



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 7740 / 7653

Email : skaruna@bheltry.co.in,

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Web : www.bhel.com

TWO PART BID	Enquiry Number:	Enquiry Date:	Due date for submission of quotation:
Tender to be submitted in two Parts	2601700022	27.05.2017	27.06.2017

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	INSITU INDUCTION BASED PRE-HEATING & POST HEATING SYSTEM WITH 90 kW RATING @ 100% duty cycle as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1 Set

Important points to be taken care during submission of offer

1. Compliance Form No: TRY/IMP/02 & TRY/IND/02A to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
2. Delivery period required is 8 months from the date of P.O.
3. Commissioning and performance prove out shall be done at BHEL Trichy by the supplier
4. Time period required for commissioning and performance prove out shall be 3 weeks from the date of intimation by BHEL
5. EMD for this tender Rs. 1,50,000/-
6. All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.

BHEL's General guidelines / instructions (refer MM/CE/GENL/001- EMD), compliance form and technical specification 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.

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

PRINCE DEVASI
Engineer

MM / Capital Equipment
BHEL, Tiruchirappalli - 620 014
Engineer / Capital Equipment / MM

PART A

**QUALIFYING CRITERIA FOR THE SUPPLY OF *IN-SITU INDUCTION*
based *PRE-HEATING & POST HEATING SYSTEM*
with minimum **90 kW** RATING (for *UNIQUE APPLICATION*)**

SECTION – I

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. The required rating of a induction based heating system may be supplied as a single unit or a combination of multiple units.

S. No.	PARTICULARS	VENDOR's RESPONSE
1.0	Number of Years of Experience of the BIDDER (Original Equipment Supplier) in the field of design, manufacture and supply of 'INDUCTION HEAT TREATMENT EQUIPMENT' for heat treatment of welds.	
2.0	YEAR of LAUNCH of the MODEL quoted against this ENQUIRY	
3.0	Number of 'Induction Heat Treatment equipment' supplied, till date in the QUOTED MODEL.	
4.0	Details on International Standards followed in Design and Testing of Induction Heat treatment Equipment.	
5.0	Comprehensive Details, on Performance Testing of Induction Heat treatment Equipment carried out at the Factory, to be furnished with the Technical Offer. Indicate the material, material thickness, maximum temperature achieved, heat gradient achieved along the thickness of the component and the frequency of the equipment in the performance test certificate.	
6.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India, to be furnished compulsorily. The agents / service centers claiming to provide 'Service after sales' shall have been registered as an authorized service agency of the OEM (Original Equipment Manufacturer) on or before the date of release of this tender.	
7.0	BIDDER to indicate the Country of Origin for the supply of Induction Heat treatment Equipment.	

SECTION – II

The BIDDER has to compulsorily meet the following requirements to get qualified for submitting an offer for the 'Induction Heat Treatment System'

S. No.	REQUIREMENTS	VENDOR's RESPONSE
8.0	The BIDDER shall have a minimum of TEN Years of Continuous Experience in the Design, Manufacture & Supply of 'Induction Heat Treatment Equipment'.	
9.0	The BIDDER should have supplied at least one 'Induction Heat Treatment Equipment' with total rating of 90 kW or above to any customer. Also, indicate the number of such 'Induction Heat Treatment Equipment / machines sold internationally / within India.	
10.0	Bidder has to submit a Performance Certificate for satisfactory performance of the equipment (stated under Clause No. 9.0) from a customer to whom such equipment has been supplied. A suggestive format of the performance certificate is enclosed in Annexure A.	
11.0	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.	

SECTION – III

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

S. No.	REQUIREMENTS	VENDOR's COMPLIANCE
12.0	The BIDDER shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial and Price Bid.	
13.0	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. In case of any deviations in any of the technical specifications, such deviations should be clearly specified in the comparative statement.	
14.0	The BIDDER shall assure a continuous support for SPARES and SERVICE for TEN Years, from the date of commissioning of the equipment at BHEL Works.	
15.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODELS of Induction Heat Treatment Equipment(s).	
16.0	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 for the scope of supply.	
17.0	Earlier performance & field experience (service support) with BHEL (if any) will be a reckoning factor for the technical qualification of the OFFER.	

