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 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2621200030**	**Enquiry Date:** **08.02.2012**	**Due date for submission of quotation:** **09.03.2012**

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	**50 Ton Double Bogie Car Bottom Furnace** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**1.00 No**

Important points to be taken care during submission of offer

1. **Material shall be delivered to**
   Indigenous Vendors:
   FOR, BHEL, Stores
   Power Plant Piping Unit
   Thirumayam
   Pudukkottai Dist.
2. **Delivery required 6 months from the date of purchase order.**
3. **Grace period of 8 weeks beyond the above delivery period will be considered.**
4. **Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**
5. **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/GT/001) 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 "2621200030".

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

TECHNICAL SPECIFICATIONS for 50 TON CAPACITY DOUBLE BOGIE CAR BOTTOM FURNACE
(Fuel : Furnace Design shall be suitable for LPG and PROPANE Gas Application)

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
1.0	**PURPOSE & WORKPIECE MATERIAL :**			
1.1	**Purpose :** To heat treat all Pressure Parts like pipelines (Straight as well as bends), headers etc			
1.2	**Job Details :** Material : Mild Steel & Alloy Steel Configuration : Straight / Bend Pipes with attachments Diameter Range : 219 to 1200mm OD Wall Thickness : 12 to 120 mm Job Length : Up to 15 M Loose Job Weight : Not exceeding 20 Tons Weight of Job Lot : Not exceeding 50 Tons	Vendor to note		
2.0	**Furnace:**			
2.1	**Operating Parameters:**			
2.1.1	Charge Capacity – Excluding Job Supporting Pedestals.	Minimum : 10 Tons Maximum : 50 tons		
2.1.2	Heat Treatment Cycles to be carried out	Stress Relieving, Annealing, Normalizing & Tempering, Solution Annealing for SS		
2.1.3	Maximum Furnace Temperature	Vendor to specify		
2.1.4	Maximum Charge Temperature	1100^0C +/- 10^0C		

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2.1.5	Rate of heating (after attaining 400^0**C)** (selection has to be infinitely variable in the range specified)	35^0C to 200^0C		
2.1.6	Rate of cooling (cooling up to 400^0**C)** (selection has to be infinitely variable in the range specified)	35^0C to 200^0C		
2.1.7	Job Temperature Uniformity at soaking	$\pm 10^0$C		
2.1.8	Fuel	LPG		
2.2	**Furnace Configuration**			
2.2.1	Fuel – Gas Fired firing system	Vendor to confirm		
2.2.2	Double Bogie Configuration with Common Furnace Chamber & Top Lifting Doors	Vendor to confirm		
2.2.3	Car Bottom Bogie Traversing on embedded Rails, through a Rack & Pinion Drive with reduction gear box	Vendor to confirm		
2.2.4	Automatic Zone Temperature Control with Programming of Heat Treatment Cycle	Vendor to confirm		
2.2.5	Ceramic Fiber module refractory for doors and shell.	Vendor to confirm		
2.2.6	Hard refractory construction for bogies	Vendor to confirm		
2.2.7	Recuperator System for Energy Conservation	Vendor to confirm		
2.2.8	Job supporting Heat resistant cast iron pedestals 12 nos. for each bogie	Vendor to confirm		
2.2.9	Separate controlled cooling system arrangement for above cooling rate	Vendor to specify		
2.3	**Furnace Inside Dimensions** :			
2.3.1	Wall to Wall width	4,500 mm		
2.3.2	Inside length (Clear Chamber)	18,000 mm		

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2.3.3	Inside Height (above Bogie top and Below Chamber Roof) - BHEL requirement is 2200mm only (to suit clearance in shop floor building)	Bidder to specify design height to meet circulation requirements and to give overall height of furnace		
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 inside the furnace should be designed to create high degree of turbulence in the furnace atmosphere, increased convection heat transfer co-efficient, resulting in better uniformity and thermal efficiency even at lower temperature.	Vendor to Confirm	.	
2.4.2	Fuel	LPG		
2.4.3	LPG Gas Pressure-BHEL can supply at 2.0 kg/cm2	Vendor to Specify		
2.4.4	Max required flow rate of LPG	Vendor to Specify		
2.4.5	Burners Type-**(High Velocity Burner of Reputed make acceptable to BHEL) (Vendor to furnish model no. and technical details of burners)**	Vendor to specify		
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		

