



An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

ENQUIRY	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com
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	Enquiry Number: 2620700027	Enquiry Date: 27.06.2007	Due date for submission of quotation: 01.09.2007
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	Induction Heating system for heating the tube bends as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com)	4 Nos.	30.03.2008

Note:

Confirmation of acceptance for BHEL commercial terms & conditions and Price Bid formats have been posted in BHEL Corporate web site www.bhel.com under Enquiry reference “2620700027”. Your offer should be based on all the above documents.

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

Manager / Capital Purchase / MM / Manufacturing

PART A**SECTION – I: QUALIFYING CRITERIA**

The BIDDER / VENDOR (OEM) has to meet the following requirements to get qualified for submitting an offer Induction Heating Equipment for Tube bends.

S. No.	REQUIREMENTS	VENDOR's COMMENTS
1	The Bidder / Vendor (OEM) shall have a minimum of TEN Years of Continuous Experience in the field of Design, Manufacture and Supply of Induction Heating Equipment.	
2	Only those vendors (OEMs), who have supplied and commissioned at least ONE Induction Heating Equipment of not less than 50 KW in the past ten years (on the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender), should quote. However, if such equipment has been supplied to BHEL, then the same must be currently working satisfactorily for not less than six months (as on date of Tender Opening) from the date of commissioning and acceptance Performance certificate from the customers regarding satisfactory performance of such equipment supplied to them in attached format should to be enclosed along with technical offer.	
2.1	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.	

SECTION – II

The BIDDER/ VENDOR (OEM) is requested to furnish the following information:

S. No.	PARTICULARS	VENDOR's RESPONSE
3	Profile of the Company bringing-out the years of Experience of the BIDDER in the field of design, manufacture and supply of Induction heating equipment.	

4	Number of Induction heating equipment supplied, installed and commissioned till date (with details on equipment type / model, configuration, customer and quantity)	
5	Details on International Standards / Design Process Codes followed in Design and Manufacture of the Equipment.	
6	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centers in India. Competency & Experience of the Local Service Agency are to be provided.	
7	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – III

The BIDDER/ VENDOR (OEM) to note the following:

S.No.	REQUIREMENTS	VENDOR's COMPLIANCE
8	The BIDDER / VENDOR (OEM) shall submit the offer in TWO PARTS -Technical [with PART A & PART B] & Commercial and Price Bid.	
9	The Technical Offer shall be supported by Product Catalogues & description.	
10	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 mere 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement (without any supporting technical write-ups, photos and datasheets] may lead to disqualification of the Technical Offer.	
11	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 the inclusion of all the accessories, toolings, attachments, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements.	
12	BIDDER / VENDOR (OEM) has to indicate the Country of Origin for the supply of equipment.	

PERFORMANCE CERTIFICATE

(On Customer's Letter Head)

1. Supplier of the machine :
2. Make & Model of the Equipment :
3. Month & Year of Commissioning :
4. Application :
5. a. Jobs Performed in the machine : Induction heating of 180° pre-bends
b. Power rating (Min 50KW) :
6. Performance of the Machine : Best in the market /
(Strike off whichever is not applicable) Satisfactory /
Good /
Average /
Not Satisfactory
7. Any other remarks:

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B**TECHNICAL SPECIFICATIONS FOR INDUCTION HEATING EQUIPMENT FOR TUBE BENDS**

S. No.	PARTICULARS & BHEL SPECIFICATIONS					Bidder's OFFER [With Complete Technical Details]
1.0	APPLICATION					
1.1	A) The Equipment is meant for heating of 180° pre-bent seamless steel tubes, which are to be loaded on Squeezing and Sizing machine used for Boiler Applications. Tube heating shall be of Induction Heating type with suitable coil arrangement to facilitate sideways movement of tube bend in to and out of the equipment.					
2.0	TUBE OUTER DIAMETER AND THICKNESS&PRE-BEND RADII: All are OD (Outer Diameter) Controlled tubes with thickness tolerance of Max. +22 %					
2.1		S.No	OD, mm	THICKNESS, mm		Pre Bend Radius, mm
				Minimum	Maximum	
		1	31.8	2.9	5.0	48
		2	38.1	4.0	5.3	65
		3	44.5	4.0	10.0	65
		4	47.63	5.0	10.0	71.5
		5	51.0	4.5	8.0	76.5
		6	54.0	4.0	10.0	76.5
		7	57.0	5.0	7.0	90
		8	63.5	5.6	8.0	100