ANNEXURE-A**PERFORMANCE CERTIFICATE**

The Performance of the subject model INDUCTION HEATING SYSTEM (**IHS**) should be certified by the customer on Customer's Letter Head, in the following suggestive pattern/format and submitted along with the TECHNICAL OFFER positively.

- 1.0 Name of the Equipment Supplier (OEM) :
- 2.0 MODEL/MAKE of the Induction Heating System :
- 3.0 Month & Year of Commissioning of the Equipment :
- 4.0 Brief Details on the Application/Use of the I H S :
- 5.0 Performance of the Induction Heating System
stated above : Very Good / Satisfactory / Not Good
- 6.0 Availability of the Induction Heating System
stated above : Good / Poor
- 7.0 Service After Sales support given by the OEM / Indian Representative,
including spares supply : Satisfactory / Not Satisfactory
- 8.0 Special Remarks / Recommendations :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

To

**DGM / Purchase
MM / CAPITAL EQUIPMENT
BHEL /TRICHY – 620 014**

PART B**TECHNICAL SPECIFICATIONS FOR 'INSITU INDUCTION BASED PREHEATING AND POST HEATING SYSTEM WITH MINIMUM OF 90 kW RATING @ 100% DUTY CYCLE**

AA. APPLICATION :			
S. No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
AA.1	This shall be a system (complete with accessories) capable of carrying out heat treatment of welds made in a variety of metallic materials. This system shall work on the principle of induction heating and shall be a portable one (mounted on movable trolleys / wheels). This system shall be capable of heat treating in the temperature of $980^{\circ}\text{C} \pm 10^{\circ}\text{C}$ in Nickel alloy pipes of wall thickness up to 120 mm. The technical evaluation will not be based not only on the kW rating of the equipment (except for the minimum requirement) but on the ability to carry out the heating trials as per above specification. Further, the system offered shall be capable of doing the above mentioned heat treatment as per the provisions of American Welding Society standard: AWS D10.10/D10.10M:1999. <i>(Refer Annexure I for the requirement of a prove out trial on a typical valve component during commissioning at WRI. The equipment will be deemed successfully commissioned only if the above specification is met for the component mentioned in Annexure I.)</i>		
BB. MACHINE CONFIGURATION : [The scope of supply shall consist of the following]			
S.No.	FEATURES /BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
BB.1	Induction Heat treatment Power source (mounted on trolleys / wheels so as to make it portable)		
BB.2.	Induction Heating Cable (compatible with item number BB.1 mentioned above)		
BB.3	Thermocouple wire roll / spool		

BB.4	Thermocouple attachment unit		
BB.5	Temperature Recorder		
BB.6	Heat Treatment Blanket		
BB.7	Glass fibre cloth		
BB.8	Glass fibre cord		
BB.9	Other mandatory/indispensable accessories		
BB.10	Operation & Maintenance Manuals – Two Copies		
BB.11	Commissioning of Equipment at BHEL Works and Performance Prove-out of the offered equipment by Supplier / Vendor's Agent as per heating requirement listed in AA1.		

CC. EQUIPMENT SPECIFICATION : INDUCTION HEAT TREATMENT POWER SOURCE FEATURES

S. No.	FEATURES	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
CC.1	Type & rating	The offered power source shall be capable of producing heat on the work piece / job by means of 'Induction Heating' principle. The power source shall be system with of a minimum rating of 90 kW at 100% duty cycle. There shall be a minimum of one control zone otherwise termed as induction loop. The other technical specifications are mentioned hereinafter.		
CC.2.	Primary side Voltage	415 $\pm$ 10% V AC, 3 Phase, 50 $\pm$ 2% Hz, through a 3 Wire System [4 th wire for EARTHING] – No Neutral Conductor		
CC.3.	Primary Side Current	Vendor to specify		
CC.4.	Primary side frequency	50 Hz		
CC.5.	Connection to Mains	There shall be a suitable connection provided (wires/hoses/cables etc.) between the input terminals of the power source with the main supply of our factory.		
CC.6.	Output side Voltage	Vendor to specify		

