Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
An ISO 9001 Company
CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

ENQUIRY	Phone: +91 431 257 75 75 Fax : +91 431 252 07 19 Email : rrmanohar@bheltry.co.in Web : www.bhel.com

	Enquiry Number:	**Enquiry Date:**	**Due date for submission of quotation:**
	2620700002	**21.02.2007**	**24.03.2007**
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	10 Ton Car Bottom Type Stress Relieving Furnace as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com)	1 No.	30.08.2007

Note:

(1) The detailed Technical Specification along with technical point-by-point confirmation, Commercial Terms & Conditions applicable for this Enquiry, 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 "2620700002". Your offer should be based on all the above documents.

(2) Also, you are requested to fill in the Supplier Registration formats available in www.bhel.com (under Advancement – Supplier Registration) and send it along with your offer.

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. Dy. Genl. Manager / Capital Purchase / MM / Manufacturing

10 TON ELECTRICALLY OPERATED CAR BOTTOM SINGLE BOGIE FURNACE

PART A

SECTION – I QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for consideration of the technical offer for the Electrically Heated Furnace.

S. No.	PARTICULARS	VENDOR'S RESPONSE
1.0	The BIDDER / VENDOR (firm / company) shall have a minimum of 5 Years of Continuous Experience in Design, Manufacture, Supply, Erection & Commissioning of Electrically Heated Furnaces.	
2.0	The BIDDER/VENDOR to furnish a current Performance Certificate from a customer, on their letter head, of an electrical furnace of rating 250 KW or more. Such furnace should be a currently working for at-least a period of one year form the date of commissioning. The full address of the Customer, and details of contact person of the customer must be furnished.	

SECTION – II

The BIDDER / VENDOR is requested to provide the following information :

S. No.	PARTICULARS	VENDOR'S RESPONSE
3.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address , details of contact person, where electrical furnaces have been supplied in the past.	
4.0	Details of Quality System followed [Furnish the salient aspects of the Quality Assurance System followed] and Stages of In-House Inspection, including Third Party Inspection Schedule.	
5.0	Details of furnaces supplied to other BHEL units (Year of commissioning, Capacity of furnace)	

S. No.	PARTICULARS	VENDOR'S RESPONSE
6.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in South India	
7.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – III

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

S. No.	PARTICULARS	VENDOR'S RESPONSE
8.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS - Technical Offer [with PART A & PART B] & Commercial and Price Bid.	
9.0	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.	
10.0	The BIDDER / VENDOR shall assure a continuous support for SPARES and SERVICE for TEN Years, from the date of commissioning of the equipment at BHEL Works.	
11.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
12.0	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	
13.0	BIDDER has to indicate the Country of Origin for the supply of main equipment / important bought-out items.	