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
3.0	TUBE MATERIAL SPECIFICATIONS:		
3.1	a. Carbon Steel: SA192, SA210 Gr.A1, SA210 Gr.C b. Alloy Steel: SA209 T1, SA213 T11, SA213T22, T23, SA213T91, T92 c. Stainless Steel : SA 213 TP304H, SA 213 TP321H, SA 213 TP347H		
4.0	OPERATING PARAMETERS:		
4.1	Tube Diameter	Minimum: 31.8 mm Maximum: 63.5mm	
4.2	Tube Wall Thickness	As given in the table (Sl.No. 2.0)	
4.3	Bend Radius	Minimum: 48 mm Maximum: 100mm	
4.4	Length over Pre-bend 	Minimum: 1200mm Maximum: 12000mm	
4.5	Bend heating Temperature	600°C to 1150°C	
4.6	Length of bend to be heated	Max 230 mm	
4.7	Time for Heating to desired temperature	20 to 30 seconds	
4.8	PRODUCTIVITY		
4.8.1	No.of bends per shift in OD 51 x 8mm / Alloy Steel Tubes for batch production jobs with Radius 25.5mm	200 bends in one 8 hour shift minimum	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
5.0	MACHINE PARAMETERS		
5.1	Height of Lower Surface of Bent Tube as loaded on the machine has to be 1000 to 1200mm above the floor level.	Vendor to specify	
6.1	INDUCTION HEATING DEVICE		
6.1.1	The induction-heating device has to be suitably selected for heating the range of tubes mentioned in S.No. 2.0 to the required temperatures. Vendor to specify the details of the Induction heating device.	Vendor to specify	
6.1.2	The Induction heating device has to be positioned in a convenient location, to facilitate easy loading of tube into the heating device and unloading of tube.	Vendor to specify	
6.1.3	The tube bend will be kept flat on suitable job supports (BHEL Scope) and slid into the Induction heating equipment coil sideways from the right side (facing the equipment). The axis of the two arms of the bend will be perpendicular to the tube heating equipment. Once the set temperature is reached, the tube bend is slid out from the left side of the coil.	Vendor to Specify	
6.1.4	The induction heating coil shall be in the form of a slot in the front of the induction heating equipment and should be suitably protected	Vendor to Specify	
6.1.5	Length of the coil slot	Vendor to Specify	
6.1.6	Depth of coil slot	Vendor to Specify	
6.1.7	Height of slot opening	Vendor to Specify	

