



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 70 49

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Email : csguna@bheltry.co.in

Web : www.bhel.com

TWO PART BID

Tender to be submitted in two parts.

**Enquiry
Number:**

2620900176

**Enquiry
Date:**

07.09.2009

**Due date for submission
of quotation:**

21.10.2009

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
10	Real Time Radioscopy (RTR) System with 320 KV X-Ray Unit and Digital Flat Panel as per the technical specification, general guidelines instructions & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	3 sets.

Important points to be taken care during submission of offer

1. Delivery required 4 months from the date of purchase order.
2. Grace period of 2 months beyond the above delivery period will be considered.
3. Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.

BHEL's General guidelines / instructions (refer MM/CE/GT/001) including bank guarantee formats and list of consortium banks, commercial terms check-list 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 "2620900176".

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

PART A**QUALIFYING CRITERIA FOR THE SUPPLY OF
REAL TIME RADIOSCOPY (RTR) SYSTEM****Qty: 3 Set****SECTION – I**

The BIDDER / VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the supply of real time radioscopy (RTR) system with 320kv constant potential X-ray equipment and digital flat panel detector for industrial applications.

S. No.	REQUIREMENTS	VENDOR's COMMENTS
1.0	The BIDDER / VENDOR shall have a minimum of TWO Years of Continuous Experience (from the date of tender opening) in the Design, Manufacture & Supply of RTR system. Kindly indicate the actual experience.	
2.0	The BIDDER / VENDOR shall have supplied at least one number of RTR System of this capacity in the last 2 years (from the date of tender opening). Kindly confirm and indicate the number of equipments (quoted model) sold in the last two years.	
3.0	The bidding FIRM should have 'in-house' or 'self-owned' facility for FABRICATION and TESTING at the rated capacity.	
4.0	Reference List of Customers and Performance Certificates from CUSTOMER(S) with full contact details of CONTACT PERSON.	
5.0	The BIDDER / VENDOR should have sound financial position and should furnish the Financial Statements (Summary of P & L Statement and Balance Sheet) for the immediate past three years.	
6.0	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.	

7.0	DELIVERY - The bidder shall quote the best possible delivery. However the delivery shall not exceed 4 months with an additional grace period of 2 months. The additional grace period will attract a penalty which is explained in the commercial terms of the enquiry. The delivery period shall be reckoned from date of purchase order to despatch from the vendor works.	
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SECTION – II

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)

S. No.	PARTICULARS	VENDOR's RESPONSE
8.0	Number of Years of Experience of the BIDDER/ VENDOR in the field of manufacturing and supplying "RTR Systems"	
9.0	Number of RTR SYSTEM supplied, erected & commissioned till date.	
10.0	Year of launch of the Model quoted against this Enquiry?	
11.0	Number of RTR SYSTEM supplied, erected & commissioned till date in the quoted Model?	
12.0	Details of Design Set-Up / Codes and Standards used.	
13.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in South India.	
14.0	Any Additional Data to supplement the manufacturing capability of the BIDDER	

SECTION – III

The BIDDER / VENDOR has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser:

S.No.	REQUIREMENTS	VENDOR's COMPLIANCE
15.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS – 1. Technical (part A & Part B) & Commercial offer and 2. Price Bid. The Technical Offer shall be in line with the BHEL Technical Specifications and the Guidelines or Annexure mentioned, wherever applicable.	
16.0	The Technical Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause of the specifications.	
17.0	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.	
18.0	The Technical Offer shall be supported by Product Catalogue, drawings, manuals and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria. This should include operational and maintenance spares also.	
19.0	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	
20.0	The reference List of Customers shall be accompanied with the details (Phone Number/E-Mail ID) of the CONTACT PERSON for cross reference	

PART-B

**TECHNICAL SPECIFICATIONS FOR REAL TIME RADIOSCOPY (RTR) SYSTEM WITH
320KV CONSTANT POTENTIAL X-RAY EQUIPMENT AND
DIGITAL FLAT PANEL DETECTOR FOR INDUSTRIAL APPLICATIONS.**

