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 79 38 Fax : +91 431 252 00 31 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2621300033**	**Enquiry Date:** **24.10.2013**	**Due date for submission of quotation:** **04.12.2013**

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	Qty.	Delivery Required	Delivery Terms Required
10	**20 Ton Stress Relieving Furnace as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)**	**1 No.**	**9 months from the date of Purchase Order**	**F.O.R, BHEL Stores, Trichy.**

Important points to be taken care during submission of offer:-

1. **Compliance Form No. TRY/IND/05 and Annexure II (Details of Company Performance) to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**
2. **EMD for this Tender will be Rs. 2,00,000.00/-**
3. **Delivery shall not exceed 9 months from the date of Purchase Order.**
4. **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.**
5. **The time period required for Erection & Commissioning of the item shall be 2 months from the date of intimation from BHEL requesting supplier to depute Service Engineers about site readiness**

BHEL's General guidelines / instructions (refer MM/CE/GENL/001-EMD) including bank guarantee formats and list of consortium banks, commercial terms check-list 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 "2621300033".

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. Manager / Capital Equipment / MM

T. VENKATESWARAN
Senior Manager
Capital Equipment / MM
BHEL, Tiruchirappalli - 620 014.

PART A:20 TON STRESS RELIEVING FURNACE

SECTION – I: QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer:

S.No.	REQUIREMENTS	VENDOR's RESPONSE
1.0	Only those vendors (OEMs), who have supplied and commissioned at least ONE LPG Fired **STRESS RELIEVING FURNACE** with a charge heating capacity of 750 deg C or higher, Charge weight carrying capacity of 20 Tons or more and Furnace for job envelope size of 3.5M (W)x1.6M(H)x8M(Depth) or larger in the past ten years (on the date of opening of this tender) and such furnace is presently working satisfactorily for a minimum period of one year after commissioning (on the date of opening of this tender) should quote.	
1.1	Vendor has to submit at least **One Performance Certificate** from their customers on customer's letter head, for satisfactory performance of STRESS RELIEVING FURNACE as said in 1.0 above which was supplied to them during the past ten years and is working satisfactorily for a minimum period of one year after commissioning (as on date of opening of this tender). For obtaining the Performance certificate, a suggestive format is provided.	
1.2	**The vendor should submit the following information from whom the performance certificate was obtained.**	
1.3	Name and postal address of the customer or company where the furnace is installed.	
1.4	Name and designation of the contact person of the customer.	
1.5	Phone, FAX no and email address of the contact person of the Customer.	
1.6	BHEL reserves the right to verify the information provided by vendor. In case the information provided is found to be false/ incorrect, the offer is liable to be rejected.	

SECTION – I I

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

S.No.	REQUIREMENTS	VENDOR's RESPONSE
2.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where Stress Relieving Bogie hearth furnaces have been supplied in the past five years.	
3.0	Details of Stress Relieving Bogie hearth furnaces supplied to other BHEL units, if any. (Year of commissioning, Length, Width, capacity and Operating temperature etc.)	
4.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in Central India.	
5.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – III

The performance certificate should be obtained on **Customer's Letter Head.**

PERFORMANCE CERTIFICATE

1.0	Supplier of the Equipment	
2.0	Make & Model number	
3.0	Month & Year of Commissioning	
4.0	Application for which the equipment is used	
5.0	a) Length of furnace	
	b) Width of furnace	
	c) Ht of furnace	
	d) Operating Temperature	
	e) WT. Carrying Capacity	
	f) Burner type: PID with MFC controlled or pulse fired system	
6.0	Performance of the Machine (Strike off whichever is not applicable)	Satisfactory Not Satisfactory
7.0	After sales service (Strike off whichever is not applicable)	Satisfactory Not Satisfactory
8.0	Feedback/ Comments/ Remarks from the customer if any.	

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B: 20 TON STRESS RELIEVING FURNACE- LPG FIRED

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
1.0	**PURPOSE & WORKPIECE MATERIAL :**		
1.1	**Purpose :** For Stress relief Heat treatment of pressure parts like Pipe bends, straights assemblies, small headers and OTSC Risers, SOFA Panels etc. of Utility / Industrial / Super critical Boilers.		
1.2	**Job Details:** 1. **Job Material:** Carbon Steel and Alloy Steel tubes and pipes including T91 & P91. 2. **Job Size:** a) The maximum job envelope size can be taken as 3500 mm(W) x 1600 mm(H) x: 8000 mm (L) b) The furnace charge will be loaded in batches of jobs specified in clause No1.1. c) Width W and height H will form the front face of furnace. d) Maximum charge weight: **20 Tons** (The specific heat of material shall be considered as 0.14 Kcal/kg^0**C)**	Vendor to note	
2.0	**Furnace:**		
2.1	**Operating Parameters:**		
2.1.1	Charge Capacity –Excluding pedestals.	20 Tons	
2.1.2	Heat Treatment Cycle to be carried out: Stress Relieving	Vendor to confirm	
2.1.3	Maximum Charge Temperature: **745 ±10 Deg C** Max. soaking time: 120 minutes	Vendor to confirm	
2.1.4	Maximum Furnace Design Temperature: Vendor to specify this temperature in order to attain the Max charge temperature of 745 ±10 Deg C	Vendor to specify	
2.1.5	Rate of heating with charge 1. Up to 400 ^{0}C ----- 220 Deg **C** / Hr 2. Above 400 ^{0}C ----- 50 Deg **C** / Hr (selection shall also be infinitely variable in the range 50 ^{0}C to 220 ^{0}C / Hr)	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.1.6	Rate of cooling with charge (selection shall be infinitely variable in the range 50 ^{0}C to 200 ^{0}C / Hr)	Vendor to confirm	
2.2	**Furnace Configuration**		
2.2.1	Type of Furnace: LPG fired Single Bogie Hearth Furnace.	Vendor to confirm	
2.2.2	Single Bogie Box type Configuration with front door sliding up/down for open/close.	Vendor to confirm	
2.2.3	Car Bottom Bogie Traversing on embedded Rails, through a Rack & Pinion Drive with reduction gear box	Vendor to furnish details	
2.2.4	Automatic Zone Temperature Control with Programming of Heat Treatment Cycle	Vendor to confirm	
2.2.5	In case of variations in loading pattern or job thickness, the temperature uniformity should be able to be maintained by manual intervention.		
2.2.6	Ceramic Fiber module refractory system / Monolane system for doors and shell.	Vendor to confirm	
2.2.7	Hard refractory construction for bogies and side walls up to burner level	Vendor to confirm	
2.2.8	Recuperator System for Energy Conservation	Vendor to confirm	
2.3	**Furnace Inside Dimensions**: Considering the job envelope size approximate size of the furnace is indicated below. However the vendor has to specify the furnace size with design considerations of job envelope size, refractory / insulation thickness, flame length, space for thermocouples and access to maintenance etc.	Vendor to Specify	
2.3.1	Inside Width of furnace (after refractory lining of side walls): **around 4500 mm**	Vendor to Specify	
2.3.2	Inside Height of furnace above Bogie top (after refractory linings on bogie and roof): **around 2500 mm**	Vendor to Specify	
2.3.3	Depth of furnace from door to rear wall (after refractory lining) : **around 8500 mm**	Vendor to Specify	
2.4	**Combustion System**:		
2.4.1	The furnace has to be provided with the required number of nozzle-mix high velocity burners suitably designed for firing LPG. The positioning of the burners should be designed to create high degree of turbulence in the furnace, increased convection	Vendor to Confirm	

