An ISO 9001 Company

Bharat Heavy Electricals Limited

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

ENQUIRY	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com

	Enquiry Number:	**Enquiry Date:**	**Due date for submission of quotation:**
	2620800057	**11.07.2008**	**12.08.2008**
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	Induction Heating Equipment for Tube Ends as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1 No.	31.12.2008

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats along with technical specifications 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 "2620800057".

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 Equipment / MM

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 30 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, for atleast one year. The performance certificate may be submitted as per attached format, 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.	

PART B

TECHNICAL SPECIFICATIONS FOR INDUCTION HEATING EQUIPMENT FOR TUBE ENDS

<table>
<tr><th>S. No.</th><th>PARTICULARS & BHEL SPECIFICATIONS</th><th>Bidder’s OFFER [With Complete Technical Details]</th></tr>
<tr><td>1.0</td><td colspan="2">APPLICATION</td></tr>
<tr><td>1.1</td><td>The Equipment is meant for heating a short length at the ends of long seamless steel tubes, for performing Hot Upset pressing on ‘Upsetting and Swaging machine’.
Tube heating shall be of Induction Heating type with suitable coil arrangement to facilitate heating of a short length of the tube for subsequent upsetting process.</td><td></td></tr>
<tr><td>2.0</td><td>TUBE OUTER DIAMETER AND THICKNESS&PRE-BEND RADII:
All are OD (Outer Diameter) Controlled tubes with thickness tolerance of Max. +18 %</td><td></td></tr>
<tr><td>2.1</td><td>
<table>
<tr><th>S.No</th><th>Tube OD in mm</th><th>Tube Thickness Range in mm</th></tr>
<tr><td>1</td><td>51.0</td><td>Min: 5mm ; Max: 12mm</td></tr>
<tr><td>2</td><td>54.0</td><td>Min: 5mm ; Max: 12mm</td></tr>
<tr><td>3</td><td>63.5</td><td>Min: 5.6mm ; Max: 12.5mm</td></tr>
</table>
</td><td></td></tr>
<tr><td>3.0</td><td colspan="2">TUBE MATERIAL SPECIFICATIONS:</td></tr>
<tr><td>3.1</td><td>a. Carbon Steel: SA210 Gr. A1, SA210 Gr.C
b. Alloy Steel: SA213T11, SA213T22, SA213T91
c. Stainless Steel: SA 213 TP304H, SA 213 TP347H</td><td></td></tr>
</table>

