TECHNICAL SPECIFICATIONS for 300KV CONSTANT POTENTIAL X-RAY EQUIPMENT (for industrial applications)					
S. No.	**PARTICULARS**	**BHEL SPECIFICATIONS**	**BIDDER's OFFER**		
			[with Complete Technical Details]	**Deviation (if any)**	**Reason for deviation**
1.0	Area of Application	The 300kV Constant potential X-Ray system is used for Film Radiography of welded joints Boiler Components having steel thickness up to 40mm.			
2.0	Principle of Operation	300 kV constant potential X-Ray equipment is used as the Radiation source in Film Radiography. It generates continuous X- rays by bombardment of high speed electrons on high atomic number Target (Tungsten)			
3.0	Design Base	Constant potential Bi polar metal ceramic X ray tube with capacity 300 kV/10mA (by varying potential difference across the electrodes (15 kV to 300 kV) with varying tube current 0 to 10mA High frequency: 40KHz technique for out put stability, low ripple and better sensitivity.			
4.0	Equipment Configuration	The minimum desired features are enlisted below			
4.1	Operating Parameters	•**Tube voltage:** Minimum 15 kV to 300 kV (Variable insteps of 0.2kV).With reproducibility ~(+ or -)0.01% of max kV value at constant temperature. •Tube Current: Minimum 0.5 mA to 10mA (in ~0.1mA steps from 0.5mA to maximum value at operating voltage.). With reproducibility ~(+ or -)2 uA			
4.2	Focal Spot	Dual focal spot preferable (with large focus 1.8mm and mini focus 0.8 mm) .Measurement as per IEC 336.			
4.3	Tube current	To be specified by supplier for large focus and mini focus at 300kV.			
4.4	Emergent Beam Cone angle	~ 40^0			
4.5	Exposure Time	Digital display: 1 Second, in steps up to 60minutes			
4.6	Pre warning	1 to 30 seconds			
4.7	Programmed operation	For storing 100 data sets, with read out message for error (With passwords), supplier to specify			
4.8	Inherent filter	Preferably Beryllium filters. Supplier to specify			
4.9	High voltage connections	Two plugs socket with locking lever and safety features, to be specified by the bidder.			
4.1	High Voltage cables	High Voltage cables to have Anode and Cathode connections with 10 meters in length, both ends Rubber cone covered plugs.			
4.11	Dose out put with inherent filter	Radiation output data at various kV at 1 m from focal spot to be furnished. Supplier to specify			

4.12	Dose-Rate	in Sv/min (R/ min) at 1 M with and without filter - Supplier to specify			
4.13	Leakage level radiation (at full load)	Leakage radiation levels measured at a distance of 1m at max voltage of 300kV and max current at that voltage be given. These should be within limits prescribed by AERB.During installation this must be demonstrated. Shall not exceed 1R / 1Hour /1metre from focal spot.			
4.14	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. •Display must be LCD, with RS 232C Interface. With provisions for adjusting kV, mA, time & to select focal spot. Direct interface with PC & selections of parameters through PC required. Provision for recording the exposure parameters and their recollection. Text messages of faults be displayed for rectification. Built in automatic warm-up program. Auto-trip facility at higher target loadings & higher target/cooling oil temperatures.			
4.15	Cooling Unit	a. Heat Exchanger Type Cooling Unit with 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.			
4.16	Flash Lamp	A Warning Flash Lamp with fail-proof safety circuit shall be supplied with 20 meter long cable.			
4.17	Gate Limit Switch	Gate Limit Switch connection to be provided			
4.18	Penetrating Power	Penetrating power for 10 Minutes. Exposure for steel [EFD=700 mm, film type Agfa D7, Optical density=2.0, Lead screens 0.1 mm (F) and 0.15 mm (B) at standard film processing parameters]			
5.0	X-Ray Unit Manipulator	A suitably designed Hydraulic Manipulator having arrangement for vertical position adjustment of the X-Ray head.			
6.0	Weight	Low weight & portable. Max. weight approximately 120kg(cathode),170kg(anode)(Supplier to specify.)			
7.0	Safety interlocks	Built in safety interlocks to switch off the system in case of emergency and safety with door interlocks.			

