



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:rmanohar@bheltry.co.in">rmanohar@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>2620600016</b>	<b>09.05.2006</b>	<b>12.06.2006</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	VACUUM SPECTROMETER 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.	15.02.2007

<b>Note:</b> (1) The detailed Technical Specification along with technical point-by-point confirmation, Commercial Terms & Conditions applicable for this Enquiry, Confirmation of acceptance for BHEL commercial terms & conditions and Price Bid formats have been posted in BHEL Corporate web site <a href="http://www.bhel.com">www.bhel.com</a> under Enquiry reference “2620600016”. Your offer should be based on all the above documents. (2) Also, you are requested to fill in the Supplier Registration formats available in <a href="http://www.bhel.com">www.bhel.com</a> (under Advancement – Supplier Registration) and send it along with your offer.
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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  Dy. Genl. Manager / Capital Purchase / MM / Manufacturing
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**PART A****QUALIFYING CRITERIA FOR THE SUPPLY OF  
OPTICAL EMISSION VACUUM SPECTROMETER****SECTION – I**

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

[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]

<b>S. No.</b>	<b>PARTICULARS</b>	<b>VENDOR's RESPONSE</b>
<b>1.0</b>	Number of Years of Experience of the BIDDER/ VENDOR in the field of design, manufacture and supply of ' <b>OPTICAL EMISSION VACUUM SPECTROMETER</b> '	
<b>2.0</b>	YEAR of LAUNCH of the Model quoted against this ENQUIRY	
<b>3.0</b>	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	
<b>4.0</b>	Number of Optical Emission Vacuum Spectrometers supplied, installed and commissioned till date, in the QUOTED MODEL	
<b>5.0</b>	Number of Optical Emission Vacuum Spectrometers supplied, installed and commissioned till date for the following category of CUSTOMERS (within INDIA): a) Government Organisations b) Private Sector Companies [Large Scale Industries]	
<b>6.0</b>	Number of Optical Emission Vacuum Spectrometer supplied, installed & commissioned till date in the following Category (around the GLOBE) : a) Universities b) R&D Labs c) Reputed Heavy Engineering Works / Manufacturing Firms	
<b>7.0</b>	Details of Design Set-Up and Technology Back-Up assured for the PRINCIPAL Equipment Maker	

<b>S. No.</b>	<b>PARTICULARS</b>	<b>VENDOR's RESPONSE</b>
<b>8.0</b>	Details on International Standards followed in Design of the Equipment (including Analysis Methodology and Calibration of Equipment)	
<b>9.0</b>	Comprehensive Details on Performance Testing - of the Equipment quoted, to be ensured in presence of BHEL Executives, prior to dispatch from Supplier's Works	
<b>10.0</b>	Details of Quality System followed (Kindly furnish the salient aspects of the QA system followed)	
<b>11.0</b>	Details on SERVICE-after-SALES Set-Up in India including the addresses of Agents/Service Centres in India and Asia	
<b>12.0</b>	Any Additional Data to supplement the manufacturing capability of the BIDDER	

## **SECTION – II**

The BIDDER / VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the Optical Vacuum Spectrometer.

<b>S. No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's COMMENTS</b>
<b>13.0</b>	The BIDDER / VENDOR shall have a minimum of FIVE Years of Continuous Experience in the Design, Manufacture & Supply of Vacuum Spectrometer. Indicate the actual experience.	
<b>14.0</b>	The BIDDER / VENDOR shall have supplied at least one number of OPTICAL VACUUM SPECTROMETER in INDIA, within the last five years. Indicate the number of equipment (of QUOTED MODEL) sold in India & Other Countries.	
<b>15.0</b>	Reference List of Customers and Performance Certificate from CUSTOMERS (minimum 2 Customers) with full contact details of CONTACT PERSON.	