PART B

TECHNICAL SPECIFICATIONS FOR ELECTRICALLY OPERATED CAR BOTTOM (SINGLE BOGIE) FURNACE

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
1.0	**SCOPE OF SUPPLY**		
1.1	Furnace & Auxiliaries	Design, Manufacture, Inspection, Supply, Erection & Commissioning, Performance Prove-Out, Documentation, Performance Guarantee as per BHEL Specifications.	
2.0	**FURNACE CONFIGURATION**		
2.1	Type	Electrically Operated Car Bottom (Bogie Hearth) Furnace – Electric Coils to be employed for heat generation	
2.2	Loading Capacity	10 Metric Tons (maximum by weight)	
2.3	Application	To carry-out stress relieving of forged and cast steel valve bodies after welding and part processing	
2.4	Job Material	Carbon Steel & Alloy Steel with Weld Over-Lays and Hard Facings (in the form of Steel Castings/Forgings or Steel Fabricated Parts)	
2.5	Job Details	Valve Bodies of Gate Valves, Globe Valves, Stop Valves, etc. Single Valve Body Envelop Dimensions : 1.8 M x 1.2 M x 1.2 M (max.) Section Thickness : 20 mm to 200 mm Weight of Single Job : NOT exceeding 9. 0 Tons. Weight of Job Lot : NOT exceeding 10.0 Tons. Heat Treatment Cycles : Stress Relieving	
2.6	Job Handling	1. Jobs will be loaded as a single piece or in multiples based on the size and weight of the individual pieces, but never exceeding the carrying capacity of the Bogie and the Free Dimensions of the Heating Chamber. 2. The job loading and unloading will be done always with the Bogie drawn outside the Furnace.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
		3. Normally EOT Cranes will be used for job loading and unloading. Since steel crates will be used to contain more number of small jobs, concentric loading is expected on the Bogie Hearth.	
3.0	**FURNACE CONSTRUCTIONAL FEATURES**		
3.1	Operation	The Heat Treatment Cycle in the furnace shall extend upto a maximum period of 120 hours, comprising of repetitive heating/soaking/ cooling processes and the continuous soaking time shall be 10 hrs., at the maximum.	
3.2	Max. Furnace Temperature	Vendor to specify	
3.2.1	Max. Charge Temp.	780 °C . Job temperature to be maintained throughout soaking period..	
3.3	Heating Rate (Steplessly Variable)	The maximum rate of heating shall be 100^{o} C/hr, beyond 350°C –	
3.4	Soaking Time	10 Hours (maximum)	
3.5	Job temperature uniformity in soaking	± 10 deg. C Max.	
3.6	Power Rating	BIDDER to specify the rating (in kW) and shall submit the design calculations to arrive at the power rating of the proposed furnace.	
3.7	Heating Chamber Dimensions	Effective loading area on the bogie shall be 4.0 M x 2.5 M and with a clear height of 2.5 M from the bogie surface. Chamber dimensions to suit the effective loading area of bogie. Vendor to specify.	
3.8	Furnace Bogie	To be provided with Single Bogie with a vertical Sliding Door (on the front side of the furnace chamber), so that sides, top and back of the heating chamber are permanently closed . Bogie to have drive mechanism for the movement of the Bogie on rails, grouted on the shopfloor, in both the directions.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
3.9	Bogie Construction	1. The bogie shall be provided with motorized drive through a suitable reduction gear box. Bidder to specify the speed of travel of the bogie. 2. The Bogie drive mechanism and gear-box are to be located on the side of the furnace for ease of maintenance. 3. Drive transmission from gearbox to car bottom bogie shall be of Ratchet & Wheel type. 4. Provision shall be made to move the bogie manually (using other mechanical means) during power failure. BIDDER has to provide details on this offered arrangement. 5. Rails for bogie movement, to specification CR 80, IS 3443, with center to center distance 1676 mm (BG), will be provided by BHEL 6. Bogie shall be provided with refractory hearth suitable to withstand the job load and temperature. 7. Provision shall be included in the design to provide sand sealing between the furnace shell and on both sides of the bogie. 8. The bogie shall be designed in such a way that perfect matching between the bogie refractory and furnace hearth refractory is ensured / maintained, in order to minimize the heat loss. 10. The bogie shall have top layer to be lined with IS 8 quality firebricks backed by light weight fire bricks of suitable thickness. 11. The loading surface of the bogie shall be provided with suitable cast iron job supports to prevent damage of refractory while loading the job. BIDDER has to give technical details from the design point of view, to meet the above listed requirements.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
3.10	Furnace Door Construction	a. Structural design to take care of strength and anti-buckling quality features of the Furnace Door under high temperatures. b. Opening & Closing of Door shall be motorized, in the form of doors sliding from top to bottom and vice versa - with suitable counter balance, gear reduction and sprocket & chain drive mechanism. c. Pneumatic door locking arrangement along with mechanical locking arrangement to minimize the heat loss when the furnace is in operation. d. Provision should be made on the door for sand sealing at the roof and bottom in the bogie in closed position of the door e. The Door shall be provided with facilities for manual operation in case of power failure or failure of the motorised system. Details of the door drive system, sand sealing, door locking mechanism to be furnished.	
3.11	Furnace Wall Insulation	a. The wall insulation shall be of ceramic fibre blanket or modules of suitable density and thickness to maintain the charge (job) temperature at 780°C. b. The maximum skin temperature should not exceed 80^{o}C c. The supplier should submit the heat balance calculation for proof of achieving the skin temperature as per BHEL specification. d. Ceramic fibre blankets / modules of suitable density and thickness shall be used for both sliding doors as well as for all the sides of the furnace for insulation purpose . e. Wall insulation design with ceramic fiber blankets / modules shall be submitted along with offer.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
		f. The interfacing surfaces of the furnace shell and the bogie shall have shaped hard refractory bricks (IS 8) suitably arranged and matched to minimize the heat loss from the furnace.	