8.0	Input Electric Power Supply	a. BHEL will provide Electric Input Power Supply at ONE POINT only, With 230 ± 10 % V, 50 Hz, Single Phase AC through a 3 wire system [Phase, Neutral & Protective Earthing]. **O R** With 415 ± 10 % V, 50 Hz, Three Phase AC through a 3 wire system [No Neutral Conductor, 4th wire for Protective Earthing]. b. BIDDER to take supply from this SINGLE Point to all the sub-systems of the equipment through proper step-up or step-down transformers.			
9.0	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.			
10.0	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.			
11.0	Safety and Quality Standards	a. Supplier 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			
12.0	Scope of supply	Following shall be supplied compulsorily with the Equipment: 1. X ray head as per specifications 2. High voltage Generators 3. High Voltage Cables: 1 pair. 4. Power connection cables: 1no 5. Digital Control unit 6. Cooling system: 7. Warning flash lamp 8. Programmable motor control Diaphragm 9. Hydraulic Manipulator for vertical movement (height adjustment) of x-ray head. 10. HT Silicon paste: 1 kg (in 100 grams pack) 11. Service tool kit 12.Necessary Standard / Certificate traceable to National/International Standard. 13. Optional / Compulsory Accessories 14. Spares & Consumables 15. Inspection at Supplier's Works & Training 16. Installation, Commissioning & Performance Prove-Out and Training on Operation, Trouble Shooting & Maintenance			

		17.Documentation: Testing& Calibration Certificates			
		18. O & M Manuals [3 Sets]			
		19. Zone monitor 1 no with power source and battery			
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	a. BIDDER has to list down the SPARES under Mechanical, Electrical & Electronic Category for the Main Equipment & Accessories for Equipment Operation in 3 shifts a day and for 365 days in a year.			
		b. BIDDER has to compulsorily quote for the following Commissioning Spares with the TECHNICAL OFFER:			
		1) High Voltage Cables for 300kV - 1 Pair			
		2) All types of PCBs for X-Ray Control System			
		3) Critical Spares for X-Ray Head and HT Transformer			
		4) Cooling System			
		5) All Signal Cables - 1 No. each			
		6) All Fuses – 3 Sets.			
15.0	Inspection	The X-Ray system and accessories (consisting of the items mentioned in the scope of supply) shall be offered for Inspection by BHEL and Performance Prove-Out.			
16.0	Installation and commissioning	The X-Ray system and accessories (consisting of the items mentioned in the scope of supply) is to be installed & commissioned at BHEL Works, by the Service Engineer of the SUPPLIER.			
17.0	Documentation in ENGLISH Language	3 Copies (In English) 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.			
18.0	Performance Guarantee	The X-Ray system and accessories (consisting of the items mentioned in the scope of supply) are to be guaranteed for its performance for a minimum period of two years from the date of performance acceptance at BHEL Works.			
19.0	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 arise. Spares to be made available with in 1 week.			
20.0	Training on Operation & Maintenance	Complete Training for 2 BHEL Engineers is to be given on Operation & Maintenance of the OFFERED Training has to be provided at BHEL Works, after the successful commissioning of the Equipment & Accessories.			

21.0	Safety and Quality Standards	Supplier to ensure that Safety and Quality of X-Ray system and accessories (consisting of the items mentioned in the scope of supply) shall conform to International Standards. Conformance certificate to be along with the equipment.			
22.0	Qualifying criteria	Bidder has to comply with the qualifying criteria as mentioned below:			
22.1		The BIDDER / VENDOR shall have a minimum of FIVE Years of Continuous Experience in the Design, Manufacture of 300kV Constant Potential X-Ray systems. Indicate the actual experience.			
22.2		The BIDDER / VENDOR shall have supplied at least one number of 300kV Constant Potential X-Ray systems within the last five years. Indicate the number of equipment (of QUOTED MODEL) sold in India & Other Countries.			
22.3		Reference List of Customers and Performance Certificate from CUSTOMERS (minimum 2 Customers) with full contact details of CONTACT PERSON.			
23.0	Additional Details	In addition, the Bidder has to give the following details, along with technical bid			
23.1		Number of Years of Experience of the BIDDER/ VENDOR in the field of design, manufacture and supply of '300kV Constant Potential X-Ray system'			
23.2		YEAR of LAUNCH of the Model quoted against this ENQUIRY			
23.3		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			
23.4		Number of 300kV Constant Potential X-Ray systems supplied, installed and commissioned till date, in the QUOTED MODEL			
23.5		Number of 300kV Constant Potential X-Ray systems supplied, installed and commissioned till date for the following category of CUSTOMERS (within INDIA): a) Government Organisations b) Private Sector Companies [Large Scale Industries]			

23.6		Number of 300kV Constant Potential X-Ray systems 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			
23.7		Details of Design Set-Up and Technology Back-Up assured for the PRINCIPAL Equipment Maker			
23.8		Details on International Standards followed in Design of the System			
23.9		Comprehensive Details on Performance Testing - of the Equipment quoted, to be ensured in presence of BHEL Executives, prior to dispatch from Supplier's Works			
23.10		Details of Quality System followed (Kindly furnish the salient aspects of the QA system followed)			
23.11		Details on SERVICE-after-SALES Set-Up in India including the addresses of Agents/Service Centers in India and Asia			
23.12		Any Additional Data to supplement the manufacturing capability of the BIDDER			