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
4.0	**OPERATING PARAMETERS:**		
4.1	Tube Outside Diameter	51mm, 54mm, 63.5mm	
4.2	Tube Wall Thickness (Tolerance: +18%)	Minimum: 5mm , Maximum: 12.5mm	
4.3	Heating Temperature	1250 deg C (Maximum)	
4.4	Length of Tube to be heated at tube end	80 mm	
4.5	Time for Heating to desired temperature	**40 seconds**	
5.0	**PRODUCTIVITY**		
5.1	No.of tube ends per shift in OD 51x7.1mm Alloy Steel Tubes for batch production jobs	100 ends in one 8 hour shift minimum (for information to Vendor to design the induction coil with suitable duty cycle)	
6.0	**MACHINE PARAMETERS**		
6.1	The induction heating coil has to be mounted on a stand, which is clamped to the body of Swaging and Upsetting machine between the clamp dies and upsetting die (Refer Indicative drg. CABS-2-15/A). The induction coil should have enough clearance to allow for the upsetting rod to pass through it. The inductor coil should also accommodate the movement of tube by 5mm from the unclamped position to clamped position. The coil with stand should be easily dismantled, whenever upsetting process is not performed. The diameter of the upsetting rod is equal to Tube OD+0.3mm.	Vendor to specify	
7.0	**INDUCTION HEATING DEVICE - CONSTRUCTION**		
7.1	The range of temperatures as mentioned in Clause 4.3 between 900 deg C and 1250 deg C.	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
7.2	The induction-heating device has to be suitably selected for heating the range of tube specifications mentioned under Clause S.No. 2.0 & 3.0, to the required temperatures in the specified time. Vendor to furnish the details of the Induction heating device.	Vendor to specify	
7.3	The Induction heating device (Inductor coil) has to be positioned in the location shown in the Indicative drg. CABS-2-15/A.	Vendor to Confirm	
7.4	The tube is fed through clamping dies. The tube is positioned by a stopper, so that the tube projects out by 100mm outside the clamping dies. The Inductor Coil has to be positioned so as to heat the tube end to a length of 80mm, in this position.	Vendor to Confirm (the tube positioning by stopper is under BHEL scope)	
7.5	The Inductor Coil to be mounted in a stand fixed to the main body of the Upsetting machine. This shall be dismantled when the upsetting process is not performed. Vendor may visit BHEL with prior intimation, to physically see the machine and understand the requirement.	Vendor to Confirm	
7.6	Size of the coil shall be suitable to allow the Upsetting Rod (Size: Tube OD+0.3mm) to pass through it. (Refer to the drg CABS-2-15/A). There shall be a minimum of 4 to 5mm gap between the tube OD and the ID of Inductor coil. The Inductor coil to accommodate the movement of tube from unclamped position to clamped position as detailed out in the sketch CABS-2-15/A. Diameter of the Inductor coil to be specified.	Vendor to Specify	
7.7	Sufficient clearance to be provided for movement of tube in and out of the inductor coil and also for vertical movement.	Vendor to Confirm	
7.8	Preferably Single common Inductor coil has to be used for all the three Tube diameters mentioned under Clause 2.0	Vendor to Confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
7.9	The Inductor coil shall be water cooled	Vendor to Confirm	
7.10	The induction heater coaxial cables from the solid state induction generator to the heating transformer should be suitably supported.	Vendor to confirm	
7.11	The vendor has to provide a sketch indicating the mechanical arrangement.	Vendor to specify	
7.12	HF induction unit should be IGBT based inverter unit.	Vendor to specify	
7.13	**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	
7.14	**Inductor:** Replaceable type, HF Inductor (water cooled type)	Vendor to confirm	
7.15	**HF Transformer**: Primary & secondary windings should be water cooled type	Vendor to specify	
7.16	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	
7.17	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	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
8.0	**Induction Unit Parameters**		
8.1	Current	Vendor to specify	
8.2	Voltage	Vendor to specify	
8.3	Frequency	Vendor to specify	
8.4	KVA rating	Vendor to specify	
8.5	Output Rating	Vendor to specify	
9.0	**Heating Controls**		
9.1	The heating has to be controlled by time setting. The tube has to be heated to the set time and automatically cut off once the set time has elapsed.	Vendor to confirm	
9.2	The time setting has to be steplessly variable for the entire range mentioned.	Vendor to confirm	
9.3	Optional Audio alarm signaling the attainment of set temperature may be offered	Vendor to offer Optionally	
9.4	The process of Upsetting will run on auto-cycle. The sequence shall be as follows: *a) Advance upsetting rod to act as Stopper at (100mm)* *b) Tube in-feed with clamp die open until tube hits stopper.* *c) Retract upsetting rod (stopper)* *d) Induction heating start.* *e) Induction heating stop after the set time elapses.* *f) Advance upsetting rod to push the tube into Clamp die* *g) Clamp die close.* *h) Advance the upsetting rod to complete upsetting of Tube end and quickly retract.* *i) Clamp Die open.* *j) Tube out-feed*	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
9.5	The operation of the Induction heating unit has to be integrated with the Upsetting machine to run the auto cycle. Electric signal will be given after the stopper retracts, for Induction heating to start. After the set time elapses, an Electric signal has to be provided from the Induction heating system to the control system of the Upsetting machine for the next operation to start. The Upsetting machine will be controlled by PLC. The integration of the Induction heating system with PLC of Upsetting machine by co-ordinating with the supplier of Upsetting machine forms part of the vendor's scope.	Vendor to confirm	
