GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
ISRO PROPULSION COMPLEX (IPRC)
MAHENDRAGIRI

Tender for Design, Fabrication, Testing, Supply, Installation, Commissioning, Demonstration and Calibration of the Horizontal Vacuum Furnace as per the specifications

Bids to be submitted online

Tender No.: IPRC/PURGP2/IP202200118901 dated 02-03-2023

A. Tender Details

Tender No :	**IPRC/PURGP2/IP202200118901**
Tender Date :	**02-03-2023**
Tender Classification:	**GOODS**
Purchase Entity :	**PURGP2**
Centre :	**ISRO PROPULSION COMPLEX (IPRC)**

Design, Fabrication, Testing, Supply, Installation, Commissioning, Demonstration and Calibration of the Horizontal Vacuum Furnace as per the specifications

1. THIS IS A TWO PART BID. HENCE, IF PRICE DETAILS OF ANY NATURE ARE FOUND IN THE TECHNICAL ANNEXURES , THE OFFER WILL BE REJECTED SUMMARILY. PRICE DETAILS SHALL BE MENTIONED IN THE REQUESTED FIELD ONLY.

2.Foreign vendors are not permitted to quote.

3.Only Class-I and Class-II Local suppliers as per Make in India Policy are eligible to participate in the bid. Minimum percentage of local content required to be participated in the bid is 20%.

a. The percentage of local content should be specifically mentioned in the offer, without which it will be summarily rejected.

b. Preference will be given to Class-I Local Supplier and in their absence, Class-II Local Supplier will be considered.

4. MSME preference is applicable only against the claim of the manufacturer and production of documentary evidence by the manufacturer for the registration of particular item under MSME.

5. Last minute clarification on tenders will not be entertained.

6. This is an E Tender. Hence Postal/Fax/Email tenders will not be accepted.

7. Acceptance of Guarantee / Warranty, Security Deposit, PBG & LD Clause shall be specified in your Offer.

8. Bidders shall quote for non-comprehensive AMC for the equipment for minimum of five years after the warranty period. The AMC should include two preventive and one breakdown maintenance each year. The cost for AMC will be considered for evaluation of the bid. The price details of the AMC shall be provided in the specified uploading area only.

9. Gem seller ID shall be furnished.

A.1 Tender Schedule

Bid Submission Start Date :	**02-03-2023 14:00**
Bid Clarification Due Date :	**23-03-2023 14:00**
Bid Submission Due Date :	**30-03-2023 14:00**
Bid Opening Date :	**30-03-2023 14:30**
Price Bid Opening Date :	**31-03-2023 14:00**

B. Tender Attachments

NA

Instructions To Vendors

1. Conditions for BIDDER FROM A COUNTRY WHICH SHARES LAND BORDER WITH INDIA

1. Any false declaration and non-compliance of the above would be a ground for immediate rejection of offer or termination of the contract and further legal action in accordance with the laws.

2. As per the Rule 144(xi) of General Financial Rule, 2017, any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the competent authority ie., Department for Promotion of Industry and Internal Trade (DPIIT).

3. Hence, Vendors or Agents of a Vendor (Indian or others) from a country sharing border with India shall submit copy of valid registration made with Department for Promotion of Industry and Internal Trade (DPIIT), Government of India along with the tender mandatorily, without which the offer will be treated as invalid.

4. Model Certificate for Tenders

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered

5. Validity of Registration: Registration should be valid at the time of submission of bids and should be valid at the time of placement of order.

2. Format for Self Certification under Preference to MAKE IN INDIA Policy CERTIFICATE

1. In line with Government Public Procurement Order No. P-45021/2/2017-BE-II dt. 15.06.2017, as amended from time to time and as applicable on the date of submission of tender, we hereby certify that we M/s. _____(supplier name) are local supplier meeting the requirement of minimum percentage of Local content _____ (class I/Class II) as defined in above orders for the materials against Tender No. _____

2. Details of locations at which local value addition will be made is as follows:
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3. We also understand, false declarations will be in breach of the Code in Integrity under Rule 175(1) (i) (h) of the General Financial Rule for which a bidder or its successors can be debarred for up two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

4. Seal and Signature of Authorized Signatory

3. GeM Seller ID

1. GeM Seller Registration: All vendors shall register themselves in GeM Portal (gem.gov.in) and provide GeM Seller unique ID in the tender documents, as this ID is mandatory for award of contract.

C. Bid Templates

C.1 Technical Bid - Design, Fabrication, Testing, Supply, Installation, Commissioning, Demonstration and Calibration of the Horizontal Vacuum Furnace as per the specifications

1. Vacuum Furnace- Design, Fabrication, Testing, Supply, Installation, Commissioning, Demonstration and Calibration of the Horizontal Vacuum Furnace as per specifications mentioned in annexure

Item specifications for Vacuum Furnace

Sl No	Specification	Value	Compliance	Offered Specification	Remark
1	Scope of work - 1A: Design, Fabrication, Testing, Supply, Installation, Commissioning, Demonstration and Calibration of the Horizontal Vacuum Furnace with gas quenching facility at IPRC, Mahendragiri	Specify	Yes / No / Explain		
2	Scope of work - 1B: including training of personnel in operation and maintenance of the furnace as per the specifications below (Continuation of Sl. No.1)	Specify	Yes / No / Explain		
3	Application - 1A: The equipment is to be used for heat treatment of components made of various grades of stainless steels, nickel-based superalloys, copper alloys	Specify	Yes / No / Explain		

4	Application - 1B: with slow, fast and controlled programmable heating/cooling rates under vacuum/inert atmosphere/partial pressure. (Continuation of Sl. No.3)	Specify	Yes / No / Explain		
5	Application - 2: In addition, the equipment is meant for vacuum brazing of parts/sub assemblies made of various grades of materials mentioned above.	Specify	Yes / No / Explain		
6	MAJOR SPECIFICATIONS AT A GLANCE: Specifications as listed below	Specify	Yes / No / Explain		
7	Effective working hot zone size (Nominal): 900 mm (W) x 900 mm (H) x 1200 mm (D)	Specify	Yes / No / Explain		
8	Maximum temperature: 1450°C	Specify	Yes / No / Explain		
9	Operating temperature (range): 400°C - 1350°C	Specify	Yes / No / Explain		
10	Continuous operation time at maximum operating temperature: 4 hours	Specify	Yes / No / Explain		
11	Temperature control and measurement accuracy: ±0.1% of operating temperature of 400°C to 1350°C	Specify	Yes / No / Explain		
12	Hot zone temperature uniformity as per AMS2750G - 1: Homogenous temperature uniformity as per AMS2750G of ±10°C or better in the entire hot zone from 300°C to 600°C	Specify	Yes / No / Explain		

13	Hot zone temperature uniformity as per AMS2750G - 2: Homogenous temperature uniformity as per AMS2750G of ±5°C or better in the entire hot zone from 600°C to 1350°C	Specify	Yes / No / Explain		
14	Working medium - 1: Vacuum and inert/partial pressure mode.	Specify	Yes / No / Explain		
15	Working medium - 2: The furnace shall be designed to operate in both vacuum and argon gas pressure.	Specify	Yes / No / Explain		
16	Working medium - 3: Vacuum mode: The vacuum level shall be better than 5 x 10^-4 mbar (i.e. < 5 x 10^-4 mbar) with full load throughout the heating cycle.	Specify	Yes / No / Explain		
17	Working medium - 4: Inert/partial pressure mode: The furnace shall be designed to operate under controlled argon atmosphere ranging from a partial pressure of 1 x 10^-2 mbar to a positive pressure of 100 mbar.	Specify	Yes / No / Explain		
18	Working medium - 5: Furnace shall have necessary gas control systems to operate furnace under argon gas.	Specify	Yes / No / Explain		
19	Ultimate vacuum level: Better than 1 x 10^-5 mbar within 45 minutes for clean, cold and empty chamber.	Specify	Yes / No / Explain		
20	Operating vacuum level (range): 1 x 10^-2 mbar to 1 x 10^-5 mbar (Fully variable/controlled/programmable)	Specify	Yes / No / Explain		

21	Leak rate - 1: Total or Global leak rate (system level): ≤1 x 10^-3 mbar.lit/s or better	Specify	Yes / No / Explain		
22	Leak rate - 2: Individual level leak rate: ≤1 x 10^-8 mbar.lit/s . The details will be furnished in QAP after placement of P.O	Specify	Yes / No / Explain		
23	Leak rate - 3: Third party certification by Bureau Veritas Certification (BVQI)/TuV/Lloyd's Register Group Limited has to be provided for the leak testing.	Specify	Yes / No / Explain		
24	Heating rates (range) : 1°C/min to 20°C/min (Fully variable, controlled & programmable)	Specify	Yes / No / Explain		
25	Cooling/quenching rates (range) - 1: 0.5°C/min to 70°C/min (controlled/ programmable) from 1350°C to 450°C.	Specify	Yes / No / Explain		
26	Cooling/quenching rates (range) - 2: Vacuum cooling/gas cooling-static/forced gas quenching shall be fully variable/controlled/ programmable.	Specify	Yes / No / Explain		
27	Cooling/quenching rates (range) - 3: Gas quenching pressure shall be 6 bar (gauge).	Specify	Yes / No / Explain		
28	Cooling/quenching rates (range) - 4: Gas quenching systems shall be designed to meet the required cooling rates mentioned above.	Specify	Yes / No / Explain		

29	Cooling/quenching rates (range) - 5: The party shall submit detailed design calculations for achieving the required cooling/quenching rate.	Specify	Yes / No / Explain		
30	Cooling/quenching gas: Argon/Nitrogen.	Specify	Yes / No / Explain		
31	Maximum charge load: 250 kg of stainless steel.	Specify	Yes / No / Explain		
32	DETAILED TECHNICAL SPECIFICATIONS: Specifications as listed below	Specify	Yes / No / Explain		
33	HOT ZONE: Specifications as listed below	Specify	Yes / No / Explain		
34	Effective hot zone size (nominal): 900 mm (W) x 900 mm (H) x 1200 mm (D)	Specify	Yes / No / Explain		
35	Maximum temperature - 1450°C	Specify	Yes / No / Explain		
36	Operating temperature (range) - 400°C - 1350°C	Specify	Yes / No / Explain		
37	Number of hot zones: Minimum 3 zones	Specify	Yes / No / Explain		
38	Continuous operation time at maximum operating temperature - 4 hours	Specify	Yes / No / Explain		
39	Temperature control and measurement accuracy - ±0.1% of operating temperature of 400°C to 1350°C	Specify	Yes / No / Explain		
40	Hot zone temperature uniformity as per AMS2750G - 1 - Homogenous temperature uniformity as per AMS2750G of ±10°C or better in the entire hot zone from 300°C to 600°C	Specify	Yes / No / Explain		