### **SECTION – III**

The BIDDER / VENDOR 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 COMPLIANCE</b>
<b>16.0</b>	The BIDDER / VENDOR shall submit the offer in TWO PARTS - Technical [ <b>with PART A &amp; PART B</b> ] & Commercial and Price Bid. The Technical Offer shall be in line with the BHEL Technical Specifications and the Guidelines or Annexures mentioned, wherever applicable.	
<b>17.0</b>	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.	
<b>18.0</b>	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.	
<b>19.0</b>	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
<b>20.0</b>	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 Scope of Supply.	
<b>21.0</b>	The reference List of Customers shall be accompanied with the details (Phone Number / E-Mail ID) of the CONTACT PERSON for cross reference by BHEL	

## TECHNICAL SPECIFICATIONS for OPTICAL EMISSION VACUUM SPECTROMETER

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
1.0	Area of Application	SPECTROMETER [an Opto-Electronic Analytical Instrument] is to be used in the Chemical Section of BHEL Plant Laboratory. This has to cater to the extensive analytical requirements for the materials used for the manufacturing in High Pressure Boilers, Industrial Valves, Seamless Steel Tubes viz., Alloys of Iron, Nickel, Copper, Aluminium, Titanium, Cobalt, etc..	
2.0	Principle of Operation	OPTICAL EMISSION VACUUM SPECTROSCOPY	
3.0	Design Base	Laboratory Model Optical Emission Vacuum Spectrometer with Photo Multiplier/ Channel Photo Multiplier Detector capable of analyzing multi-base materials .	
4.0	Equipment Configuration	The minimum desired features are enlisted below	
4.1	Operating Parameters	Shall have operating parameters to ensure Accuracy, Precision and other requirements as per ASTM E-1009. Certification of the instrument shall be as per this ASTM Standard.	
4.2	Constructional Features	Shall be designed for measuring multi base materials [ <b>Refer ANNEXURE –A</b> ] and for high throughput sample analysis	
4.3	Optical System	Simultaneous and sequential system of focal length 750mm (minimum) Radius Rowland circles engineered to self compensate for temperature induced by mechanical change.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
4.4	Grating	Spectrometer should be provided with grating or gratings appropriately selected for the analytical tasks in question. 2400 to 3600 rulings/mm	
4.5	Wave Length Range & Channels	110 to 800 nm shall have provision for more than 100 channels simultaneously. Also to have provision for addition of analytical channels later.	
4.6	Excitation Stand & Small Sample Adaptors	Argon flushed petry stand with pneumatic sample holder, Automatic self cleaning & flushing Adaptor for small samples, Wire Adaptor for wires with 0.8 mm to 10 mm diameter and thin plate samples	
4.7	Excitation System	Digital Current Control Source (CCS) with variable frequency upto 1000 Hz	
4.8	Readout System	Built-in Time Resolved Spectroscopy -TRS	
4.9	Detector	Photo Multiplier (PMT), Channel Photo-Multiplier (CPMT)	
4.10	Vacuum System	Shall have suitable Oil Free Vacuum Pumps. BIDDER to give technical details of the Pumps.	
5.0	Typical Material Specifications	IRON, NICKEL, COPPER, ALUMINIUM, TITANIUM Base & COBALT Base, for both Quantitative & Qualitative Analysis Mode with SUS/CRM Standards for all ranges [Refer to <b>ANNEXURE –A</b> ]	
6.0	Operating Software	Windows based SOFTWARE, auto diagnostic mode which displays all the parameters like Vacuum, Temperature, Voltage, Gas-Flow & Data Transfer to Excel, Word or Customised Report generation facility, e-mail output & data base for storage, retrieval, statistical analysis, etc.	