3.12	Furnace Shell	Shall be built out of 10 mm (minimum) thick mild steel plates for covering (enclosure) and reinforcements with rolled sections of suitable dimensions, to give a rigid and sturdy construction to the Furnace Shell, to withstand distortions due to thermal & mechanical stresses, to house the insulation and refractory brick work, to hold other related structures and components and to give a prolonged life span for the furnace. BIDDER has to furnish the basic preliminary drawing with the Technical Offer.	
3.13	Heating Elements	1. Material: KANTHAL A-1 STRIPS and the dimensions are to be designed by the supplier to suit the furnace specification. 2. The thickness of the heating element shall be min 2 mm. 3. Heating Elements supporting system shall be suitable for strip-corrugated elements for freely radiating style / similar arrangement. 4. Test Certificates for Kanthal A-1 Strips is to be furnished by the supplier, with the documentation for the Furnace. 5. The heating elements shall be arranged or supported on the sidewalls / rear wall of the furnace. Heating elements shall not be located on the doors .	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
		6. The number of refractory blocks supporting the heating elements shall be kept at a minimum and the complete arrangement drawings shall be submitted to BHEL for approval prior to taking up the manufacture. (Coil pitch and spacing between coils shall be designed in such a way to avoid deflection, arcing and short-circuiting between strips and coils.) 7. The heating elements holding arrangement should be rigid enough, ease of maintenance and avoid sagging of the elements in due course of furnace operation. The rigidity of the supports has to ensured from the furnace wall .	
3.13.1	No. of Temperature Control Zones	Three	
3.14	Ventilation	BIDDER has to suggest / recommend for suitable ventilation arrangement for the inner chamber of proposed furnace, for an effective and optimum working cycle .	
3.15	Circulating Fan	1. Two numbers of circulating fans to be provided to maintain uniformity of temperature of job and furnace. 2. The material of construction of the circulating fan system shall be suitable for the max. furnace operating temperature. 3. Water chiller and chilled water circulation system, of adequate capacity, to be provided for the bearings & shaft of the circulating fan. 4. Baffle arrangement shall be provided to have uniform circulation inside furnace. 5. Alarm provision to be made to indicate failure of chilled water circulation system and / or circulating fan failure.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
		6. Vendor to furnish along with technical offer, details of i) power rating of the circulating fan, ii) material of construction of the fan, iii) chiller, iv) arrangement of fan, v) arrangement & capacity of water circulation system for fan bearings and shaft.	
3.16	Painting	1. The furnace shall be painted with rust preventive coat, one coat of Zinc Chromate Primer and two coats of Heat Resistant Aluminum Paint, with suitable Dry Film Thickness (DFT) and curing time. Furnace Door Counter Weights are to be painted with yellow and black zebra strips. 2. The final coat of finish painting shall be done at BHEL Works, before handing over the Furnace after the successful commissioning and performance prove-out.	
4.0	**PROGRAMMABLE TEMPERATURE CONTROLLER**		
4.1	Type	Shall be of multi-programmed Programmer of (upto) eight ramp / dwell combinations.	
4.2	Make	Eurotherm, Model: 2404P4	
4.3	Range	0 – 1200 °C	
4.4	Input to the Programmable controller	Universal type	
4.5	Output from the Programmable Controller	4 mA to 20 mA	
4.6	Display	Digital Display	
4.7	Power Supply	230±10% V, 50 Hz Single Phase AC Supply	
5.0	**POWER CONTROLLER**		
5.1	Type	The Controller shall be of Thyristor type, suitably designed for automatic heat-treatment cycles, without any manual intervention.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
5.2	Capacity	The capacity of the Thyristor Pack shall be suitable for the KW rating of the furnace. –	
5.3	Controller Unit	1. The furnace temperature shall be controlled by Thyristor Controller through Programmable Controller in auto / manual mode. 2. The Power control shall be through a system consisting of Thyristorised Power Pack and Control Cards, inclusive of suitable fan cooling arrangement. 3. The power controller shall be of EUROTHERM / JELTRON make. –	
5.4	Control Panel	1. Two control panels shall be provided. 2. One panel to house the Programmable temperature controller, Temperature recorder, Safety Controller. 3. Second panel to house Power controller, Fuses, Indicating lamps, Digital ammeter and voltmeter, auto/manual selector, input/output terminals, starters for all drives, over-load relays, On/Off controller. –	
5.5	Display	Provision for monitoring the electrical parameters like current for each phase, voltage, kWh., etc. through a suitable Display Unit.	
6.0	**TEMPERATURE RECORDER**		
6.1	Make / Type	16 Channels (min.) CHINO LAXSONS make, Hybrid Temperature Recorder, microprocessor based, with digital display, –with Ethernet and with a recording chart of width 250 mm. Vendor to specify model no.	
6.2	Range	0 - 1200°C	
6.3	Scale Width	250 mm	
6.4	Power Supply	230±10% V, 50 Hz Single Phase AC Supply	
6.5	Backup Power Supply	Suitable U P S (uninterrupted power supply) provision shall be made to operate the Temperature Recorder for one hour, in case of electrical power failure.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
7.0	**SAFETY CONTROLLER**		
7.1	Make	MASIBUS / RADIX	
7.2	Range	0 - 1200°C –	
7.3	Input to the Controller	K-Type Thermocouple	
7.4	Output from Controller	Relay type, Relay rating 2 Amps 230V AC	
7.5	Power Supply	230±10% V, 50 Hz Single Phase AC Supply	
8.0	**THERMOCOUPLE**		
8.1	Type	K – Type thermocouple	
8.2	Number of Thermocouple (TC)	a. One number Duplex and one number Simplex type TC for each furnace zone for connection to the Programme Controller, Temperature Recorder and – Safety Controller. b. 12 Nos. of K-type, 4000 mm long, 6.0 mm OD, mineral insulated, inconel sheathed thermocouple for job temperature measurements. c. Additional provisions shall be made on both sidewalls of the furnace to insert thermo couples for measurement during furnace qualification / calibration exercise.	
9.0	**GENERAL POINTS**		
9.1	Input Power Supply	1. The furnace shall be suitable for an input supply through a 415 ± 10% V, 50 ± 3% Hz. 3 Phase AC, 3 - Wire System. 2. BHEL will provide the input power supply at one point only and further tappings (for sub-systems) are to be managed by the Supplier, through suitable step-down transformers and proper internal wiring. 3. Supplier has also to specify the means & mode of giving power supply to the heating elements.	

