भारत सरकार/**GOVERNMENT OF INDIA**
अंतरिक्ष विभाग/**DEPARTMENT OF SPACE**
क्रय यूनिट-।।।/**PURCHASE UNIT-III**
विक्रम साराभाई अंतरिक्ष केंद्र/**VIKRAM SARABHAI SPACE CENTRE**
तिरुवनंतपुरम/**THIRUVANANTHAPURAM – 695 022**
भारत/**INDIA**
Tel: +91-471-2563676/3775/3617
email: spso_prso_pur@vssc.gov.in , pso1_prso_pur@vssc.gov.in

EXPRESSION OF INTEREST

No. VSSC/PCM-PUR/EOI-01/A/[UHTC-CVI/CVD] FURNACE/2022-23 Date: 13/02/2023

"अति उच्च तापमान सिरेमिक-रासायनिक वाष्प इनफिल्ट्रेशन (यूएचटीसी-सीवीआइ) भट्टी की अभिकल्पना, निर्माण, आपूर्ति, संस्थापन तथा कमीशनिंग" के लिए अभिरूचि की अभिव्यक्ति।

INVITATION FOR "EXPRESSION OF INTEREST" [EOI] FOR "Design, Manufacture, Supply, Installation and Commissioning of Ultra-High Temperature Ceramic-Chemical Vapour Infiltration (UHTC-CVI) Furnace"

इच्छुक प्रत्याशित निर्माता हमारे संदर्भ सं. **VSSC/PCM-PUR/EOI-01/A/[UHTC-CVI/CVD]FURNACE/2022-23** का उद्धरण करते हुए **13/04/2023 [14:00 Hrs. Indian Standard Time (IST)] को या उससे पहले** निम्नलिखत पते पर अपनी अभिरुचि की अभिव्यक्ति दे सकते हैं।

VSSC invites, EOI from prospective bidders for **"DESIGN, MANUFACTURE, SUPPLY, INSTALLATION AND COMMISSIONING OF ULTRA-HIGH TEMPERATURE CERAMIC-CHEMICAL VAPOUR INFILTRATION (UHTC-CVI) FURNACE".** Interested parties may furnish their **Expression of Interest in a Sealed Envelope** quoting our **Reference No.VSSC/PCM-PUR/EOI-01/A/[UHTC-CVI/CVD]FURNACE/2022-23 on or before 13/04/2023 [14:00 Hrs. Indian Standard Time (IST)]** to the following address:

वरि. क्रय एवं भंड़ार अधिकारी / Sr. Purchase & Stores Officer,
क्रय यूनिट III /Purchase Unit- III,
आरएफएफ क्षेत्र, इसरो पीओ/ RFF Area, ISRO. PO,
तिरुवनंतपुरम/Thiruvananthapuram- 695022
भारत/**INDIA**

फोन/Ph: +91-471-256 3775/3609
EOI documents are available at our website www.isro.gov.in and www.vssc.gov.in.

हस्ताक्षरित/Sd/-

वरि.प्रधान, क्रय एवं भंड़ार/ Sr.Head, Purchase & Stores

The EoI document shall be submitted in "hard copy" only. It is the sole responsibility of the bidder to ensure that Expression of Interest in a Sealed Envelope shall reach the address mentioned above, on or before 13/04/2023 [14:00 Hrs IST]

A confirmation on submission of EoI along with the postal/courier tracking details may be emailed to: spso_prso_pur@vssc.gov.in , pso1_prso_pur@vssc.gov.in quoting our Reference No.VSSC/PCM-PUR/EOI-01/A/[UHTC-CVI/CVD]FURNACE/2022-23.