	heat transfer to get better uniformity and thermal efficiency even at lower temperature.		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
2.4.2	Fuel	LPG	
2.4.3	LPG line Pressure at BHEL: 1.5 to 2.0 kg/cm2	Vendor to confirm	
2.4.4	Max required flow rate of LPG (Supporting heat calculation details to be enclosed)	Vendor to Specify	
2.4.5	Burner Type - **(High Velocity Burner of Kromschroder/Eclipse or any reputed make acceptable to BHEL) (Vendor to furnish model no. and technical details of burners)**	Vendor to furnish details	
2.4.6	Number of rows and arrangement of Burners (Schematic drawing should be furnished along with the offer)	Vendor to specify	
2.4.7	**Number of Burners** (Calculation details should be submitted with the offer)	Vendor to Specify	
2.4.8	Burner Rating	Vendor to Specify	
2.4.9	Burner turn - down ratio (higher ratio is preferred)	Vendor to specify	
2.4.10	Flame Length	Vendor to Specify	
2.4.11	**Furnace Control System**: The vendor should be able to offer both the following systems. 1. PID with Mass Flow Control and 2. Pulse-fired system. However the **Type of Furnace control system will be finalized by BHEL at the time of technical discussion.**	Vendor to Confirm	
2.4.12	No. of Temperature control Zones	Four	
2.4.13	LPG gas burner: Material of construction shall be SS 310/Grey Cast Iron inside portion.	Vendor to specify	
2.4.14	LPG gas igniter: Material of construction shall be SS 310/Kanthal A1 with ceramic body.	Vendor to specify	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.4.15	Two way solenoid valve shall be brass/aluminium material and should be flame proof as per IS: 2148 gas group class IIA, IIB.	Vendor to Confirm	
2.4.16	Vent valves opening position to be indicated in the control panel	Vendor to Confirm	
2.4.17	All vent valves shall be routed above roof for better air mix up in atmosphere.	Vendor to Confirm	
2.4.18	All valve flanges shall be raised face with serrations.	Vendor to Confirm	
2.4.19	Wherever electrical input is available with any instrument in the LPG line such as Igniter cables, scanner related items, junction boxes, transmitter, limit switches they shall be provided with **flame proof enclosure with double compression cable gland** for cable entry/exit.	Vendor to Confirm	
2.4.20	All cables should be Flame Retardant Low Smoke design only	Vendor to Confirm	
2.4.21	Copper cladded asbestos gasket to be used for valve flanges.	Vendor to Confirm	
2.4.22	Complete piping system with all mechanical components should withstand Max 6 bar pressure during initial testing.	Vendor to Confirm	
2.4.23	2 Nos. of "y" type / simplex filter with 4 Nos. of isolation valves to be provided.	Vendor to Confirm	
2.4.24	Instrument impulse line shall be SS 316, Schedule 40.	Vendor to Confirm	
2.4.25	Copper washer shall be provided to all pressure gauges and switches	Vendor to Confirm	
2.4.26	All Flanges should be provided with copper earthing.	Vendor to Confirm	
2.4.27	One spectacle blind shall be provided for each furnace near terminal point at gas train piping.	Vendor to Confirm	
2.4.28	Full TIG welding shall be carried out for all welding joints in LPG pipe lines.	Vendor to Confirm	
2.4.29	Provide one push button-type isolation valve for all pressure gauge /pressure switch	Vendor to Confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.4.30	**Forced Draught (FD) Fan** a) FD Fan with VFD of suitable capacity **(including excess air)** has to be provided to ensure proper combustion and controlled cooling (whenever required) b) Air flow –Calculation details to be enclosed c) Air Pressure d) Power Rating (KW)	Vendor to Confirm Vendor to specify	
2.4.31	**Induced Draught (ID) Fan & Dilution Fan:** a) ID Fan and Dilution fan of suitable capacity with VFD has to be provided before the stack to ensure proper combustion and controlled cooling (whenever required) b) Air flow –Calculation details to be submitted with the offer c) Air Pressure of ID fan d) Air Pressure of Dilution fan e) Power Rating (KW) of ID fan f) Power Rating (KW) of Dilution fan	Vendor to Confirm Vendor to specify	
2.4.32	Type of all Blower/Fan	Centrifugal	
2.4.33	Make of all Blowers- **C-Doctor/ Patel / Flakt India** or any other make acceptable to BHEL.	Vendor to Specify.	
2.4.34	The FD Fan and ID Fan have to be suitably sized to ensure a Balanced Draught System. Drive mechanism for FD and ID fans should be of belt drive.	Vendor to confirm	
2.4.35	A standby fan with motor each for the FD, ID & Dilution fan system has to be provided.	Vendor to confirm	
2.4.36	Bell mouth(Silencer) inlet to be provided on the suction side of FD, ID & Dilution fans	Vendor to confirm	
2.4.37	Suitable filter to be provided on the suction side of FD fan. Vendor must provide suitable handling facility for cleaning the filter element by 1 person.	Vendor to confirm	
2.4.38	All the motors used for the fans shall be of Energy efficient (EFF1) class conforming to IEC/IS standards. All blower motors should be with VFD drive. VFD drive should be of SIEMENS (preferably Sinamics) / YASKAWA/ ABB /ALLEN BRADLEY/MITSUBHISHI makes only.	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.4.39	All the Fans (FD, ID & Dilution) should comply with the following construction / performance 1. Impeller blades are to be fully welded. 2. Availability of sufficient strengthening stiffeners in the body / support structure of the blower. 3. Noise level: Max. 85 ± 3 dBA @ 1.5 meter distance 4. Vibration level: As per ISO-14694. Up to 4.8 mm/sec (RMS) with foundation 5. Dynamic balancing of impeller at rated speed.	Vendor to confirm	
2.4.40	**Dampers** :		