9.6	Time setting with digital display has to be provided on the Electric control panel	Vendor to confirm	
9.7	Provision for operating heating cycle alone, initially, for time setting, bypassing the auto cycle to be provided. The manual control push button for this purpose has to be provided on the operator control panel of the Upsetting machine. An Emergency stop / Heater on-off buttons also to be provided.	Vendor to confirm	
9.8	No separate operator control panel is required. All the controls for Induction heating system has to be mounted on the operator control panel of the Upsetting machine. However, necessary electrical push buttons, wiring for fixing on the upsetting machine operator control panel and other electrical / electronic items required to integrate with PLC are part of vendor's scope.	Vendor to confirm	
9.9	Hand held Non contact type temperature measuring unit with digital display of reputed make to be provided to enable time setting for various sizes / specification of tubes. Make and Model to be specified.	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
10.0	**Water Chiller**		
10.1	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	
10.2	Chiller capacity (taking into account the ambient temperature of 45 deg Celsius)	Vendor to Specify	
10.3	Vendor shall recommend additives if any to prevent scaling of cooling components in the water chiller.	Vendor to confirm	
10.4	Suitable flow sensors are to be provided to have an interlock with the induction heating system.	Vendor to confirm	
11.0	**ELECTRICAL:**		
11.1	**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	
12.0	**Electric Panel**		
12.1	Electrical panel shall be Box type self-standing with locking arrangement to be provided.	Vendor to confirm	
12.2	Electrical Panel Air-Conditioner to be provided.	Vendor to confirm	
12.3	All Ammeters, Voltmeters shall be located on the panel.	Vendor to confirm	
12.4	Machine panel shall be adequately illuminated for maintenance purpose.	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
12.5	All electrics shall be tropicalised & shall have IP 54 protection	Vendor to confirm	
12.6	Control voltage: The control voltage shall be 24 Volts	Vendor to confirm	
13.0	**Input Power Supply**		
13.1	The electrical power input shall be 415 ± 10% V, 50 ± 3% Hz, 3 Phase AC supply through a 3 Wire System. No neutral conductor.	Vendor to confirm	
13.2	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	
13.3	**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	
14.0	**COMPONENTS USED:**		
14.1	All electrical items shall be of reputed make like Siemens/ SEW / ROCKWELL Allen Bradley/ Telemechanique / Delta	Vendor to Specify	
14.2	All components/devices/terminals are to be incorporated with ferrules.	Vendor to Confirm	
14.3	All motors shall be from reputed makers like SIEMENS, ABB, Allen Bradley conforming to IEC Standards.	Vendor to Specify	
15.0	**Ambient Atmospheric Conditions**		
15.1	The Induction heating equipment with all Sub-Systems shall be suitable for operation in an ambient temperature of 25 to 45degC and with a Relative Humidity of 45% to 90%.	Vendor to Confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS		Bidder's OFFER [With Complete Technical Details]
15.2	The entire Equipment shall be TROPICALISED in Design and Construction.	Vendor to Confirm	
16.0	**SAFETY**		
16.1	All Safety features provided in the equipment shall be specified by the vendor.	Vendor to Specify	
17.0	**PAINTING**		
17.1	Painting of Equipment / Electrical Panels using RAL 6011 Apple Green Colour (Polyurethane Paint). Touch paint has to be supplied along with the machine to repaint the portions where paint has peeled off during erection and commissioning.		
18.0	**MACHINE PACKING**		
18.1	Sea / Road worthy & rigid packing for all items of complete equipment System, all accessories and other supplied items to avoid any damage/loss in transit.	Vendor to confirm	
19.0	**GENERAL POINTS**		
19.1	Make and Model of the machine to be mentioned. Detailed catalogs of the machine to be sent with the offer.	Vendor to Specify	
19.2	Complete description of all systems & sub-systems shall form part of the technical bid.	Vendor to Specify	
19.3	A schematic diagram showing the layout of the machine & associated systems with salient dimensions shall be submitted along with the offer.	Vendor to Submit	
19.4	Standards for Design, Manufacture and testing of the machine shall be in accordance with internationally accepted standards.	Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
20.0	**SPARES (to be recommended by the vendor)**	
20.1	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)**	
20.2	**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.	
20.3	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	
20.4	**Essential Spares**	
20.4.1	Mechanical spares: 1. Spare Induction Heating Coils – 3 Nos	
20.4.2	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]
21.0	**MACHINE INSPECTION & ACCEPTANCE**	
21.1	**INSPECTION**	
21.1.1	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.	
21.2	**ACCEPTANCE CRITERIA**	
21.2.1	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.	
21.2.2	The prove-out trials shall be on the Tubes supplied by BHEL.	
21.2.3	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. Equipment shall be tested for 100 tubes / shift for 3 shifts for acceptance.	
22.0	**ERECTION & COMMISSIONING**	
22.1	The supplier shall depute his engineer(s) for supervising the erection and commissioning of the machine at BHEL and prove-out trials	
23.0	**TRAINING**	
23.1	The supplier shall train BHEL's Engineers in Operation and Maintenance of the Machine at supplier's works for a period of minimum 2 working days.	
23.2	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 4 working days.	