Government of India
Department of Space
Vikram Sarabhai Space Centre
Indian Space Research Organization
Thiruvananthapuram-695022, Kerala
India

No. VSSC/PCM-PUR/EOI-01/A/[UHTC-CVI/CVD]FURNACE/2022-23 Date: 13/02/2023

INVITATION FOR EXPRESSION-OF-INTEREST

Vikram Sarabhai Space Centre (VSSC) proposes to invite **Expression-Of-Interest (EOI)** for Design, Manufacture, Supply, Installation and Commissioning of Ultra-High Temperature Ceramic – Chemical Vapour Infiltration (UHTC-CVI) Furnace"

The objective of this EOI is to shortlist OEMs who are technically suitable for the Design, Manufacture & Supply of state-of-the-art Ultra-High Temperature Ceramic Chemical Vapour Infiltration/Deposition (UHTC-CVI/CVD). The entire work of the proposed project is intended to be completed on TURN-KEY basis in 12 months from the Effective Date of Contract (EDC).

The OEM shall also have the capability to design and supply graphite or C/C multi-stack fixtures along with the furnace for the batch scale-up of UHTC coating over flat/shaped C/SiC or C/C components.

EOI document can be downloaded from website www.isro.gov.in and the response shall be submitted within the due date and time. **"Expression of Interest" with all essential information shall reach the Senior Purchase and Stores Officer, Purchase Unit III, Vikram Sarabhai Space Centre, ISRO Post, Thiruvananthapuram 695022, Kerala, INDIA on or before 13th April 2023 14.00 hours, Indian Standard Time (IST).**

This EOI is issued as a "Pre-Bid Qualification". Inadequate or incomplete information will result in rejection of the offer. VSSC reserves the right to accept or reject all or any of the EOI. Mere compliance to the EOI terms does not guarantee further consideration for qualification. Addendum, if any, to this EOI shall be hosted in our website www.isro.gov.in .

Senior Purchase and Stores Officer,
Purchase Unit III,
Vikram Sarabhai Space Centre,
ISRO P.O., Thiruvananthapuram - 695022, Kerala
India

INVITATION FOR EXPRESSION-OF-INTEREST

"Expression-Of-Interest for "Design, Manufacture, Supply, Installation and Commissioning of Ultra-High Temperature Ceramic – Chemical Vapour Infiltration (UHTC-CVI) Furnace"

INTRODUCTION

Vikram Sarabhai Space Centre (VSSC) hereafter referred to as "VSSC" is inviting Original Equipment Manufacturers (OEMs) for the submission of an Expression of Interest (EOI).

The objective of this EOI is to shortlist OEMs who are technically suitable for the Design, Manufacture & Supply of *state-of-the-art* Ultra-High Temperature Ceramic Chemical Vapour Infiltration/Deposition (UHTC-CVI/CVD) furnace. The entire work of the proposed project is intended to be completed on **TURN-KEY** basis in **12 months** from the Effective Date of Contract (EDC).

SCOPE OF WORK

The major scope of this Project involves Design, Manufacture, Supply, Installation, & Commissioning of Ultra-High Temperature Ceramic Chemical Vapour Infiltration/Deposition (UHTC-CVI/CVD) furnace inclusive of all associated sub systems.

The UHTC-CVI/CVD furnace should have an effective working-zone (uniform temperature zone) of 400 mm diameter × 800 mm height and should be capable of operating continuously at 1600°C for 200hrs under inert, vacuum, or reactive gas conditions.

The UHTC-CVI/CVD furnace is intended for the following applications:

- Deposition of Ultra-High Temperature Ceramic (UHTC) coatings of ZrC/HfC/ ZrB_2/HfB_2 on C/SiC or C/C composites or graphite by CVD process.
- Infiltration of above UHTC species into porous C/SiC or C/C (δ= 1.4-2.1 g/cm^3) composites by CVI process.
- The furnace should also cater to CVD and CVI processes of SiC

During installation & commissioning, the OEM should demonstrate the CVI and CVD operations involving the infiltration and deposition of UHTCs viz., ZrC, HfC, ZrB_2, HfB_2 and SiC on C/C or C/SiC partially densified substrates (δ= 1.4-2.1 g/cm^3).