2.4.41	Damper has to be provided before the stack in the flue gas path to regulate draught	Vendor to confirm	
2.4.42	The damper has to work on auto mode and its opening should get adjusted automatically depending upon the draught required in the furnace (positive).	Vendor to Confirm with details	
2.4.43	Provision should be there to operate the damper in manual mode also.	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.5	**Refractory Lining:** (For Shell and doors) Ceramic fiber block modules / monolane system with back up layer of suitable density and thickness (conforming to ASTM-892 C-1993) to ensure that the skin temperature of the furnace does not exceed 80^{o}C; the anchor material should be SS310. 1. (Vendor to furnish calculations for choice of insulation material and Data sheet of the insulating materials) 2. The supplier shall provide MSDS for all refractory material (including ceramic wool) – It shall cover "cradle to grave". 3. The supplier shall indicate the applicability of the ceramic material under **Hazardous Wastes (Management, Handling and Tran's boundary Movement) Rules, 2008.**	Vendor to Specify	
2.5.1	Size of Ceramic Fiber Block Modules/ Monolane system (Size should be under the standard manufacturing range of the supplier)	Vendor to Specify	
2.5.2	Density	Vendor to specify	
2.5.3	Thickness	Vendor to Specify	
2.5.4	Maximum Service Temperature	Vendor to specify	
2.5.5	Make: M/s MMTCL or M/s Unifrax only	Vendor to confirm	
2.5.6	Size of Back up Blanket layer / Monolane system (Size should be under the standard manufacturing range of the supplier)	Vendor to Specify	
2.5.7	Density	Vendor to specify	
2.5.8	Maximum Service Temperature	Vendor to specify	
2.5.9	Thickness	Vendor to Specify	
2.5.10	Make: M/s MMTCL or M/s Unifrax only	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.6	**Furnace hearth :**		
2.6.1	Side walls are to be constructed with the combination of hard refractory & Insulation brick (Shaped bricks) with Calcium silicate board backup for suitable thickness and leveled equal to the top of bogie refractory. The shaped brick combination between the bogie and the hearth should ensure good thermal sealing between them.	Vendor to Confirm	
2.6.2	Make of Hard refractory materials: M/s ACE, M/s Maithan refractories, M/s TATA refractories, M/s Corborundam Universal or any other make acceptable to BHEL. (Relevant data sheets to be submitted in the offer)	Vendor to confirm	
2.6.3	The peripheral refractory has to be held and supported by a set of heat resisting castings, confirming to IS 4522, Grade-9	Vendor to Confirm	
2.7	**Burner blocks:** 90% High Alumina or SIC material	Vendor to Confirm	
2.8	**Furnace Door:** One front door with vertical up/down for open/close.		
2.8.1	Number of Doors - ONE	Vendor to Confirm	
2.8.2	Operation - VERTICAL	Vendor to Confirm	
2.8.3	**Drive:** Electric drive with Speed reduction Gear Box, Electromagnetic Brake etc. for the door at ground level	Vendor to confirm	
2.8.4	Pneumatic door locking arrangement along with mechanical lock arrangement has to be provided to press the door against door opening in its closed position. (Complete details should be furnished with the offer)	Vendor to confirm	
2.8.5	All Pneumatic elements used shall be of FESTO/ SMC or any other make acceptable to BHEL.	Vendor to confirm	
2.8.6	BHEL will provide air supply at a pressure of 6 bar only at one point near the furnace. Vendor to provide suitable air drier, filter, regulator, air booster etc for controlling the required air pressure for the pneumatic system.	Vendor to confirm and provide details	
2.8.7	Provision should be made on the door for sand sealing at bottom in the bogie in closed position of the door. (Complete details should be furnished with the offer)	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.8.8	The periphery of the door has to be designed suitably so that positive sealing is established with the furnace by the door in closed position.	Vendor to confirm	
2.8.9	In the unlocked position, and while lifting the door, it should move away from the furnace opening and move up without interfering on any furnace structure.	Vendor to confirm	
2.8.10	Interlock should be provided so that bogie can be operated only when door is completely open.	Vendor to confirm	
2.8.11	All the pneumatic equipment and interlock elements are to be suitably protected from failure due to heat from the furnace	Vendor to confirm	
2.8.12	Steel construction with ceramic fiber modules lining inside and a set of heat resisting grey cast iron castings, conforming to IS 4522, Grade-9 around the periphery of the door and with suitable counter balance arrangement	Vendor to Confirm	
2.8.13	The counter weight arrangement should be provided on the sides of the door.	Vendor to Confirm	
2.8.14	Vendor to provide suitable interlock for low firing at door open condition and high fire only after closing the door		
2.9	**Furnace Construction (General) :**		
2.9.1	The complete furnace structure including the sidewalls and roof are to be manufactured from rolled steel sections and plates of suitable thickness (Minimum 10mm for side walls and minimum 8 mm for roof) (Complete details should be furnished with the offer)	Vendor to confirm	
2.9.2	The various load bearing members are to be designed conservatively to ensure rigidity of the complete casing.	Vendor to confirm	
2.9.3	A schematic diagram showing the layout of the furnace & associated systems with salient dimensions should be furnished along with the offer	Vendor to confirm	
2.10	**RECUPERATOR:**		
2.10.1	The recuperator shall be of multi tubular metallic construction with counter flow,	Vendor to confirm	