41	Hot zone temperature uniformity as per AMS2750G - 2 - Homogenous temperature uniformity as per AMS2750G of ±5°C or better in the entire hot zone from 600°C to 1350°C	Specify	Yes / No / Explain		
42	Heating rates (range) : 1°C/min to 20°C/min (Fully variable, controlled & programmable)	Specify	Yes / No / Explain		
43	Cooling/quenching rates (range) - 1 - 0.5°C/min to 70°C/min (controlled/ programmable) from 1350°C to 450°C.	Specify	Yes / No / Explain		
44	Cooling/quenching rates (range) - 2 - Vacuum cooling/gas cooling-static/forced gas quenching shall be fully variable/controlled/ programmable.	Specify	Yes / No / Explain		
45	Cooling/quenching rates (range) - 3 - Gas quenching pressure shall be 6 bar (gauge).	Specify	Yes / No / Explain		
46	Cooling/quenching rates (range) - 4 - Gas quenching systems shall be designed to meet the required cooling rates mentioned above.	Specify	Yes / No / Explain		
47	Cooling/quenching rates (range) - 5 - The party shall submit detailed design calculations for achieving the required cooling/quenching rate.	Specify	Yes / No / Explain		
48	Maximum charge load - 250 kg of stainless steel.	Specify	Yes / No / Explain		
49	Work job materials: Super alloys, stainless steels, copper alloys, etc.	Specify	Yes / No / Explain		

50	Mounting/Fixing of accessories and heating elements: Should facilitate for easy installation and removal for replacement.	Specify	Yes / No / Explain		
51	Hot Zone & Heating Elements (All metal hot zone) - 1: Heating Elements (M/s. PLANSEE/HC Starke/equivalent reputed make) – Wide band dual V grooved Lanthanum doped Molybdenum.	Specify	Yes / No / Explain		
52	Hot Zone & Heating Elements (All metal hot zone) - 2: Heat Shields: Shall be provided all around hot zone including front and back areas.	Specify	Yes / No / Explain		
53	Hot Zone & Heating Elements (All metal hot zone) - 3: Shall be designed as all metallic with optimum numbers of metallic layers of molybdenum/ lanthanated molybdenum/stainless steel. Non-metallic shall be avoided.	Specify	Yes / No / Explain		
54	Hot Zone & Heating Elements (All metal hot zone) - 4: Supports/spaces between heating element shall be made of high strength, shock resistant, high purity ceramic material.	Specify	Yes / No / Explain		
55	Thermocouples for temperature monitoring and control of hot zone - 1A: Pt, Pt Vs 13%Rh “R” type – Recrystallized Alumina/Molybdenum Sheathed (Qty – 6 Nos.) with minimum two numbers in each hot zone.	Specify	Yes / No / Explain		

56	Thermocouples for temperature monitoring and control of hot zone - 1B: One thermocouple will be used for temperature control of each zone and one TC will be used for over temperature protection.	Specify	Yes / No / Explain		
57	Thermocouples for temperature monitoring and control of hot zone - 2: One complete set of thermocouples has to be provided as essential spares (6 Nos of R-Type Rigid thermocouples). Details are also provided in general terms and conditions.	Specify	Yes / No / Explain		
58	Thermocouples for work temperature measurement (flexible) - 1: Pt, Pt Vs 13%Rh “R” type – Recrystalized Alumina/Molybdenum Sheathed (Qty – 3 Nos) (Minimum one number in each hot zone).	Specify	Yes / No / Explain		
59	Thermocouples for work temperature measurement (flexible) - 2: 12 Nos of “K/N” type with Molybdenum/ Recrystallized Alumina Sheathed (Minimum four numbers in each hot zone).	Specify	Yes / No / Explain		

60	Thermocouples for work temperature measurement (flexible) - 3: One complete set of thermocouples has to be provided as essential spares (3 Nos of R-Type and 12 Nos. of K/N type of flexible thermocouples).Details are also provided in general terms and conditions.	Specify	Yes / No / Explain		
61	Work load support grid/plate in the hot zone - 1: The party has to supply following support grids of adequate dimensions: i) 1 No of molybdenum support grid/plate, ii) 1 No of inconel support grid/plate.	Specify	Yes / No / Explain		
62	Work load support grid/plate in the hot zone - 2: Thickness of the support grids should be 8 mm or more.	Specify	Yes / No / Explain		
63	Work load support grid/plate in the hot zone - 3: The support grids/plate shall be capable of carrying 250 kg stainless steel work load at the operating temperature.	Specify	Yes / No / Explain		
64	Work loading and unloading mechanism - 1: A loading and unloading trolley suitable to carry the charge weight of 500 kg max with manual to and fro motion and hydraulically operated up and down movement of fork is to be provided.	Specify	Yes / No / Explain		

65	Work loading and unloading mechanism - 2: Loading platform/harness inside the chamber shall be at 700-950 mm above the ground level such that once the chamber door is opened, job shall be easily loaded/unloaded.	Specify	Yes / No / Explain		
66	Arrangement of heating elements - 1: Hot zone shall be designed to ensure uniform temperature across the effective hot zone area.	Specify	Yes / No / Explain		
67	Arrangement of heating elements - 2: Heating elements shall be arranged to a balanced 3 phase heating power system.	Specify	Yes / No / Explain		
68	Arrangement of heating elements - 3: Heating elements shall be properly supported to prevent them from sagging while heating and to accommodate their thermal expansion.	Specify	Yes / No / Explain		
69	Arrangement of heating elements - 4: Terminal electrodes of heating elements shall be solid water cooled with suitable material, preferably of OFHC copper.	Specify	Yes / No / Explain		
70	Arrangement of heating elements - 5: All the insulators used in the hot zone shall be of suitable material, preferably high purity re-crystallized Alumina.	Specify	Yes / No / Explain		
71	Arrangement of heating elements - 6: All the fasteners and supports at hot zone shall be made of molybdenum.	Specify	Yes / No / Explain		

72	Operating temperature - 1: 1350˚C under vacuum/argon gas with 250 kg of heating load for 4 hrs.	Specify	Yes / No / Explain		
73	Operating temperature - 2: Furnace shall also have capability to carryout prolonged heating operation (Continuous soaking at 900˚C for 12 hrs)	Specify	Yes / No / Explain		
74	Heating insulation - 1A: The heat insulation shall be provided by minimum 6 layers of radiation shields comprising 3 inner layers of molybdenum (Make: M/s. PLANSEE, Austria/equivalent reputed make) and	Specify	Yes / No / Explain		
75	Heating insulation - 1B: 3 layers of SS sheets on all sides to minimize heat loss. Inner most layer shall be made of Lanthanum doped molybdenum. All end joints shall be designed properly to minimize heat loss. (Continuation of sl.no.75)	Specify	Yes / No / Explain		
76	Heating insulation - 2: Suitable spaces shall be provided between each layers of heat shield to ensure uniform and correct clearance and avoid deformation leading to a mechanical contact between shields during operation.	Specify	Yes / No / Explain		
77	Heating insulation - 3: Integration of heat shield shall be made for easy maintenance and replacement of heating elements.	Specify	Yes / No / Explain		

78	Heating insulation - 4: The party may suggest improved design with justification for better performance.	Specify	Yes / No / Explain		
79	VACUUM CHAMBER: Specifications as listed below	Specify	Yes / No / Explain		
80	Vacuum chamber design - 1: Chamber type - Horizontally mounted front loading type double walled water-cooled chamber.	Specify	Yes / No / Explain		
81	Vacuum chamber design - 2: Design - It should be designed as per ASME unfired pressure vessel code section VIII, Division I. The inner surface of the chamber is to be polished for maintaining low outgassing rates.	Specify	Yes / No / Explain		
82	Vacuum chamber design - 3: Maximum working pressure of argon gas in chamber shall be limited to 6 bar (gauge).	Specify	Yes / No / Explain		
83	Vacuum chamber design - 4: The chamber shall be provided with all safety features like pressure relief valves and rupture disc of suitable rating.	Specify	Yes / No / Explain		
84	Vacuum chamber design - 5: Chamber shall be designed to operate the furnace in vacuum during heating and in argon atmosphere during quenching.	Specify	Yes / No / Explain		

85	Vacuum chamber design - 6: The outer wall temperature of the chamber shall not exceed 50°C at maximum operating temperature and load.	Specify	Yes / No / Explain		
86	Vacuum chamber design - 7: The party shall submit the detailed design document inclusive of design details, drawings, vacuum calculations, make and model of the bought out items and details of vacuum system.	Specify	Yes / No / Explain		
87	Furnace shell material - 1: Fully metallic	Specify	Yes / No / Explain		
88	Furnace shell material - 2: Inside - Stainless Steel 316L, polished & buffed/electro-polished for low out-gassing rates.	Specify	Yes / No / Explain		
89	Furnace shell material - 3: Outside - Stainless Steel 304L, powder coated.	Specify	Yes / No / Explain		
90	Furnace shell material - 4: Suitable insulation shall be provided such that outer wall temperature shall not exceed 50°C.	Specify	Yes / No / Explain		
91	Furnace shell material - 5: Avoid nonmetallic materials inside the furnace including graphite and paints	Specify	Yes / No / Explain		
92	Chamber construction design and fabrication - 1: Chamber construction and design shall be as per ASME unfired pressure vessel code section VIII, Division-I.	Specify	Yes / No / Explain		

93	Chamber construction design and fabrication - 2: All welding for the chamber shall be carried out by welders qualified in accordance with latest version of the ASME Boiler and pressure vessel code, section IX.	Specify	Yes / No / Explain		
94	Chamber construction design and fabrication - 3: As noted above the chamber shall be cylindrical and double walled water-cooled type.	Specify	Yes / No / Explain		
95	Chamber front door - 1: Hinged door type to allow complete access to the hot zone with necessary locking arrangement and appropriate sealing to achieve leak tightness/ vacuum levels.	Specify	Yes / No / Explain		
96	Chamber front door - 2: Door shall open left to right manually.	Specify	Yes / No / Explain		
97	Chamber front door - 3: Inner surface of the door to be provided with pre polished stainless steel SS304L.	Specify	Yes / No / Explain		
98	Chamber front door - 4: Front side shall be full opening (more than 120 degree) hinge supported front door.	Specify	Yes / No / Explain		
99	Chamber front door - 5: High temperature resistance Viton O-rings shall be provided to ensure complete sealing.	Specify	Yes / No / Explain		
100	Chamber front door - 6: Front door should preferably have one view port of diameter 100 mm.	Specify	Yes / No / Explain		

101	Chamber front door - 7: Suitable electro pneumatic lock shall be provided for door lock.	Specify	Yes / No / Explain		
102	Chamber front door - 8: Additional manual hinge locks for door locking.	Specify	Yes / No / Explain		
103	Working medium: Vacuum/inert atmosphere/partial pressure	Specify	Yes / No / Explain		
104	Chamber ports - 1: Shall contain all necessary ports of ISO type.	Specify	Yes / No / Explain		
105	Chamber ports - 2: Chamber shall be provided with sufficient number of ports for evacuation, gas inlet, feed through for heater, vacuum gauge, pressure gauge, thermocouples, etc.	Specify	Yes / No / Explain		
106	Chamber ports - 3: Extra port with provision to connect additional thermocouples (minimum 4 Nos) shall be provided.	Specify	Yes / No / Explain		
107	Chamber ports for thermocouple: Should be provided with vacuum-tight feed through glands.	Specify	Yes / No / Explain		
108	Ports for job thermocouples: A separate flanged port with a feed through plate.	Specify	Yes / No / Explain		
109	Leak rate - 1A: Total or Global leak rate (system level): ≤1 x 10^-3 mbar.lit/s or better	Specify	Yes / No / Explain		
110	Leak rate - 2A: Individual level leak rate: ≤1 x 10^-8 mbar.lit/s . The details will be furnished in QAP after placement of P.O	Specify	Yes / No / Explain		