CC.7.	Output Side Current	Vendor to specify		
CC.8.	Output side frequency	Vendor to specify. This operating frequency should be able to meet the requirement of CC.1 and AA.1		
CC.9.	Portability	The power source shall be mounted on with hard rubber lined wheels for portability of the power source by manual pushing to various places, as and when required.		
CC.10.	Weight	The weight of the power source shall be suitable for mobile handling. Accordingly wheels and other accessories to be made suitably available.		
CC.11.	Dimensions	Vendor to specify		
CC.12.	Power cable	A suitable power cable shall be provided for powering the induction heating power source from the mains		
CC.13.	Program controller for carrying out heat treatment	There shall be a program controller for precisely programming, executing and controlling the heating cycle desired for the weld joint, by means of an appropriate feedback control system. The detailed requirements of the program controller are provided below This shall precisely control the preheating and post heat treatment cycle. The program controller shall allow for inputting the following details with regard to the preheating / post weld heat treatment cycle of the welds: (1) Rate of heating otherwise known as heating ramp – This shall be controllable in the range of 5° C/hour to 222° C/hour after the weld joint reaches 300° C. Prior to reaching 300° in the weld, the rate of heating shall be a minimum of 50° C /hour.		

CC.13.	Program controller for carrying out heat treatment	(2) Soaking temperature – The maximum soaking temperature reachable shall be 980° C. The power source shall also be designed for reaching any soaking temperature lesser than or equal to 980° C in Nickel alloy pipes of Outside diameter (OD) lesser than 500 mm and with wall thickness upto 120 mm. (3) Soaking time – The soaking time is the time for which the soaking temperature is to be maintained. The induction heating system shall be designed for maintaining the soaking temperature as specified in point (2) above for the required span of time. The maximum required soaking time shall be 720 minutes in a single cycle. (4) Rate of cooling otherwise known as cooling ramp – This shall be controllable in the range of 5° C/ hour to 222° C/hour until the weld joint reaches 300° C. After reaching 300° C in the weld, the rate of cooling shall be higher than or equal to 222° C/ hour until the weld reaches the ambient temperature. There shall be suitable feedback system integrated in the power source's program controller for sensing the temperature of the job (by means of thermocouples placed at multiple locations on the weld) and to carefully control and execute the PWHT cycle of the weld joint as specified above from points (1) to (4). The induction heat treatment system shall be capable of carrying out PWHT cycle as mentioned above meeting to the requirements of the American Welding Society standard - AWS D10.10/D10.10M:1999 and this shall be checked during the time of pre-dispatch inspection.		
CC.14.	Cooling arrangement for the power source	There shall be a forced ventilation housing provided in the induction heating power source.		

CC.15.	Total noise emission during operation	The total emission of the sound from the equipment during the course of PWHT cycle shall be less than 75 dB		
CC.16.	Digital Control	The power source shall have digital control/ Settings/ features for carrying out the heat treatment of welds as described in item number CC.13 mentioned above. Type of digital control shall be explained by vendor.		
CC.17.	Power Input	The power source shall be capable of working by accepting input supply in the following condition 415 $\pm$ 10% V AC, 3 Phase, 50/60 $\pm$ 2% Hz, through a 3 Wire System [4 th wire for EARTHING] – No Neutral Conductor		
CC.18.	Protection	a) Inbuilt protection for the Power source against Overload / Short-Circuit conditions b) All electronic circuitry of the power source shall be protected suitably to prevent damage from dust and grinding particles c) Machine Design to ensure proper earthing for the machine and its peripherals d) Degree of protection shall be according to IP 21	[BIDDER has to specifically furnish technical details on how these protective measures are addressed in the Machine Design]	