<b>S. No.</b>	<b>PARTICULARS</b>	<b>BHEL SPECIFICATIONS</b>	<b>BIDDER's OFFER [with Complete Technical Details]</b>
<b>7.0</b>	Calibration	In addition to factory calibration, facility for modification of factory calibration (to include own standard and to extend calibration curve)	
<b>8.0</b>	Input Electric Power Supply	230 $\pm$ 10 % V, 50 Hz, Single Phase AC through a 3 wire system [Phase, Neutral & Protective Earthing]	
<b>9.0</b>	Ambient Condition	The uncontrolled ambient room conditions are : - a) Temperature : 18 to 45 ° C, b) Relative Humidity : 45 to 85 % BIDDER to specify the atmospheric conditions, as the working environment for the OFFERED Equipment to deliver precise results and serve for a prescribed life of the Equipment.	
<b>10.0</b>	Data Logging Facility	To provide a suitable PC System (Computer and Accessories) with SOFTWARE compatible to WOS XP for acquiring and compiling of test data, and printing. Computer (PC) Configuration (minimum):- Intel Pentium 4 Processor 630 with HT Technology; (2MB L2 Cache, 3.00 GHz, 800 MHz FSB); Intel 915G Mother board; 512 MB DDR, 80 GB SATA Hard disk; COMBO CDRW-DVD; 17" TFT Monitor, Speakers, 56.6 KBPS Internal Modem; Multi-Media Keyboard, Optical Mouse, Laser Colour Printer, etc.	
<b>11.0</b>	Accessories	BIDDER to list down (with UNIT RATE) the various ACCESSORIES 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.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
12.0	Mandatory Accessories	<p>Following shall be supplied compulsorily with the Equipment :</p> <ul style="list-style-type: none"> <li>a) Necessary Standard Samples/SUS with Test Certificates traceable to National / International Standards.</li> <li>b) Holders / Adaptors for small samples, wires with 0.8mm to 10 mm dia, thin plates and pin samples.</li> <li>c) Sample preparation machines for Ferrous &amp; Non-Ferrous materials (with consumables &amp; spares).</li> <li>d) Voltage Stabiliser, UPS &amp; Isolation Transformers</li> <li>e) Argon Purification System, Gas Regulators with connecting hoses.</li> <li>f) Suitable Furniture / Working Table &amp; Chair for the placement of Instrument and Computer.</li> </ul>	
13.0	Consumables for Main Equipment & Accessories	BIDDER has to list down the CONSUMABLES to be used in the Operation of the Equipment and QUOTE with UNIT RATE for all the listed consumables, to be procured with the equipment.	
14.0	Spares for Main Equipment & Accessories	BIDDER has to list down the SPARES Printed Circuit Boards – PCBs, etc.) coming under the Category of Mechanical, Electrical & Electronic Spares for the Main Equipment as well for the essential and optional desirable Accessories. BIDDER to QUOTE with UNIT RATE for all the listed SPARES, to be procured with the equipment.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
15.0	Inspection	The Equipment & Accessories shall be offered for Inspection by BHEL Engineers and Performance Prove-Out, as per ASTM E-1009, at the Works of the Supplier, prior to dispatch.	
16.0	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.	
17.0	Performance Prove-Out at BHEL	The Supplier's Service Engineer has to conduct demonstration & calibration of the Equipment with Accessories as per <b>ASTM E 1009</b> and to carry-out Performance Prove-Out as per BHEL Specifications.	
18.0	Documentation in ENGLISH Language	3 Copies of the Operation & Maintenance Manuals containing Electric Schematics, Circuit Diagrams, PCB Drawings, Trouble Shooting Charts, Mechanical Sub-Assemblies, Rating of Bought-Out Items, etc. shall be supplied, at the time of inspection by BHEL Engineers. In addition, one SOFT COPY in CD to be supplied.	
19.0	Performance Guarantee	The Equipment & Accessories (including Bought-Out Items) are to be guaranteed for its performance for a minimum period of two years from the date of performance acceptance at BHEL Works.	
20.0	Service Support Requirements.	Vendor shall ensure AMC service facilities in India after the guarantee period, through trained service personnel in India	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
21.0	Training on Operation & Maintenance	Complete Training for 2 BHEL Engineers is to be given on Operation & Maintenance of the OFFERED EQUIPMENT at SUPPLIER's Works, FREE OF COST. Similar Training has also to be provided at BHEL Works, after the successful commissioning of the Equipment & Accessories.	
22.0	Annual Maintenance Contract - AMC	The BIDDER has to QUOTE for AMC under two patterns given below, for a period of THREE YEARS after the expiry of ORIGINAL WARRANTY period :	
22.1	AMC – CASE I	Technical Service for Preventive Maintenance, Trouble Shooting and Re- Commissioning of the Equipment <b>excluding</b> the Cost of SPARES and Consumables [BHEL will make available the required Spares & Consumables on demand]	
22.2	AMC – CASE II	Technical Service for Preventive Maintenance, Trouble Shooting and Re- Commissioning of the Equipment <b>INCLUDING</b> the Cost of SPARES and Consumables [BHEL will not be responsible for the timely availability of Spares & Consumables]	
22.3	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.	
22.4	AMC – Service Calls	The BIDDER has to furnish details on service calls for preventive maintenance (number of calls and intervals) and break-down maintenance	