111	Leak rate - 3 - Third party certification by Bureau Veritas Certification (BVQI)/TuV/Lloyd's Register Group Limited has to be provided for the leak testing.	Specify	Yes / No / Explain		
112	Maximum chamber pressure - 1: Maximum chamber operating pressure during heat treatment cycle at maximum quenching rate shall be 6 bar gauge.	Specify	Yes / No / Explain		
113	Maximum chamber pressure - 2: Maximum chamber operating pressure during brazing cycle shall be 0.5 bar gauge.	Specify	Yes / No / Explain		
114	Maximum chamber pressure - 3: Maximum chamber design pressure shall be 8 bar gauge.	Specify	Yes / No / Explain		
115	Pressure relief valve - 1A: Two independent spring-loaded safety relief valve should be provided on the chamber to prevent the gas pressure hike above the desired level.	Specify	Yes / No / Explain		
116	Pressure relief valve - 1B: First safety relief valve shall be set to discharge at 110% of maximum allowable working pressure and at full opening the pressure inside the chamber shall not exceed 120% of the design pressure.	Specify	Yes / No / Explain		

117	Chamber vent valves - 1A: A chamber vent valve should be incorporated in the vacuum piping for admitting atmosphere air into the chamber. This valve should also be controlled by the proposed vacuum control system.	Specify	Yes / No / Explain		
118	Chamber vent valves - 1B: It should be electro-pneumatic type. In addition, a manually actuated vent valve also shall be provided for controlled air admittance. A 25-micron rating filter should be incorporated in the chamber vent valves.	Specify	Yes / No / Explain		
119	Support structure: Should be made of box type structure made of SS	Specify	Yes / No / Explain		
120	Painting: The outer shell of the vacuum chamber is to be applied with suitable primer and then finished with two coats of industrial grade paint.	Specify	Yes / No / Explain		
121	Vacuum sealing - 1: All the demountable vacuum seals shall be made of viton O-rings and gaskets with mating surfaces machined to close tolerances meeting the general specification of the vacuum standards.	Specify	Yes / No / Explain		
122	Vacuum sealing - 2: The seal area shall be effectively water cooled to avoid heat damage.	Specify	Yes / No / Explain		

123	Vacuum sealing - 3: The chamber to door sealing shall be of 'O' ring groove and 'O' ring seal arrangement. Chamber end shall have end flanges with groove and 'O' ring shall be fitted in	Specify	Yes / No / Explain		
124	Support structure for chamber - 1: Chamber shall be mounted on a rigid support legs.	Specify	Yes / No / Explain		
125	Support structure for chamber - 2: The chamber shall be located at a suitable height to facilitate easy approach to the operator.	Specify	Yes / No / Explain		
126	Support structure for chamber - 3: Chamber shall be provided with suitable lifting brackets.	Specify	Yes / No / Explain		
127	VACUUM SYSTEM: Specifications as listed below	Specify	Yes / No / Explain		
128	Ultimate vacuum level: Better than 1 x 10^-5 mbar within 45 minutes for clean, cold and empty chamber.	Specify	Yes / No / Explain		
129	Operating vacuum level (range): 1 x 10^-2 mbar to 1 x 10^-5 mbar (Fully variable/ controlled/ programmable)	Specify	Yes / No / Explain		
130	Vacuum pumping system - 1: All pumps (roots, rotary, and diffusion pumps) shall be from M/s. Edwards/ Pfeiffer/ Leybold/ Alcatel/Aglient/equivalent reputed make only.	Specify	Yes / No / Explain		
131	Vacuum pumping system - 2: Roughing Vacuum pump shall be dry (oil free type) pump only.	Specify	Yes / No / Explain		

132	Vacuum pumping system - 3: Capacitance gauge for vacuum level measurements (M/s. Edward/ Pfeiffer/ Leybold/ equivalent reputed make) shall be provided.	Specify	Yes / No / Explain		
133	Vacuum pumping system - 4: Operated using PLC with sequenced mode to provide interlock for safe operation	Specify	Yes / No / Explain		
134	Vacuum pumping system - 5: SS plumbing lines with metallic bellow (M/s. Mewaza/Edwards/Pfeiffer/Leybold/equivalent reputed make) adaptors.	Specify	Yes / No / Explain		
135	Vacuum pumping system - 6: LN2 trap/Cryo trap/Chevron Baffles shall be provided.	Specify	Yes / No / Explain		
136	Vacuum pumping system - 7: All flanges and fittings should be as per ISO standards with Viton ‘O’ rings seal.	Specify	Yes / No / Explain		
137	Vacuum pumping system - 8: Additional port to be provided (as per ISO standard) in the backing line for helium leak test.	Specify	Yes / No / Explain		
138	Vacuum pumping system - 9: Shall contain an exhaust oil mist filter of reputed make to avoid contamination.	Specify	Yes / No / Explain		
139	Vacuum pumping system - 10: Details of pumps proposed for use are to be mentioned in the offer. Same make of elements for the vacuum system is preferred.	Specify	Yes / No / Explain		

140	Vacuum pumping system - 11: All pumps must be provided with first charge of proper oils/fluids.	Specify	Yes / No / Explain		
141	Vacuum pumping system - 12: Required fittings, valves and gauges should be provided with schematic diagram.	Specify	Yes / No / Explain		
142	Vacuum pumping system - 13: All necessary cables, valves and lines are to be provided.	Specify	Yes / No / Explain		
143	Vacuum pumping system - 14: Vacuum controller shall be engaged in partial pressure operation mode. Inert gas in standard cylinders will be arranged at the installation site by us.	Specify	Yes / No / Explain		
144	Vacuum pumping system - 15: Details about the vacuum achievable with proposed vacuum pumps along with calculations and supporting documents shall be submitted.	Specify	Yes / No / Explain		
145	Vacuum pumping system - 16: The pumping system should have capability to generate an ultimate vacuum of 1x10^-5 mbar or better in the chamber from the atmospheric pressure in clean and cold condition within 45 minutes.	Specify	Yes / No / Explain		
146	Vacuum valves - 1A: All vacuum valves including roughing, fore-line, high vacuum, holding, backfill, etc. should be electro-pneumatic and Stainless Steel.	Specify	Yes / No / Explain		

147	Vacuum valves - 1B: All valves should be from M/s. VAT Vacuum Ventile-AG/Pfeiffer/Alcatel/TM Vacuum Products USA/EBRO Armaturen/equivalent reputed make only.	Specify	Yes / No / Explain		
148	Vacuum plumbing and bellows - 1: All plumbing and metallic bellows should be made of Stainless steel 304 and designed for appropriate size. All the joints in the vacuum lines should be of ISO/ DIN standard.	Specify	Yes / No / Explain		
149	Vacuum plumbing and bellows - 2: Necessary bellow adaptors should be provided to connect the vacuum pumping system with the chamber.	Specify	Yes / No / Explain		
150	Vacuum instrumentation - 1: Vacuum controller and sensors shall be from M/s. Leybold/Pfeiffer/Edwards/equivalent reputed make only	Specify	Yes / No / Explain		
151	Vacuum instrumentation - 2A: Vacuum controller with one cold cathode/ inverted magnetron sensor and two Pirani inputs with alarms/switching at high and low settings (cross over) for all channels.	Specify	Yes / No / Explain		
152	Vacuum instrumentation - 2B: (One Pirani for holding vacuum, Second Pirani for rough vacuum and cold cathode/ inverted magnetron sensor for high vacuum in furnace)	Specify	Yes / No / Explain		

153	Vacuum instrumentation - 3: One additional port to be provided for one vacuum sensor for attaching standard sensor for furnace vacuum system calibration.	Specify	Yes / No / Explain		
154	Vacuum instrumentation - 4A: One mechanical gauge should be provided on the chamber to see the rough vacuum.	Specify	Yes / No / Explain		
155	Vacuum instrumentation - 4B: Dial analog type mechanical vacuum gauge of 4” diameter having a measuring range from 0-760 mm of Hg is to be provided in the furnace chamber.	Specify	Yes / No / Explain		
156	Additional vacuum sensor ports to be provided: One port each of 25 mm for vacuum monitoring in between roughing pump & booster pump, booster pump & diffusion pump and diffusion pump & high vacuum valve.	Specify	Yes / No / Explain		
157	Ultimate vacuum - 1: In clean, cold, empty chamber (expect the charge material) an ultimate vacuum of 1x10^-5 mbar or better should be achieved.	Specify	Yes / No / Explain		
158	Ultimate vacuum - 2: The total pumping time to generate the ultimate vacuum from atmospheric pressure should not exceed 45 minutes.	Specify	Yes / No / Explain		
159	CLOSED LOOP GAS QUENCHING SYSTEM: Specifications as listed below	Specify	Yes / No / Explain		
160	Cooling/quenching Gas - Argon/Nitrogen.	Specify	Yes / No / Explain		

161	Cooling/quenching rates (range) - 1) 0.5°C/min to 70°C/min (controlled/ programmable) from 1350°C to 450°C.	Specify	Yes / No / Explain		
162	Cooling/quenching rates (range) - 2) Vacuum cooling/gas cooling-static/forced gas quenching shall be fully variable/controlled/ programmable.	Specify	Yes / No / Explain		
163	Cooling/quenching rates (range) - 3) Gas quenching pressure shall be 6 bar (gauge).	Specify	Yes / No / Explain		
164	Cooling/quenching rates (range) - 4) Gas quenching systems shall be designed to meet the required cooling rates mentioned above.	Specify	Yes / No / Explain		
165	Cooling/quenching rates (range) - 5) The party shall submit detailed design calculations for achieving the required cooling/quenching rate.	Specify	Yes / No / Explain		
166	Inert gas circulation/recirculation in the hot zone: Gas blowing system with proper valves and a heat exchanger shall be provided.	Specify	Yes / No / Explain		
167	Blower and heat exchanger location: These systems are to be located externally to the chamber.	Specify	Yes / No / Explain		
168	Isolation of gas quenching system from the chamber: Isolation by gate/ball valves	Specify	Yes / No / Explain		
169	Gas flow meters: At appropriate places in gas storage system	Specify	Yes / No / Explain		

170	Gas storage system - 1A: Gas storage accumulator of suitable capacity to transfer gas to vacuum chamber to be operated at 6 bar (gauge) should be provided.	Specify	Yes / No / Explain		
171	Gas storage system - 1B: If the capacity of vessel is within the purview of SMPV rule 2016, approval should be obtained from PESO for the design and manufacture of the same.	Specify	Yes / No / Explain		
172	Gas storage system - 2: Gas storage tank should be as per the ASME code SEC VIII, Div 1 (Pressure vessel design code).	Specify	Yes / No / Explain		
173	Gas storage system - 3A: Two independent spring-loaded safety relief valve should be provided on the gas storage tank to prevent the gas pressure hike above the desired level.	Specify	Yes / No / Explain		
174	Gas storage system - 3B: 1st safety relief valve shall be set to discharge at 110% of MAWP and at full opening the pressure inside the vessel shall not exceed 120% of the design pressure.	Specify	Yes / No / Explain		
175	Gas storage system - 4: Inspection of the main shell shall be done in accordance with AMSE code SEC V.	Specify	Yes / No / Explain		
176	Gas storage system - 5: Welding shall be carried out by welders qualified in accordance with latest version of the ASME Boiler and pressure vessel code, section IX.	Specify	Yes / No / Explain		

