Ref No: WEX/Furnace/EOI/02/2012-13 Dated 06/07/2012

Annexure-I

RECONDITIONING, UPGRADATION AND RETROFITTING OF 5 No's FURNACES INSTALLED IN HEAT TREATMENT SHOP, BLOCK-3, HEEP, BHEL, HARIDWAR - 249403
(Details are given below)

FURNACE 1 & 2: ELECTRICAL BOX FURNACES PLAN NOS. 7-017 & 7-018

(A) Brief Description of the Electrical Box Furnaces :-

Electrical Box Furnaces are meant for Stress relieving/annealing/normalizing etc. of ferrous components as per the preset (adjustable time-temperature program). The furnace consists of shaped refractories, heating elements and a pusher-drawer mechanism.

The furnace is loaded / unloaded by means of the pusher-drawing mechanism, provided with special charging device. This charging device is motor driven (1.7 KW, 1420 RPM, 3-Phase AC Motor). The parts to be heated are charged on the pusher-drawer mechanism and are placed before the furnace door. The furnace door is raised manually by means of door lifting mechanism chain. The channels of the pusher-drawer mechanism are thrown away on the charge opening apron. The parts placed on the four trays are pushed into the furnace. The tray moves on the balls which are laid into the four channels of the pusher-drawer mechanism as well as into the furnace channels. The trays are hooked by means of two pins of the pusher-drawer mechanism carriage. The rail track for the pusher-drawer mechanism is laid from the furnace to the loading/unloading platform. The furnace channels and the pusher-drawer mechanism channels coincide each other when the pusher-drawer mechanism is at the furnace door.

Common Specs :-

Furnace Working Dimensions (mm) : 910 x 1825 x 615

Furnace Power Rating = 100 KW

Max. Working Temp = 860 Deg. C

Heating time up to working temp = 8.5 Hrs.

Charge Capacity = 3000 Kg

Metal Structure Weight = 4000 Kg

Total Furnace Weight = 9500 Kg

Mode of Heating = Electrical Resistance Heating

No. of Control Zone = 1

Type of Temperature Control = ON/OFF using Power Contactors

Power Supply = 415V/50Hz/3-Phase 3-Wire

Rail Track Width = 1450 mm

Usage : Both the furnaces are used for Hardening, Tempering, Normalizing & SR application

(B) <u>Broad Scope of Work :</u> (ELECTRICAL BOX FURNACES PLAN NOS. 7-017 & 7-018)

(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.

1. Reconditioning, retrofitting and up gradation of the complete furnace to suit automatic operation of the furnace as per the **parameters given above**.
2. Replacement of the refractory lining, 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.
3. Mode of Temperature control will be: Proportional through Thyristor / IGBT Power Controller
4. Installation and commissioning of New Power drives of required capacity as per zone requirement is to be done.(Preferably Siemens / Eurotherm Make)
5. Installation of New Electrical control panels accommodating power drives and other electrical switch gears (Preferably Siemens/L&T/GE Make) with adequate cooling arrangement. MCCB for each zone has to be provided.
6. All Cabling related to power, controller, printer, thermocouples, instrumentation etc.
7. All necessary sensors & feedback elements like thermocouples, limit switches, flow switches, pressure switches etc. along with display units, annunciators are to be installed and commissioned.
8. Duplex type Thermocouples for measuring Job Temperature & K-type compensating cable should be used.
9. Reconditioning of Charge pushing & drawing mechanism/ Rail Track.
10. Reconditioning of Door's opening and closing mechanism.
11. Insulation of Walls, Roof & Door is to be done with proper insulating materials (Ceramic Fibre Blanket, Ceramic Fibre Module etc or its combination) of adequate thickness is to be done.
12. Control of HEATING / COOLING of the furnace is to be done using PID programmable temperature 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.
13. Provision of manual setting of temperature is also to be provided in case of problem in auto-mode.
14. A new Temperature recorder (preferably Eurotherm 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 and interfaced.
15. Necessary safety interlocks to be provided for safe operation of furnace.
16. 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.
17. Necessary repair work on the outer wall / body of the furnace & on the Charge Pusher/Drawer mechanism.
18. Any work (mechanical / electrical / Electronics / Instrumentation) not mentioned in this scope of work but is necessary to keep the furnace in working condition with all features and accuracies are in the scope of the contractor.

FURNACE 3 & 4: ELECTRICAL CHAMBER FURNACES PLAN NOS. 7-049 & 7-051

(A) Brief Description of the Electrical Chamber Furnaces :-

Furnace No-3 , Plan No. 7-049 , Chamber Dimensions (mm) : 1300 x 500 x 1000

Furnace No-4 , Plan No. 7-051 , Chamber Dimensions (mm) : 1300 x 520 x 945

Common Specs :-

Max. Working Temp = 1200 Deg. C

Rating = 50KW

Batch Capacity = 200 Kgs

Mode of Heating = Electrical Resistance Heating

No. of Control Zone = 1

Type of Temperature Control = ON/OFF using Power Contactors

Power Supply = 415V/50Hz/3-Phase 3-Wire

Door = Manual up/down type using pulley

Usage : Both the furnaces are used for Hardening, Tempering, Normalizing & SR application

(B) <u>Broad Scope of Work :</u> (ELECTRICAL CHAMBER FURNACES PLAN NOS. 7-049 & 7-051)

(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.

