

**SPECIFICATION FOR DEVELOPMENT OF AN AUTOMATED SPLIT
TYPE FURNACE FOR SR OF HIGHER RATING
HEAT EXCHANGER JOINTS.**

SPECIFICATION NO. :-MTD-HCM-10-08-276

1. GENERAL:-

Presently, we have a Vertical Split Type LPG fired Stress Relieving (SR) furnace, having 2 nos. of High Velocity burners of capacity 10,00,000 BTU/Hr. The same are controlled by a EURO THERM 2604 Dual cycle controller. With the increased thickness of jobs, the existing burners are not in the position to meet heat load requirements. Hence, the temperature to be achieved for the SR could not be achieved. Further, in many of the new jobs, simultaneous SR is required at two joints, viz, one at the end & other at a distance of 1.5 to 3.0 m from the end. Also, the heat load requirement of the middle joint is much lesser than the end joint. Hence, it is proposed to upgrade the existing SR furnace by slightly modifying the same and introducing a New one.

2. CONFIGURATION:-

In view of the above requirements of increased heat load and simultaneous SR of an additional joint, it is proposed to upgrade the existing system by slightly modifying the existing system & introducing a New SR Furnace, as per **Drawing No.: 3-TDX-27-2268 (2 Sheets)** and the tentative job sketch is as per **Sketch-I**, enclosed. The new furnace is to be almost similar in construction to the existing furnace but would be with 2 nos. of high velocity burners of rating around 30,00,000 BTU/Hr & a totally new burner(LPG) & Air train. Only the EURO THERM 2604 controller from the existing panel is to be taken & fitted in a new control panel for controlling & sequencing the full SR cycle for a period of upto 36 hours.

The motorised valves of the existing furnace is to be removed & replaced by a simple 2 set point temperature controller with just ON/OFF control. Further, the existing furnace & the control panel is to be shifted in front & used for doing the SR of intermediate joints. Only the 2604 controller is to be removed from the existing panel & put in new panel. Rest all the controls, should be new in the new control panel. Also separate LPG & Air points are to be tapped from the existing line for giving input to the new furnace. Further, existing control panel is to be made functional for manual control of existing furnace.

3. TECHNICAL SPECIFICATION: -

A). JOB SPECIFICATIONS (REFER ENCLOSED SKETCH-I): -

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|----------------------------|---|
| a) Job type | - Cylindrical shell & skirt welded together. |
| b) Max./ min. O.D. of jobs | = 1800 mm / 700 mm |
| c) Thickness of joints | - 16 - 36 mm (skirt joint) & 75 – 100 mm (main joint) |
| d) Width of joints | - 400 mm |
| e) Material of jobs | - Carbon Steel / Alloy Steel. |

B). BROAD SPECIFICATION OF THE FURNACE (DRG. NO.: 3-TDX-27-2268): -

- | | |
|--------------|---|
| a) Equipment | - Portable Stress Relieving Furnace. |
| b) Fuel | - LPG - Air mixture (20% LPG + 80% Air) |

- c) LCV of fuel - 500 BTU/cft
- d) Dia. Of jobs to be stress relieved - 700 – 1800 mm
- e) Furnace type - two halves, vertical split, fabricated out of ~ 12 mm M.S.
Plate and Structural elements.
- f) Furnace lining - Ceramic Fibre Blanket
- g) Thickness of lining - 75 mm
- h) Ceramic fibre anchor - AISI - 310 S.S. Studs/Washers/Suitable
- i) Max. Temperature - 650° C
- j) Rate of heating & cooling - 90° C per hour
- k) Soaking at. Max.-temperature - 1 hour / inch thickness + 1 hour
- l) Temperature of LPG - Ambient
- m) Pressure of gas - At Variable Pressure (Max. 15” W.G.)
- n) Burners type - LPG fired excess air nozzle mixing type gas burners.
- o) Burner make - Eclipse/Wesman/Hotwork.
- p) Quantity - 2 nos.
- q) Burners installed heating capacity - Min. 30 Lacs BTU / Hr.
- r) Turn down ratio of burner - Min. 20:1
- s) Combustion air blower type - Centrifugal
- t) Capacity - 900 cft/min / Suitable
- u) Static pressure - 500 mm W.G.
- v) Motor rating - Min. 5 HP 1440 RPM / Suitable
- w) Temperature control - existing Eurotherm 2604 controller for new
furnace & old control panel for the ON/OFF control of existing furnace.
- x) 12-point, Z-fold temperature recorder - existing Chino make to be used in new panel. (No
temperature recording required in the existing panel).
- y) Heat resistant cement/piping/valves/ERI, etc. -Reputed make.

C). MAKE OF BOUGHT OUT ITEMS: -

- a) Motor – Bharat Bijlee / ABB / Siemens only
- b) Burners make – Eclipse / Wesman/Hotwork.
- c) Pneumatic element – Festo only
- d) Electrical control elements to be Siemens make only.
- e) Motorised valves / Pressure switches / Flame detectors – Krom Schroder / Honeywell.
- f) Temperature controller – Eurotherm / Radix / Yokogawa / Chino.
- g) Other items – Reputed make.

5. SCOPE OF SUPPLY:-

1. Designing, Manufacture and Supply of the complete Stress Relieving Furnace as per our
specification. – 1 Lot.
2. Mechanical Kit comprising of fasteners, bolts, handtools, etc – 1 Lot
3. Control Panel. – 1 No.
4. Operating & Maintenance Manuals. – 4 Set
5. Test & Guarantee Certificates. – 4 Set
6. Installation, Commissioning and proving on actual jobs.
7. Spares (To be quoted as optional as per Para. 7)

6. LUBRICATION:-

Suitable arrangement for lubrication is necessary. Provision is to be made for the above by providing nipples etc. at strategic places wherever required. The gears and bearings should be impregnated with solid lubricants before assembly.