	convective heat transfer arrangement. Material shall be SS 310 for hot face and SS 304 for cold face. **(Complete details of construction should be furnished with the offer)**		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
2.10.2	Recuperator has to pre-heat the air to around 250 Deg.C. **Thermal calculation to be submitted with the offer**. Recuperator bypass with suitable valves to be provided	Vendor to confirm	
2.10.3	The recuperator has to be located suitably in the flue gas path above the ground itself	Vendor to confirm	
2.10.4	On line indication of inlet, exit temp of air and flue gas to be available.	Vendor to confirm	

2.11	**FLUE DUCT:**		
2.11.1	Flue duct Position (Suitably insulated preferably with hard refractory)	Vendor to specify	
2.12	**STACK :**		
2.12.1	The stack for flue gas outlet has to be designed and constructed with refractory brick lining and the venturi should be of stainless steel material suitably to leave the waste gas at a lowest temperature.	Vendor to specify	
2.12.2	Chimney height shall satisfy the requirements of Tamil Nadu Pollution Control Board (TNPCB) norms with respect to emission of SOx; NOx and Suspended Particulate Matter (SPM). The guidelines to calculate the chimney height is as follows: $H = 14 (Q)^{0.3}$. Q – SOx emission rate in Kg/hr; H – Height of stack in meters from ground level. However the chimney shall have a height arrived at by the above formula or approximately 17 Meters (Assuming roof height as 15 Meters). That is the outlet and weather cowl should be at minimum 2 meters above the roof level. Cutting the opening for chimney at the roof of the shop is in the scope of vendor. The location of the chimney will be intimated by BHEL after receiving the total lay out of furnace and accessories from the vendor.	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.12.3	Four port holes at 90 deg shall be provided at each elevation (one at 2.0 meters from the ground level and the other at a height of 6xD where D is the inner diameter of chimney). Each porthole shall be of 100 mm inner diameter, welded with a standpipe 100 mm long fixed with a flange and bolted with a dummy plate.	Vendor to Confirm	
2.12.4	Platform, with toe guard, should be provided all around the chimney 1.0 m below each plane to house the sample collection equipment and for working clearance for crew. Handrail should be provided all round the platform. Ladder shall be provided for both traverse point planes.	Vendor to Confirm	
2.12.5	Suitable ladder with cage should be provided to reach platform at both sampling planes.	Vendor to Confirm	
2.12.6	Suitable monkey ladder with safety rings shall be provided up to top of the chimney	Vendor to confirm	
2.12.7	The stack shall be provided with a weather cowl and red indicating lamp for high rise structure.	Vendor to Confirm	
2.12.8	The stack shall be provided with complete lightning arrester system including lightning arrester spike, copper conductor tape from spike to test link, test link, earth pit as per Indian standards	Vendor to Confirm	
2.12.9	Exit temperature, Oxygen, SPM (in mg/cu.m), SPM (Microns), SOx; NOx; CO; flue gas velocity at the outlet tip of the chimney	Vendor to Specify	
2.12.10	The demonstration (proving) of the parameters as per 2.12.9 is in the scope of vendor. Necessary calibrated measuring instruments used for this purpose is in the scope of the supplier. Emission certificate to be provided by the supplier after commissioning the furnace.	Vendor to Confirm	
2.13	**FURNACE BOGIES**:		
2.13.1	Number of Bogies: **One**	Vendor to Confirm	
2.13.2.	Bogie Dimension: The approximate bogie dimension is given. Vendor to specify according to design and size of furnace chamber dimensions. a) Width 4500 mm app--- Vendor to specify		

	b) Length 8500 mm app --- Vendor to specify		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
2.13.3	The bogie to be driven by fabricated rack (Pin type) and pinion arrangement motorized with reduction units, couplings and electromagnetic brakes. (Complete details should be furnished with the offer)	Vendor to specify	
2.13.4	The complete bogie with refractory to be supported on the set of cast wheels through trolley arrangement - one set of guided wheels (essential) and others – plain wheels **(90 lbs parallel rails will be supplied and erected by BHEL as per drg of vendor).**	Vendor to Confirm	
2.13.5	The bogie should be able to be moved out sufficiently for carrying out the maintenance work.	Vendor to Confirm	
2.13.6	Bogie speed in m/min	Vendor to specify	
2.13.7	The Bogie refractory has to be constructed with the combination of IS 8 quality firebricks and Insulation bricks for suitable thickness backed by calcium silicate board and ensure that the skin temperature does not exceed 80 deg.C (Complete details with calculation should be furnished with the offer)	Vendor to Confirm	
2.13.8	Around the periphery, special shaped bricks of IS 8 quality have to be positioned. The combination of the shaped bricks in bogie and the hearth should ensure good thermal sealing between them.	Vendor to Confirm	
2.13.9	Heat resisting gray iron castings confirming to IS 4522 - Grade-9 has to be positioned around the periphery of the bogie to support the refractory.	Vendor to Confirm	
2.13.10	The bogie castings shall be of min. 20 mm thick at the base and 16 mm thick on the sides and the width of the base must be more than that of the side.	Vendor to Confirm	
2.13.11	Double Sand sealing has to be provided between bogie and the furnace hearth and it should be ensured that the alignment should not fail due to heat transfer. Complete sand sealing castings shall confirm to IS 4522 - Grade-9	Vendor to Confirm	
2.13.12	The peripheral bottom of the furnace hearth has to be lined with special shaped	Vendor to Confirm	

	bricks to match with the shaped bricks on the bogie periphery.		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
2.13.13	The bogie is to be manufactured from rolled steel sections and plates of suitable thickness (Min 10mm). (Complete details should be furnished with the offer)	Vendor to Confirm	
2.13.14	The Bogie structure has to be designed to give minimum deflection under different load conditions.	Vendor to Confirm	
2.13.15	It should be ensured that all the wheels share the load uniformly.	Vendor to Confirm	
2.13.16	The wheels are to be mounted on antifriction bearings through non-rotating axles in such a way that heat transfer from bogie structure to the bearings is reduced to the minimum.	Vendor to Confirm	
2.13.17	KW Rating of Bogie Drives	Vendor to specify	
2.13.18	All the Castings in the furnace shall be fixed with respective structures using SS-304 bolts of min. M16 size.	Vendor to Confirm	
2.13.19	All the gear boxes used in the furnace shall be of standard size and of reputed makes of Greaves / Shanthi gears / Radicon / Elecon / Premium or any other make acceptable to BHEL.	Vendor to Specify	
2.14	**PIPELINES & VALES**		
2.14.1	BHEL will provide LPG at one point near the furnace. All piping for LPG to the furnace gas control valves and to other points is in the scope of the vendor. 2Kg/cm2 Regulator to be provided at the start of the Gas train system for fine tuning.	Vendor to Confirm	
2.14.2	All air piping from the fans to the control valves and to other points is in the scope of the vendor	Vendor to Confirm	
2.14.3	Required valve for control of gas and air is in scope of the vendor	Vendor to Confirm	
2.14.4	All hot air pipe lines to be insulated with LRB mattress and aluminium sheet of suitable thickness.	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
2.14.5	All the pipe lines to be installed above ground level	Vendor to confirm	
2.14.6	Make of Gas and Air valves used shall be of Kromschroder/Samson Mumbai/IL Palghat/MIL Chennai/ Fouress Bangalore/Fisher Xomas Chennai/ Eclipse/ Dungs/ Audco/ Flowjet	Vendor to Specify	
2.14.7	Gas valves, air valves & field instruments in gas line must be fire proof as per NFPA.	Vendor to confirm	