177	Gas storage system - 6: Suitable surface protection (by painting etc.) should be provided to storage tank for protection from corrosion.	Specify	Yes / No / Explain		
178	Gas storage system - 7: A gas storage bank to hold sufficient gas cylinders shall be provided.	Specify	Yes / No / Explain		
179	Gas storage system - 8: The gas storage tank and gas storage bank should have all required safety valves, gas regulator, dial gauges, isolation valves, non-return valve, pig tails, etc. for feeding argon gas in furnace.	Specify	Yes / No / Explain		
180	Gas pressure control system - 1: The furnace should also be designed to heat in argon gas partial pressure atmosphere.	Specify	Yes / No / Explain		
181	Gas pressure control system - 2: A digital pressure controller with pressure sensor and suitable pressure control mechanism also to be provided to control the chamber pressure.	Specify	Yes / No / Explain		
182	Gas pressure control system - 3: A pressure switch should be provided in chamber to cut off the gas supply by closing the gas inlet solenoid valve after achieving the set level of pressure.	Specify	Yes / No / Explain		

183	Gas pressure control system - 4: All necessary control valves, needle valves, manual valves, flow meter, etc. required for operation of furnace in gas environment and for gas quenching should be provided.	Specify	Yes / No / Explain		
184	ELECTRICAL SYSTEM: Specifications as listed below	Specify	Yes / No / Explain		
185	Power system for heating elements - 1: 415V ±10%, three phase, 50Hz	Specify	Yes / No / Explain		
186	Power system for heating elements - 2A: Variable reactance transformer with separate windings for each zone shall be controlled by a master and slave programmable controllers.	Specify	Yes / No / Explain		
187	Power system for heating elements - 2B: The terminal voltage to the heating elements should be below 40V. Lower terminal voltage will be preferred.	Specify	Yes / No / Explain		
188	Power system for heating elements - 3: Furnace and heating power system should be designed by providing sufficient margin (minimum 30%) in heating capacity.	Specify	Yes / No / Explain		
189	Power controller: Three phase thyristor power controllers: 3 Nos for three zones for independent control from M/s. Eurotherm/Yokogawa/equivalent reputed make.	Specify	Yes / No / Explain		

190	Electrical panel: Free standing panel (M/s. Rittal/President/Valrack/ equivalent reputed make) with full opening front doors for housing all control instrumentation, PLC, push buttons, lights, alarms, motor starters, relays, power meters, etc.	Specify	Yes / No / Explain		
191	Control panel cooling: The size of the panel must be specified and should be ventilated with an air circulation fan to prevent temperature build up due to the operation of the instruments or shall be provided with panel air conditioner.	Specify	Yes / No / Explain		
192	Current and voltage display requirements: Provisions are to be made in the electrical panel to measure and display the current and voltage of every hot zone heating element. An ammeter shall also be provided to monitor the gas blower motor current.	Specify	Yes / No / Explain		
193	Wiring requirements: Electrical and instrumentation panel shall be wired as per international standards.	Specify	Yes / No / Explain		
194	INSTRUMENTATION AND CONTROL SYSTEM: Specifications as listed below	Specify	Yes / No / Explain		

195	Control console/panel - 1A: Control console should be an industrial standard IP-54 class protection fabricated out of mild steel sheets neatly powder coated console .	Specify	Yes / No / Explain		
196	Control console/panel - 1B: (M/s. Rittal/President/Valrack/equivalent reputed make) made of MS sheet which houses all the control switches and the control instruments required for smooth operation of the system	Specify	Yes / No / Explain		
197	Control console/panel - 2: The control console shall be divided into six segments with power panel, control panel, vacuum panel and heating & cooling thyrister control panels (3 Nos).	Specify	Yes / No / Explain		
198	Control console/panel - 3A: It shall house all the control instruments and switches for operation of the various systems viz. auto/semi-auto/manual selector switches,	Specify	Yes / No / Explain		
199	Control console/panel - 3B: furnace start – stop switches with indicator lamps, mimic diagram, utility failure indications etc.	Specify	Yes / No / Explain		

200	Control console/panel - 4: The panel shall also house all the control switches and instrumentation like temperature programmable controller, over temperature controller, power controller, ammeter, voltmeter, status indicators, etc.	Specify	Yes / No / Explain		
201	Control console/panel - 5A: The control panel shall also be provided with a large red mushroom style emergency stop button which will turn off heater power, close all valves (except inert gas)	Specify	Yes / No / Explain		
202	Control console/panel - 5B: and bring the unit to safe operating conditions (i.e., isolate vacuum pumping system, if the emergency is applied during vacuum sequence stage and bring the unit up to atmosphere pressure).	Specify	Yes / No / Explain		
203	Control console/panel - 6: Control panel shall have indication about the status of the power supply and its auxiliaries.	Specify	Yes / No / Explain		
204	Control console/panel - 7: All the electrical switch gears (control transformers, contactors, relays, fuses, timers and motors starters etc) are to be mounted on a plate and fitted vertically for convenience of maintenance.	Specify	Yes / No / Explain		

205	Control console/panel - 8: Control console shall have full opening back door for easy approach of internal components	Specify	Yes / No / Explain		
206	Control console/panel - 9: The electrical items like MCB's relays, contactors etc shall be of M/s. Siemens/Allen Bradley/ABB/Schneider/L&T/equivalent reputed make.	Specify	Yes / No / Explain		
207	Control console/panel - 10: The electrical wiring of the panel shall conform to the accepted international standards.	Specify	Yes / No / Explain		
208	Control console/panel - 11: The control panel should have audio-visual alarm for alarm/fault indication to indicate any failure in safety systems, auxiliaries, power supply, etc.	Specify	Yes / No / Explain		
209	Instrumentation and control - 1A: All the necessary control instrumentation shall be provided in the system for manual monitoring, recording and controlling of various parameters.	Specify	Yes / No / Explain		
210	Instrumentation and control - 1B: The instrumentation and control system is to be backed by an online UPS of adequate rating with a minimum back up of at least 30 minutes, provided by the supplier	Specify	Yes / No / Explain		

211	Instrumentation and control - 1C: so that all the process parameters are monitored and recorded continuously without any missing of data in case of a power failure.	Specify	Yes / No / Explain		
212	Instrumentation and control - 2A: In addition to manual mode of data acquisition system, PC based data acquisition and control system with SCADA software should be provided. Optionally, provision for acquiring the data	Specify	Yes / No / Explain		
213	Instrumentation and control - 2B: Offline report generation software shall be provided. The system should include latest version PC with faster memory, 24” TFT LED color monitor, color laser printer, etc. The PC shall be backed by UPS mentioned above.	Specify	Yes / No / Explain		
214	Auto/Semi-Auto/Manual controller - 1: The control instrumentation shall have auto mode, semi-auto mode and manual mode.	Specify	Yes / No / Explain		
215	Auto/Semi-Auto/Manual controller - 2: Auto mode: System is to operate in fully automatic mode based on the program loaded. All safety and monitoring system shall be enabled.	Specify	Yes / No / Explain		

216	Auto/Semi-Auto/Manual controller - 3A: Semi – Auto mode: The system is to operate in semi auto mode, in which provision should be provided to change/edit the process variable parameters on – line to aid in process development.	Specify	Yes / No / Explain		
217	Auto/Semi-Auto/Manual controller - 3B: These parameters will be used for auto mode operation. All safety and monitoring systems shall be enabled.	Specify	Yes / No / Explain		
218	Auto/Semi-Auto/Manual controller - 4A: Manual Mode: The system is to operate in fully manual mode with push buttons and controllers. This mode is to ensure that the process can be completed in case of a control system failure.	Specify	Yes / No / Explain		
219	Auto/Semi-Auto/Manual controller - 4B: All essential safety and monitoring systems are to be enabled. The thyristor control output should be controlled by potentiometer for the manual control mode.	Specify	Yes / No / Explain		
220	Auto/Semi-Auto/Manual controller - 5: A vacuum controller shall be provided for complete automation of vacuum pumping system with fully manual over riding facility using vacuum gauges and set point controllers.	Specify	Yes / No / Explain		

221	Auto/Semi-Auto/Manual controller - 6A: The vacuum controller shall incorporate vacuum flow chart, manually operated push button switch, status indicating LED's, valves, logic controllers, mode selector switch	Specify	Yes / No / Explain		
222	Auto/Semi-Auto/Manual controller - 6B: and utility failure indication with an operator call alarm. Provision to execute vacuum control operations from main PLC controllers shall also be provided.	Specify	Yes / No / Explain		
223	Temperature programmable controller - 1A: Microprocessor based PID controllers of reputed make like M/s. Siemens/Eurotherm/ Yokogawa/ Honeywell/equivalent reputed make shall be provided for temperature programming and controlling.	Specify	Yes / No / Explain		
224	Temperature programmable controller - 1B: The accuracy required is ±0.25% of full scale input.	Specify	Yes / No / Explain		
225	Temperature programmable controller - 2A: This programmer controller should capable of storing 50 programmes. Each programme shall have 16-20 segments to meet various temperature profiles.	Specify	Yes / No / Explain		

226	Temperature programmable controller - 2B: This programmer/controller should be interfaced with power controller for controlling the power to the heating elements.	Specify	Yes / No / Explain		
227	Temperature programmable controller - 3: The PID controller should have the capability to select different type of thermocouples like K/N/R/S/C etc. and should be with communication ports for interfacing the data logging system.	Specify	Yes / No / Explain		
228	Temperature programmable controller - 4A: The system should have minimum 2 Pt, Pt Vs 13%Rh “R” type – Recrystallized Alumina/Molybdenum sheathed-type thermocouples	Specify	Yes / No / Explain		
229	Temperature programmable controller - 4B: inside each hot zone, one primarily for controlling temperature and the other for over temperature protection.	Specify	Yes / No / Explain		
230	Temperature programmable controller - 5: 6 nos. of “R” type - Pt, Pt v/s 13 % Rh thermocouples of M/s. Omega/TL/Tudor/equivalent reputed make with range from ambient to 1650°C shall be provided for the monitoring and control of hot zone.	Specify	Yes / No / Explain		

231	Temperature programmable controller - 6: One complete set of thermocouples has to be provided as essential spares (6 Nos. of R-Type rigid thermocouples) for the monitoring and control of hot zone. Details are also provided in general terms and conditions.	Specify	Yes / No / Explain		
232	Temperature programmable controller - 7A: An independent digital over temperature controller from M/s. Honeywell/Eurotherm /Yokogawa/Siemens/ equivalent reputed make with separate thermocouple in each zone	Specify	Yes / No / Explain		
233	Temperature programmable controller - 7B: shall be provided for monitoring and control of hot zone.	Specify	Yes / No / Explain		
234	Temperature programmable controller - 7C: It should have a relay output which is interlocked with furnace power supply to cut it off in the event of any malfunctioning of PID controller/thyristor and if the temperature level shoots beyond the set temperature.	Specify	Yes / No / Explain		

