

Technical Specification for repair and modification of Thermal Ageing Oven

A	OVEN 1		
Sl. No.	Description	BHEL Specification	Vendor Specification
1	General Description of thermal ageing oven 1		
1.1	Heating Chamber Dimension	1500 mm X 1000 mm X 1000 mm (Width X Height X Depth)	
1.2	Working Temperature	400 Degree C	
1.3	Temperature controller accuracy	+/- 5 Degree C	
2	Scope of Repair / Modification		
2.1	Heating Elements	Dismantling of the existing heating elements and replacement with new straight shape stainless steel sheathed tubular heaters with GI fins for long life and adjustable clamps for temperature requirement as described in Sl. No. 1	
2.2	Insulation system	Replacement of existing thermal insulation system with suitable insulation layers to cater the temperature requirement of 400 Degree C. Thermal insulation shall be so chosen that the heating of the external body of oven is minimised.	
2.3	Air Circulation Fans / Impellers	Inspection and repair / replacement of existing motors (if not working). Inspection and repair / replacement of the fan fixtures, belt arrangements, bearings etc. Inspection and repair / replacement of impellers of suitable material to withstand temperature of 300 Degree or more.	
2.4	View Glass	Replacement of the gaskets of the view glass. Suitable New LED lighting of appropriate illumination to be provided. The illumination shall be such that the job inside the chamber can be clearly visible through the view glass.	
2.5	Door	Inspection of Door. Repair / replacement of the locking system. Suitable gasket and locking arrangement to be provided to arrest any heat loss.	
2.6	Control Panel	New control panel as described in sl. No. 5 to be provided.	
2.7	Painting	The new control panel and the existing oven to be painted with suitable paints.	
3	Safety interlocks & Protection		
3.1	Door interlocks	Door interlocks to ensure the heating elements are energised only when the door is fully closed	
3.2	Fan interlock	Suitable interlock to ensure the recirculating fan / impeller is switched on after complete closure of the doors and the heaters are energised only after the fan is switched on.	

3.3	Emergency Push Button	Emergency push button at suitable and easy access location for emergency stopping of the oven.	
4	Control and Data record		
4.1	Heater Control Module	Thyristor based heater control module controlled by microprocessor based PID controller for precise control of temperature as per required temperature-time curve.	
4.2	Temperature Control	Microprocessor based PID controller to control thyristor based heater control module for precise control of the oven as per the required temperature - time curve.	
4.3	Data recorder	Suitable data recorder of reputed make for display of temperature and time and recording of data for 90 days with a log interval of 2 minutes. Provision of record and storage of data in pendrive shall also be provided. Provision for control of oven and Data access and printing of the data log and graphs through external computer shall be provided.	
4.4	Fault condition	Fault indication and warning / alarm for faults conditions like temperature overshoot, thermocouple failure, air circulation fan failure, door not closed, heater failure and power failure etc. to be provided.	
5	Control Panel		
5.1	Control Panel	Control panel shall be mounted on the wall of the oven with hinged door at the front. The panel shall be of rigidly constructed and firmly mounted on oven wall. The incoming and outgoing cables of the control panel shall be suitably marked for easy identification and tracing. The control cables and power cables with clear markings and identification tags shall be separately routed to avoid any disturbance to control signals.	
5.2	Control Panel Display	HMI with microcontroller based digital programmable PID temperature controller. Indication for ON - OFF condition of supply mains, heaters, motor, etc Digital indication for indication of voltage and current in three phase with ON-OFF switch	
5.3	Alarms	Audio Visual alarms for any fault conditions with acknowledgement feature to be incorporated .	
6	Test Certificate and Manual		
6.1	Manufacturer's Test certificate	Manufacturer's test certificate of heating elements to be provided at the time of installation at BHEL R & D.	
6.2	Calibration certificate	Calibration certificate from NABL accredited Lab to be provided along with the item.	
6.3	Operation Manual	Installation, Operation and maintenance manual of the oven to be provided along with the item	
6.4	Drawing	Detailed drawing of the oven and control panel with clear component identification shall be provided along with the equipment. Detailed wiring diagram with proper levelling of the components/modules to be provided for circuit tracing and fault diagnosis	