The OEM shall have the capability to design and supply graphite or C/C multi-stack fixtures along with the furnace for the batch scale-up of UHTC coating over flat C/SiC or C/C laminates and components. The fixture shall consist of retort type construction enveloping the effective hot zone, with suitable stiffeners to hold the maximum number of laminates/fixtures. The OEM should also be capable of carrying out flow field modeling to ensure uniform flow of gas, so as to ensure uniform infiltration/coating.

FUNCTIONAL REQUIREMENTS

The UHTC-CVI furnace should perform the following:

i. Uniform Ultra-High Temperature Ceramic coatings of ZrC, ZrB_2, HfC, HfB_2, SiC over C/C or C/SiC composites by CVD process
ii. Uniform Infiltration of above UHTC species into porous C/SiC and C/C composites by CVI process

The furnace should be an independent *state-of-the-art* comprehensive unit comprising the following essential subsystems and based on the design requirement the supplier may add or delete any subsystems.

a. Stainless Steel vacuum chamber assembly
b. Graphite heating element
c. Graphite retort assembly
d. Metal Chloride Generator
e. Vacuum pumping system with controls
f. Process gas supply and control system
g. Inert gas supply and control system
h. Instrumentation and control system
i. Water cooling and circulating system
j. Scrubber system and exhaust treatment system
k. Safety and interlock system
l. PLC and SCADA

Brief specifications of the proposed UHTC-CVI/CVD furnace are provided in this document. The vendor in their offer, shall give detailed specifications, along with make, model and specifications of all subsystems/items.

GENERAL REQUIREMENTS

i. The EOI shall be submitted by those interested in this program on or before 13/04/2023 14.00 Hrs [IST]
ii. If required, the preliminary plan / proposal regarding the technical content shall have to be presented to an expert committee in VSSC, on a mutually agreed date.
iii. Further actions, decided subsequently, shall include - responding to an RFP from VSSC, submission of competitive technical bids and the price bids. The whole project must be necessarily accomplished on a fast track mode within **12 months** from the EDC with well-planned milestones and targets.

PRE-QUALIFICATION CRITERIA

i. As per the provisions of Make in India policy, issued by Government of India, purchase preference will be given to **Class-I** Local suppliers and in their absence, **Class-II** Local suppliers will be considered. Hence the percentage of local content, should be specifically mentioned in your offer. Non- local suppliers/Global vendors will be considered only in the absence of **Class-I/II** local suppliers and is subject to the approval of competent authority.

> ***Class–I Local supplier.***
> *A supplier or service provider, whose goods, services or works offered for procurement, has local content, Equal or more than 50%.*
>
> ***Class–II Local supplier.***
> *A supplier or service provider, whose goods, services or works offered for procurement, has local content, Minimum 20% but less than 50%.*
>
> ***Non-Local supplier***
> *A supplier or service provider, whose goods, services or works offered for procurement, has local content, less than 20%.*
>
> *The Class-I & II Local supplier should also provide a "Self-Certification" along with the offer indicating that the item offered meets the minimum local content as prescribed in the tender and provide the percentage of local content along with details of the **location(s)/vendor(s)** at which the value addition is made. In case of two bid tender, it is mandatory to indicate compliance to "Minimum Local Content (MLC) in technical bid itself.*
>
> *False declaration will be in breach of "code of integrity", for which a bidder or its successor's "will be debarred/will not be eligible" for purchase preference from further tenders/pending tenders, for a minimum period of two years, along with other actions as may be applicable.*

ii. Any bidder from a country which shares a land border with India will be eligible to bid in this tender, only if the bidder is registered with the Competent Authority. Competent Authority for the purpose of registration shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT), Government of India. The registration should be valid at the time of submission of bids and shall remain valid till the placement of order/completion of contract.

iii. 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.

iv. Vendor should have valid registrations for GST. Vendor should submit GST Registration details (For Indian vendors only).

v. Vendor should submit PAN card details (For Indian vendors only).

vi. Vendor should submit banker's details.

vii. List of their clients to be provided (both government and private sectors, national & international).