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER (with Complete Technical Details)
1.0	Description of the Real Time Radioscopy System	<p>The Real Time Radioscopy System, (RTR) consists of an X-Ray Source (320 kV constant potential X-Ray system with swiveling arrangement) and an Imaging System (Digital Flat Panel Detector). The output of the overall system shall be Digital Radioscopic Image meeting the sensitivity as well as other requirements, as outlined subsequently in this technical specification.</p> <p>Section-I: 320 kV constant potential X-Ray system Section-II: Digital Flat Panel Detector Section-III: Swivelling System</p>	
2.0	Area of Application	Online Radioscopic Inspection of Straight Tube Butt welds in Steel for detection of defects and to meet the 2% quality level (IQI Sensitivity ASTM 2-2T) as per ASME section V.	
2.1	Job Details	Butt Welds of Seamless Steel Tubes of Diameter 25.4 mm to 89 mm and Double wall Thickness ranging from 8mm to 30 mm.	

Section –I: 320 kV Constant Potential X-Ray system

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
3.0	Principle of Operation	320 kV constant potential X-Ray equipment is the Radiation source in the RTR system .It Generates continuous X- rays by bombardment of high speed electrons on high atomic number Target (Tungsten) and it will have 100% duty cycle.	
4.0	Design Base	Constant potential Bi polar metal ceramic X ray tube with capacity 320 Kv/10mA (by varying potential difference across the electrodes (30 kV to 320 kV) with varying tube current 0 to 10 mA High frequency: Output for stability, low ripple and better sensitivity. – Vendor to specify	
5.0	Equipment Configuration	The minimum desired features are enlisted below	
5.1	Operating Parameters	Tube voltage: 30 kV to 320 kV (Variable insteps of 0.2 kV). Tube Current: 0.5 mA to 10 mA (Variable in steps of 0.1mA).	
5.2	Focal Spot	Dual focal spot preferable (with large focus 1.8 mm and mini focus 0.8mm) as per IEC 336	
5.3	Tube current	To be specified by vendor for large focus and mini focus at 320kV.	
5.4	Exposure Time	Digital display: 1 Second, in steps up to 30minutes	
5.5	Pre warming	1 to 250 seconds	
5.6	Programmed operation	For storing 100 data sets, with read out message for error (With passwords), vendor to specify	
5.7	Inherent filter	Preferably Beryllium filters. Vendor to specify	
5.8	High voltage connections	Two plugs socket with locking lever and safety features, to be specified by the bidder.	

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
5.9	High Voltage cables	High Voltage cables to have Anode and Cathode connections with 10 meters in length, both ends Rubber cone covered plugs.	
5.10	Dose output with inherent filter	Vendor to specify	
5.11	Dose-Rate	in Sv/min (R/ min) at 1 M with and without filter - Vendor to specify	
5.12	Leakage level radiation (at full load)	Shall not exceed 1R / 1Hour /1metre from focal spot.	
5.13	Control Unit	Digital Control Unit containing Power Module, Control Module [with clear text in English], Control Cabinet [with table top], Standard Operating Programs, Inter- Connecting Cables [with length of approximately 20 meters], Control Unit Lock & Key, etc.	
5. 14	Coolant medium	Oil	
5.15	Cooling Unit	a. Heat Exchanger Type oil Cooling Unit with water, suitable rating and efficient coolant pump, to meet the peak-load operational requirements. b. The unit shall have the in-built warning system for unit failure, low level of coolant, lack of flow, leakage, etc. and connected with the tripping mechanism of the main equipment. c.BIDDER to furnish complete details on the Cooling System with accessories provided and to list down essential spares like Cooling Fans, pair of Coolant Circulation ,Hoses with end connectors, etc.	
5.16	Flash Lamp	A Tower type Warning Flash Lamp with fail-proof safety circuit shall be supplied with 20-meter long cable.	