CABS-1-07BN: Induction Heating Equipment for Bends

S. No.	PARTICULARS & BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]	
6.1.8	The coil would be empty (without load) from the time that one bend is moved out after heating to the time that another bend is moved into the coil slot for heating. There should be no adverse effect on the operation of the induction heating equipment on account of this. Details of the features to take care of this should be furnished in the offer	Vendor to Specify	
6.1.9	There should be a provision to raise or lower the induction heating transformer with heating coil by 200mm electro hydraulically by means of cylinders (details should be furnished in the offer)	Vendor to Specify	
6.1.10	There should be provision to move the induction-heating transformer along with heating coil on its base forward and backward by max 300mm to 500mm by electro hydraulic means. Details should be furnished in the offer	Vendor to Specify	
6.1.11	The induction heater coaxial cables from the solid state induction generator to the heating transformer should be suitably supported so as to facilitate the above mentioned movements	Vendor to confirm	
6.1.12	Suitable hydraulic power pack with controls should be provided. Details should be furnished in the offer	Vendor to Specify	
6.1.13	The vendor has to detail out in their offer about the mechanical arrangement and control of the heating unit.	Vendor to specify	
6.1.14	HF Power Source: Solid State HF Power source with suitable cooling system to be provided. (Complete details should be furnished in the technical offer)	Vendor to Specify	
6.1.15	Inductor: Replaceable type, HF Inductor (water cooled type)	Vendor to confirm	
6.1.16	HF Transformer: Primary & secondary windings should be water cooled type	Vendor to specify	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
6.1.17	Induction Unit Parameters		
6.1.17.1	Current	Vendor to specify	
6.1.17.2	Voltage	Vendor to specify	
6.1.17.3	Frequency	Vendor to specify	
6.1.17.4	KVA rating	Vendor to specify	
6.1.17.5	Rating Output	Vendor to specify	
6.1.18	The high frequency induction unit should be IGBT based inverter unit.	Vendor to specify	
6.1.19	The heating system has to enable continuous control of the heating process. The tube has to be heated to the set temperature and automatically cut off once the set temperature is reached.	Vendor to confirm	
6.1.20	Optional Audio alarm signaling the attainment of set temperature may be offered	Vendor to Confirm	
6.1.21	The range of temperatures as mentioned in Sl. No. 6.7 shall be from 600°C to 1150°C.	Vendor to confirm	
6.1.22	The temperature setting has to be steplessly variable for the entire range mentioned.	Vendor to specify	
6.1.23	A digital temperature display unit shall be provided, showing both the set temperature and the actual temperature, separately. The digits of display unit shall be large enough to read from a distance.	Vendor to specify	
6.1.24	Suitable temperature sensing device to be provided for measurement and control of temperature.	Vendor to specify	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
6.1.25	The details of rate of heating or the time taken for heating to the required temperature shall be furnished by the vendor.	Vendor to specify	
6.1.26	Suitable protection for HF Transformer & HF Inverter has to be provided against factors such as over voltage, over current, under Voltage, over temperature, Cooling Water flow failure & Short circuit protection etc.	Vendor to confirm	
6.1.27	Bidder to furnish details on the protection system provided to avoid short-circuiting of secondary side of HF (matching) Transformer with job.	Vendor to Specify	
6.1.28	Water Chiller		
6.1.28.1	Closed circuit Refrigerant type Water Chiller system of cooling water circuit with temperature setting, for Induction heating coil & HF Transformer coil shall be provided. The details to be furnished in the offer giving details such as Flow, Pressure, water tank capacity, Temperature etc.	Vendor to specify	
6.1.28.2	Chiller capacity (taking into account the ambient temperature of 45 deg Celsius)	Vendor to Specify	
6.1.28.3	The water chiller shall make use of additives to prevent scaling of cooling components.	Vendor to confirm	
6.1.28.4	Suitable flow sensors are to be provided to have an interlock with the induction heating system.	Vendor to confirm	
6.2	ELECTRICAL:		
6.2.1	Wiring: All electrical items, limit switches etc, on the machine shall be Wired using PVC sheathed cable running in conduits to cable ducts to common terminal block. External wiring from / to control panel, control desk, external motors etc shall be by means of screened multi-core cables.	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
6.2.2	Electric Panel		
6.2.2.1	Electrical panel shall be Box type self-standing with locking arrangement to be provided.	Vendor to confirm	
6.2.2.2	Electrical Panel Air-Conditioner to be provided.	Vendor to confirm	
6.2.2.3	All Ammeters, Voltmeters shall be located on the panel.	Vendor to confirm	
6.2.2.4	Machine panel shall be adequately illuminated for maintenance purpose.	Vendor to confirm	
6.2.3	Operator console		
6.2.3.1	The pendant type operator console shall be provided at a convenient height for easy operation	Vendor to confirm	
6.2.3.2	Operator console shall contain push buttons, indication lamps, selector switches, digital temperature display / setting unit etc.	Vendor to confirm	
6.2.4	All electrics shall be tropicalised & shall have IP 54 protection	Vendor to confirm	
6.2.5	Machine lighting: Suitable for the operator to work with job.	Vendor to confirm	
6.2.6	Control voltage: The control voltage shall be 24 Volts	Vendor to confirm	
6.2.7	Input Power Supply		
6.2.7.1	The electrical power input shall be $415 \pm 10\%$ V, $50 \pm 3\%$ Hz, 3 Phase AC supply through a 3 Wire System. No neutral conductor.	Vendor to confirm	
6.2.7.2	BHEL provides this supply at one point only and the supplier has to provide of all other electrical distribution network required for the INDUCTION HEATING EQUIPMENT.	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
6.2.8	Power Requirement: Vendor to indicate the total tentative power requirement (including that for all the accessories and attachments) in kVA with the offer.	Vendor to specify	
6.3	Compressed air supply will be at 4 to 5 Kg/cm ² for any pneumatic circuits in the machine.	Vendor to confirm	
6.4	COMPONENTS USED:		
6.4.1	All electrical items shall be of reputed make like Siemens/ SEW / ROCKWELL Allen Bradley/ Telemecanique / Delta	Vendor to Specify	
6.4.2	All components/devices/terminals are to be incorporated with ferrules.	Vendor to confirm	
6.4.3	All motors shall be from reputed makers like SIEMENS, ABB, Allen Bradley conforming to IEC Standards.	Vendor to Specify	
6.4.4	All hydraulic elements shall be of VICKERS / REXROTH, DENISONS make.	Vendor to Specify	
6.4.5	All hydraulic hoses shall be preferably of GATES make.	Vendor to Specify	
6.5	Machine Maintenance: The machine configuration and element arrangement should have easy accessibility, higher rigidity, self-aligning /fitting, locking & piloting arrangement of machine components and modules.	Vendor to confirm	
7.0	Ambient Atmospheric Conditions		
7.1	The Induction heating equipment with all Sub-Systems shall be suitable for operation in an ambient temperature of 25 to 50°C and with a Relative Humidity of 45% to 90%.	Vendor to confirm	
7.2	The entire Equipment shall be TROPICALISED in Design and Construction.	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
8.0	SAFETY		
8.1	All Safety features provided in the equipment shall be specified by the vendor.	Vendor to Specify	
9.0	PAINTING		
9.1	The heavier machine parts are to be heat-treated after fabrication (including castings and forgings) and shot blasted for surface preparation prior to painting.	Vendor to confirm	
9.2	One coat of Primer with 25 μ of DFT (Dry Film Thickness) and 48 hours of curing after painting.	Vendor to confirm	
9.3	Two coats of Enamel Paint (Colour – Apple Green) each with 25 μ of DFT and intermittent curing of minimum 16 hours.	Vendor to confirm	
10.0	GENERAL POINTS		
10.1	Make and Model of the machine to be mentioned. Detailed catalogs of the machine to be sent with the offer.		
10.2	Complete description of all systems & sub-systems shall form part of the technical bid.		
10.3	A schematic diagram showing the layout of the machine & associated systems with salient dimensions shall be submitted along with the offer.		
10.4	The operating sequence of the machine with broad outline of various operations involved should be furnished with the offer.		
10.5	Standards for Design, Manufacture and testing of the machine shall be in accordance with internationally accepted standards.		
10.6	Approximate weight of the Machine & Sub-Systems.		