**NOTE : ANNEXURE –A Enclosed.**

**OPTICAL EMISSION VACUUM SPECTROMETER****ANNEXURE - A****ALLOY TYPE AND CONCENTRATION RANGE (%) OF ELEMENTS****1.0 TITANIUM BASE ALLOYS**

<b>ELEMENT</b>	<b>RANGES</b>
Si	0.01 to 0.50
Mn	0.01 to 2.00
Mo	0.02 to 5.0
Cr	0.005 to 3.6
Ni	0.005 to 0.02
Al	0.005 to 8.0
Mg	0.01 to 0.5
Sn	0.05 to 1.0
V	0.04 to 6.0
Fe	0.03 to 2.5
Zr	0.005 to 5.0
Ti	Base

**2.0 COPPER BASE ALLOYS**

(e.g.:- gun metal, leaded tin bronze, copper-aluminum alloys,  
copper-zinc, copper-nickel and copper-zinc-nickel alloys)

<b>ELEMENT</b>	<b>COPPER BASE ALLOY (%)-RANGE (Bronze &amp; Brass)</b>	<b>COPPER BASE ALLOY (%)-RANGE Cu-Be/Co-Ag alloy</b>	<b>ALUMINIUM BASE ALLOYS (%)-RANGE</b>	<b>PURE COPPER</b>
Si	0.01-3.0	0.01-0.15	0.01-20	0.0005-0.2
Mn	0.01-4.5	0.01-1.0	0.01-2.0	0.0004-0.15
Fe	0.01-6.0	0.005-0.20	0.01-2.0	0.0008-0.020
Ni	0.01-35	0.01-0.50	0.01-2.0	0.0002-0.70
Sn	0.01-20.0	--	0.01-2.0	0.0003-0.05
Pb	0.01-20.0	--	0.01-2.0	0.0003-0.5
Zn	0.01-50.0	--	0.01-13.0	0.0015-0.25
Al	0.01-15.0	0.01-0.50	Base	0.001-0.05
Mg	0.01-1.0	--	0.01-10.0	0.0002-0.025
Be		0.002-2.50	0.001-0.1	0.0001-0.025
Cr		0.1-3.5	0.001-0.8	0.0003-0.9
Ag		0.01-2.0	--	0.0005-0.5
Co		0.01-3.30	--	0.0015-0.2
Zr		0.01-0.50	0.001-0.3	0.0003-0.22
Ti		--	0.001-0.25	0.0002-0.02
V		--	0.005-0.10	
Ca		--	0.001-.02	
P	0.0001-1.0			0.0001-0.25
Cu	Base	Base	0.1-10.0	BASE