235	Temperature programmable controller - 8: For the monitoring and control of hot zone, thermocouples should be located at suitable positions to achieve uniform temperature control throughout the hot zone area and it should not obstruct during the job handling.	Specify	Yes / No / Explain		
236	Temperature programmable controller - 9A: An extra feed through port/connector for connecting 4 nos. of thermocouples for temperature uniformity survey (TUS)/furnace calibration should also be provided.	Specify	Yes / No / Explain		
237	Temperature programmable controller - 9B: Closure flange also should be provided to close if it is not under use.	Specify	Yes / No / Explain		
238	Temperature programmable controller - 10: 3 Nos of Pt, Pt Vs 13%Rh “R” type – Recrystallized Alumina/ Molybdenum Sheathed thermocouples (flexible) shall be provided for work temperature measurement (Minimum one number in each hot zone).	Specify	Yes / No / Explain		

239	Temperature programmable controller - 11: 12 nos of Molybdenum/Recrystallized alumina sheathed “K/N” type thermocouples shall be provided for work temperature measurement (Minimum four numbers in each hot zone).	Specify	Yes / No / Explain		
240	Temperature programmable controller - 12A: One complete set of thermocouples has to be provided as essential spares (3 Nos of R-Type and 12 Nos. of K/N type of flexible thermocouples) for work flexible work temperature measurement.	Specify	Yes / No / Explain		
241	Temperature programmable controller - 12B: Details are also provided in general terms and conditions.	Specify	Yes / No / Explain		
242	Temperature programmable controller - 13: One internal plug and socket assembly for 12 Nos of “K/N” type thermocouples along with compensating cables and connectors shall also be provided.	Specify	Yes / No / Explain		
243	Programmable logic controller (PLC) - 1A: Programmable logic controller from M/s. Siemens/ABB/Honeywell/Allen-Bradley/GE-FANUC/equivalent reputed make shall be provided in the system for complete automation of vacuum cycle, gas flow	Specify	Yes / No / Explain		

244	Programmable logic controller (PLC) - 1B: and temperature cycle in conjunction with temperature programmer controller, other process controllers (Vacuum, Cooling & Flow etc) and also to achieve various interlocks in the system.	Specify	Yes / No / Explain		
245	Programmable logic controller (PLC) - 2: It should be ensured that 25% of free I/Os are available in PLC system for further expansions/modifications.	Specify	Yes / No / Explain		
246	Programmable logic controller (PLC) - 3: An advance version Industrial PC with SCADA software (M/s. Siemens/ GE-FANUC/ equivalent reputed make) for complete automation, control and data logging of furnace operation should be provided.	Specify	Yes / No / Explain		
247	Programmable logic controller (PLC) - 4: All the process log data should be acquired through SCADA and stored in the PC. The party shall specify the frequency of data logging.	Specify	Yes / No / Explain		
248	Instrumentation and control system mimic diagram: A mimic diagram of the system with status indicator shall be available on the control cabinet to allow the operator to monitor the status of the furnace functions	Specify	Yes / No / Explain		

249	Calibration of sensors and equipment : All vacuum & temp. sensors and instruments shall be calibrated in accredited lab and certificates shall be furnished.	Specify	Yes / No / Explain		
250	On-line UPS: The system shall be provided with online UPS of adequate rating with minimum 30 minutes back up for PC, PLC and other control instrumentation to monitor the parameters during power failure and also to bring the system to a safe condition during power failure.	Specify	Yes / No / Explain		
251	Circuit details: All the circuit diagrams and details should be provided.	Specify	Yes / No / Explain		
252	Auto/manual operation - 1: Furnace should be operated in both auto and manual mode with all safety interlocks.	Specify	Yes / No / Explain		
253	Auto/manual operation - 2: An auto/manual control provision should be provided with capability to operate the furnace in fully automatic mode and manual overriding mode with all safety interlocks.	Specify	Yes / No / Explain		
254	Auto/manual operation - 3: Mimic diagram, manually operated ON/OFF switches, indication lamps, auto/manual standby selector switch, utility failure indications and alarms etc should be provided.	Specify	Yes / No / Explain		

255	SCADA system - 1A: The equipment should be supplied with suitable SCADA for its complete safe and fail free operation, control and data acquisition. SCADA software shall be like Win-CC/Simplicity or equivalent compatible to the PLC.	Specify	Yes / No / Explain		
256	SCADA system - 1B: SCADA should capable of monitoring and automatic logging of all process parameters like temperature, vacuum, gas pressure. All system warnings and alerts should be displayed in PC.	Specify	Yes / No / Explain		
257	SCADA system - 2: The SCADA should have the features for programming the heating cycle, pressure level setting, monitoring the process parameters, recording, storing and reporting. SCADA should have provision for health check of equipment, monitor the input and output status and interlocks in the PLC.	Specify	Yes / No / Explain		

258	SCADA system - 3: An Industrial PC (see Programmable Logic Controller) of advanced version and laser color printer should be supplied. PC should be interfaced with PLC and PID. SCADA should have the provision for future modifications. Graphic mimic diagram should be provided in SCADA for online monitoring of operation equipment. Re-installable licensed copy of all necessary software and programmes should be provided along with equipment.	Specify	Yes / No / Explain		
259	SCADA system - 4: The SCADA system should provide a user friendly and intuitive graphical user interface to the operator. It shall have an active mimic diagram of the equipment as a whole and separate mimics for the subsystems. The mimic diagrams shall be active with live process parameter indicators.	Specify	Yes / No / Explain		
260	SCADA system - 5A: The SCADA program should enable profile programming and RECIPE programming of various parameters, which can be stored and recalled from the PC.	Specify	Yes / No / Explain		
261	SCADA system - 5B: Each profile/recipe should be able to take up to 50 programmes and each programme should have 16 segments minimum.	Specify	Yes / No / Explain		

262	SCADA system - 6A: The SCADA system should provide following operations viz. 1) vacuum, vacuum heat and natural (vacuum) cool; 2) vacuum, vacuum heat, gas cool (static); 3) vacuum, vacuum heat, gas fast cool;	Specify	Yes / No / Explain		
263	SCADA system - 6B: The SCADA system should provide following operations viz.4) vacuum, gas heat (static), natural (vacuum) cool.	Specify	Yes / No / Explain		
264	SCADA system - 7A: High and low limits of each parameter should be programmable in the recipe/profile. Audio visual alarms to be generated in the control panel if the process goes out of the set boundaries.	Specify	Yes / No / Explain		
265	SCADA system - 7B:Suitable corrective actions/safety measures to be enabled automatically.	Specify	Yes / No / Explain		
266	SCADA system - 8: Various system mimic diagrams must be available on the SCADA screen with related measured parameters displayed live on the mimic diagram.	Specify	Yes / No / Explain		
267	SCADA system - 9: Error logging with date/time stamp for all events should be provided.	Specify	Yes / No / Explain		

268	SCADA system - 10A: The SCADA system should have a detailed error reporting system for easy maintenance. All the I/O conditions are to be monitored through the software.	Specify	Yes / No / Explain		
269	SCADA system - 10B: A maintenance mode should be provided to aid in easy maintenance/fault finding of the system. Graphical plotting of all parameters should be available in the SCADA package.	Specify	Yes / No / Explain		
270	SCADA system - 11: Real-time plotting of all the process parameters should be available in the SCADA system. The control system should be designed in such a way that the process should be completed even if the SCADA front end fails.	Specify	Yes / No / Explain		
271	Safety & interlocks - 1: The equipment shall be provided with all the safety devices and interlocks to protect the system and the operator from malfunction and possible operator’s errors.	Specify	Yes / No / Explain		
272	Safety & interlocks - 2A: In all modes of operation; automatic, manual & maintenance, safety of the furnace along with vacuum systems shall be ensured during power interruption or in case of emergency stop.	Specify	Yes / No / Explain		

273	Safety & interlocks - 2B: A key lock shall be provided for the maintenance mode. All right-angle valves leading to the vacuum pumps shall automatically close during a power failure or any unexpected interruption.	Specify	Yes / No / Explain		
274	Safety & interlocks - 2C:After such an interruption, the valves shall remain in closed condition until the operator resets.	Specify	Yes / No / Explain		
275	Safety & interlocks - 3: The door shall be interlocked with vacuum system, gas system and heating system to avoid accidental operation/opening.	Specify	Yes / No / Explain		
276	Safety & interlocks - 4: Heating system shall be interlocked with water cooling system, vacuum/pressure.	Specify	Yes / No / Explain		
277	Safety & interlocks - 5: Vacuum system shall be interlocked with pneumatic pressure, water cooling system, air admit valves and gas inlet/outlet valves.	Specify	Yes / No / Explain		
278	Safety & interlocks - 6: Vacuum pumps & valves shall be interlocked to prevent its accidental operation and for sequential operation wherever necessary.	Specify	Yes / No / Explain		
279	Safety & interlocks - 7: Gas purging shall be interlocked with chamber vacuum valves, chamber pressure and inlet gas pressure.	Specify	Yes / No / Explain		

280	Safety & interlocks - 8: Diffusion pump shall be interlocked to cooling water, vacuum level and necessary vacuum valves.	Specify	Yes / No / Explain		
281	Safety & interlocks - 9: Air admittance shall be interlocked with chamber vacuum valves, gas admittance valve and heating system. Air admittance is prohibited above 300℃.	Specify	Yes / No / Explain		
282	Safety & interlocks - 10: A pressure switch shall be provided in pneumatic line to alert the operator by alarm and should be interlocked by PLC in case pneumatic pressure in the supply line fails below the required operating pressure.	Specify	Yes / No / Explain		
283	Safety & interlocks - 11: Water cooling system shall be designed such that gravity flow of water is available to heated areas of equipment in case of accidental power failure/ pump failure.	Specify	Yes / No / Explain		
284	Safety & interlocks - 12: All the instruments required for obtaining the above signals to PLCs such as level switch, pressure switch, flow switches, thermocouples etc. shall be included in the scope of supply.	Specify	Yes / No / Explain		
285	Safety & interlocks - 13: Audio-visual alarm and the levels of the alarms shall be defined by the manufacturer in order to ensure safe operation of the furnace.	Specify	Yes / No / Explain		

286	Safety & interlocks - 14: The furnace shall be protected from surge current, over voltage, under voltage and phase failure.	Specify	Yes / No / Explain		
287	Safety & interlocks - 15: All three phase motors shall be double earthed.	Specify	Yes / No / Explain		
288	Safety & interlocks - 16: All cables, cooling water line shall be neatly routed through proper trays/conduits.	Specify	Yes / No / Explain		
289	SAFETY DEVICES AND INTERLOCKS: Specifications as listed below	Specify	Yes / No / Explain		
290	Power failure - 1A : In the event of power failure, all the process valves in the system shall immediately go to the closed position. The system shall continue to admit the cooling water from the overhead water tank for chamber/auxiliary cooling.	Specify	Yes / No / Explain		
291	Power failure - 1B :When the power resumes, the process should restart from the beginning.	Specify	Yes / No / Explain		
292	Power failure - 2 : In the event of a power failure, all vacuum valves shall close thereby protecting the hot zone and the work load from damage.	Specify	Yes / No / Explain		
293	Over temperature protection: In the event of over temperature, the heater power shall be switched off with indicator light and alarm sound.	Specify	Yes / No / Explain		