S.No.	FEATURES	PARAMETERS / DESCRIPTION	BIDDER'S OFFER [with Complete Technical Details]
9.2	Pneumatic air supply	BHEL will supply air at 60 – 70 psi at one point. Distribution from BHEL terminal point, including filter – regulator shall be in the scope of Vendor.	
9.3	Ambient Conditions	The control elements shall meet all the specified requirements while working in an ambient temperature of maximum 50 ° C and 90 % of relative humidity.	
9.4	Make of Motors	Motors shall be of M/s Siemens / KEC / ABB / BBL makes. Single phasing preventers shall be incorporated for all the motors.	
9.5	Control Elements	The electrical switch and control elements shall be of Siemens / L&T / GEC Alsthom / Telemechanique make.	
9.6	Gear Boxes	The gear boxes are to be of Greaves / Radicon / Elecon / Shanthi Gears make only and necessary Test and Guarantee Certificate are to be submitted.	
9.7	Remote Control Unit	Remote Control Pendant (hand held type) shall be provided for bogie and front sliding door operations.	
9.8	Cabling Code	All wires, cables, instrument tappings, etc. shall be terminated at components / devices / terminals using suitable number ferrules.	
9.9	Inter-Connecting Cables	The required length of Power and Control (Copper) Cables to inter-connect the Power Controller and Terminals, Field Instruments, Motors etc. with Panel shall be quoted. Compensating cables shall be routed through separate cable trays.	
9.10	Safety Systems	Necessary safety interlocks incorporated for the safe operation of the furnace shall be elaborated in the offer.	