1. Reconditioning, retrofitting and up gradation of the complete furnace to suit automatic operation of the furnace as per the **parameters given above**.
2. Replacement of the refractory lining, 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.
3. Mode of Temperature control will be: Proportional through Thyristor / IGBT Power Controller
4. Installation and commissioning of New Power drives of required capacity as per zone requirement is to be done.(Preferably Siemens / Eurotherm Make)
5. Installation of New Electrical control panels accommodating power drives and other electrical switch gears (Preferably Siemens/L&T/GE Make) with adequate cooling arrangement. MCCB for each zone has to be provided.
6. All Cabling related to power, controller, printer, thermocouples, instrumentation etc.
7. All necessary sensors & feedback elements like thermocouples, limit switches, flow switches, pressure switches etc. along with display units, annunciators are to be installed and commissioned.
8. Duplex type Thermocouples for measuring Job Temperature & K-type compensating cable should be used.
9. Door's opening and closing mechanism is to be modified / improved with locking facility.
10. Insulation of Walls, Roof & Door is to be done with proper insulating materials (Ceramic Fibre Blanket, Ceramic Fibre Module etc or its combination) of adequate thickness is to be done.
11. Control of HEATING / COOLING of the furnace is to be done using PID programmable temperature 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.
12. Provision of manual setting of temperature is also to be provided in case of problem in auto-mode.
13. A new Temperature recorder (preferably Eurotherm 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 and interfaced.
14. Necessary safety interlocks to be provided for safe operation of furnace.
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. Painting of both the Furnaces with two coats of reputed brand of Aluminum heat resistant paint. Painting should be carried out according to the standard procedure for painting including cleaning and removing old paint, applying metal primer putty etc.
17. Necessary repair work on the outer wall / body of the furnace.
18. Any work (mechanical / electrical / Electronics / Instrumentation) not mentioned in this scope of work but is necessary to keep the furnace in working condition with all features and accuracies are in the scope of the contractor.

FURNACE 5: GAS NITRIDING ELECTRICAL PIT FURNACE PLAN NO. 7-031

(A) Description of Gas Nitriding Electrical Pit Furnace (Plan No 7-031) Installed in Block-3:

Electrically heated pit type Gas Nitriding furnace is used for gas nitriding & tempering to relieve stress after machining of steel parts. The furnace is fabricated of a mild steel chamber with reinforcements and a lid. Both the chamber and lid are suitably insulated with refractory bricks and ceramic fibre modules. The Furnace is having a re-circulating Fan on the door cover for temperature uniformity and gas circulation in the chamber. The door lifting is through a 3-phase AC motor with in-built brakes, the door turning is manual using handle.

Specifications of the furnace:-

Furnace Power Rating	= 120 KW
Mains Power Supply	= 415VAC/50HZ/3-Phase 3-Wire
Max. Working Temperature	= 650 Deg. C.
Batch Capacity	= 2000 Kg (Single Charge)
No. of Electrical Control Zone	= 2
Power Capacity of each Zone	= 60 KW
Atmosphere in the Furnace	= NH_3 + N_2 + H_2
Ammonia Consumption	= 2.5 Kg/Hr
Water Consumption	= 0.8 m^3/hr
Ideal Running Power Capacity	= 16 KW
Working Dimensions of the Furnace (mm)	= 800 (dia) x 2400 (height)
Overall dimension of the furnace (mm)	= 1940 (width) x 2600 (length) x 5650 (height)
Total Furnace Weight	= 10300 Kg

Mode of Temperature control = ON/OFF through Power Contactor

Door = Lifting is through a 3-phase AC motor with in-built brakes, the door turning is manual using handle.

(B) Broad Scope of Work: (GAS NITRIDING ELECTRICAL PIT FURNACE PLAN NO. 7-031)

(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.

1. Reconditioning, retrofitting and up gradation of the complete furnace to suit automatic operation of the furnace as per the **parameters given above**.
2. Replacement of the refractory lining, 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.
3. Mode of Temperature control will be: Proportional through Thyristor / IGBT Power Controller
4. Installation and commissioning of New Power drives of required capacity as per zone requirement is to be done.(Preferably Siemens/Eurotherm Make)
5. Installation of New Electrical control panels accommodating power drives and other electrical switch gears (Preferably Siemens/L&T/GE Make) with adequate AC/cooling arrangement. MCCB for each zone has to be provided.
6. All Cabling related to power, controller, printer, thermocouples, instrumentation etc.
7. All necessary sensors & feedback elements like thermocouples, limit switches, flow switches, pressure switches etc. along with display units, annunciators are to be installed and commissioned.
8. Duplex type Thermocouples for measuring Job Temperature & K-type compensating cable should be used.
9. Supply, Installation & Commissioning of centrifugal type 3-Phase AC Re-circulating fan on the Door cover with proper interlocking features & feedback elements.
10. Reconditioning & Retrofitting of Water supply, Ammonia supply & exhaust system.
11. Insulation of Walls, Roof & Door is to be done with proper insulating materials (Ceramic Fibre Blanket, Ceramic Fibre Module etc or its combination) of adequate thickness is to be done.
12. Control of HEATING / COOLING of the furnace is to be done using PID programmable temperature 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.
13. Provision of manual setting of temperature is also to be provided in case of problem in auto-mode.
14. A new Temperature recorder (preferably Eurotherm 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 and interfaced.
15. Necessary safety interlocks to be provided for safe operation of furnace e.g.
    - Interlock of Heating Elements with Re-circulating Fan
    - Interlock of Heating Elements with Water Supply
    - Interlock of Re-circulating fan / Heating Elements with Door cover
16. 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.
17. Any work (mechanical / electrical / Electronics / Instrumentation) not mentioned in this scope of work but is necessary to keep the furnace in working condition with all features and accuracies are in the scope of the contractor.

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 & size of furnaces or both during last 5 years along with following details :-

S. 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 09:00 AM to 04:00 PM before submitting their offers.