DD. EQUIPMENT SPECIFICATION : INDUCTION HEATING CABLE FEATURES				
S. No.	FEATURES	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
DD.1	Type and length	A flexible induction heating cable of minimum 40 metres length (as a single unit) shall be provided. This shall be a water cooled type. Provision for coolant carriage with suitable connectors at the end for extension/connection to the power source is mandatory. Besides this, three more similar spare cable shall also be supplied – 02 sets. In addition, an extension cable for connecting the liquid cooled heating cable to the power source of length 15 m – 20 m may be provided with mandatory connectors/jumpers.		
DD.2.	Chiller for cooling Induction Heating cable	A suitable cooling/chilling unit for the Induction heating cable. In case chilling/cooling unit needs an external power supply, the same to be clearly mentioned and equipment supplied with the main unit. There shall be a reservoir/tank of sufficient capacity to cool the induction heating cables along with necessary hoses and with required buffer quantity to meet the continuous heat treatment application.		
DD.3.	Cable Sheathing	Protective Sheathing to be provided for the Induction heating cables so as to withstand shopfloor rough use for the entire length of the cables.		
EE. EQUIPMENT SPECIFICATION : THERMOCOUPLE WIRE ROLL / SPOOL FEATURES				
S. No.	FEATURES	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
EE.1.	Type	K type (Chromel – Alumel type)		
EE.2.	Application	The thermocouple shall be capable of accurate measurements of temperature of the job / work piece during the PWHT cycle or the preheating operation. Thermocouple shall be capable of measuring temperatures accurately until 1200° C.		

EE.3.	Configuration	Thermocouple wire, glass fiber insulated, 2 x 0.5 mm ² , 100 metres long roll / spool - No. of rolls required - 4 numbers.		
EE.4.	Compensating cables/extension cables	Compensating cables, if necessary, shall have to be supplied in required numbers for enabling fixing of six numbers of thermocouples on the job. Durable extension cable combining all thermocouple connections from the job using a connector and providing inputs to the power source as a terminal connection. Single cable of length around 15 m to 30 m will be accepted – 2 Nos.		
FF. EQUIPMENT SPECIFICATION : THERMOCOUPLE ATTACHMENT UNIT (TAU) FEATURES				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
FF.1.	Application	A thermocouple attachment unit (TAU) for fast attachment of thermocouples with wire diameter in the range of 0.5 mm to 1 mm, shall be provided meeting the following specifications The TAU shall provide a firm connection between surface of the job/work piece and thermocouple element. Suitable fixing mechanisms are to be supplied as mandatory accessories for this unit.		
FF.2.	Charging current	90 – 230 V (AC) / with frequency 50 Hz / 60 Hz		
FF.3.	Battery operating voltage	12 V (DC)		
FF.4.	Battery capacity	Around 3.0 Ah		
FF.3	Charge condition display	There shall be an LED display for displaying the charge condition of the battery of the TAU		
FF.4.	Weight	Vendor to specify.		
FF.5.	Charging cable	The TAU shall be supplied with one charging cable		
FF.6.	Carry case	The TAU shall be supplied in a hardtop carrycase along with pliers and cable set.		

GG. EQUIPMENT SPECIFICATION : TEMPERATURE RECORDER FEATURES				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
GG.1.	Application	The temperature recorder shall be capable of measuring the entire heating cycle.		
GG.2.	Configuration	This shall be a twelve point temperature recorder so as to take care of plotting the temperature values from different thermocouples placed in various locations of the job to be heat treated. The recorder stores data with respect to time. The unit should provide provision (output signal) for connection of any standard analogue/chart type recorder for output graphs.		
GG.3.	Thermocouple inputs	This shall accept inputs from a standard K type thermocouple wire and there shall be suitable provisions /sockets for connecting the output of K type thermocouples (fixed to the job / work piece to the temperature recorder)		
GG.4.	Input Power	Shall operate in 230 V AC input power		