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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-Flame should not impinge on job	Vendor to Specify		
2.4.11	Type of Temperature Control	PID		
2.4.12	No. of Temperature control Zones	Four		
2.4.13	LPG gas burner material of construction shall be SS 310 inside portion.	Vendor to Confirm		
2.4.14	LPG gas igniter material of construction shall be SS 310.	Vendor to Confirm		
2.4.15	Two ways solenoid valve shall be brass material and should be flame proof as per IS: 2148 gas group class IIA, IIB.	Vendor to Confirm		
2.4.16	Isolation valves shall be fire safe design as per IS: 2148	Vendor to Confirm		
2.4.17	Vent valves opening position to be indicated in the control panel	Vendor to Confirm		
2.4.18	All vent valves shall be routed above roof to better air mix up in atm.	Vendor to Confirm		
2.4.19	All valve flanges shall be raised face with serrations.	Vendor to Confirm		
2.4.20	Wherever electrical input is available with any instrument in the LPG line such as Igniter cables, scanner related items, junction boxes, transmitter, limit switches shall be flame proof enclosure with double compression cable gland provision for cable entry/exit.	Vendor to Confirm		
2.4.21	All cables should be Flame Retardant Low Smoke design only	Vendor to Confirm		

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2.4.22	Copper cladded asbestos gasket to be used for flanges valves	Vendor to Confirm		
2.4.23	The complete piping system with all mechanical components should withstand minimum 5 bar pressure	Vendor to Confirm		
2.4.24	Provide 2 Nos. of "y" type / simplex filter with 4 Nos. of isolation valves in place of a common filter.	Vendor to Confirm		
2.4.25	Instrument impulse line shall be SS 316, Sch 40.	Vendor to Confirm		
2.4.26	Copper washer shall be provided to all pressure gauges and switches	Vendor to Confirm		
2.4.27	All Flanges should be provided with copper earthing	Vendor to Confirm		
2.4.28	One spectacle blind shall be provided for each furnace near terminal point at gas train piping.	Vendor to Confirm		
2.4.29	TIG root run welding shall be carried out for all welding joints in LPG line.	Vendor to Confirm		
2.4.30	Provide one isolation valve for all pressure gauge /pressure switch	Vendor to Confirm		
2.4.31	**Forced Draught (FD) Fan:**	Vendor to Confirm		
a)	FD Fan with VFD of suitable capacity **(including excess air)** has to be provided to ensure proper combustion	Vendor to Confirm		
b)	Air flow	Vendor to Specify		
c)	Air Pressure	Vendor to Specify		
d)	Power Rating (KW)	Vendor to Specify		
e)	Type of blower: Centrifugal	Vendor to confirm		
f)	Make of Blower- **C-Doctor/ Patel/Flakt**	Vendor to confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
2.4.32	**Induced Draught (ID) Fan:**			
a)	ID Fan of suitable capacity has to be provided before the stack	Vendor to Confirm		
b)	Air flow	Vendor to Specify		
c)	Air Pressure	Vendor to Specify		
d)	Power Rating (KW)	Vendor to Specify		
e)	Type of blower: Centrifugal	Vendor to Specify		
f)	Make of Blower- **C-Doctor/ Patel/Flakt**	Vendor to confirm		
2.4.33	The FD Fan and ID Fan have to be suitably sized to ensure a Balanced Draft System	Vendor to confirm		
2.4.34	A standby fan each for both FD and ID system has to be provided	Vendor to confirm		
2.4.35	Bell mouth (Silencer) inlet to be provided with suitable filter on the suction side of FD fan. Vendor must provide suitable handling facility for cleaning the filter element by 1 person	Vendor to confirm		
2.4.36	All the Fans (FD & ID) should comply with the following test parameters: 1. Full welding of impeller blades with the rotating base plate. 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-2372. Up to 2.8 mm/sec (RMS). 5. Dynamic balancing of impeller at rated speed.	Vendor to confirm		