294	Overload protection: All the motors shall be fixed with overload protection to protect the rotary, roots pump motors and other motors from drawing excessive current due to over load.	Specify	Yes / No / Explain		
295	Cooling water failure - 1: Water lines for different systems of the furnace shall be taken from a central manifold distributing them into various circuits providing each with a control valve for independent operation.	Specify	Yes / No / Explain		
296	Cooling water failure - 2A: Similarly, the outlet water from different systems of the furnace shall be connected to a common outlet manifold.	Specify	Yes / No / Explain		
297	Cooling water failure - 2B: Water flow switches shall be provided on the outlet of each system so that the water flow rate of each of the system shall be sensed and an OK signal is given to operate the control system.	Specify	Yes / No / Explain		
298	Cooling water failure - 3: In case of water supply failure or reduced rate of water flow, these switches should de-energize the electrical circuit and give alarm showing the status of the system through indicators.	Specify	Yes / No / Explain		

299	Cooling water failure - 4A: In the event of low water flow to critical circuits like chamber, electrodes etc., the control shall shut down heater power, indicator light and alarm sound should be activated and should automatically switch over to the emergency overhead tank.	Specify	Yes / No / Explain		
300	Cooling water failure - 4B: There shall be indicator light and alarm sound in case of water failure from over head tank also. Cooling water lines shall be provided to different system of the equipment from a central manifold with individual control valves.	Specify	Yes / No / Explain		
301	Cooling water failure - 5: The outlet water from different systems of the unit shall be connected to a common outlet manifold.	Specify	Yes / No / Explain		
302	Cooling water failure - 6: Water flow switches shall be provided on the outlet of each system so that the water flow of each of the system can be sensed and may be interlocked by PLC for safety of the equipment.	Specify	Yes / No / Explain		
303	Cooling water failure - 7: The cooling lines shall be color coded as per IS:2379.	Specify	Yes / No / Explain		
304	Auxiliary Systems: All auxiliary systems required for the independent operation of the equipment shall be supplied.	Specify	Yes / No / Explain		

305	Cooling system - 1: Water chiller of required capacity for equipment shall be provided.	Specify	Yes / No / Explain		
306	Cooling system - 2: All other required sub-systems such as emergency water storage tank, air compressor etc. required for independent operation of equipment shall also be provided.	Specify	Yes / No / Explain		
307	Cooling system - 3: All the plumbing and electrical lines required for the equipment shall be provided.	Specify	Yes / No / Explain		
308	Job loading: Suitable loading mechanism shall be provided by the manufacturer for loading of work pieces and charging into the furnace.	Specify	Yes / No / Explain		
309	UPS: The system shall be provided with online UPS of adequate rating with minimum 30 minutes back up for PC, PLC and other control instrumentation to monitor the parameters during power failure and also to bring the system to a safe condition during power failure.	Specify	Yes / No / Explain		
310	Closed loop water – cooling system - 1: Closed loop water cooling system as standalone system (M/s. Paharpur/GEM/equivalent reputed make) shall be provided for cooling the furnace chamber, lid and vacuum pumps etc with the elements listed below.	Specify	Yes / No / Explain		

311	Closed loop water – cooling system - 2: Inlet and outlet water manifolds with distribution lines for various water circuits and temperature sensors.	Specify	Yes / No / Explain		
312	Closed loop water – cooling system - 3: At the inlet of the water line, isolation valve, pressure relief valves, pressure gauge should be provided (depending upon number of circuits, required number of isolation valves should be provided).	Specify	Yes / No / Explain		
313	Closed loop water – cooling system - 4: An over pressure safety release valve and pressure gauge should be provided at inlet manifold to protect the chamber in case of over pressure than the set values.	Specify	Yes / No / Explain		
314	Closed loop water – cooling system - 5: Emergency overhead water tank of suitable capacity with non-return valve and normally closed solenoid valve shall be provided. The overhead tank is to be located at a suitable height to achieve requisite inlet pressure.	Specify	Yes / No / Explain		
315	Closed loop water – cooling system - 6: All water pipe lines shall preferably made of Stainless steel to prevent corrosion.	Specify	Yes / No / Explain		

316	Closed loop water – cooling system - 7: Provision should be provided to bypass the cooling plant with water from over head tank for the safety of diffusion pump and chamber, in case of power failure.	Specify	Yes / No / Explain		
317	Pressure switches: Two pressure switches one in pneumatic line and the other in the process gas line shall be connected to alert the operator by alarm in case the gas supply pressure drops below the required operating level.	Specify	Yes / No / Explain		
318	Vacuum controller - 1A: Out gassing alarm : Vacuum gauge controller shall be interlocked with process parameter such that in the event of pressure raise due to out gassing from the article,	Specify	Yes / No / Explain		
319	Vacuum controller - 1B: it should give generate an output signal with audio, visual temperature alarm warning and later to switch off heaters or reduce heating power.	Specify	Yes / No / Explain		
320	Vacuum controller - 2A: Proximity switch : The high vacuum valve should be fitted with proximity switches to provide the signal on the valve fully closed position	Specify	Yes / No / Explain		

321	Vacuum controller - 2B: so that even if the electrical signal gives any wrong signal, the proximity switches will not allow other operations to be carried out.	Specify	Yes / No / Explain		
322	Chamber over pressure protection and alarm - 1A: There shall be 3 levels of protection for chamber over pressure using two spring loaded safety valves and one rupture disc with pressure sensors and interlocks for smooth operation.	Specify	Yes / No / Explain		
323	Chamber over pressure protection and alarm - 1B: The rupture disc shall be designed and incorporated at suitable pressure levels.	Specify	Yes / No / Explain		
324	Chamber over pressure protection and alarm - 2A: Electronic pressure sensor with set point controller - Pressure sensor on chamber should sense the gas pressure inside the chamber and close the process gas valve,	Specify	Yes / No / Explain		
325	Chamber over pressure protection and alarm - 2B: if the chamber pressure exceeds beyond the set value.	Specify	Yes / No / Explain		

326	Chamber over pressure protection and alarm - 3: The system should include a chamber pressure switch as a safety feature that shuts down all the process gas flow if the pressure in the chamber exceeds a specific set point, and releases excess gas pressure.	Specify	Yes / No / Explain		
327	Chamber over pressure protection and alarm - 4: A pressure relief valve assembly should be provided to blow off the pressure in case of pressure build up inside the chamber.	Specify	Yes / No / Explain		
328	Door closer interlock: This shall prevent heater power to the furnace unless the door is shut.	Specify	Yes / No / Explain		
329	Interlocks: Interlocks to avoid manual errors like failure to close the door, operation of manual valves etc shall be provided. Water, air and vacuum fail interlocks must be provided. They shall have indications as well as audio alarm provided on the front panel.	Specify	Yes / No / Explain		
330	Pneumatic supply - 1A: Pneumatic supplies to all the valves shall be from a pneumatic manifold fabricated out of SS. This manifold at the inlet should have isolation valve, pressure gauge, filters, lubricators and regulator.	Specify	Yes / No / Explain		

331	Pneumatic supply - 1B: A pressure switch shall also be incorporated on the manifold to given an alarm, which alerts the operator if the pressure becomes low. Check valves shall be provided at critical locations.	Specify	Yes / No / Explain		
332	Mechanical stops: All rails and floor tracks provided for work handling equipment should be provided with mechanical stops at each extreme of travel to prevent over travel.	Specify	Yes / No / Explain		
333	GENERAL TERMS & CONDITIONS: Specifications as listed below	Specify	Yes / No / Explain		
334	Items to be supplied - 1: Vacuum furnace as per specifications given above - 1 No.	Specify	Yes / No / Explain		
335	Items to be supplied (Essential spares) - 1: Vacuum Pump Oil (for all rotary, roots and diffusion pumps) - suitable for 3 refillings	Specify	Yes / No / Explain		
336	Items to be supplied (Essential spares) - 2: Vacuum Gauge Head - Pirani: 2 Nos., Penning - 1 No.	Specify	Yes / No / Explain		
337	Items to be supplied (Essential spares) - 3: “O” rings and Gaskets - 1 set	Specify	Yes / No / Explain		
338	Items to be supplied (Essential spares) - 4: Diffusion pump heater - 1 No.	Specify	Yes / No / Explain		
339	Items to be supplied (Essential spares) - 5: Thermocouples (control and job thermocouples) - 1 set	Specify	Yes / No / Explain		
340	Items to be supplied (Essential spares) - 6: Thyristor fuse - 3 Nos.	Specify	Yes / No / Explain		

341	Pre-qualification criteria (PQC) for parties - 1: The bidder shall be Indian manufacturer for the tendered item.	Specify	Yes / No / Explain		
342	Pre-qualification criteria (PQC) for parties - 2A: The bidder shall submit, along with his offer a list of customers with full addresses where the similar (maximum temperature - 1450℃, chamber pressure – 6 bar gauge, and actual hot size – 2.5 m3)furnaces with gas quenching facility supplied by them and in operating condition during the past seven years.	Specify	Yes / No / Explain		
343	Pre-qualification criteria (PQC) for parties - 2B: Details of the supply shall be listed on a format provided in Annexure-1. Kindly provide details of relevant chambers only in the Annexure-1.	Specify	Yes / No / Explain		
344	Pre-qualification criteria (PQC) for parties - 3A: The bidder shall also provide copies of purchase orders and work completion reports preferably from Government Institutions/organizations, as evidence for having done similar kind of work	Specify	Yes / No / Explain		

345	Pre-qualification criteria (PQC) for parties - 3B: (maximum temperature - 1450℃, chamber pressure – 6 bar gauge, and actual hot size – 2.5 m3) in the past seven years, along with quotation.	Specify	Yes / No / Explain		
346	Pre-qualification criteria (PQC) for parties - 4: Prior experience in design and manufacturing of high temperature vacuum furnace with gas quenching facility of similar or higher capacity (maximum temperature - 1450℃, chamber pressure – 6 bar gauge, and actual hot zone size – 2.5 m3) will be considered as qualification criteria for the supplier. Kindly note that the feedback of the end-user shall be obtained (from our side) and it will be used to evaluate their technical competency.	Specify	Yes / No / Explain		
347	Pre-qualification criteria (PQC) for parties - 5: The party shall submit company balance sheet and profit & loss account for the last 3 years duly audited and authenticated/certified by a chartered accountant which shall commensurate with the level demanded for the execution of the work specified in this document.	Specify	Yes / No / Explain		

348	Pre-qualification criteria (PQC) for parties - 6: Factory visit shall be conducted during technical bid evaluation to ensure credentials of the supplier, if required.	Specify	Yes / No / Explain		
349	Annual maintenance contract (AMC) - 1: The vendor shall quote for non-comprehensive AMC for the equipment including calibration in every 6 months for minimum of five years after the warranty period. The AMC shall include two preventive and one breakdown maintenance visits each year.	Specify	Yes / No / Explain		
350	Annual maintenance contract (AMC) - 2: The party shall specify the price for preventive maintenance (including calibration) visits and the person-day charges for breakdown maintenance separately. The cost for AMC shall be considered for evaluation of the bid.	Specify	Yes / No / Explain		
351	Documents to be submitted along with quotation - 1: Technical specification offered	Specify	Yes / No / Explain		
352	Documents to be submitted along with quotation - 2: Specification compliance report	Specify	Yes / No / Explain		
353	Documents to be submitted along with quotation - 3: Proposed QA plan	Specify	Yes / No / Explain		