S. No.	PARTICULARS & BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
11.0	SPARES (to be recommended by the vendor)	
11.1	Itemized breakup of mechanical, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered)	
11.2	a) Electrical /Electronic Spares: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, IGBT Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch etc.	
11.3	Recommended set of spares for all attachments are to be offered with details.	
11.4	Vendor to confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	
11.5	Essential Spares	
11.5.1	Mechanical spares: 1. Spare Induction Heating Coils – 2 Nos 2. Hydraulic components-2 sets	
11.5.2	Electrical & Electronics: - 1. IGBTs - 1 set 2. Proximity switch, limit switches, push buttons, indicating lamps etc.- 2 Nos each 3. Coaxial Cable HF cable – 1 set	

S. No.	PARTICULARS & BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
12.0	MACHINE INSPECTION & ACCEPTANCE	
12.1	INSPECTION	
12.1.1	The Machine shall be offered for inspection and performance trials to test the design capabilities of the machine, by BHEL Engineers before Dispatch at Supplier's works.	
12.2	ACCEPTANCE CRITERIA	
12.2.1	All the features of the machines shall be operated and shown and to work as given in the specification, at supplier's works during inspection and during commissioning at BHEL works.	
12.2.2	The prove-out trials shall be for the Tube bend sizes given by BHEL during the technical discussions or at the time of releasing the Purchase Order.	
12.2.3	The production output of the machine shall be proved out by the commissioning Engineer at BHEL works for the Production rate mentioned in the specification.	
13.0	ERECTION & COMMISSIONING	
13.1	The supplier shall depute his engineer(s) for supervising the erection and commissioning of the machine at BHEL and prove-out trials	

S. No.	PARTICULARS & BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
14.0	TRAINING	
14.1	The supplier shall train BHEL's Engineers in Operation and Maintenance of the Machine at supplier's works for a period 5 working days. (Quote should be on per man day basis)	
14.2	The supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance (Mechanical, Electrical/ Electronics System) after the commissioning of the Machine at BHEL works for not less than 6 working days.	
14.3	The training shall include specialized coaching in <ul style="list-style-type: none"> a. Safety b. Operation of the machine c. Trouble-Shooting, d. Any special features of the machine e. Electrical / Mechanical / Electronics systems 	
15.0	GUARANTEE	
15.1	Equipment has to be guaranteed for its performance, for a minimum of 24 months from the date of commissioning.	