

## TECHNICAL SPECIFICATIONS AND OTHER ALLIED REQUIREMENTS

SI No.	Description of items	Quantity
PUR/177/FDY/MP/E/2021-22		
1	SUPPLY, INSTALLATION & COMMISSIONING OF MICROWAVE HEATING BASED SINTERING FURNACE (DETAILED SPECIFICATION AS PER ANNEXURE – I)	1 SET.

### 1. DELIVERY, INSTALLATION & COMMISSIONING :

- 1.1. The ordered goods are to be delivered, installed, commissioned at CSIR-CMERI, Durgapur within 90 days of receipt of Purchase Order. Installation should be carried out only by expert engineers of Supplier / Manufacturer at Free of Cost basis. During the course of installation, necessary training on operation and maintenance of the goods shall be imparted to Institutes Scientist / Engineers/Technicians.

### 2. PERFORMANCE SECURITY

- 2.1 3 % of the Invoice value valid till 2 months beyond the warranty period.

### 3. PAYMENT TERM

**4.1** (a) 80% of the contract price of goods [ 80% of the cost of goods and 100% taxes ] shall be paid against delivery and inspection of all the ordered goods at site [ final destination].If required Purchaser may ask for a joint inspection in presence of Supplier's representatives for verification of the goods delivered. All charges for such inspection shall be borne by the Supplier.

(b) 20% balance payment shall be paid within 30 days of delivery, installation, commissioning, training and acceptance of the material upon submission of claim supported by the acceptance certificate issued by the purchase and the Performance Security

5. Bid Securing Declaration is to be submitted by the Bidder as per the format prescribed in the tender document.

5. Optional items will not be considered for price evaluation.

6. Submission of Manufacturers Authorization Form in the prescribed format shall be mandatory for NON-OEM bidders.

## Annexure I

### Specifications of Microwave Heating Based Sintering Furnace

<b>A) PERFORMANCE SPECIFICATIONS</b>		
<b>S. No.</b>	<b>Parameter</b>	<b>Specification</b>
1.	Working temperature	1600 °C or higher
2.	Maximum load at maximum operating temperature.	2 kg or higher
3.	Process duration (ramping+soaking)	30 hours continuously or higher with minimum 6 hour soaking at working temperature.
4.	Maximum skin temperature of Furnace	Not more than 50 °C above ambient with a safety interlock.
5.	Effective hot zone (minimum size)	150 mm (W) x 100 mm (H) x 150 mm (D)
<b>B) FURNACE DESIGN SPECIFICATIONS</b>		
1.	Furnace casing	SS 304L
2.	Furnace wattage	5.8 kW or higher
3.	Temperature sensor for monitoring furnace body temperature	Thermostat with interlock having temperature range 50 °C to 80 °C.
4.	3 Phase Energy Meter	Measurement and display of System voltage, System current, Active power (system/Phase -kW)
5.	Phase failure relay	<ul style="list-style-type: none"><li>• Three Phase three wire Under and over voltage control,</li><li>• Auto/manual reset, adjustable under/over voltage settings.</li><li>• Adjustable trip delay and ON delay.</li></ul>
6.	Features	<ul style="list-style-type: none"><li>• Door interlock switch</li><li>• Microwave inlet port</li><li>• Gas injection port with SS valve and flow meter. Gases to be used argon, Nitrogen, carbon dioxide.</li><li>• Vent port and Viton 'O' ring seals</li><li>• Outlet Gas Flow Meter</li><li>• Vacuum port along with vacuum pump. (100 mbar below atmospheric pressure along with vacuum pump)</li><li>• Furnace must have one view port for visual observation with quartz glass.</li></ul>
7.	Stand	Necessary stand with suitable height must be provided to keep the equipment for comfortable working level.
<b>C) MICROWAVE POWER SPECIFICATIONS/HEATING SYSTEM</b>		
1.	Microwave frequency:	2450 MHz
2.	Max. Microwave power wattage	5.8 kW or higher
3.	Digital Display	Set Power, Dynamic Power, Anode Voltage, Anode Current, Magnetron Life Timer
4.	Magnetron type	Water cooled or air cooled