2.15	**ELECTRICAL :**		
2.15.1	**Tropicalization** : All electrical / electronic equipment shall be tropicalized.	Vendor to Confirm	
2.15.2	All Electric enclosures shall have IP 54 protection	Vendor to Confirm	
2.15.3	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm	
2.15.4	415V +/- 10%, 50HZ +/-3 Hz, 3 Phase AC (3 wire system without neutral) power supply will be provided by BHEL at a single point near the furnace in the control room, as per layout recommended by Vendor.	Vendor to Confirm	
2.15.5	All cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the equipment/control cabinets, shall be the responsibility of vendor. All cables should be of copper only.	Vendor to Confirm	
2.15.6	Requirement of grounding/earthing with required material details should be informed by vendor well in advance so that it could be incorporated during construction of foundation. BHEL will provide earth pits at pre-designated locations. Vendor has to make all required connections to the earth pit. Separate earthing should be provided for main power panels, Burner control panels and Chimney lightning arrester, each to be terminated at individual earth pits. Earth flats should be GI (25 mm X 3 mm). Appropriate length GI flats for earthing are vendor's scope.	Vendor to Confirm	
2.15.7	All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220 Volts, 5/15	Vendor to Confirm	

	Amp AC. All adapters / receptacles should have compatibility with Indian equivalents. All single phase power supply/control voltage should be 230 V, 50 Hz.		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
2.15.8	Motors & other electrical components shall conform to IEC or Indian Standards. Motors shall be of energy efficient (EFF1) and makes of ABB / Siemens / Kirloskar / Bharat Bijlee / Hindustan / Crompton Greaves / NGEF or any other make acceptable to BHEL.	Vendor to Specify	
2.15.9	All the metallic cable trays required for laying of cables should be included in the offer.	Vendor to Confirm	

2.15.10	Vendor should ensure proper earthing for the furnace and its peripherals.	Vendor to Confirm	
2.15.11	All electrical components like contactors and OLRs etc., should be of BCH/Siemens/ L&T /Schneider/ GE/ or Telemechanique make and VFD for fans shall be of **SIEMENS (preferably Sinamics)/ YASKAWA /ABB/ / ALLEN BRADLEY/MITSUBHISHI** make. The VFDs shall take reference from PLC output (4-20mA) to ensure controlled and efficient blower operation during furnace heating and cooling cycles.	Vendor to specify	
2.16	**JOB SUPPORT PEDESTAL**:		
2.16.1	Number of job support pedestals to be placed on bogie	Total 6 Nos.	
2.16.2	**Material:** Heat resistant cast iron as per IS 4522 grade-9	Vendor to Confirm	
2.16.3	Size: **300 x 400 x 3750 in mm (Height x Width x Length) 'I' section with web thickness of 75mm and necessary stiffeners** **Drawings of pedestal to be submitted along with the offer.**	Vendor to submit	
2.16.4	Weight of each pedestal	Vendor to specify	
3.0	**SAFETY ARRANGEMENTS:**		
3.1	Following safety features in addition to other standard safety features should be		

	provided on the machine:		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
3.2	Furnace should have adequate and reliable safety interlocks / devices to avoid damage to the furnace, work piece and the operator due to the malfunctioning or mistakes. Furnace functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages on panel should be available.	Vendor to specify	
3.3	A detailed list of all alarms / indications provided should be submitted by the Vendor.	Vendor to specify	
3.4	All the pipes, cables etc. should be well supported and protected.	Vendor to Confirm	
3.5	All the rotating parts should be statically & dynamically balanced to avoid undue vibrations and suitably guarded.	Vendor to Confirm	
3.6	3 emergency switches are to be provided to switch off the whole furnace in case of emergency. The locations are (one at control Panel and one each on either side of the furnace.	Vendor to Confirm	
3.7	6 Nos Gas leak detector to be provided to cover critical gas leak zone. The system should have independent control with alarm. Vendor to provide the test certificate with LPG sample for LEL as per standard. Functional test with same sample to be done after commissioning of the instruments at site. Supply of standard sample gas is under vendor's scope. Ambetronics/Oldham makes gas leak detectors or any other make acceptable to BHEL is preferred.	Vendor to Specify	
4.0	**INSTRUMENTATION & CONTROL SYSTEM :**		
4.1	All controls will be located in a Control Room (with A.C) adjacent to the furnace. BHEL will construct the Control room based on inputs to be provided by the vendor	Vendor to Confirm	
4.2	**Furnace temperature control :** PLC-PC based instrumentation with SCADA software system shall be provided for control of the furnace. The PLC-PC based system shall be based on Redundant system with Master and Slave configuration. It operates through a Personal computer and suitable SCADA software. The control loop with auto tuning function	Vendor to specify	