viii. Vendor should submit self declaration that their firm is not blacklisted by any Organization or Government body (national & international).

ix. The Vendor should be a profit making Company during the last 3 financial years (FY-2019-20, 2020-21 and 2021-22) ending 31st March of the corresponding year. This shall not be applicable for Government undertakings/Central Public Sector Units/State Public Sector Units. Copy of audited balance sheet to be submitted as proof.

x. The VENDOR should have successfully executed one purchase order of value INR 1500 lakhs or two purchase orders of value INR 1100 lakhs each or three purchase orders of INR 760 lakhs each in the past **8 years** for the design, manufacturing and supply of UHTC-CVI/CVD Furnace systems capable of providing any one of the ceramic coatings of ZrC, ZrB_2, HfC, HfB_2, SiC over C/C or C/SiC composites by CVD process.

xi. Authorized Indian Agent of OEM's while quoting shall note the following points:

A. Foreign principal's Performa invoice/quote indicating the commission payable to the Authorized Indian dealer and nature of after sales service to be rendered by the Authorized Indian dealer.
B. Copy of the agency agreement between the foreign principal and the Authorized Indian dealer, and the precise relationship between them and their mutual interest in the business.
C. Registration and item empanelment of the Authorized Indian Agent.
D. Agency commission if any shall be paid only in Indian currency.
E. Compliance of Tax Laws by the Authorized Indian Agent.

TECHNICAL CRITERIA FOR SCRUTINY OF EOI

OEMs/Authorised Indian Agent who are interested in submitting the EOI shall submit the same on or before 13/04/2023 14.00 Hrs [IST].

The EOI document should contain the following details:

i. The full address with contact details of the OEM / Authorised Indian Agent
ii. The present major activities of the OEM and Documentation to that effect (Product Brochures, leaflets, etc.)
iii. Technical competence for showing interest in this project.
iv. Details substantiating the experience of the OEM in the manufacturing & supply of CVI/CVD furnaces of different sizes and products, CVI/CVD solutions & processes, Patents, Publications etc.
v. Details of turnkey CVD/CVI systems executed in India/around the world (both government & private sector). The details provided shall be specific to **fully**

operational CVI/CVD systems having a usable hot-zone size greater than or equal to 400 mm diameter × 800 mm height, with capability to deposit/infiltrate any one of the following, viz: ZrC, ZrB_2, HfC, HfB_2, SiC.

vi. A performance report from the customers on the satisfactory working of the CVI/CVDsystems (with capability to deposit/infiltrate any one of the following, viz: ZrC, ZrB_2, HfC, HfB_2, SiC & usable hot-zone size greater than or equal to 400 mm diameter × 800 mm height) is desirable. The vendor shall provide full contact details of the customers from both government and private sectors (both national & international).

vii. Preliminary Execution Plan regarding the realization of the facility on a fast-track mode within **12 months**– Details to be given with milestone targets and time schedule for Design, Manufacturing, Delivery, Installation and Commissioning of UHTC-CVI/CVD furnace from EDC. The execution plan for the project shall have salient technical details, tentative schematic, distinctive features unique to the OEM (if any) vis-à-vis the requirements projected by VSSC as detailed below.

Note: This invitation for EOI does not carry any guarantee for allotment of contract. VSSC team may visit and assess the capability & adequacy of available facilities to take up and execute the aforesaid work successfully. The final evaluation of the responses will be based on inputs furnished against our criteria, assessment based on facility visit, if required, feedback from customers and overall assessment.