354	Documents to be submitted along with quotation - 4: Proposed acceptance test procedure	Specify	Yes / No / Explain		
355	Documents to be submitted along with quotation - 5: Details such as the model number, make and specifications of all the temperature/pressure controllers/sensors, thermocouples etc as well as for the subsystems and accessories used in the furnace.	Specify	Yes / No / Explain		
356	Documents to be submitted along with quotation - 6: The vendor shall provide the list and details of all imported equipment/ spare parts/accessories/ consumables etc. which require custom duty exemption certificate (CDEC) from the Department.	Specify	Yes / No / Explain		
357	Documents to be submitted along with quotation - 7: Layout plan: General arrangement of equipment layout details with drawings and necessary building plan	Specify	Yes / No / Explain		
358	Documents to be submitted along with quotation - 8: Utilities required: Party shall clearly indicate the details of power, quenching gas and cooling water requirements to be provided at the installation site.	Specify	Yes / No / Explain		

359	Documents to be submitted along with quotation - 9: Credentials - a: The supplier should submit, along with his offer a list of customers with full addresses where the similar furnaces with gas quenching facility is supplied by them are in operating condition. Details of the supply can be listed on a format provided in Annexure-1. Kindly provide details of relevant chamber only in the Annexure-1.	Specify	Yes / No / Explain		
360	Documents to be submitted along with quotation - 10: Credentials - b: Party shall also provide copies of purchase orders preferably from Government Institutions/organizations, as evidence for having done similar kind of work (maximum temperature - 1450℃, chamber pressure – 6 bar gauge, and actual hot size – 2.5 m3) in the past 10 years, along with quotation.	Specify	Yes / No / Explain		
361	Documents to be submitted along with quotation - 11: Credentials - c: The party shall submit company balance sheet and profit & loss account for the last 3 years duly audited and authenticated/certified by a chartered accountant which shall commensurate with the level demanded for the execution of the work specified in this document.	Specify	Yes / No / Explain		

362	Documents to be submitted after placement of purchase order - 1: Design documents including detailed design calculations for the vacuum chamber, vacuum calculations and drawings of the equipment	Specify	Yes / No / Explain		
363	Documents to be submitted after placement of purchase order - 2: Quality Assurance Plan (QAP)	Specify	Yes / No / Explain		
364	Documents to be submitted along with equipment - 1: Two sets of complete operation and instruction manual shall be provided along with the equipment. The assembly drawing and service manuals for each component shall also be provided. Two sets of all electrical wiring diagram (as built), PLC interlocking schematic diagrams and all other relevant documents shall also be provided.	Specify	Yes / No / Explain		
365	Documents to be submitted along with equipment - 2: All documentation shall be in English language. All software/ programmes developed shall be supplied in installable CDs with Licenses.	Specify	Yes / No / Explain		
366	Documents to be submitted along with equipment - 2: Provision for uploading of PLC software into the system in case of software crash.	Specify	Yes / No / Explain		

367	Documents to be submitted along with equipment - 3: The weld procedure specification (WPS), procedure qualification record (PQR), and welder performance qualification (WPQ) shall be provided.	Specify	Yes / No / Explain		
368	Documents to be submitted along with equipment - 4: Two sets of trouble shooting documents.	Specify	Yes / No / Explain		
369	Documents to be submitted along with equipment - 5: Two sets of periodical maintenance manuals for the equipment and all the accessories / subsystems used.	Specify	Yes / No / Explain		
370	Third party inspection (TPI): The equipment shall undergo third-party inspection for design and verification of vacuum chamber, fabrication of vacuum chamber and final leak tests after system integration by Bureau Veritas Certification (BVQI)/TuV/Lloyd's Register Group Limited. The party shall quote separately the charges for the same.	Specify	Yes / No / Explain		

371	Pre-Delivery Inspection (PDI) - 1: The equipment will be inspected at the manufacturing site by our representatives before dispatch. However, inspection by IPRC team should be allowed, if necessary, at different stages of fabrication, integration and testing of furnace.	Specify	Yes / No / Explain		
372	Pre-Delivery Inspection (PDI) - 2: Following reports/certificates shall be provided by the party to PDI team: i) Test certificates for all the materials used in fabrication of vacuum furnace and its sub-systems. ii) Test certificate and traceability of molybdenum heating elements. All relevant documents shall be verified by third party (Bureau Veritas Certification (BVQI)/TuV/Lloyd's Register Group Limited).	Specify	Yes / No / Explain		

373	Pre-Delivery Inspection (PDI) - 3: DP test of all weld joints, radiography of weld exposed to vacuum, hydro – testing of the chamber shell before assembly, hydro testing of gas storage tank and leak testing of the whole unit shall be carried out by a third party (Bureau Veritas Certification (BVQI)/TuV/Lloyd's Register Group Limited) having necessary accreditation for performing the test. Test certificates shall be provided to PDI team.	Specify	Yes / No / Explain		
374	Pre-Delivery Inspection (PDI) - 4: DP test of all weld joints, radiography of weld exposed to vacuum, hydro – testing of the chamber shell before assembly, hydro testing of gas storage tank and leak testing of the whole unit shall be carried out in presence of PDI team of IPRC.	Specify	Yes / No / Explain		

375	Pre-Delivery Inspection (PDI) - 5: The vendor shall submit all documents including test reports and test certificates with respect to design, vacuum chamber design calculations, materials, fabrication, testing, TPI reports on design verification and TPI clearance of all documents pertaining to the realization of indented system etc during pre-delivery inspection at manufacturer's site.	Specify	Yes / No / Explain		
376	Pre-Delivery Inspection (PDI) - 6: The equipment shall be assembled and satisfactory performance of all the systems shall be demonstrated as per the specifications and as per mutually evolved accepted test procedures at manufacturer's site subsequent to pre delivery inspection.	Specify	Yes / No / Explain		
377	Installation, commissioning and acceptance - 1: The supplier shall undertake the full responsibility for the following activities.	Specify	Yes / No / Explain		
378	Installation, commissioning and acceptance - 2: The dispatch and delivery of the equipment at the identified site, its successful installation and commissioning at IPRC, Mahendragiri.	Specify	Yes / No / Explain		

379	Installation, commissioning and acceptance - 3: Manufacturer shall demonstrate the performance of the system fully with a minimum of 3 successful heating trials to maximum operating temperature with full load followed by maximum quenching rate shall be demonstrated.	Specify	Yes / No / Explain		
380	Installation, commissioning and acceptance - 4: In addition, a benchmark test (typical heat treatment cycle) shall be demonstrated using material supplied by IPRC.	Specify	Yes / No / Explain		
381	Acceptance test procedure: The equipment shall be assembled and satisfactory performance of all the systems shall be demonstrated as per the specifications and mutually accepted quality assurance plan (QAP). The tentative QAP is given in Annexure-2.	Specify	Yes / No / Explain		
382	Utilities to be provided at installation site: Party/supplier shall clearly indicate the requirements/utilities to be made available at the installation site.	Specify	Yes / No / Explain		
383	Software modification: Any software modification required within 1 year from installation is to be done free of cost.	Specify	Yes / No / Explain		

384	Guarantee/Warranty - 1: The equipment should be fully guaranteed for performance for 24 months from the date of commissioning and acceptance. A certificate to this effect should be given by the supplier / party	Specify	Yes / No / Explain		
385	Guarantee/Warranty - 2: Commitment towards after sales service and supply of spare parts for the offered equipment for a period of at least 10 years is to be furnished by the party.	Specify	Yes / No / Explain		
386	Guarantee/Warranty - 3: The party shall commit to enter in to annual maintenance contract after the guarantee period on mutually agreed terms.	Specify	Yes / No / Explain		
387	Recommended consumables and spares: Detailed list of recommended consumables and spare parts for running 100 Nos of cycles with individual quoted price shall be mentioned. This list shall be submitted along with the price bid only.	Specify	Yes / No / Explain		
388	Paint: The outer shell of the vacuum chamber and all other components of the furnace system must be applied with a primer coat and finished with two coats of industrial grade paint.	Specify	Yes / No / Explain		

389	Training for operation and maintenance: Two IPRC personnel shall be trained for the operation and maintenance of the equipment at the time of final inspection and commissioning of the equipment at IPRC.	Specify	Yes / No / Explain		
390	Schedule - 1: The design documents shall be submitted within 1.5 months after placement of order for review by IPRC. The suggestions, if any, from IPRC shall be incorporated in the design and its satisfactory performance to the required specifications lies with the party. Final review of the revised design document shall be completed within 1 month of its submission.	Specify	Yes / No / Explain		
391	Schedule - 2: The intimation for pre-dispatch inspection (PDI) shall be provided by the party within 10 months of final clearance of the design document. PDI and any corrections arising during the same shall be completed within 3 weeks after intimation.	Specify	Yes / No / Explain		
392	Schedule - 3: Following this, site readiness inspection by the party shall be completed within 1 week.	Specify	Yes / No / Explain		
393	Schedule - 4: The equipment shall be packed and dispatched within one week after verifying site readiness.	Specify	Yes / No / Explain		

394	Schedule - 5: The installation of equipment shall be completed within 1 month from verifying readiness of installation site at IPRC.	Specify	Yes / No / Explain		
395	The quotation shall be of two part: Technical without cost aspects and commercial with detailed cost break up	Specify	Yes / No / Explain		
396	Security deposit (SD) - 1: The Supplier shall provide Bank Guarantee for an amount equivalent to the 3% (Three PERCENT) of the total Order value towards Security Deposit for the due performance of the Purchase Order. The Security Deposit can be submitted in the form of Bank Guarantee or Fixed Deposit receipt obtained from any Nationalized/Scheduled Bank and it shall be kept valid for a period of sixty days beyond the date of completion of the Purchase Order.	Specify	Yes / No / Explain		
397	Security deposit (SD) - 2: This Security Deposit will be returned to the Supplier only upon successful completion of all the contractual obligations or shall be adjusted/ forfeited against non-fulfilment of any of the contractual obligations. The Security Deposit shall be submitted within 30 days from the date of receipt of Purchase Order.	Specify	Yes / No / Explain		

398	Performance Bank Guarantee (PBG) - 1: The Supplier shall guarantee the successful and satisfactory performance /commissioning of equipment/machinery under the conditions specified in the Purchase Order.	Specify	Yes / No / Explain		
399	Performance Bank Guarantee (PBG) - 2: As a performance security, the SUPPLIER shall furnish a performance bank guarantee from Nationalized Bank/Scheduled Bank for an amount equal to the sum of 3% of the order value ensuring the due performance of equipment/machinery in accordance with all the specifications and terms specified in the Purchase Order herein valid for the warranty period.	Specify	Yes / No / Explain		
400	Performance Bank Guarantee (PBG) - 3: On due performance, the performance bank guarantee shall be automatically cancelled and returned to the Supplier within 30 days after expiry of the Warranty period. The performance bank guarantee shall have claim period of 60 days.	Specify	Yes / No / Explain		

401	Liquidated damages (LD): Delivery is the essence of the contract. Items shall be delivered within stipulated period. If delivery is delayed beyond the stipulated delivery period mentioned in the purchase order or any extension thereof, an amount equal to 0.5% per week shall be recovered, subject to a maximum of 10% of the order value shall be deducted from your bills due.	Specify	Yes / No / Explain		
402	Payment terms - 1: Milestone payment will be considered as follows.	Specify	Yes / No / Explain		
403	Payment terms - 2: Milestone 1 - 10% advance against bank guarantee (valid beyond 60 days till final acceptance of the system) immediately after placement of purchase order and submission of Proforma Invoice.	Specify	Yes / No / Explain		
404	Payment terms - 3: Milestone 2 - 10% against bank guarantee upon submission of detailed TPI approved design documents including detailed design calculations for the vacuum chamber, vacuum calculations, drawings of the equipment and Quality Assurance Plan (QAP).	Specify	Yes / No / Explain		
405	Payment terms - 4: Milestone 3 - 65% upon receipt of items at Department’s site	Specify	Yes / No / Explain		