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
6.0	Input Electric Power Supply	415 \pm 10 % V, 50 Hz, Three Phase AC through a 3 wire system [No Neutral Conductor, 4 th wire for Protective Earthing]. BIDDER to take supply from this SINGLE Point to all the sub-systems of the equipment through proper step-up or step-down transformers. Vendor to confirm	
6.1	Ambient Condition	a.The uncontrolled ambient room conditions are : 1)Temp:18 to 45° C 2)Relative Humidity : 45 to 85 % b.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.	
6.2	Weight	Vendor to specify	
6.3	Safety interlocks	Built in safety interlocks to switch off the system in case of emergency and safety with door interlocks.	
6.4	Safety and Quality Standards	a. Vendor to ensure Safety and Quality of X-Ray System, which shall conform to International Standards. b. Conformance certificate to be given along with the Equipment	
7.0	Accessories	A measuring instrument for measuring high frequency, filament current, filament voltage etc. has to be offered. In addition to it, BIDDER has 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.	

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.0	Scope of supply	<p>Total Number of X-Ray systems-3 Numbers. (One for each RTR system)</p> <p>Following shall be supplied compulsorily with the each system :</p> <ul style="list-style-type: none"> a) X ray head as per BHEL specifications b) High voltage Generators c) High Voltage Cables: One pair (for Each RTR) d) Power connection cables e) Digital Control unit f) Cooling system g) Tower type Warning flash lamp h) Programmable motor control Diaphragm i) Suitably rated 3Phase stabilizer j) Service tool kit k) Necessary Standard / Certificate traceable to National / International Standard. l) Compulsory Accessories m) Consumables n) Essential Spares o) Lead shutters (mounted on the X-Ray out -put port, operable from the control room. The movement of the shutters shall be independent in X & Y directions) p) Documentation: Testing & Calibration Certificates, O & M and service Manuals -3 Hard Copies (One for each RTR) and One in CD. q) Radiation Zone monitor (Wall mountable) with range 0 to 100 mR/hr-3 No.(One for each RTR) 	
9.0	Consumables for Main Equipment	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.	

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
10.0	Spares for Main Equipment & Accessories	<p>a. BIDDER has to list down the SPARES under Mechanical, Electrical & Electronic Category for the Main Equipment & Accessories for Equipment for operation in 3 shifts a day and 365 days in a year. ie, the Spares required for normal running of the system for a period of at least 2 years.</p> <p>b. BIDDER has to compulsorily quote for the following Spares with the TECHNICAL OFFER:</p> <p>1) High Voltage Cables for 320kV - 2 Pair</p> <p>2) All types of PCBs for X-Ray Control System-1Set</p> <p>3) Critical Spares for X-Ray Head and HT Transformer-1Set</p> <p>4) All Signal Cables - 1 No. each</p> <p>5) All Fuses – 3 Sets.</p>	

Section –II: DIGITAL FLAT PANEL DETECTOR FOR REAL TIME RADIOSCOPY SYSTEM
Compatible with 320 kV X Ray constant potential system

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
11.0	Principle of Operation	The Digital Flat Panel Detector is an imaging device in lieu of Photographic film / Image intensifier used for RTR of welds. X-Rays are made to pass through the weld and the image of the weld is captured concurrently with x ray irradiation. The Flat Panel Detector converts X ray image into Visible Digital Image and displays in a computer monitor.	
12.0	Radioscopic Technique	Double wall double Image Technique to achieve 2% Penetrameter sensitivity.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
13.0	Mechanical specification	The Flat Panel shall have an active area of 200 x 200 mm. weight of flat panel along with power supply connector, trigger connector, provision for grounding, plug etc. shall be minimum so as to handle them manually and to make the swiveling system simpler. Preferred weight is less than 20 kg. Electronics of the system (such as chip on board module (COB) for charge amplifiers and rod drivers, Pre-controlling COBs, PCB signal generation, Main PCB for interconnecting all the PCBs and other controls shall preferably be mounted beside the active area, to avoid the direct exposure to radiation. Flat Panel Housing shall be of preferably Aluminum. The sensor / scintillator shall be protected. Vendor to specify the size of the Panel.	
13.1	Operating Parameters for Flat Panel	(a) Input X Ray Radiation 30 to 320 kV, @intensity 1-10mA (b) Environmental condition: Temperature-Room Temperature (18-35 °C) RH maximum 85%; Mains supply 240V + / - 10 % Frequency: 50 Hz	
13.2	Technical Features		