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2.4.37	**Dampers** :			
a)	Damper has to be provided after the furnace hearth and before the stack in the flue gas path to regulate draught	Vendor to confirm		
b)	The damper has to work on auto mode and its opening should get adjusted automatically depending upon the draught required in the furnace (positive). (Complete details should be furnished with the offer)	Vendor to Confirm		
c)	Provision should be there to operate the damper in manual mode also.	Vendor to confirm		
2.5	**Refractory Lining:** (For Shell and doors) Ceramic fiber blocks modules 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 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 Trans boundary Movement) Rules, 2008.**	Vendor to Specify		

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2.5.1	Size of Ceramic Fiber Block Modules (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	Max.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 (Size should be under the standard manufacturing range of the supplier)	Vendor to Specify		
2.5.7	Density	Vendor to specify		
2.5.8	Max.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		
2.6	**Furnace hearth :**			
2.6.1	Side walls are to be lined with hard refractory & Insulation brick construction with Calcium silicate board backup of suitable thickness and combination equal to the top level of bogie refractory.	Vendor to Confirm		
2.6.2	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 material		
2.8	**Furnace Door:**			
2.8.1	Number of Doors	Two		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
2.8.2	Operation	**Vertical**		
2.8.3	**Drive:** Electric drive with Speed reduction Gear Box, Electromagnetic Brake etc. for each 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	Provision should be made on the door for sand sealing at the roof and bottom in the bogie in closed position of the door. (Complete details should be furnished with the offer)	Vendor to confirm		
2.8.6	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		
2.8.7	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		
2.8.8	Interlock should be provided so that bogie can be operated only when door is completely open.	Vendor to confirm		
2.8.9	All the pneumatic equipments and interlock elements are to be suitably protected from failure due to heat from the furnace	Vendor to confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
2.8.10	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		
2.8.11	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) (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, convective heat transfer arrangement. MOC shall be SS310 hot face and SS304 cold face. **(Complete details of construction should be furnished with the offer)**	Vendor to confirm		

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2.10.2	Recuperator has to pre-heat the air to 400 Deg.C. Recuperator Bypass with suitable valves to be provided **Thermal calculation to be enclosed**	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)	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 enture 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 height of the chimney shall be the Height calculated by the above formula OR 20m(Bldg height 14M) whichever is higher	Vendor to confirm		

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2.12.3	At two planes (one at 2.0 meters from the ground level and the other at 6 D height of the chimney. Where D is the inner diameter of the chimney), four portholes shall be provided at 90 deg each. 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. Staircase 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 rungs shall be provided from roof top to top of the chimney	Vendor to confirm		
2.12.7	The stack shall be provided with a weather cowl	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.	Vendor to Confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
2.13	**FURNACE BOGIES**:			
2.13.1	Number of Bogies	Two		
2.13.2.	Furnace Bogie Dimension a)	Length 15,000 mm		
	b)	Width 4,000 mm		
	c) from ground	Height 800 mm		
2.13.3	The bogies 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 bogie should be able to be moved out sufficiently for carrying out the maintenance work.	Vendor to Confirm		
2.13.5	Top layer of Bogie has to be lined with IS 8 quality firebricks backed by lightweight firebricks and calcium silicate board back up of suitable thickness. (Complete details should be furnished with the offer)	Vendor to Confirm		
2.13.6	Around the periphery, special shaped bricks of IS 8 quality has to be positioned	Vendor to Confirm		
2.13.7	Heat resisting gray iron castings has to be positioned around the periphery of the bogie to support the refractory.	Vendor to Confirm		
2.13.8	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.	Vendor to Confirm		

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2.13.9	The peripheral bottom of the furnace hearth has to be lined with special shaped bricks to match with the shaped bricks on the bogie periphery.	Vendor to Confirm		
2.13.10	The sealing between bogie and the hearth has to be designed suitably to avoid heat transfer from furnace while furnace is under operation	Vendor to Confirm		
2.13.11	The bogies are 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		
2.13.12	The Bogie structure has to be designed to give minimum deflection under different load conditions.	Vendor to Confirm		
2.13.13	The complete bogie with refractory to be supported on the set of cast wheels through trolley arrangement –one set guided and other set plain wheels	Vendor to Confirm		
2.13.14	It should be ensured that all the wheels share the load to the maximum extent.	Vendor to Confirm	.	
2.13.15	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		
2.13.16	KW Rating of Bogie Drive	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	Vendor to Confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details))	DEVIATION / REMARKS
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	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	a) 415V with fluctuation of +/- 10%, 50HZ +/-3 %, 3 Phase AC power supply will be provided by BHEL at a single point near the furnace in the control room, as per layout recommended by Vendor. b) 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. **c)** 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.	Vendor to Confirm		