406	Payment terms - 5: Milestone 4 - 15% upon satisfactory completion of erection/installation, commissioning and demonstration of the functions of vacuum furnace as per specifications against performance bank guarantee for an amount equal to the sum of 3% of the order value valid over the warranty period with additional 60 days claim period from the date of final acceptance of the system at the site by the Department.	Specify	Yes / No / Explain		
407	MSME preference: MSME preference is applicable only against the claim of the manufacturer and production of documentary evidence by the manufacturer for the registration of particular item under MSME.	Specify	Yes / No / Explain		
408	Arbitration - 1: In the event of any dispute/s, difference/s, or claim/s arising out of or relating to the interpretation and application of the Order, such dispute/s or difference/s or claim/s shall be settled amicably by mutual consultations of the good Offices of the respective parties and recognizing their mutual interests attempt to reach a solution satisfactory to both the parties.	Specify	Yes / No / Explain		

409	Arbitration - 2: If such a resolution is not possible, within 30 days from the date of receipt of written notice of the existence of such dispute/s, then the unresolved dispute/s or difference/s or claim/s shall be referred to the Sole Arbitrator appointed by the Parties by mutual consent in accordance with the rules and procedures of Arbitration and Conciliation Act 1996 as amended from time to time.	Specify	Yes / No / Explain		
410	Arbitration - 3: The arbitration shall be conducted in Bengaluru in the Arbitration and Conciliation Centre-Bengaluru (Domestic and International) as per its rules and regulations. The expenses for the Arbitration shall be shared equally or as may be determined by the Arbitrator. The considered and written decision of the Arbitrator shall be final and binding between the parties.	Specify	Yes / No / Explain		

411	Arbitration - 4: The applicable language for Arbitration shall be “English” only. Work under the order shall be continued by you during the pendency of arbitration proceedings, without prejudice to a final adjustment in accordance with the decision of the Arbitrator unless otherwise directed in writing by the Department or unless the matter is such that the works cannot be possibly continued until the decision (Whether final or interim) of the arbitrator is obtained.	Specify	Yes / No / Explain		
412	Force majeure - 1: Should a part or whole of items covered by this order be delayed in delivery due to reasons of force majeure (in the States of Kerala and Karnataka and, if affecting this order, in any other part of India), which shall include lockouts, strikes, riots, civil commotions, fire, accident, acts of God and war, stoppage of deliveries by governments, refusal for or non-receipt of import license for raw materials, non-availability, (continued below)	Specify	Yes / No / Explain		

413	Force majeure - 2: (continued from previous) the delivery periods referred to in this order shall be extended by a period(s) not in excess of duration of such force majeure. Both parties undertake to advise each other within 15 days one becomes aware of the circumstances of such force majeure, so that action under the provisions of this order can be mutually reviewed and agreed upon between supplier and the DEPARTMENT.	Specify	Yes / No / Explain		
414	Disputes: Disputes arising during the period of purchase order shall be settled by mutual discussion and negotiations. The results of such resolution of dispute shall be incorporated as rider or an amendment to this order.	Specify	Yes / No / Explain		
415	Secrecy: The party shall agree that all the information related to this purchase order will be treated as secret and that the contents of designs, process sheets or any other documents will not be divulged/disclosed or parted with to any third party whatsoever without the written authorization by the DEPARTMENT.	Specify	Yes / No / Explain		

416	Short closing/termination of order - 1: Under normal circumstances, short closing/ termination of the Order is not foreseen. Short closing or termination of this order may me done due to any of the reasons listed below.	Specify	Yes / No / Explain		
417	Short closing/termination of order - 2: Reason 1 - Continued non-performance of the supplier, resulting in inordinate delays in the delivery dates, in spite of repeated written requests for meeting the delivery schedules, as provided for in the order.	Specify	Yes / No / Explain		
418	Short closing/termination of order - 3: Reason 2 - Major changes in the policies of the Government of India as a result of which the department is compelled to curtain its requirements wholly/partly.	Specify	Yes / No / Explain		
419	Short closing/termination of order - 4: Reason 3 - In the event of the supplier's failure to meet: (1) The technical requirements of the order, (2) The progress and/or delivery requirements	Specify	Yes / No / Explain		
420	Short closing/termination of order - 5: Reason 4 -If supplier has not observed the provisions set out concerning the disclosure and use of information provided by the department.	Specify	Yes / No / Explain		

421	Short closing/termination of order - 6: Reason 5 -If the supplier fails to comply with the provisions set out in the order concerning technical details made available by the department.	Specify	Yes / No / Explain		
422	Short closing/termination of order - 7: Reason 6 -If the supplier transfers his order without the department’s authorization or concluded sub-contract against the department’s explicit directives.	Specify	Yes / No / Explain		
423	Short closing/termination of order - 8: On receipt of such notice, the SUPPLIER shall take all necessary steps for winding up of the order in the notice, within a reasonable period, but in any case, not exceeding three months from the date of posting of this notice.	Specify	Yes / No / Explain		
424	Short closing/termination of order - 9: The Department shall in no circumstances be liable to pay any sum which, when added to other sums paid, due or becoming due to the Supplier under the order, exceeds the total payment for the work set forth in the order.	Specify	Yes / No / Explain		

425	Short closing/termination of order - 10: The ownership of all materials, part and unfinished work paid for by the Department under the provisions of this clause shall be vested in or transferred to the Department as soon as they have been paid for.	Specify	Yes / No / Explain		
426	Short closing/termination of order - 11: If the order is cancelled/short closed at the fault of the supplier the Department may, at its option and without prejudice to its right of claiming compensation for damage other than the damage clauses given below, claim compensation to: i) Have the work performed in its own establishments and ii) Have the work performed by way of a replacement order with a third party.	Specify	Yes / No / Explain		

Document : Annexure-2

Document : Annexure-I

Document : Technical specification

Supporting Documents required from Vendor

1. Copies of purchase orders preferably from Government Institutions/organizations, as evidence for having done similar kind of work in the past 7 years, along with quotation.

2. Party shall submit company balance sheet for the last 3 years duly audited and authenticated/certified by a chartered accountant as per technical specificationsevel demanded for the execution of the work specified in this document.

3. The vendor shall quote for non-comprehensive AMC for the equipment including calibration in every 6 months for minimum of five years after the warranty period as perclause in the technical specification (Price Bid Related)

4. Details of prior experience in manufacturing high temperature vacuum furnace with gas quenching facility of similar or higher capacity

5. Similar kind of work :maximum temperature - 1450°C, chamber pressure – 6 bar gauge, and actual hot size – 2.5 m3

6. Kindly provide details of relevant chamber only in the Annexure-1.

7. list of customers with full addresses where the similar furnaces with gas quenching facility is supplied by them are in operating condition. Details of the supply can be listed on a format provided in Annexure-1

8. Utilities required: Party shall clearly indicate the details of power, quenching gas and cooling water requirements to be provided at the installation site

9. Layout plan: General arrangement of equipment layout details with drawings and necessary building plan

10. The party shall provide the list and details of all imported equipment/ spare parts/accessories/ consumables etc. which require custom duty exemption certificate (CDEC) from the department

11. Details such as the model number, make and specifications of all the temperature/pressure controllers/sensors, thermocouples etc as well as for the subsystems and accessories used in the furnace

12. Proposed acceptance test procedure

13. Proposed QA plan

14. Specification compliance report

15. Technical specification offered

5 additional documents can be uploaded by the vendor

C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	Design, Fabrication, Testing, Supply, Installation, Commissioning, Demonstration and Calibration of the Horizontal Vacuum Furnace with gas quenching facility at IPRC, Mahendragiri including training of personnel in operation and maintenance of the furnace	Yes / No / Explain	
2	Validity of Offer (specify)	Yes / No / Explain	
3	Delivery Period (specify)	Yes / No / Explain	
4	Delivery Terms: Normal delivery terms - FOR Destination (i.e., IPRC, Mahendragiri)	Yes / No / Explain	
5	Payment Terms: (Please refer Clause No.8.22 of the Enclosed Technical Specification). Specify your Payment Terms.	Yes / No / Explain	
6	Security Deposit: The Supplier shall provide Bank Guarantee for an amount equivalent to the 3% (THREE PERCENT) of the total Order value towards Security Deposit for the due performance of the Purchase Order. The Security Deposit can be submitted in the form of Bank Guarantee or Fixed Deposit Receipt obtained from any Nationalized/ Scheduled Bank and it shall be kept valid for a period of sixty days beyond the date of completion of the Purchase Order. This Security Deposit will be returned to the Supplier only upon successful completion of all the contractual obligations or shall be adjusted/ forfeited against non-fulfilment of any of the contractual obligations. The Security Deposit shall be submitted within 30 days from the date of receipt of Purchase Order.	Yes / No / Explain	
7	Confirm: Conditions for BIDDER FROM A COUNTRY WHICH SHARES LAND BORDER WITH INDIA	Yes / No / Explain	

8	Liquidated Damages: The delivery period / completion period shall be the essence of the Purchase Order. If the Supplier fails to meet delivery date within the time specified above or any extension thereof, the Department will recover from the Supplier as Liquidated Damages (LD) a sum of 0.5% of the total order value for each calendar week of delay subject to a maximum of 10% of the total order value. Confirm your acceptance.	Yes / No / Explain	
9	Name of PRINCIPAL, Address, Contact No, E-mail Id etc. (specify):	Yes / No / Explain	
10	Currency quoted (specify)	Yes / No / Explain	
11	Warranty / Guarantee Period: (specify) (Please refer technical annexure for details)	Yes / No / Explain	
12	Taxes and other costs, if any: (Specify).	Yes / No / Explain	
13	Performance Bank Guarantee: Performance Bank Guarantee (PBG) for 3% of the order value shall be submitted along with your Invoice/prior to final payment. It shall be valid till the warranty/ guarantee period and shall have an additional claim period of 60 days.	Yes / No / Explain	
14	Only Class-I and Class-II Local suppliers as per Make in India Policy are eligible to participate in the bid. Percentage of Local Content for the offered item / items shall be specified	Yes / No / Explain	
15	MSME preference is applicable only against the claim of the manufacturer and production of documentary evidence by the manufacturer for the registration of particular item under MSME.	Yes / No / Explain	
16	Bank Details (State Bank of India, Mahendragiri, Tirunelveli (Dist) - 627 133) Details of your bank shall be furnished.	Yes / No / Explain	
17	Percentage of Local Content	Yes / No / Explain	

18	Vendor shall quote for non-comprehensive AMC for the equipment for minimum of five years after the warranty period. The AMC should include two preventive and one breakdown maintenance each year. The cost for AMC will be considered for evaluation of the bid. The price details of the AMC shall be provided in the specified uploading area only.	Yes / No / Explain	
19	Any other terms	-	

C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
1	Vacuum Furnace-Design, Fabrication, Testing, Supply, Installation, Commissioning, Demonstration and Calibration of the Horizontal Vacuum Furnace as per specifications mentioned in annexure	1.00 Lot		-		