S. No.	PARTICULARS & BHEL SPECIFICATIONS	Bidder's OFFER [With Complete Technical Details]
23.3	The training shall include specialized coaching in a. Safety b. Operation of the machine c. Trouble-Shooting, d. Any special features of the machine e. Electrical / Mechanical / Electronics systems	
24.0	**GUARANTEE**	
24.1	Performance Guarantee for a minimum period of 24 months (for the machine in total and sub-systems or bought-out items in particular) from the date of commissioning of the machine.	

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 :

   b. Power rating (Min 30KW) :

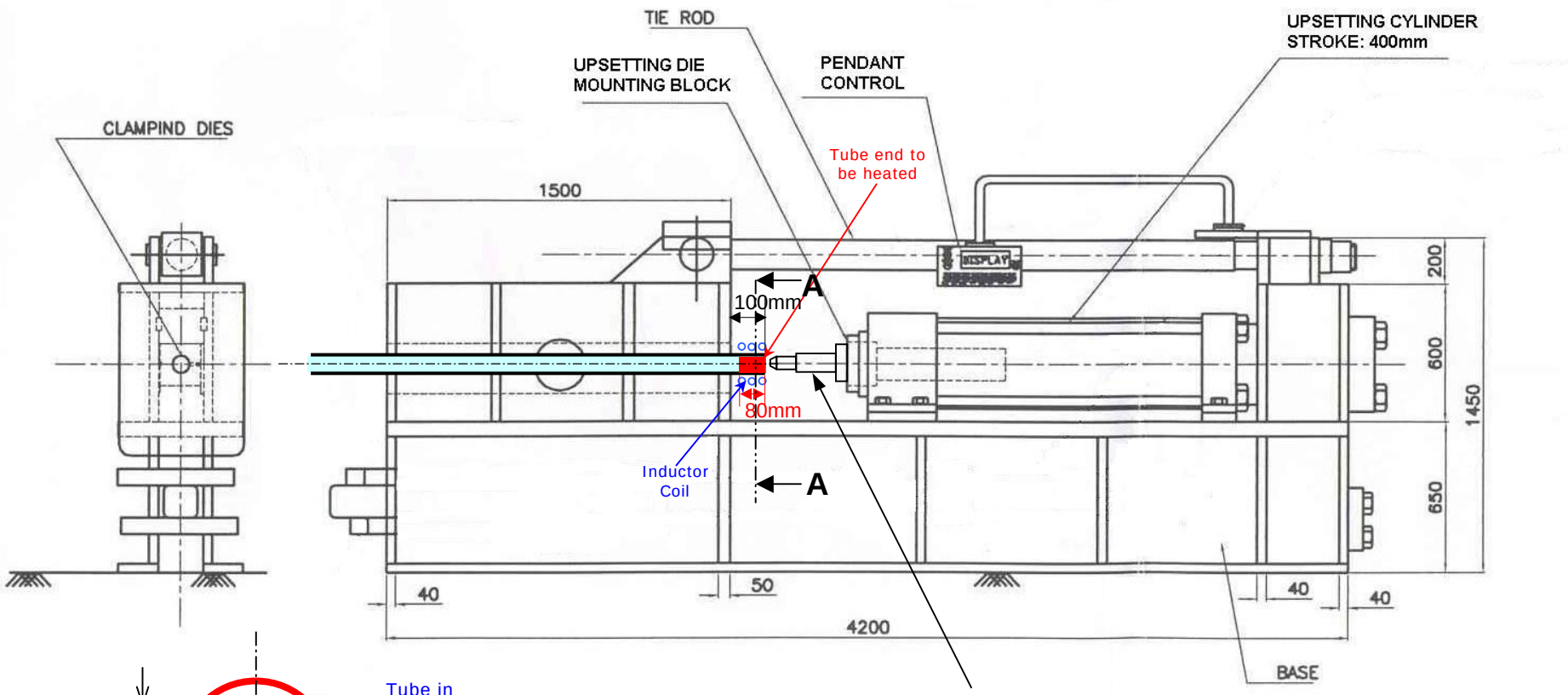
6. Performance of the Machine : Best in the market /
   (Strike off whichever is not applicable) Satisfactory /
   Good /
   Average /
   Not Satisfactory

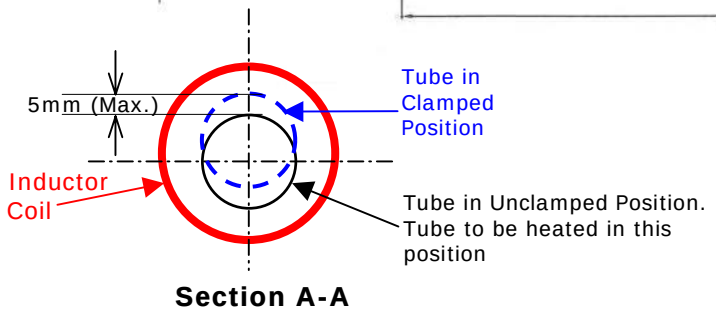
7. Any other remarks:

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

UPSETTING AND SWAGING MACHINE





Section A-A

All Dimensions are in 'mm'

BHEL, TIRUCHIRAPPALLI
Drg. No. CABS-2-15/A
(Indicative drawing only)