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2.15.5	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 Amp AC. All adapters / receptacles should have compatibility with Indian equivalents.	Vendor to Confirm		
2.15.6	Motors & other electrical components shall conform to IEC or Indian standards	Vendor to Confirm		
2.15.7	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to Confirm		
2.15.8	Vendor should ensure the proper earthing for the furnace and its peripherals.	Vendor to Confirm		
2.16	**JOB SUPPORT PEDESTAL**:			
2.16.1	Number of job support pedestals to be placed on each bogie	Total 24 Nos. for the two bogies		
2.16.2	**Material:** Heat resistant cast iron as per **IS 4522 grade-11**	Vendor to Confirm		
2.16.3	Size: **350 x 300 x 3750 in mm (Height x Width x Length)**	Vendor to Confirm		
2.16.4	Max Weight of each pedestal	Vendor to specify		

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3.0	**SAFETY ARRANGEMENTS:**			
3.1	Following safety features in addition to other standard safety features should be provided on the machine:			
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	Emergency switches should be provided at suitable locations	Vendor to Confirm		
3.7	4 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	Vendor to Specify		

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4.0	**INSTRUMENTATION & CONTROL SYSTEM :**			
4.1	All controls will be located in a Control Room 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 (4 Zones) Auto/Manual with PID tuning. Make. Yokogawa, Eurotherm and Chino.	Vendor to Confirm		
4.3	Furnace over temperature control (4 Zones) to be made available at control panel only.	Vendor to confirm		
4.4	Vendor to offer temperature control for individual zones with inbuilt error message indication type burner sequential controller for individual burners. (Complete details should be provided along with the offer). Make: Esapyronics, Honeywell, Kromschroder	Vendor to confirm		
4.5	Recuperator protection for preheat temperature control.	Vendor to confirm		
4.6	The system shall comprise, but not be limited to the following:			
4.6.1	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 of inconel with adjustable flange 1 metre long. Asbestos compensating cables to be provided for heat resisting	Vendor to confirm		

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4.6.2	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 is vendor's scope.	Vendor to confirm		
4.6.3	Suitable rated modulating motors / Control elements for 4 Zones	Vendor to confirm		
4.6.4	Mass flow based zonal control system for temperature controls-This has been indicated in 4.2.	Vendor to confirm		
4.6.5	Minimum 16 Point Micro Processor based temperature recorder with chart width 250 mm along with 50 nos. of chart paper packs. Make. Yokogawa, Eurotherm and Chino.	Vendor to confirm		
4.6.6	Pressure switches, flow transmitters for gas, air and control elements.	Vendor to confirm		
4.6.7	Furnace pressure transmitters and control elements	Vendor to confirm		
4.6.8	Instruments cables and compensating cables	Vendor to confirm		
4.6.9	Piping for air, LPG and pneumatics.	Vendor to confirm		
4.6.10	Junction boxes	Vendor to confirm		
4.6.11	Any other requirement to complete the system	Vendor to specify		
4.7	Possibility of over viewing the status in the control room.	Vendor to Confirm		

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4.8	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		
4.9	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	Vendor to Confirm		
	c) Safety system and alarm indication required are to be indicated.	Vendor to Confirm		
4.10	Separate panels should be provided for instruments, Burner sequence controller. Separate Control transformer (415V/230V) should be provided for the Instrumentation panel**.**	Vendor to Confirm		
4.11	PI Diagram, schematic circuit diagram for instruments control system to be submitted along with offer	Vendor to Confirm		
4.12	Suitable UPS supplied by vendor for recording temperature for max 30 minutes in case of power failure	Vendor to confirm		
4.13	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		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
4.14	Gas Train System details to be given for all the components with P & I Diagram. Suitable pres-sure 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**.**	Vendor to Confirm		
4.15	Burner purge cycles with adequate purging time for safe operation shall be provided.	Vendor to Confirm		
4.16	Manual Gas Shut Off Valve shall be provided apart from the safety shutoff valve in the gas train.	Vendor to confirm		
4.17	Push button Control Station shall be provided near the furnace for all manual operations	Vendor to confirm		
4.18	Local push button stations shall also be provided for roller conveyors, fans and door drives	Vendor to Confirm		
4.19	Maintenance platform at suitable height for instrumentation to be provided	Vendor to confirm		
4.20	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.			