S.No.	PARTICULARS	DESCRIPTION	BIDDER'S RESPONSE
10.0	**SPARES**		
10.1	OPERATING SPARE PARTS	a. The Supplier shall LIST DOWN with the OFFER, the complete set of replaceable parts / items / components coming in the Furnace and other Sub-Systems / Accessories / Attachments and shall QUOTE the Unit Price for each item. b. Bidder has to COMPULSORILY quote for the following items with the TECHNICAL OFFER : 1. Mechanical wearing components due to linear movement and rotation, etc. 2. Electrical & Electronic Items – Thyristor Controller 1 Set Thyristors 1 Set Limit switches 2 Nos. Semiconductor fuses 1 Set Programmable Temp. Controller 1 No. Safety Controller 1 No. Power supply card for recorder 1 No. Input card for recorder 1 No. Recorder Motors 1 No. of each type 3. Miscellaneous Heating Elements (KANTHAL A-1 STRIPS)} 25% of Refractory Blocks supporting } used qty. Heating Elements } Cr/Al Thermocouples Duplex 2Nos & } 2 Sets Simplex 1 No. } Ribbon cassette for recorder 5 Nos. 250mm wide recorder chart paper roll 25 Nos. c. BHEL will procure almost all parts listed under the above category with the Furnace.	

S.No.	PARTICULARS	DESCRIPTION	BIDDER'S RESPONSE
10.2	COMMISSIONING SPARES	Bidder has to COMPULSORILY List Down the items with the TECHNICAL OFFER, which are likely to be replaced during the erection & commissioning operations, where these items are likely to be replaced due to failure or damage. THESE ITEMS ARE TO BE REPLACED AT THE COST OF THE SUPPLIER.	
11.0	**FURNACE INSPECTION & ACCEPTANCE**		
11.1	Inspection	1. The supplier has to offer, for inspection at Supplier's Works by BHEL Officials, all the furnace components (structures, insulation material, refractory bricks, etc.), mechanical sub-assemblies, heating elements, accessories & attachments forming part of the electrical and control systems, spares, anchoring & supporting materials, etc., which are in individual despatchable consignments. 2. Items like Temperature Program Controller, – Temperature Recorder, Safety Controller, Thermo-Couples, etc, shall be tallied with the Test Certificates of the OEM.	
11.2	Acceptance	1. The acceptance of the Furnace in Total will be only after the testing for its performance prove-out as per BHEL Specifications, at BHEL Works, after the completion of erection and commissioning activities. 2. Various heat-treatment cycles of stress relieving, – shall be run and proved out for meeting BHEL Specification requirements, by utilizing one cycle in each category of heat-treatment.	