	to be constituted within the PLC through intelligent software. Suitable interface, required software, programming device to upload, download for PLC program changing in future or up gradation of PLC version. Upgrade software to be supplied by the Vendor. The system to monitor furnace parameters on the SCADA screen, enhanced interlocks for safety of furnaces and process level of furnace automation, continuous and efficient data logging and archiving etc to be provided. Preferable make of the PLC is ABB, Allen Bradley, Siemens. Suitable PC is under the scope of the vendor. Technical specifications of the PC should be submitted by vendor (makes: Dell/Acer/HP or any other make acceptable to BHEL).		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
4.3	Furnace over temperature control to be made available at control panel only.	Vendor to confirm	
4.4	Recuperator protection for preheat temperature control.	Vendor to confirm	
4.5	The system shall comprise, but not be limited to the following:		
4.5.1	Zonal Thermocouples: 2 Nos. of Duplex thermocouples to be provided. One thermocouple for temperature controller, second for excess temperature controller 3rd for recorder and 4th as a spare. Thermocouple type-K with protective sheath to be 1 metre long of inconel with adjustable flange. Asbestos compensating cables to be provided for heat resistance.	Vendor to confirm	
4.5.2	K- type Compensating cables of the Temperature recorder to be wired from the control panel to 6 location of each side wall of the furnace for material temperature measurements. Holes for thermocouples to be provided in between the burners at suitable locations approved by BHEL. Thermocouples will be provided by M/S. BHEL. Supply of suitable length of compensating cables from these locations to the recorder is vendor's scope	Vendor to confirm	
4.5.3	Suitable rated modulating motors / Control elements for all the Zones	Vendor to confirm	
4.5.4	Mass flow-based (or/ alternatively) Pulse firing-based zonal control system for temperature control. This has been indicated in 2.4.11	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
4.5.5	24 Point Micro Processor based temperature recorder with chart width 180 mm along with 50 nos. of chart paper packs. Make. Yokogawa, Eurotherm and Chino.	Vendor to confirm	
4.5.6	Pressure switches with isolation valves, flow transmitters with manifold valves for gas, air and control elements with suitable markings for easy observation of position of the valves to be provided.	Vendor to confirm	
4.5.7	Furnace pressure transmitters and control elements with P&I diagram should be submitted.	Vendor to confirm	
4.5.8	Instrument cables and compensating cables are to be separated from power cables. All cables should be of FRLS design only.	Vendor to confirm	
4.5.9	Piping lines for instruments to be provided with clamps and neatly routed	Vendor to confirm	
4.5.10	Metal Junction boxes with suitable terminal blocks and glands to be provided. All the wires should be with marked ferrules for easy identification both in the control panel and for the field instruments	Vendor to confirm	
4.5.11	Suitable rating UPS with battery to be provided for the Instrument panel, PC and recorder with a minimum backup of 1 hour. Makes: Emerson/APC/Microtek or any other make acceptable to BHEL.	Vendor to confirm	
4.5.12	Any other requirement to complete the system.	Vendor to specify	
4.6	Possibility of over viewing the status in the control room.	Vendor to Confirm	
4.7	For excess temperature control of respective zone, it should be possible to set the limit value of each zone in the Control panel. In case of zonal temperature overshoots the maximum set value; it should control all safety systems along with raising audio visual alarm.	Vendor to Confirm	
4.8	Other features required:		
	a) Alarm annunciation	Vendor to Confirm	
	b) Gas flow measuring system: Orifice type volumetric flow measurement with totalizer to be indicated in the control panel and SCADA	Vendor to Confirm	
	c) Safety system and alarm indication required are to be indicated.	Vendor to Confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
4.9	Required Motor Control Centers shall be provided for control of all fans and blowers (This point should be separated from instrumentation and control)	Vendor to confirm	
4.10	Gas Train System details to be given for all the components with P and I diagram Suitable pressure gauge with isolation valve to be provided in the inlet and outlet of the gas train system. An additional pressure gauge in the gas train system after the main safety valve will be provided**.** All the field instruments in the gas line should be of flame proof enclosure	Vendor to Confirm	
4.11	Burner purge cycles with adequate purging time for safe operation shall be provided.	Vendor to Confirm	
4.12	Manual Gas Shut Off Valve shall be provided apart from the safety shutoff valve in the gas train.	Vendor to confirm	
4.13	Push button Control Station shall be provided near the furnace for all manual operations (door movement, bogie movement & door locking)	Vendor to confirm	
4.14	Local push button stations shall also be provided for bogie drive, ID fans, FD fans, Dilution fans and door drives	Vendor to Confirm	
4.15	Maintenance platform at suitable height for instrumentation to be provided	Vendor to confirm	
4.16	Instruments Calibration: Calibration certificates to be provided for process values measuring instruments, Transmitters, Thermocouples and compensating cables. Test certificates required for Pressure switches and modulating motors etc. are to be provided at the time of inspection of the furnace at vendor works. Vendor has to carry out re-calibration for all the above calibrated items at BHEL site during commissioning. After placement of order vendor has to provide the Calibration certificate and test certificate as per BHEL format.	Vendor to confirm	

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER
4.17	Ignition & Flame Supervision: Spark igniter of high voltage type (H.V) to be used. The flame monitoring system to be with Ionization Sensor/U.V. scanner for its reliability. In case of U.V Scanner, it must be provided with suitable air cooling. The flame supervision circuit is linked to the gas solenoid valve for each burner. This enables to monitor and control the flame of each burner continuously through PLC.	Vendor to specify	
5.0	**LEVELLING & ANCHORING SYSTEM**		
5.1	Complete anchoring system including foundation bolts, anchoring materials, leveling shoes etc should be supplied by the supplier	Vendor to Confirm	
6.0	**TOOLS FOR ERECTION, OPERATION & MAINTENANCE:**		
6.1	Vendor shall bring special tools required for erection of the Furnace, Tools like Torque Wrench, Keys, Spanners, and Grease Guns etc. for Furnace operation & maintenance shall be supplied & list shall be submitted with offer. EOT crane service will be provided by BHEL inside the shop floor for erection. Any Mobile crane requirements for erection of furnace and other components are under supplier's scope.	Vendor to Confirm	
7.0	**SPARES :**		
7.1	Itemized breakup of mechanical, pneumatic, electrical , electronic and Refractory spares used on the furnace 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)**	Vendor to Confirm	
7.2	Following spares to be quoted compulsorily a. Burner -- 20% of total quantity b. Burner Blocks -- 20% of total quantity c. Burner controllers – 20% of total quantity d. Gas Solenoid Valve for burners-- 20% of total quantity e. UV Flame Detector/Ionization sensor--20% of total quantity	Vendor to Confirm	

	f. Thermocouple-duplex -- 4 Nos. g. Flow transmitter for gas: 1 No. h. Flow transmitter for air: 1 No. i. Pressure switch for gas: 1 No. j. Pressure switch for air: 1 No. k. Furnace Pressure transmitter: 1 No. l. Actuator for gas: 2 No. m. Actuator for air 2 No. n. Seal kit for pneumatic cylinder: 1 Set. o. PLC analog input module: 1 No. p. PLC analog output module: 1 No. q. PLC digital input module: 1 No. r. PLC digital output module: 1 No. s. PLC thermocouple module: 1 No. 1. PLC power supply unit: 1 No. t. Indication lamp : 1 Set u. Limit switches: 4 Nos. v. Ribbon cartridge: 3 Nos. w. Excess temp controller: 1no. x. All type of Air valves: 10% of quantity used in the furnace y. All type of Castings: 20% of quantity used in the furnace z. All type of Gas valves: 10% of quantity used in the furnace aa. All types of refractory bricks (Standard bricks and special shaped bricks): 10% of quantity used in the furnace bb. All types of ceramic fiber modules and blankets used in the furnace: 10% of quantity in each type(max. temp and density) used in the furnace cc. Couplings used in door and bogie drive assembly. – 1no each dd. Bogie drive plummer block with bearing – 1no. ee. Pneumatic valves – 1no of each type ff. Gas filter – 1 no		