7. SPARES:-

Spares such as valves, burner, sequence controller and other critical items for successful running of system for 2 years should be incorporated in Scope of Supply. This may be quoted separately.

8. GUARANTEE:-

The equipment should be guaranteed for successful performance and for free replacement of faulty material or components / defective workmanship for a period of 12 months from the date of commissioning.

9. PAINTING:-

The equipment is to be painted with Heat Resistant Aluminum paint after Red oxide primer.

10. CONTROL PANEL:-

A Reputed make control panel of IP42 grade housing the controls for SR operation is to be supplied, along with the following accessories:

- i) Incomer switch fuse unit (SFU).
- ii) Cubicle ventilation fan, Louvers with dust cover for ventilation.
- iii) Emergency stop contactor & scheme to isolate all supplies.
- iv) 220V AC control supply.
- v) 24V DC Power Supply for valves, etc, if required.
- vii) 20" tube light for panel illumination & 5 amps socket for 220V AC supply.
- viii) AC motors feeders comprising of MCCB's contactors for feeding following 3-Phase 415V AC motors.
- ix) Multi- loop Temperature controller as per spec.(BHEL Scope of supply)
- x) Safety temperature controller.
- xi) 12 points 180mm z-fold pen-paper chart recorder.(BHEL Scope of supply)
- xii) 9 nos. of Mineral insulated 'K' type thermocouples long leads with Pin & Socket arrangement.
- xiii) Indication lamps for supply, status and fault annunciation.
- xiv) Controllers, relays, selector switches, DLS, fuses, MCB's etc.
- xv) Electrical kit comprising of terminal blocks, cables, conduits, push buttons, ammeter, voltmeter, panel fan, glands, lugs, etc.
- xvi) Control transformer of sufficient KVA rating.

Sufficient extra space must be kept in panel for mounting atleast 10% extra elements. Also the base of the panel should be atleast 300 mm from the ground floor for ease of maintenance, for the same suitable fabricated frame is to be provided at the panel base.

The internal layout of the control panel should be as per IS standards, ensuring long & trouble free life of the control elements and ease of maintenance during breakdown.

11. ELECTRICALS:-

All electricals should have suitable safety devices such as thermal overload trip devices, current limiting devices, electronic shear pin, fuses etc. Electrical power supply available is 415 V, 3Ø, 3 wire only at 50 Hz. (No neutral is available). Hence if there's any requirement of 220/110 Volts, suitable transformers may be incorporated.

All wiring to be suitably numbered / ferruled for easy maintenance. All electrical components should be of Siemens make.

ICTP to be included in the operator cabin on the crane as the supply shall be given at this point. Cable from supply point to ICTP on panel shall be in BHEL scope. All other cables/ wires are to be done by the supplier.

12. INSPECTION & M/C CHECKS:-

Inspection of the equipment will be carried out at the supplier's work before dispatch of the same for satisfactory performance of the head.

13. DESIGN CONCURRENCE:-

The equipment should be designed as per our specification keeping in view the latest standard and trends in mind. Design should be got vetted from BHEL before starting the manufacturing. However the responsibility of its performance and its proving will lie on the supplier.

Heat treatment & material of critical components is to be strictly adhered to and mentioned in the offer itself.

14. LITERATURE:-

Four copies of operation & maintenance manuals, assembly drawings, parts drawings, test charts, spare part's manuals are to be supplied with the attachment. One set of manual is to be sent before hand.

15. INSTALLATION. COMMISSIONING AND PROVING FOR PERFORMANCE:-

The installation, commissioning and proving of the equipment for desired performance on 4 nos. of our actual jobs is to be done by the supplier at our works.

Manufacturer should comply with the following during Installation, Commissioning and proving:-

- (a) Experienced & qualified team headed by a team leader fully conversant with the work scope should only be deputed. Labours, if required should be brought or arranged locally.
- (b) E & C work has to be completed in one go except where it is agreed with mutual consent.
- (c) Any help required from BHEL during E & C has to be indicated in the offer itself, except where agreed, rest has to be organized by manufacturer etc.
- (d) Manufacturer's team is required to comply with general discipline, indl. safety rules and workshop norms while doing the work. Any work with safety hazards etc should not be done in any case. No work should be done without proper authorisation or permission.

16. DETAILS TO BE FURNISHED WITH THE OFFER:-

Following details must be supplied with the offer:-

- a. Only parties having atleast one year of experience of supplying similar systems need to quote.
- b. Full technical details / specifications, general arrangement drawing, electrical schematics, etc.
- c. Control diagrams illustrating construction of the system / equipment.
- d. Material specifications which are used in the manufacturing of the equipment.
- e. Overall dimensions and space requirements.
- f. Power and compressed requirements.
- g. List of customers to whom similar / identical system / equipment have been supplied.
- h. Point wise reply to each & every point of our specification is a must. It not complied, then the offer will not be considered.

17. OTHER UTILITIES AVAILABLE WITH BHEL-BHOPAL:-

Compressed air at 4 Kg / sq. cm Max. and regular water supply.

18. AMBIENT CONDITION & TROPICALISATION:-

All electronic components should be tropicalised to withstand environmental temp. Variation from 4 to 50 degree C and RH variation from 5 to 95 %.

19. STRESS RELIEVING OF ALL FABRICATED/CAST ITEMS :-

All cast parts are to be stress relieved before and after rough machining. Gears, Shafts should be hardened & tempered.

20. TRAINING:-

Training should be imparted to our operators and maintenance people for 4-5 days so that they should be in a position to run the system, independently.