### **3.0 FERROUS BASE ALLOYS**

<b>ELEMENT</b>	<b>CARBON STEEL (%)-RANGE</b>	<b>LOW ALLOY STEEL (%)-RANGE</b>	<b>TOOL STEEL (%)-RANGE</b>	<b>HIGH MANGANESE STEEL (%)-RANGE</b>	<b>CAST IRON (%)-RANGE</b>
C	0.01-1.0	0.01-1.0	0.1-2.0	0.1-1.5	2.0-4.3
Mn	0.03-3.0	0.1-3.0	0.5-4.0	7.0-20.0	0.1-4.0
Si	0.03-2.0	0.1-2.0	0.1-2.0	0.1-1.5	0.05-1.6
S	0.002-0.1	0.002-0.1	0.01-0.2	0.01-0.2	0.003-0.8
P	0.002-0.1	0.002-0.1	0.01-0.2	0.01-0.2	0.003-0.14
Cr	0.005-0.2	0.1-6.0	1.0-10	0.01-6.0	0.005-1.4
Ni	0.005-0.2	0.1-6.0	0.1-1.0	0.01-4.0	0.005-1.7
Mo	0.005-0.2	0.1-3.0	0.1-10.0	0.01-1.50	0.005-1.5
V	0.005-0.2	0.005-2.0	0.1-3.0	0.01-0.20	0.005-0.6
Cu	0.001-0.5	0.001-0.9	0.05-0.5	0.01-0.20	0.005-1.6
Nb	0.002-0.1	0.002-0.1	--	--	0.002-0.06
W	0.001-0.1	0.001-0.1	0.5-25.0	--	0.005-0.11
Co	0.001-0.1	0.001-0.1	0.1-12.0	--	0.005-0.11
Ti	0.001-0.1	0.001-0.5	--	--	0.001-0.33
Sn	0.001-0.1	--	--	--	0.002-0.19
Sb	0.001-0.1	--	--	--	
Al	0.001-0.1	--	--	0.01-0.30	0.001-0.12
B	0.001-0.5	--	--	--	0.0001-0.11
Zr	0.001-0.5	--	--	--	0.003-0.06
Ta	0.001-0.1	--	--	--	
N	0.001-0.65	0.001-0.65	---	--	
Bi	0.001-0.021	0.001-0.021	--	--	
O	0.001-0.1	0.001-0.1	--	--	
As	0.0005-0.09				0.0005-0.09
Ca	0.0005-0.09				0.0005-0.09
Pb	0.0005-0.09				0.0005-0.09
Ce	0.0005-0.09				
Mg					0.0005-0.12

**4.0 OTHER ALLOYS**

<b>ELEMENT</b>	<b>STAINLESS STEEL (%)-RANGE</b>	<b>COBALT BASE ALLOYS (%)-RANGE</b>	<b>INCONEL NICKEL BASE (%)-RANGE</b>	<b>INCOLOY NICKEL BASE (%)-RANGE</b>
C	0.01-0.50	0.01-3.0	0.02-1.5	0.02-0.5
Mn	0.10-7.50	0.1-4.0	0.1-10	0.1-1.5
Si	0.10-3.0	0.1-4.0	0.1-5.0	0.1-2.5
S	0.002-0.06	0.002-0.06	0.002-0.06	0.002-0.06
P	0.002-0.06	0.002-0.06	0.002-0.06	0.002-0.06
Cr	4.0-35	8.0-40.0	15-30	15-20
Ni	4.0-35	2.0-5.0	BASE	BASE
Mo	.01-4.0	0.5-1.5	0.1-20.0	0.05-1.0
V	0.001-0.50	0.1-0.5	0.1-1.0	--
Cu	0.001-3.0	0.01-0.5	0.01-33.0	0.05-0.5
Nb	0.1-2.5	0.5-3.0	0.01-8.0	---
Co	0.002-1.0	BASE	0.01-5.0	0.02-0.5
Ti	0.002-2.0	0.1-0.5	0.01-5.0	--
Sn	0.0001-0.1	--	0.02-0.2	--
Sb	0.002-0.1	--	0.02-0.2	--
Al	0.002-.05	0.02-1.4	0.02-0.5	0.05-0.5
B	0.002-0.1	--	0.002-0.5	--
Ta	0.002-2.0	-	0.05-1.0	--
W	0.05-1.0	1.0-10.0	0.05-13.0	--
Bi	0.001-0.1	--	--	--
N	0.001-0.1	--	0.001-0.1	--
O	0.001-0.1	--	0.001-0.1	--
Fe	BASE	0.1-10	0.1-10.0	1.0-45.0
As	0.002-0.06		0.002-0.06	