	gg. Gas filter element – 5 no's hh. GVT line Pressure Regulator – 1 no ii. Chain used in bogie drive – 1no jj. Bogie drive gearbox with motor – 1set kk. Gas leak detector – 1 no		
7.3	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.	Vendor to Specify	
8.0	**DOCUMENTATION**		
8.1	Documents to be submitted along with offer for technical Evaluation:		
8.1.1	The vendor to submit the following drawings / details along with offer for technical evaluation: 1. P&I Diagram with bill of materials 2. General Arrangement diagram 3. Schematic Instrument circuit diagram 4. Electrical circuit diagram 5. Electrical component layout drawings of all control panels and operator pendants. 6. Heat load calculation 7. Furnace efficiency calculation 8. Complete list of components in Each Burner Assembly 9. Burner capacity selection method 10. LPG consumption in Nm3/hr under following conditions, which shall be verified at the time of commissioning: a) at No load after soaking for 3 hrs at maximum furnace temperature. b) at 50% load and operating the furnace for one complete cycle from start to end of soaking cycle. 11. Burner arrangement layout drawing. 12. Drive arrangement drawings for Bogie drive & door drive with bill of materials.	Vendor to enclose	

	13. Counterbalance & door locking arrangement drawing 14. FD, Dilution & ID Fan calculation 15. Refractory arrangement with Bill of materials 16. Casting arrangements. 17. Recuperator selection and heat transfer calculation. 18. Piping routing diagram 19. Quality action plan 20. MSDS for all insulation and refractory items used in the furnace. 21. Panel layout 22. Pneumatic Circuit with bill of materials. 23. Job support pedestal drawing.		
8.2	**Documents to be submitted for BHEL approval before manufacturing:**		
8.2.1	The vendor to submit the following drawings / details for BHEL approval before manufacturing (drawing should be submitted for approval within 1 month of placing PO and approval of drawings should be obtained by vendor within 30 days from the date of submission of drawings to BHEL for approval by providing required details/clarifications by BHEL if any): 1. P&I Diagram with bill of materials 2. General Arrangement diagram 3. Schematic Instrument circuit diagram 4. Electrical circuit diagram (power and control circuit) with detailed BOM 5. Electrical component layout drawings of all control panels and operator consoles 6. Heat load calculation 7. Furnace efficiency calculation 8. Skin temperature calculation 9. Complete list of components in Each Burner Assembly 10. Burner capacity selection method 11. LPG consumption in Nm3/hr under following conditions, which shall be verified at the time of commissioning: a) at No load after soaking for 3 hrs at maximum furnace temperature.	Vendor to confirm	

	b) at 50% load and operating the furnace for one complete cycle from start to end of soaking cycle. 12. Burner arrangement layout drawing. 13. Drive arrangement drawings for Bogie drive & door drive with bill of materials. 14. Counterbalance & door locking arrangement drawing 15. FD, Dilution & ID Fan calculation 16. Refractory arrangement with Bill of materials and special shaped brick drawings 17. Casting arrangements and casting drawings. 18. Panel layout 19. Pneumatic Circuit with bill of materials. 20. Job support pedestal drawing. 21. Quality plan. 22. Recuperator selection and heat transfer calculation 23. Piping routing diagram 24. MSDS for all insulation and refractory items used in the furnace 25. Counterbalance & door locking arrangement drawing 26. FD, Dilution & ID Fan calculation 27. Refractory arrangement with Bill of materials and special shaped brick drawings 28. Casting arrangements and casting drawings. 29. Panel layout 30. Pneumatic Circuit with bill of materials. 31. Job support pedestal drawing. 32. Quality plan. 33. Recuperator selection and heat transfer calculation 34. Piping routing diagram. 35. MSDS for all insulation and refractory items used in the furnace.		
8.3	**Documents to be submitted along with Equipment:**		
8.3	Three sets of O&M manuals (3 Hard copies) in English language having the	Vendor to confirm	

	following documents should be supplied along with the furnace. Apart from the hard copies, vendor to provide the entire documentation in a single PDF including the catalogues of all bought items and the same shall be provided in a pen drive. Note: One set of all the documents (hard copy and soft copy) to be shown to the BHEL inspector at the time of inspection at vendor's works to check the sufficiency of documents.		
8.3.1	The O&M Manual should contain the following	Vendor to confirm	
A	One copy of all approved drawings.		
B	P&I Drawing of furnace		
C	Electrical Wiring Drawings – Power & Control Circuits		
D	Terminal drawings with check points shall be provided for Electronic Controls		
E	Trouble Shooting Chart for Main and all Sub-Systems		
F	Specifications, Catalogues, O&M Manuals and Engineering manuals of all bought out items including drawings, wherever applicable.		
G	All Mechanical drawings for the items manufactured / covered under scope of vendor. Mechanical drawing includes GA & Sub-assembly drawings with major and critical dimensions, material and weight.		
H	Furnace Operation Procedure for start up, purging, shutdown, Power failure interruption, Gas fluctuation condition, etc. with all safety instructions. PLC ladder diagrams (both in hard and soft copy), Additional licensed software for SCADA should be provided.		
I	Complete refractory lay out and shaped brick drawings with dimensions, including specification of refractory materials used.		
J	Complete Casting lay out and individual casting drawings with dimensions, including specification of casting materials used.		
K	Drive arrangement drawings for Bogie drive & door drive with bill of materials including specification of materials used.		
L	Counterbalance and door locking arrangement drawings for door with bill of materials including specification of materials used.		

M	Bogie sealing, Door sealing arrangement drawings.		
N	Complete details of Combustion system- Operation and maintenance.		
O	Complete Master List of spare parts used along with item part number/ specification/ type, name and address of the spare supplier		
P	Calibration certificates for all the Panel instruments, Transmitters, Flow meters, Thermocouples and test certificates for Pressure switches, modulating motors and regulators.		
Q	Complete Printed Circuit Board Schematics indicating check points (Test Points) for Electronic Controls.		
R	Complete calculations for heat load, skin temperature, burner selection, FD fan selection, refractory selection, efficiency, fuel consumption, etc.		
S	Panel layout with details for panel size, Painting, Cable entry, etc. Details and specification for contactor, MCB, Push buttons, OLR, Indication lamps, ON/OFF rotary switches, Isolators, selector switches, safety devices, etc to be provided.		
T	List of all alarms / indications / annunciator.		
U	The vendor shall submit complete Master List of parts used in the machine.		
8.4	One set of all the documents (hard copy and soft copy) to be shown to the BHEL Executives at the time of inspection at vendor's works.	Vendor to confirm	
9.0	**TRAINING:**		
9.1	The Vendor shall impart training to BHEL Operators and Maintenance crew(Mechanical, Electrical / Electronics) in Operation and Maintenance) after commissioning of the Machine at BHEL works for min 15 working days	Vendor to confirm	
10.0	**FOUNDATION:**		
10.1	Vendor shall submit the preliminary foundation drawing of furnace, blowers, chimney, bogie etc. with static and dynamic load details for getting BHEL's approval within one month of ordering. The layout should consist of all requirements pertaining to complete furnace including space requirement for Control Room, Blowers, and Stack, Rails etc. Based on input details from vendor, BHEL will design and construct complete foundation for the equipment. Supplier is requested to confirm the leveling of rails for bogie along with BHEL at site		