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5.	Magnetron Make	Richardson electronics/Hitachi/Muegge
6.	Output power:	0.150 kW or lower to 5.8 kW or higher, continuously variable
7.	Input power	AC 415, 3 Phase power, 50 Hz
8.	Power control:	Microprocessor based Microwave Power Controller, programmable control, digital display with computer connectivity
9.	Wave guide type	WR-340, SS 304 material
10.	Standard Isolators	WR-340 Isolator with water load
11.	Launcher	WR-340 Standard Launcher

#### **(D) TEMPERATURE MEASUREMENT SYSTEM**

1.	Temperature control	Single wavelength Infrared pyrometer with transparent quartz window attachment and temperature range of 350 – 1800 °C, adjustable emissivity, digital display, computer connectivity.
2.	Temperature control	PID controller with programmer and Digital Temperature Indicator. (At least 8-10 program with 16 segments) Make: Eurotherm/OMRON/Honeywell/Fuji.
3.	Temperature sensor	Infra-red pyrometer, 350 – 1800 °C, adjustable emissivity, digital display, computer Interface. (Make: Raytech/Mikron/Impac/AST)
4.	Temperature Accuracy	± 5°C at soaking
5.	Safety	Input, output fuses

#### **(E) CONTROL SYSTEM**

1.	Control Keys/buttons/knobs:	Mains ON / OFF Switch Microwave Start/Stop Output Microwave Power Controller. Emergency OFF Auto / Manual Selector Switch Chamber Light ON/ OFF
2.	Display	Forward Power Meter Process Timer
3.	Indicator Lamps	Water Flow – Cooling Failure Power Supply Fault Applicator Door Open H.V. Door Open & Tower Lamp
4.	Additional Port/control	Programable Data logging system along with its software for operating the furnace and recording data of input processing parameters using computer.
5.	Computer Desktop	i5 or higher Intel processor 16 GB RAM or higher, 1 TB storage capacity. 23 inch computer screen,

#### **(F) CLOSED LOOP WATER COOLING CHILLER UNIT**

1.	Water chilling unit	Chiller unit with all pipes and fittings for the cooling water system to be supplied with the system.
2.	Capacity	150 litres of tank or higher
3.	Temperature controller	Automatic ON/OFF, Digital temperature controller with set temperature.
4.	Cooling	Automatic cooling ON/OFF facility

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5.	Working temperature range	5- 10 °C
6.	Water Circulation	20 LPM or higher
7.	Wheel mounting	The water chilling plant should have wheels to move the equipment easily
8.	Switches	Independent control for chilling plant and water circulation pump
<b>(G) CERAMIC CASKET WITH SUSCEPTOR</b>		
1.	Ceramic casket	Ceramic casket assembly suitable for 1600 °C trials. 5 Sets of caskets and along with susceptors needed. Party should mention the life cycle of the casket and susceptors. Casket make: Rath/Zircar/ CUMI.
<b>(H) Others</b>		
1.	Schematic diagram, technical drawings, two sets of operating and maintenance manuals, Instruction manuals, part list, component layout, circuit diagrams, troubleshooting charts, along with assembly layout shall be enclosed to your offer/supply.	
2.	Party should provide minimum 12 months of warranty.	

#### # Qualifying criteria

1. The OEM must be in business for at least four years and have supplied similar products. Party should submit proof of previously designed and supplied similar microwave sintering furnace. Provide minimum three purchase order copies with photographs of the supplied system, the list of customers in India, along with performance certificate in following format.

Sl. No.	Model & Make with date of Installation	Name & address of Institute	Contact Person Name, Mobile/telephone number & email Id.

2. Party must demonstrate 30 hours continuous operation (at least 6 hr soaking) at 1600 °C of the furnace with susceptors and casket supplied by them.

*Adpreet Singh*  
*Himanshu*  
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*Manish*  
*Prasanna*  
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