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
13.2.1	Flat Panel Detector System	<p>The Flat Panel system shall include:</p> <p>(1) Acquisition System including</p> <ul style="list-style-type: none"> a) Detector Panel b) Panel Controller c) Panel Temperature Control d) Real Time Image Display monitor and Real Time Image Controller e) Acquisition Control Station (Computer, software and data interface cables) f) Mechanical fixture for mounting the panel in line with the X-Ray system, and connected to swiveling arrangement such that the Source to detector distance and height can be adjusted.(Refer Section-III) <p>(2) Image Review System to Review images</p> <ul style="list-style-type: none"> a) Computer with CD archival unit, monitor, keyboard and mouse b) Image Review Software <p>Data and image storage and management system essential</p>	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
13.2.2	Detector Panel	<p>Detector Panel: Receptor type: Amorphous Silicon Conversion screen (Scintillator): vendor to specify Active area: 200mm x 200mm (minimum) (Vendor to specify) Pixel matrix: 1024 x 1024 (minimum), (vendor to specify) Pixel pitch: 200 micron or lesser (vendor to specify) Other selectable fields: vendor to specify. Controllable detector adjustments: Offset Gain, Non linearity, and pixel correction. (Vendor to specify) Electronics: ADC – At least 14-bit Dark current- <1pA/Pixel Saturation charge of ASIC- Vendor to specify Applicable fields of X-Ray voltage: 30kV to 320kV. Conversion factor: - vendor to specify in Cd/M²/ μGy/second Limiting visual resolution: Vendor to specify (Without & With magnification) Modulation Transfer Function (MTF)-Vendor to specify Non Linearity: < ± 2% Dynamic Range: At least 3500:1. Integral distortion in percentage (%)- Vendor to specify. Mode: Real Time (Dynamic). Frames Rate: Preferably 30 Frames / Second. (Vendor to specify the Frame rate to achieve the real time image without pixel binning) Integration time: Vendor to specify corresponding to the frame rate. Image Capturing Time: Vendor to specify Shutter arrangement to be operated from control room:. Vendor to specify</p>	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
13.2.3	BLOOMING	Confirm that there will not be any blooming of the quoted Digital Flat Panel, due to direct exposure of it, when used without masking the job, up to 320 kV of X-Ray Voltage. However the filters (Aluminum, Copper etc.) can be used at the X-Ray port for controlling the Blooming. Clearly specify any other method including software which can be used to avoid the blooming problem and ensuring an image free from blooming meeting 2% penetrameter sensitivity requirement	
13.2.4	LAG	Preferably <10%. Vendor to specify	
13.2.5	Signal to Noise Ratio	Vendor to specify	
13.2.6	Acquisition System		
13.2.6.1	Acquisition Control Computer-	a) Hard drive with over 2GHz processor, with Industrial Rack mount chassis, dual processors, min 1GB RAM, min 80GB hard disc capacity with Additional Graphics Card, DVD/CD, 100Base T network interface with RJ-45 socket, minimum 1280x1024 pixel & 0.25mm(maximum) pitch antiglare flicker free TFT/LCD color monitor, , key board and optical mouse. The acquisition system shall have sufficient disk space for temporary storage of over 2400 full frame digital radiographs. -Vendor to specify b) Display: preferably, Automatic Gray scaling (16 to 8 bit conversion) for monitor display (vendor to specify) c) Data transmission from detector to acquisition system shall be through Ethernet system.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
13.2.6.2	Acquisition Control Software	<p>a) With graphical user interface. The software shall include a sequenced, graphical user interface to guide the operator through system initialization, calibration and validation, plus selection of each part.</p> <p>b) Real Time Images shall be displayed on a monitor connected directly to detector controller for Real time Image Processing, and to average and store multiple static images.</p> <p>c) The images must be available for programming the ADR in real time. For this, the Vendor shall Provide the images in standard image format (JPEG, BMP etc) in real-time (without user specification or user prompted file saving) in a fixed location in the PC hard drive.</p>	