GG.5.	Other features and functionalities	(1) The screen shall be capable of recording the temperature ranging from ambient to a limit of 1200° C without spill over of certain portions of the recorded data to other chart paper. In other words, the entire heating cycle graph between time and temperature shall be observable in a single chart paper. (2) The temperature recorder shall have an analogue (or) digital display with a provision to record the complete heating cycle starting from beginning of heating till the completion of cooling of the weld joint to the room temperature. This data of Temperature and time shall be recorded for the entire cycle. (3) There shall also be provisions for observing the instantaneous temperature (in the analogue (or) digital form) recorded by each of the thermocouples connected to the job, during the course of the heating cycle. (4) The temperature recorder shall be loaded with a roll of paper (of minimum length 10 meters) for immediate commencement of operation as soon as the machine is delivered. (5) The temperature recorder shall be a portable unit with suitable handles for carrying.		
GG.6.	Paper roll	Roll of paper (of a minimum length of 10 meters) suitable for use in the temperature reorder shall be provided – 2 units (This is in addition to the already loaded roll of the paper in the temperature recorder)		
GG.7.	Number required	1 unit, meeting to the features specified in item numbers GG.1. to GG.6.		

HH. EQUIPMENT SPECIFICATION HEAT TREATMENT BLANKET FEATURES				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
HH.1.	Heat Treatment Blanket	Post Weld Heat Treatment Blanket of a minimum thickness of 15 mm and of a minimum width of 600 mm and of a minimum length of 14 metres shall be supplied in rolled form. The required quantity – 1 number of roll. Preheat Cable cover to protect the heating cable from slag and molten metal created during welding. – Required quantity will be 1 No. of at least 25 m length. Preheat insulation to protect liquid cooled heating cables capable of addressing temperatures for the application that can be cut and fit into required length. Length is minimum of length of 10 m with 300 mm width.		
HH.2.	Highest operating temperature	The Heat Treatment Blanket shall be capable of withstanding temperatures up to 1000° C.		
II. EQUIPMENT SPECIFICATION : HEAT RESISTANT STRAP BANDS' FEATURES				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
II.1.	Application & Requirement	Heat resistant strap bands for securely holding the inductive heating coils against the job / workpiece, shall be supplied – required quantity – one spool of 100 meters length minimum. They may be excluded from supply if the heat treatment blankets are provided with straps.		

JJ. EQUIPMENT SPECIFICATION : GLASS FIBRE CLOTH FEATURES				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
JJ.1.	Application & Requirement	Temperature stable glass fibre cloth useable for covering the work piece to protect the heat sensitive heating cables from heat of the work piece during the inductive heating process. The minimum dimensional requirements of the glass fibre cloth are provided below Thickness: 2 mm Width: 1000 mm Length: 25 metres	The glass fibre cloth meeting to the above mentioned specifications shall be supplied in a rolled form / spool form.	
KK. EQUIPMENT SPECIFICATION : GLASS FIBRE CORD FEATURES				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
KK.1.	Application & Requirement	Glass fibre cord useable for supporting thermal cables and connections and for fixing of ceramic fibre mats or glass fibre cloth and heating cables. The following are the specifications Cord diameter – 3 mm Cord in the form of roll with cord length of 100 meters.		
LL. EQUIPMENT SPECIFICATION : OTHER MANDATORY/INDISPENSABLE ACCESSORIES FEATURES				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
LL.1	Type	Other mandatory/indispensable accessories required for using the offered equipment for the application mentioned in item number AA.1 shall be supplied in sufficient numbers for trouble-free operation of the equipment upto an year. Vendor to specify.		
LL.2.	Calibration certificates	Valid Calibration certificates wherever applicable need to be enclosed for all meters/equipment/accessories in the system including all display meters, thermocouple sensors, recorders etc.		