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
4.21	Ignition & Flame Supervision: Spark igniter of high voltage type (H.V) to be used. The flame monitoring system to be with U.V. scanner or Ionization rod 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 furnace sequence controller.			
5.0	**LEVELLING & ANCHORING SYSTEM**			
5.1	Complete anchoring system including foundation bolts, anchoring materials, leveling shoes etc should be supplied	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, Grease Guns etc. for Furnace operation & maintenance, shall be supplied & list shall be submitted with offer	Vendor to Confirm		
7.0	**SPARES :**			
7.1	Itemized breakup of mechanical, pneumatic, electrical , electronic, instrumentation and refractory spares used on the furnace in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on 3 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		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
7.2	**Mechanical & Pneumatic Spares :** All types of Valves, Filters, Pressure Switches, Transducers, Flow Switches, actuators etc.	Vendor to Specify		
7.3	**Electrical / Electronic :** All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor fuses, Special Fuses, Circuit Breakers, Main Power Switch, spars for Field Sensors etc.	Vendor to Specify		
7.4	Following spares to be quoted compulsorily a. Burner 2 Nos. b. Burner Blocks 20 Nos. c. Gas Solenoid Valve 4 Nos. d. UV Flame Detector/ Ionization rods 4 Nos. e. Thermocouple-duplex 6 Nos. **f.** Flow transmitter for gas 1 No. **g.** Flow transmitter for air 1 No. h. Pressure switch for gas 1 No. i. Pressure switch for air 1 No. j. Furnace Pressure transmitter 1 No. k. Actuator for gas 2 No. l. Actuator for air 2 No. m. Seal kit for pneumatic cylinder 1 Set. **n.** PID type digital controller 1 No. **o.** Push button 1 Set. **p.** Relays 1 Set. **q.** Indication lamp 1 Set	Vendor to Confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION / REMARKS
7.4	r. Limit switches 4 Nos. s. Contactors 1 Set **t.** Fuse 1 Set u. Ribbon cartridge 3 Nos. v. Burner sequential controller- 6 Nos. w. Excess temp controller- 1no. x. Air solenoid valve 4 Nos.	**Vendor to Confirm**		
7.5	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		
7.6	All electrical cables used shall be of copper core only	Vendor to Confirm		
8.0	**DOCUMENTATION** Five sets of following documents in English shall be supplied along with Furnace Materials			
8.1	Operating & Maintenance Manuals of Furnace	Vendor to confirm		
8.2	The O&M Manual should contain the following	Vendor to confirm		
	a. Drawing of the Furnace.			
	b. GA Drawing of Individual Mechanisms.			
	c. Sub-Assembly Drawings (without dimensions) for sub-systems for maintenance purpose			
	d. Dimensional Sketches (plan, front and side view) of the entire panel and detailed view of position and layout of controls, display and other man machine interface shall be submitted for ergonomics			
	e. Furnace Control Schematics			
	f. Electrical Wiring Drawings – Power & Control Circuits			