13.2.7	Review System	Image Review station shall be networked to acquisition stations and static images shall be automatically transferred to review station after acquisition.	
13.2.7.1	Review System computer	<p>The system shall have the following minimum specifications Hard drive- over 2GHz processor, 1 GB (min) RAM, MIN 80GB hard disc, with Additional Graphics Card</p> <ul style="list-style-type: none"> • Archival drive-DVD/CD Reader and Writer. • Monitor, key board, mouse <p><u>Note:</u> Vendor to specify whether a separate Computer is required for Review system or a single computer is used for both acquisition and Review systems. If a single computer is used, it should have the total memory (160GB HDD, 2GB RAM etc).</p>	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
13.2.7.2	Review software:	<p>It shall be compatible with NIMA DICOM3.0 standard and with ASTM DICONDE standard for image format and functionality. It shall have the facility to make the image automatically available in BMP, JPEG and TIFF image file format for use in standard applications.</p> <p>Image Processing functions: The software should be capable of performing the following functions</p> <ul style="list-style-type: none"> - Noise reduction through integration. - Contrast enhancement - Edge enhancement - 16 bit filter capability, with different Kernel sizes. - Low pass filter, high Pass filter, median, crisping, pseudo 3D etc. - 8-bit type predefined filters for all type of image processing. 	
13.2.7.3	Software	All software must be original licensed with back up in CD form.	
13.3	Dose overload	Vendor to specify	
13.4	Safety and Quality Standards	Vendor to ensure that Safety and Quality of Digital Flat Panel shall conform to International Standards. Conformance certificate to be furnished along with the equipment.	
13.5	Temperature control system	The ambient temperature can be up to 40 deg.C. The detector shall have a low maintenance, closed loop temperature regulating system, and triple regulated power supplies to stabilize detector operation.	
13.6	Input Electric Power Supply	230 \pm 10 % V, 50 Hz, Single Phase AC through a 3 wire system [Phase, Neutral & Protective Earthing]	
13.7	Calibration	Factory calibration	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
13.8	Ambient Condition	<p>The uncontrolled ambient room conditions are:</p> <p>a) Temperature: 18 to 45° C,</p> <p>b) Relative Humidity: 45 to 85 %</p> <p>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.</p>	
13.9	Accessories	<p>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.</p>	
14.0	Scope of supply	<p>Total number of Flat Panel systems-3 No (One for each RTR system)</p> <p>Following (except accessories) shall be supplied compulsorily with each Equipment:</p> <ul style="list-style-type: none"> a) Digital Flat Panel System as per specification b) Suitably rated UPS online c) Power cables as well as other required inter connecting cables d) Mountable operator control panel with keypads and cables. e) Remote Control Shutter for Flat Panel f) Necessary Standard / Certificates traceable to National / International Standards. g) Spares. <p style="padding-left: 40px;">All signal cables-1 set.</p> <p style="padding-left: 40px;">All PCBs –1 set</p> <p style="padding-left: 40px;">All fuses-1set</p> <p><u>Accessories:</u> Total 2 Sets for the entire system</p> <ul style="list-style-type: none"> 1) Duplex wire type IQI EN 462 Part 5 2) Converging Line pair Quality indicator 	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
15.0	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.	
16.0	Spares for Main Equipment & Accessories	BIDDER has to list down the SPARES under Mechanical, Electrical & Electronic Category for the Main Equipment & Accessories for Equipment for operation in 3 shifts a day and 365 days in a year. ie, the Spares required for normal running of the system for a period of at least 2 years. BIDDER to QUOTE with UNIT RATE for all the listed SPARES, to be procured with the equipment.	