MM. OPERATION & MAINTENANCE (O&M) MANUALS :				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
MM.1	No. of Copies	2 (Two) sets containing manuals of the equipment consisting of all the items mentioned in item numbers BB.1 to BB.5 to be sent along with the machine.		
MM.2	Language	English		
MM.3	Manual Details :	a. Manual shall contain all instructions for machine installation and for carrying out Post weld heat treatment in the correct sequence/ method b. Manual shall clearly describe the operation of the power source and all other items in item numbers BB.1. to BB.5.		
MM.3	Manual Details :	c. Manual shall contain general circuit diagrams, showing the interconnection of various elements and also details on PCBs [Printed Circuit Board] like tapping voltages, main electronic elements' specifications and ratings, etc. d. Manual to give other details like troubleshooting details, method of winding the induction heating coils for performing PWHT on pipe welds of different sizes and different thicknesses. e. Master List of Parts & Spares used in the Machine with Make, Model, Rating, etc. f. All manuals to be provided in soft copy form in 2 Nos.		
NN. GENERAL POINTS :				
S. No.	PARTICULARS	BHEL SPECIFICATION	OFFER BY BIDDER	DEVIATIONS
NN.1.	Pre-dispatch Inspection	The equipment shall be submitted for pre-dispatch inspection (PDI) at the manufacturer's works by BHEL Engineers before despatching the same to the BHEL, Trichy. During the PDI, a trial PWHT experiment is to be performed as per AWS D10.10 and the same shall be done in the presence of BHEL Engineers.		

NN.2.	Training	The Supplier's SERVICE ENGINEER shall give training in the Operation and Maintenance of the Machine for BHEL Staff, after the successful commissioning of the Induction Heat treatment equipment, with job trials.		
NN.3.	Commissioning	The equipment shall be installed and commissioned by the supplier/supplier's representative at BHEL Works. Commissioning is deemed to be successfully completed only when the prove out trials for the specification listed is performed for the component shown in Annexure I. If vendor fails to provide successful heat treatment for the component (or a material of its equivalent thickness at BHEL discretion), the equipment will not be accepted.		
NN.4.	Performance Guarantee	The equipment shall be guaranteed for a Minimum of 12 months from the date of commissioning at WRI/BHEL or from 18 months from the date of despatch.		

Annexure – 1 to Part B specifications of Induction Heat treatment equipment

Requirement of Prove out Trial

NOTE: A VALVE COMPONENT MADE OF INCONEL ALLOY 617 OF DIMENSIONS AS SPECIFIED IN THE DRAWINGS OF THIS ANNEXURE WILL BE MADE AVAILABLE FOR PROVE OUT TRIALS.