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
	g. Pneumatic Circuit Diagram			
	h. Engineering manual for the controller			
	I. Back up programmed for the controller with necessary licensed software			
	j. Complete Printed Circuit Board Schematics indicating check points (Test Points) for Electronic Controls			
	k. Trouble Shooting Chart for Main and all Sub-Systems	Vendor to confirm		
8.3	One Hard Copy of O & M Manual shall be submitted at the time of inspection of the furnace by BHEL Officials	Vendor to confirm		
8.4	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.	Vendor to confirm		
8.5	The vendor shall submit complete Master List of parts used in the machine.	Vendor to confirm		
8.6	One additional sets of all the above documentation on CD	Vendor to confirm		
9.0	**TRAINING:**			
9.1	The Vendor shall impart training to BHEL's Operators and Maintenance crew in Operation and Maintenance (Mechanical, Electrical / Electronics and Control system) after the commissioning of the Machine at BHEL works for not less than 15 working days	Vendor to confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
10.0	**FOUNDATION:**	Vendor to Confirm		
10.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Purchase order. The layout should consist of all requirements pertaining to complete furnace including space requirement for Control Room, Blowers, and Stack, Rails etc. Vendor shall furnish the foundation layout and static and dynamic load details within 3 months of Purchase order. BHEL shall design and construct complete foundation for the furnace as per the Vendor's recommendation			
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 free of cost. Fabrication requirements like gas, electrode at site is in the scope of vendor BHEL will also provide EOT crane for handling and lifting during erection at site free of cost	Vendor to Confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
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 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 all above activities.	Vendor to confirm		
11.5	The Vendor shall bring commissioning spares required for commissioning of the machine within stipulated time	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	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		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
12.2	The furnace shall be tested by the vendor for its performance prove-out as per BHEL Specifications, at BHEL after erection & commissioning. The furnace will be tested and proved utilizing One cycle in each of following category. 1. Normalizing (only rate of heating and soaking involved) at 885±15, 935±15, 1050± 10 deg C 2. Stress Reliving (Involves Rate of heating, soaking, and rate of cooling) at 610 ±15, 655±15, 695±15, 745±15, 760±10 deg C	Vendor to Confirm		
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 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 400 deg C). All new fabricated items to be painted after 1 coating of primer paint	Vendor to Confirm		
13.2	**For Fans, Control Panel** : Two coats of IS 281 Synthetic Enamel Apple Green Color Paint	Vendor to Confirm		

S.No.	DESCRIPTION	PARAMETERS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
13.3	**Air & Gas Pipelines** : Two coats of Blue & Yellow color synthetic enamel paint or as per instructions of BHEL and with indication of direction of flow marked at suitable intervals	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	**GUARANTEE :**			
15.1	12 months from the date of commissioning and acceptance at BHEL works or 18 months from the date of supply whichever is earlier.	Vendor to confirm		
16.0	**GENERAL**			
16.1	Furnace Model Number	Vendor to specify		
16.2	Total Connected Load (in kava)	Vendor to specify		
16.3	Floor Area Required (by Length, Width, and Height) for completes the furnace with all the accessories.	Vendor to specify		
16.4	Total weight of the furnace (with tentative weight for individual assemblies / modules)	Vendor to specify		
17.0	**QUALIFYING CRITERIA FOR BID ACCEPTANCE**			
17.1	Only those BIDDERS (**Original Equipment Manufacturers**), who have supplied and commissioned at least **ONE** number **of LPG FIRED DOUBLE BOGIE HEARTH FURNACE** with a minimum charge carrying capacity of 50Tons in each bogie and suitable for operating at a furnace temperature of 1200 °C or higher in the past FIVE years (on the date of opening of Technical Bid of the Tender) and such a FURNACE is presently working satisfactorily (for more than one year from the date of commissioning at the customer's works (reference date is Technical Bid opening date of the Tender), will be entertained to quote for this BHEL Tender.			

S.No.	SPECIFICATION REQUIREMENTS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
17.1	However, if such a FURNACE had already been supplied to any of BHEL Unit/Division, then that FURNACE shall presently be working satisfactorily and any remarks on the performance of the subject FURNACE in total or any sub-system or bought-out items forming part of the subject FURNACE and the QUALITY of the AFTER-SALES SERVICE SUPPORT rendered by the BIDDER will be a reckoning point in technical evaluation of the TECHNICAL BID submitted.		
17.2	The BIDDER shall submit the following information, provided the BIDDER satisfies the above tender clause :		
17.2.1	Name and Complete Postal Address of the COMPANY / FIRM/INDUSTRY – Bidder's Customer, where the BIDDER supplied FURNACE (S) is/are working .		
17.2.2	Name and contact address with e-mail id and telephone & fax numbers of the customer's authorized person for seeking feedback on the performance of the furnace (as per the above Clause No. 1.0) is installed.		
17.2.3	Month and Year of installation and commissioning of the subject furnace (as per Clause No.1.0) at the customer's works.		
17.2.4	Application / End Use for which the subject furnace (as per Clause No.1.0) is deployed by the Bidder's Customer		
17.2.5	Along with the Technical Bid / Offer, the Bidder shall submit one Performance Feedback Certificate from the Bidder's Customer(s) for the satisfactory performance of the FURNACE supplied. For submitting the Performance Certificate in the original letter head of the customer, a sample format is provided in ANNEXURE -A**.**		
17.2.6	BHEL reserves the right to verify the information provided by the Bidder under the above listed tender clauses. In case, any of such information provided by Bidder is found to be false/ incorrect/mis-guiding, the offer shall be rejected.		