SECTION-III: SWIVELLING SYSTEM FOR REAL TIME RADIOGRAPHY SYSTEM Compatible with 320 kV X Ray constant potential system & Digital Flat Panel

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
17.0	Swiveling System	<p>a) A suitably designed Swiveling System (C-Arm) with a provision to mount X-Ray head on one end and Digital Flat Panel on the opposite end. The swiveling system should be able to swivel about the vertical axis from + 45 Degrees to Zero and then to – 45 Degrees, for the relative angular movement of the X-Ray Head and Digital Flat Panel with respect to the joint under test (tube under test will be in horizontal position).</p> <p>b) The Manipulator has to be operated from the Control Room.</p> <p>c) It shall be designed such a way that entire assembly is balanced to avoid tilting, toppling, eccentric loading on the mechanical drive & system</p>	

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
18.0	Mechanical Fixture for Digital Flat Panel	The flat Panel shall be mounted on a Mechanical fixture in line with the X-Ray system, and connected to swiveling arrangement such that 1) Source to detector distance shall be adjusted between 700 to 1250mm 2) Height - adjustable between 1 and 1.5 metre from ground. NOTE: The Inner dimensions of the X-Ray hall is approx 4 x 3 meters.	
19.0	Scope of Supply	The swiveling system as per clause 17.0 and Mechanical fixture to mount X ray head and Flat Panel which can be operated from Control Room. Number of swiveling systems : Three Numbers.(One for each RTR)	
20.0	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.	
21.0	Spares for Main Equipment & Accessories	BIDDER has to list down the SPARES Coming under the Category of Mechanical, Electrical & Electronic Spares for the Main Equipment as well for the essential and optional desirable Accessories. To be replaced with actual spares and accessories. BIDDER to QUOTE with UNIT RATE for all the listed SPARES, to be procured with the equipment.	

Section IV: GENERAL

Sl. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
22.0	Performance Prove-Out at BHEL	<p>The Vendor has to conduct demonstration of the following in accordance with ASME Boiler and Pressure vessel code section V.</p> <p><u>Resolution of the Digital Flat Panel System:</u> Resolution shall be minimum 2.5 line pair /mm. (at MTF>20%)</p> <p><u>IQI Sensitivity-</u> 2 - 2T (2%), using ASTM strip hole type pentameters for Single wall Steel thickness ranging from 4 to 12 mm.</p> <p>In addition the vendor should be able to demonstrate the Performance parameters such as DQE, Linearity, SNR, Dynamic Range, Contrast Sensitivity etc.</p>	
23.0	Inspection & Acceptance	<p>The overall system and accessories shall be offered for Inspection to BHEL Engineers at vendors works. The RTR system (consisting of the items described as per section – I ,Section-II and Section-III) shall be demonstrated for it's Performance Prove-Out using the samples of Steel tubular butt weld joints with single wall thickness ranging from 4 to 12 mm, and using a Double Wall Double Image Technique, to meet the quality requirements a specified in Clause 22.</p>	
24.0	Installation and commissioning	<p>The overall RTR system and accessories (consisting of the items described as per section – I ,Section-II and Section-III) is to be installed & commissioned at BHEL Works, FREE OF COST, by the VENDOR.</p> <p>Suitable cable tray with cover , fixing stand dressing of all cables are to be done suitably</p>	

25.0	Documentation in ENGLISH Language	3 Copies (In English) of the Operation, Maintenance & Service Manuals for all the 3 systems 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.	
26.0	Performance Guarantee	The overall RTR system and accessories (consisting of the items described as per section – I, Section-II and Section-III, including Bought-Out Items) are to be guaranteed for its performance for a period of one year from the date of performance acceptance at BHEL Works.	
27.0	Service and Spares Support Requirements	Vendor shall ensure after the guarantee period, through trained service personnel in India for next 5 years as and when need arises.	
28.0	Training on Operation & Maintenance	Complete Training Free of Charge for BHEL Engineers is to be given on Operation & Maintenance of the system at BHEL	
29.0	Annual Maintenance Contract - AMC	The BIDDER has to QUOTE for AMC with detailed scope of work.	
30.0	Special Conditions	All vendors shall quote for all the three components of the system (320 kV constant potential X-Ray systems, Digital Flat Panel Detector & Swivelling System) together. Offer for part system will not be considered	
		Overseas vendor are permitted to offer Indian components, such as mechanical swiveling system & UPS system ONLY.	
		Integration & Commissioning and performance prove out is the responsibility of the vendor.	
		separate rate shall be quoted for a) 320 kv X – ray system & Digital flat panel b) Mechanical swiveling system	