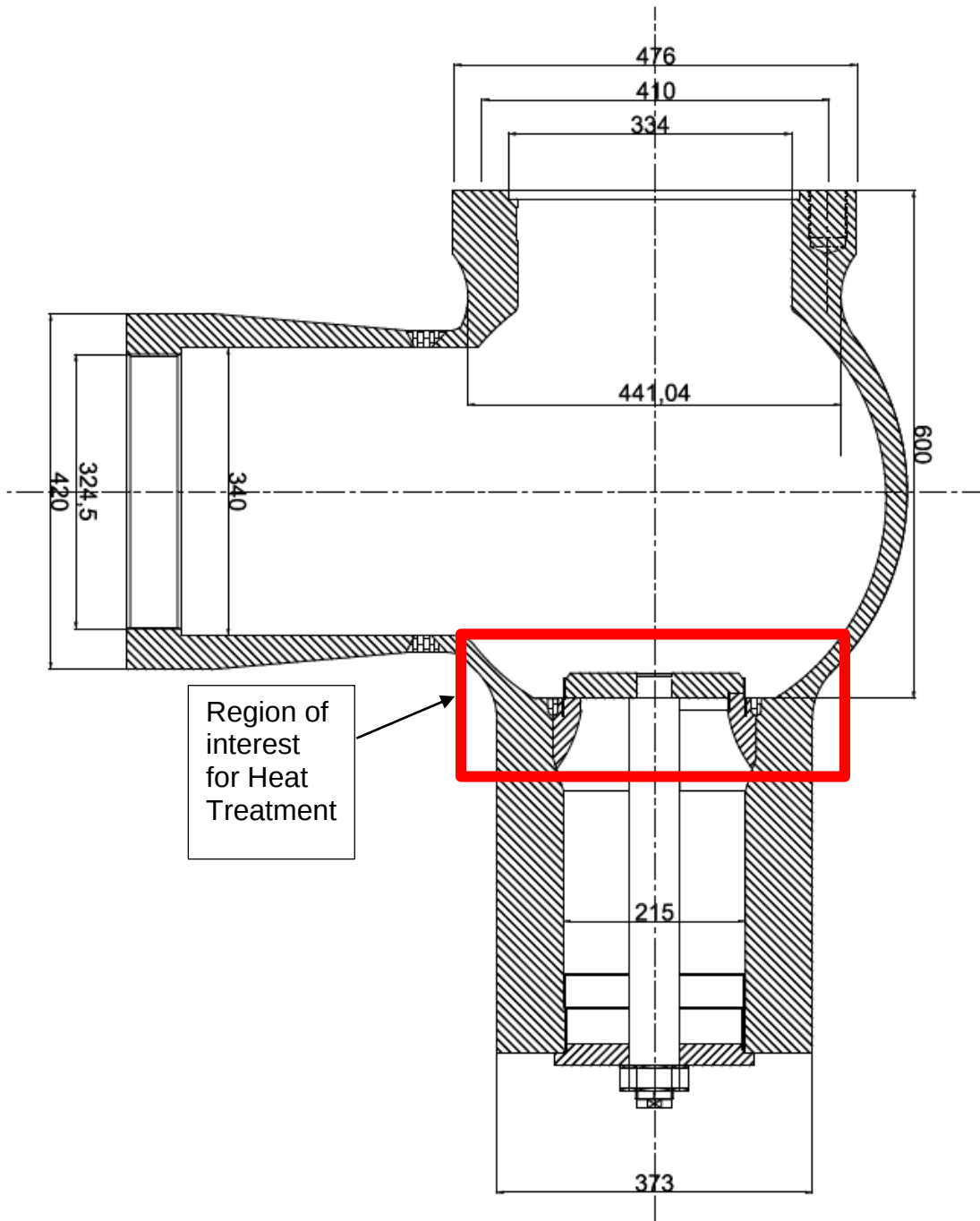


Fig. Inconel Valve component for prove out trials.

The prospective vendor shall perform a heat treatment experiment using the model of the Induction heat treatment equipment which the vendor proposes to offer to this

tender. A heat treatment trial shall be performed in above mentioned pipe by wrapping the induction heating coils in the component.

The parameters for the heat treatment cycle are given below

Rate of Heating: shall be not more than 52° C/ hour till 980 ° C temperature is reached on the heating location in the job (i.e. ID of the pipe).

Soaking Temperature: 980° C $\pm$ 10° C (along the entire thickness of the pipe).

Soaking Time: 720 minutes

Rate of cooling: not greater than 67 ° C / hour till 300° C temperature is reached on the job (i.e. ID of the pipe) and thereafter air cooling shall be carried out.

The scheme of temperature recording thermocouples shall be as follows.

A minimum of one thermocouple shall be placed on the inner circumference of the pipe and a minimum of one thermocouple shall be placed on the outer circumference of the pipe and both these thermocouples shall be placed in the zone heated by laying the induction coils.

The heat treatment cycle (i.e. plot of temperature versus time) as sensed by each of the two thermocouples (fixed as mentioned above) shall be plotted in a single chart paper by a temperature recorder with two distinct colours so that the thermocouple(s) fixed on the outer circumference and that / those fixed on the inner circumference shall be easily distinguishable.

It is mandatory that the vendor perform a PWHT experiment as stated above for the commissioning to be deemed as successful.