_4$	Hydrous aluminium silicate, a member of the clay group
Larnite	β-Ca_2SiO_4	Calcium silicate
Lime	CaO	Calcium oxide
Maghemite	γ-Fe_2O_3	Iron oxide belonging to the spinel group
Magnesioferrite	$MgFe_2O_4$	Iron magnesium oxide belonging to the spinel group
Magnetite	Fe_3O_4	Iron oxide belonging to the spinel group
Marcasite	FeS_2	Polymorph of iron disulphide
Merwinite	$Ca_3Mg(SiO_4)_2$	Calcium magnesium silicate
Mullite	$Al_{4+2x}Si_{2-2x}O_{10-x}$	High temperature polymorph of aluminium silicate
Nepheline	$Na_3(Na,K)(Al_4Si_4O_{16})$	Sodium aluminium silicate, a member of the feldspathoid group
Periclase	MgO	Magnesium oxide
Pyrite	FeS_2	Polymorph of iron disulphide
Quartz	SiO_2	Low temperature polymorph of silicon dioxide
Rutile	TiO_2	Polymorph of titanium dioxide
Siderite	$FeCO_3$	Iron carbonate
Spinel	$MgAl_2O_4$	Magnesium aluminium oxide belonging to the spinel group
Szomolnokite	$FeSO4{\cdot}H_2O$	Iron sulphate, a member of the melanterite group
Thenardite	Na_2SO_4	Sodium sulphate, a member of the Thenardite–mirabilite group
Tridymite	SiO_2	High temperature polymorph of silicon dioxide

Annexure-II/Common Boiler Deposits

Mineral Name	Chemical Formula
Acmite	$Na_2O.Fe2O3.4SiO2$
Analcite	Na2O.Al2O3.4SiO2.2H2O
Anhydrite	CaSO4
Aragonite	CaCO3
Amphibole	$MgO.SiO_2$
Brucite	Mg(OH)2
Bunsenite	NiO
Copper	Cu
Cuprite	Cu2O
Calcite	CaCO3
Cancrinite	Na2O.CaO.4 Al2O3.2CO2.9SiO2.3H2O
Gypsum	CaSO4.2H2O
Hematite	Fe_2O3
Halire	Nacl
Hydroxyapatite	Ca10(OH)2(PO4)6
Ironoxicle hydrate	FeO(OH)
Magnesium phosphate	Mg3(PO4)6
Magnetite	Fe3O4
Noselite	4 Na2O.3 Al2O3.6Sio2.SO4
Pectolite	Na2O.4CaO.6SiO2. H2O
Quartz	SiO2
Serpentine	3MgO.2SiO2.2 H2O
Sodalite	3Na2O.3AlO3.6SiO2.2NaCl
Tenorite	CuO
Thenardite	Na2SO4
Wallastonite	CaSiO3
Xonotlite	5CaO.5SiO2.H2O
Zincite	ZnO