S.No.	PARTICULARS	DESCRIPTION	BIDDER'S RESPONSE
12.0	**ERECTION & COMMISSIONING**		
12.1	Erection	1. Erection of Complete furnace and its auxiliaries – is under supplier's scope. 2. Civil foundation Works will be BHEL scope. 3. BHEL will provide electricity, water and crane for handling and lifting of furnace components / materials at erection site (free of cost). However, welding machines, accessories and consumables will be under the scope of supplier for erection and commissioning.	
12.2	Commissioning	1. Commissioning of the Equipment and Smooth Functioning of all the Sub-Systems (at BHEL Works) shall be the RESPONSIBILITY of the Supplier, including the performance prove-out heat-treatment cycles (minimum three cycles). 2. The below mentioned heating cycles shall be proved by the supplier, during commissioning of the furnace with load, at BHEL Works :- a. Rate of heating : 50°C/hr. & 100°C/hr. b. Maximum charge (job) temperature :770 °C± 10°C c. Soaking Time : 10 Hours. d. HT cycles between 600 to 780 deg C.	
13.0	**FURNACE DOCUMENTATION**		
13.1	O & M Manuals	a. Three Copies of the Operation & Maintenance Manual to be given in Hard Bound Paper Copies with one copy in CD form (SOFT COPY) b. One Hard Copy of O & M Manual shall be submitted at the time of INSPECTION of the Furnace (materials & sub-systems) by BHEL Officials at Supplier's Works. c. The following documents and details (as given under **Clause No. 13.2** shall form part of the Operation & Maintenance Manual	

S.No.	PARTICULARS	DESCRIPTION	BIDDER'S RESPONSE
13.2	Documents and Technical Details	a. GA Drawing of the Furnace in Total. b. GA Drawing of Individual Mechanisms / Sub-Systems / Sub - Assemblies. c. Sub-Assembly Drawings (without dimensions) for sub-systems for maintenance purpose.. d. Electrical Wiring Drawings – Power & Control Circuits e. Pneumatic Circuit Diagram (if any) f. Complete Printed Circuit Board Schematics indicating check points (Test Points) for Electronic Controls g. Specifications / Ratings of All Bought-Out-Items h. Warranty / Guarantee Card for all Bought-Out-Items i. Trouble Shooting Chart for Main and all Sub-Systems j. Drawings of all the refractory components with specifications. k. Total Weight of the furnace structures, lining & insulation, mechanical sub-systems, etc.	
14.0	**TRAINING**	a. The Supplier shall train BHEL Staff in the Trouble Shooting and Maintenance of the Furnace Supporting Systems, free of cost, during the inspection at the Supplier's Works. b. The Supplier's Service Engineer shall train BHEL Staff in the Operation, Trouble Shooting and Maintenance of the Furnace for a minimum period of 15 Working Days, after the SUCCESSFUL COMMISSIONING of the furnace, at BHEL Works, free of cost.	

S.No.	PARTICULARS	DESCRIPTION	BIDDER'S RESPONSE
15.0	TECHNICAL OFFER	The Technical Offer shall contain the following : a. Complete Scope of Supply, including Main Equipment, Safety systems, All Accessories and Attachments, etc. b. List of Operating Spares, Commissioning Spares, Foundation / Anchoring Materials c. Erection, Commissioning and Performance Prove-Out Details. d. Complete description of all systems & sub-systems forming part of the Furnace. e. A schematic diagram showing the layout of the furnace & associated systems with salient dimensions f. The technical write-up on the operating sequence of the furnace with broad outline of various operations involved	
16.0	PERFORMANCE GUARANTEE	The Performance of the Furnace in total and/or the Components / Sub-Assemblies / Bought-Out-Items in particular, shall be guaranteed for a minimum period of twenty- four [24] months from the date of performance acceptance at BHEL Works.	