S.No.	SPECIFICATION REQUIREMENTS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
17.3	The BIDDER has to furnish the PROFILE of the Company bringing out the aspects such as the Source of Technology for Furnace Design, Manufacture, Installation & Commissioning		
17.4	Financial Background of the Company with copies of three year's Financial Balance Sheet – to assure the financial position for undertaking such a contract (in case of order realization on the Bidder) with sustainability and solvency.		
17.5	Detailed List of Manufacturing and Testing Facilities owned by the Bidder for the manufacture of the components / sub-assemblies required to build the entire furnace.		
17.6	The BIDDER has to furnish Reference List of Customers, with full address, details of contact person, where Double Bogie Hearth Furnaces have been supplied in the past.		
17.7	Details of Double Bogie Hearth Furnace supplied to other BHEL units, if any. (such as Year of Commissioning, Furnace Dimensions, Charging Capacity, Operating Temperature, etc.)		
17.8	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in South India, to attend to BHEL's Service Needs within response period of maximum 48 hours.		
17.9	Any Additional Data to supplement the competency, manufacturing capability and capacity of the BIDDER, for the tendered FURNACE.		

S.No.	SPECIFICATION REQUIREMENTS	BIDDER'S OFFER (With Complete Technical Details)	DEVIATION/ REMARKS
18.1	The BIDDER shall submit the offer in TWO PARTS. 1. Technical Offer [with PART A & PART B] & Commercial Offer [without Price Portion] 2. Price Bid.		
18.2	The Technical Offer shall contain a comparative statement of Technical **Specifications listed by BHEL** and the **Offer Details submitted by the Bidder**, against each clause. IMPORTANT : A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement where specific details are required, may lead to disqualification of the Technical Offer without any notice from BHEL Side .		
18.3	The Technical Offer shall be supported by Product Catalogues & Data Sheets and also technical details of Bought-Out-Items with copies of Product Catalogue to the extent possible.		
18.4	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply & Work at BHEL Site and the Un-Priced Part of the Price-Bid, for the confirmation of the above.		
18.5	DELIVERY - The bidder shall quote the best possible delivery. However the delivery shall not exceed SIX months with an additional grace period of TWO months. The additional grace period will attract a penalty which is explained in the commercial terms of the enquiry. The Delivery Period includes the process of seeking approval by BHEL for the General Arrangement Drawing for the Total Furnace and the Specifications/makes of the Bought-Out Items . The delivery period shall be reckoned from date of release of LOI/Purchase Order to dispatch of last item from the Bidder's / Sub-vendor's Works.		

ENCLOSURE : ANNEXURE – A (as Page No.33)

PERFORMANCE CERTIFICATE

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

1. Supplier of the FURNACE		
2. Make & Model of the FURNACE		
3. Month & Year of Commissioning		
4. Application for which FURNACE is deployed / used		
5.	**FURNACE SPECIFICATIONS** : a) Length b) Width c) Vertical Clearance d) Operating Temperature e) Charge Carrying Capacity per Bogie f) Total Connected Load in kVA	
6. Performance of the FURNACE (Strike off whichever is not applicable)		Satisfactory / Good / Average / Not Satisfactory
7. After Sales Service rendered by the Furnace Supplier - OEM (including SUB-VENDORS)		Satisfactory / Good / Average / Not Satisfactory
8. Any Other Special Remarks		
Date:		Signature & Seal of the Issuing Authority