	during execution of civil foundation.		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
11.0	**ERECTION & COMMISSIONING**		
11.1	Vendor to take full responsibility for carrying out the erection, start up, testing & commissioning of the furnace & its control & all types of other supplied equipment. The Vendor shall arrange manpower & tools for the same	Vendor to Confirm	
11.2	Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by Vendor in their foundation/layout drawings. Fabrication requirements like gas, three phase welding machine, welding electrodes and mobile crane at site are in the scope of vendor. Welding electrode used for Mild Steel should be of 7018 grade and for other alloy materials & pipeline welding suitable grade electrodes acceptable to BHEL should be used.	Vendor to Confirm	
11.3	Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. All tests, as mentioned in clause 12.0 (Furnace Inspection & Acceptance) shall from part of the commissioning activity.	Vendor to confirm	
11.4	The Vendor should bring tools, Tackles and other necessary equipment required to carry out E&C activities.	Vendor to confirm	
11.5	The Vendor shall bring commissioning spares required for commissioning of the machine.	Vendor to Confirm	
11.6	Schedule of Erection and Commissioning shall be submitted with the offer	Vendor to Confirm	
11.7	Vendor should furnish charges, duration, terms & conditions for E & C in detail separately along with offer.	Vendor to Confirm	
12.0	**FURNACE INSPECTION & ACCEPTANCE**		
12.1	**Inspection at Vendor's works:** The furnace materials and bought-out items shall be offered for inspection to BHEL for completeness of supply at supplier's works prior to dispatch.	Vendor to Confirm	
12.1.1	Complete sub-systems as per the contract - verification of functions to the extent possible.		
12.1.2	Blowers (FD, Dilution & ID fans) to be offered for checking the performance. If		

	required it shall be offered at blower supplier's works.		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
12.1.3	Verification of Calibration certificates of instruments.		
12.1.4	Verification of Documents as per clause (**8.4**)		
12.2	**Inspection at BHEL works:** After erection of the furnace, the furnace shall be tested by the vendor for its performance prove-out as per BHEL Specifications as follows: 1. Air leak test at 6 bar pressure for all gas and air lines (no leak is permitted) 2. The furnace shall be tested and proved for 3 cycles of stress Relieving Heat treatment (Max soaking temperature 745+/-10 deg C) The heat treatment charts have to be approved by BHEL.		
12.2.1	During soaking cycle, the temperature uniformity along the length of the charge shall not exceed +/- 10 deg. C between any two thermocouples under following loading pattern in auto mode. a. The minimum load on the furnace shall be 80% of the capacity of furnace. b. The non-uniformity of loading along the length of the bogie will be maintained within 20%. If the loading pattern differs from the above, the temperature uniformity has to be maintained with manual intervention.		
12.2.2	Verification of Calibration certificates of instruments.		
12.2.3	Verification of Control logic for all functions by simulation.		
12.2.4	Verification of Pollution control norms, skin temperature, etc.		
12.2.5	Verification of Documents as per clause (**8.3.1**)		
13.0	**PAINTING:**		
13.1	**For Furnace, Recuperator & Bogies & Stack**		
13.1.1	**Primer painting:** One coat of primer painting at vendor's works and one coat of primer after erection	Vendor to Confirm	
13.1.2	**Final painting:** Vendor to paint the complete furnace chamber with 2 coats of heat	Vendor to Confirm	

	resistant Al paint (of grade 250 deg C) and the entire chimney, recuperator & flue path with 2 coats of heat resistant Al paint (of grade 600 deg C).		
S.No.	**DESCRIPTION**	**PARAMETERS**	**BIDDER'S OFFER**
13.2	**For Fans, Control Panel :** Two coats of Synthetic Enamel Apple Green Color Paint IS 5/1994. Shade :(ISC) NO-281.	Vendor to Confirm	
13.3	**Air & Gas Pipelines** : White & Yellow or as per instructions of BHEL and with indication of direction of flow marked at suitable intervals	Vendor to Confirm	
13.4	Portion, if any, of the furnace, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor.	Vendor to Confirm	

14.0	**PACKING :**		
14.1	Rigid packing for items like fans, blowers, drives, electric / electronic panels and controls and such other items susceptible to damage during transit.	Vendor to confirm	
15.0	**GENERAL**		
15.1	Furnace Model No.	Vendor to specify	
15.2	Total Connected load (KVA)	Vendor to specify	
15.3	Approximate total Floor area required (Length x Width) and Height for complete machine & accessories.	Vendor to specify	
15.4	Total weight of the furnace	Vendor to specify	
15.5	**Performance Guarantee:** The complete furnace e with accessories and all systems shall be guaranteed for a period of 12 months from commissioning or 18 months from date of dispatch whichever is earlier.		
16	**SCOPE OF SUPPLY:**		
16.1	**Supplier's Scope** 1. Design, Manufacture, Supply, Erection, Commissioning and prove out of High Temperature Solution Annealing / N&T Furnace. 2. All anchoring & foundation bolts, levelling plates for the complete furnace and its accessories and chimney 3. Levelling Instruments, Power Tools / Hand Tools for erection.		

	4. Mobile Crane/Winches for erection work where there is no reach of shop EOT crane. 5. Welding machines and consumables required for erection 6. Commissioning Engineer with erection crew Furnace calibration and Heat treatment cycles prove out		
16.2	**BHEL's Scope** 1. Drawings approval 2. Civil foundation work as per manufacturer's drawing 3. Supply and laying 90 lbs rails for bogie 4. Jobs for prove out 5. EOT Crane service inside shop 6. Compressed air supply and LPG supply at one location as indicated in the drawing Electrical Power Supply point at one location as indicated in the drawing		