B		OVEN 2	
Sl. No.	Description	BHEL Specification	Vendor Specification
1 General Description of thermal ageing oven 2			
1.1	Heating Chamber Dimension	1500 mm X 600 mm X 700 mm (Width X Height X Depth)	
1.2	Working Temperature	400 Degree C	
1.3	Temperature controller accuracy	+/- 5 Degree C	
1.4	Power rating	7.5 kW, 3 Phase, 440 Volts, 50 Hz	
2 Scope of Repair / Modification			
2.1	Heating Elements	Dismantling of the existing heating elements and replacement with new straight shape stainless steel sheathed tubular heaters with GI fins for long life and adjustable clams for rating and temperature requirement as described in Sl. No. 1	
2.2	Insulation system	Replacement of existing thermal insulation system with suitable insulation layers to cater the temperature requirement of 400 Degree C. Thermal insulation shall be so chosen that the heating of the external body of oven is minimised.	
2.3	Air Circulation Fans / Impellers	Inspection and repair / replacement of existing motors (if not working). Inspection and repair / replacement of the fan fixtures, belt arrangements, bearings etc. Inspection and repair /replacement of impellers of suitable material to withstand temperature of 350 Degree or more.	
2.4	View Glass	Replacement of the gaskets of the view glass. Suitable LED lighting of appropriate illumination to be provided. The illumination shall be such that the job inside the chamber can be clearly visible through the view glass.	
2.5	Door	Inspection of Door. Repair / replacement of the locking system. Suitable gasket and locking arrangement to be provided to arrest any heat loss.	
2.6	Control Panel	New control panel as described in sl. No. 5 to be provided.	
2.7	Painting	The new control panel and the existing oven to be painted with suitable paints.	
3 Safety interlocks & Protection			
3.1	Door interlocks	Door interlocks to ensure the heating elements are energised only when the door is fully closed	
3.2	Fan interlock	Suitable interlock to ensure the recirculating fan / impeller is switched on after complete closure of the doors and the heaters are energised only after the fan is switched on.	
3.3	Emergency Push Button	Emergency push button at suitable and easy access location for emergency stopping of the oven.	
4 Control and Data record			

4.1	Heater Control Module	Thyristor based heater control module controlled by microprocessor based PID controller for precise control of temperature as per required temperature-time curve.	
4.2	Temperature Control	Microprocessor based PID controller to control thyristor based heater control module for precise control of the oven as per the required temperature - time curve.	
4.3	Data recorder	Suitable data recorder of reputed make for display of temperature and time and recording of data for 90 days with a log interval of 2 minutes. Provision of record and storage of data in pendrive shall also be provided. Provision for control of oven and Data access and printing of the data log and graphs through external computer shall be provided.	
4.4	Fault condition	Fault indication and warning / alarm for faults conditions like temperature overshoot, thermocouple failure, air circulation fan failure, door not closed, heater failure and power failure etc. to be provided.	
5 Control Panel			
5.1	Control Panel	Control panel shall be mounted on the wall of the oven with hinged door at the front. The panel shall be of rigidly constructed and firmly mounted on oven wall. The incoming and outgoing cables of the control panel shall be suitably marked for easy identification and tracing. The control cables and power cables with clear markings and identification tags shall be separately routed to avoid any disturbance to control signals.	
5.2	Control Panel Display	HMI with microcontroller based digital programable PID temperature controller. Indication for ON - OFF condition of supply mains, heaters, motor, etc Digital indication for indication of voltage and current in three phase with ON-OFF switch	
5.3	Alarms	Audio Visual alarms for any fault conditions with acknowledgement feature to be incorporated .	
6 Test Certificate and Manual			
6.1	Manufacturer's Test certificate	Manufacturer's test certificate of heating elements to be provided at the time of installation at BHEL R & D.	
6.2	Calibration certificate	Calibration certificate from NABL accredited Lab to be provided along with the item.	
6.3	Operation Manual	Installation, Operation and maintenance manual of the oven to be provided along with the item	
6.4	Drawing	Detailed drawing of the oven and control panel with clear component identification shall be provided along with the equipment. Detailed wiring diagram with proper levelling of the components/modules to be provided for circuit tracing and fault diagnosis	

C General Specification			
Sl. No.	Description	BHEL Specification	Vendor Specification

1	Transportation of item	Transportation of both the ovens (Oven 1 and Oven 2) to vendor's workplace and back to BHEL R & D, Hyderabad after repair and modifications is in the scope of vendor.	
2	Installation	Vendor shall install both the thermal ageing ovens (Oven 1 and Oven 2) at BHEL R & D after completion of all repair and modifications.	
3	Demostration	Vendor shall demonstrate the operation of the both the ovens (Oven 1 and Oven 2) post repair and modification at BHEL R & D as per BHEL requiremnts.	
4	Training	The supplier shall provide training to BHEL representatives for proper installation, operation, maintenance, fault diagnosis and troubleshooting, of both the equipment.	
5	Inspection	Vendor shall allow BHEL representatives to inspect the progress of work at their work place against prior intimation.	
6	Delivery Time	Delivery time from the date of PO to be provided along with the offer. Delivery time shall include all activities pertaining to the repair and modification of the ovens - transportation of oven to vendors workplace, repair, modification, transportation back to BHEL R & D, installation of the oven, demonstration and training as per this specification.	
7	Warranty	Minimum 12 months warranty for each oven (Oven 1 and Oven 2) from the date of successful installation, demonstration and training at BHEL R & D.	
8	Pre Bid Inspection	Bidders may visit BHEL R & D to inspect and check the present status and condition of the thermal ovens to ensure the suitability and repairability of the ovens before offering their bids.	