Ref No. WEX/Furnace/EOI/ 01/2012-13 Dt. 06.07.2012

Annexure-I

RECONDITIONING, UPGRADATION AND RETROFITTING OF Bogie Hearth Electric Furnace (Plan No 0-045) installed in Block-2

Description of Bogie Hearth Electric Furnace (Plan No 0-045) installed in Block-2:

Bogie Hearth Single ended Furnace meant for Stress relieving/annealing/normalizing etc. of ferrous components as per the preset (adjustable time-temperature program). It consists of: heating chamber/framework. Lining and heating cells, movable hearth, door, portal (column and frame with door shifting drive) hearth shifting drive, contact joint and electric system. Furnace framework is made from separate panels. The front wall is a cast structure. Hearth sidewall is a cast structure too. Supplying for hearth heaters is effected over contact joint, movable joint contacts are fastened to hearth frame. The hearth runs on the rollers, connected to a common chain.

Furnace working space is separated from surrounding area by sand seal. Hearth along railway moves using electro-mechanical drive, installed into the groove in front of furnace. Hearth chamber lining is multi-layered. Hearth door is a cast structure; door weight is counter-balanced, placed in the vertical columns. Door is lifted using electromechanical drive.

Heaters of zones I-IV 135KW each are star joint and V^{th} zone 240KW is connected in delta. Zones switching is done by contactors.

Hearth shifting is possible only when door is completely opened.

Door lowering is possible only when hearth is pushed into the furnace completely.

The furnace has five zones controlled through a six-point recorder through relay output. At present there are no other controllers. There is another six point recorder for job temperature recording.

A. Physical and operational details of existing furnace:

Furnace Power: 780 KW

Batch capacity (Gross Load) - 10 Tons

Working space dimension:		
Length : 4600 mm	**Width :** 2300 mm	**Height :** 1600 mm
Furnace Dimension:		
Length : 16600 mm	**Width :** 6200 mm	**Height :** 7800 mm
Door opening height : 1600 mm		
Working height of the Bogie Top : 1300 mm (maximum)		
Maximum working Temperature : 1000 ° C (this temperature will be maintained for 4 hours (maximum).		
Temperature of heated charge : 900 ^{0}C **Heating Rate :** 80 ^{0}C/Hr Maximum **Cooling Rate:** 20 ^{0}C/Hr Minimum		
Mode of Temperature control : Direct on-line power contactor connected to 3-phase power supply		
No of thermal zones : 5 *nos* Temperature uniformity in the zone : +/- 5 ^{0}C of set value		
Furnace outer wall temperature: 3*0* ° C maximum above ambient temperature.		

B. BROAD SCOPE OF WORK:

(For the entire work defined, Supply, Installation and Commissioning is included in vendor's scope)

The furnace retrofitting/reconditioning/up gradation is to be done in accordance with up-to date standards and special care is to be taken to ensure ease of operation and maintenance, accuracy of heating and safety etc. to suit automatic operation of the furnace as per the parameters given above. It includes:

1. Replacement of the refractory lining, insulation, heating elements & supports inside the furnace of side walls, top, bottom & on door with latest Technology refractory lining/Ceramic Fibre Modules/ Ceramic Fibre Blanket etc & heating elements to achieve the original working temperature of the furnace. Insulation of Walls, Roof, Door and Bogie is to be done with proper insulating materials (Ceramic Fibre Blanket, Ceramic Fibre Module etc or its combination) of appropriate thickness.
2. Heating elements of reputed make suitable for 1000 ^{0}C must be used.
3. **Mode of Temperature control will be:** Proportional through Thyristor / IGBT Power Controller (preferably Eurotherm* Make) with control accuracy +-1 ^{0}C and range 0-1200 ^{0}C, input signal : Universal, output signal : 4-20 mA DC, accuracy : +/-0.3%FSD. It will require appropriate programmable controllers with safety controller and recorder for job temperature recording along with thermocouples.
4. Installation and commissioning of New Power drives (preferably Eurotherm* Make) of required capacity as per zone requirement is to be done.
5. Installation of New Electrical control panels accommodating power drives and other electrical switch gears (SIEMENS/L&T/GE make) with proper cooling. MCCB for each zone has to be provided.
6. All necessary sensors (thermocouples etc.) along with display units, annunciators are to be installed.
7. Duplex type Thermocouples of reputed make for measuring Job Temperature must be provided.
8. K-type compensating cable should be used.
9. Bogie top plates, made of Casting Hearth Plate Segments with Tongue & Grove design of adequate thickness are to be installed. Brick retainer casting of adequate thickness and Sand sealing, made of sand sealing material-HRCI are to be done.
10. Reconditioning of Bogie pushing & drawing mechanism
11. Reconditioning of Door's opening and closing mechanism.
12. Provision of manual setting of temperature is also to be provided in case of problem in auto-mode.
13. A Temperature recorder (Chino/Eurotherm/Honeywel Make) able to plot the T-T diagram with date & time log and different color for different thermocouples (Recorder with minimum 8 Channels / recorder) is to be installed.
14. Necessary safety interlocks to be provided for safe operation of furnace. Provision of "Emergency Stop" is to be provided.
15. The complete furnace system shall be suitable for continuous operation to its full capacity for 24 hours a day and 7 days a week throughout year.

16. Any work (mechanical / electrical / Electronics / Instrumentation) not mentioned in this scope of work but necessary to keep the furnace in working condition with all features and accuracies will be in the scope of the contractor.

Supply of all necessary items/components will be in vendor's scope. Engineering and Designing of furnace is to be done by vendor and same should be mentioned and explained in the offer.

- Eurotherm's drives are already being used in different furnaces installed in HEEP,BHEL Haridwar.

Expression of Interest Requirements:

Qualifying Criteria:

Only those vendors need to send offers who have done similar type of work i.e. they have either manufactured, supplied and commissioned new furnaces of similar size and nature or have retrofitted similar type and size of furnaces or both during last 5 years along with following details:

Sl.No	Description		Details	Enclosure
1.	Organization Details			
2.	Contact Person Details			
	2.1	Name & Designation		
	2.2	E-mail Id		
	2.3	Contact No.		
3.	Details of work of similar nature done or New furnaces manufactured/supplied and commissioned along with the details of Customers, year(s) of commissioning and value of purchase orders during last 5 years.			
4.	Audited balance sheets of last 3 financial years i.e. 2009-10, 2010-11, and 2011-12.			
5.	Current order book position			
6.	Any other relevant note, if any			

Interested vendors may visit HEEP, BHEL Haridwar plant if they so desire to see the furnaces on any working day between 09:00AM and 04:00PM before submitting their offers.