BRIEF SPECIFICATIONS OF PROPOSED UHTC-CVI/CVD FURNACE

1.	**HOT ZONE**		
1.1	Effective working zone	:	400 mm diameter × 800 mm height (or bigger)
1.2	Continuous operating temperature	:	1600°C (minimum)
1.3	Continuous operating duration	:	200 hrs (minimum)
1.4	Number of zones	:	Two zones to ensure uniform heating for the main reaction chamber
1.5	After burner	:	Suitable heater/afterburner to be provided to eliminate the polysilanes generated and excess reactants if any during deposition/infiltration of above specified species. Details to be specified by the party.
1.6	Temperature uniformity in the effective working zone	:	±0.5% up to 1000°C or better and ±0.5% or better beyond 1000°C, with respect to set point
1.7	Charge weight	:	100 Kg (minimum)
1.8	Method of heating	:	Resistance heating by Graphite Rod/Flat type graphite heaters. All the Graphite material should be sourced from **SGL Carbon/Carbon Lorraine /Fiber Materials Incorporated (FMI)/Mersen**. Details of heater and insulation to be provided by the party.
1.9	Charge hearth with rotating mechanism	:	Charge Hearth should be made of High-Density Graphite. Suitable arrangement should be in place for rotating the charge hearth at 1-5 RPM to achieve uniform deposition.
1.10	Electrical supply at site	:	415V AC, 50 Hz, 3 Phase
1.11	Heating system and Power supply	:	Thyristor Power Controller coupled to PID programmer controller. The secondary voltage should be in the range of 24-40 volts to avoid risk of arcing.
1.12	Heating rate	:	Programmable: 0-10°C/min for full charge weight
1.13	Block diagram	:	The party should provide detailed block diagram and line diagram for the electrical circuitry with the elements used.
1.14	Tooling and fixtures	:	Suitable toolings and fixtures as per details provided by VSSC, made of high-density graphite/Carbon-Carbon composite of make **SGL Carbon /Carbon Lorraine / Fiber Materials Incorporated (FMI)/Mersen** shall also be quoted.
2.	**FURNACE CHAMBER (BOTTOM LOADING)**		
2.1	Configuration	:	Vertically mounted double walled water-cooled cylindrical Chamber with bottom loading configuration
2.2	Design	:	As per ASME code, considering the external cooling water pressure also.
2.3	Material of construction	:	The facility will be located in a seashore area with atmospheric temperature 25-40°C and humidity ~95%. Suitable MOC must be chosen. All pipes shall be provided with suitable anti-corrosion coating.
2.4	Construction	:	Leak tightness should be ensured with individual leak rate of $1x10^{-9}$ mbar lit/sec and the total leak rate should be less than $1x10^{-6}$ mbar lit/sec. Top lid should be provided with lifting hooks for handling, harness, etc. to enable cleaning.

			Bottom lid should be removable for cleaning, maintenance etc. A suitable mechanical/hydraulic system should be provided for the bottom lid.
2.5	Ports	:	ISO ports with appropriate sealing should be provided for evacuation, electrical feed-through, gas inlets and thermocouple feed-through. Spare ports shall be provided for connecting additional thermocouples. Details of ports and specifications may be provided by the party.
2.6	Surface finish	:	Both outer and inner surfaces of the vessel should be buffed and painted/powder-coated with suitable high temperature resistant paint.
3.	**VACUUM SYSTEM**		
3.1	Vacuum Pumping System	:	The vacuum pumping system should have one main pumping chain and a redundant pumping chain (for easy switch over) which individually shall achieve the ultimate vacuum requirement of $5x10^{-3}$ mbar in the furnace at ambient condition within one hour. The pumps should be of make **Pfeiffer/Leybold/Busch/BOC/Edwards/Kinney/Finder**. Details such as make and capacity of the pumps, duration of ultimate vacuum achievement and mode of redundancy need to be provided by the party.
3.2	Isolation valve/Vent valve	:	Electro Pneumatically operated valve of makes **BOC Edwards/ Prisma/ Pfeiffer/ Leybold/ VAT/ KBS/ BRAY** should be provided to isolate the furnace from pumping system and to back-fill the chamber at the end of the process or during emergency shutdown, by admitting Argon or Nitrogen gas.
3.3	Throttle valve	:	Motorized throttle valve with PID Controller of make **BOC Edwards/ C2AI/ Pfeiffer/ Leybold/ VAT/ KBS/ BRAY** with suitable dia. should be provided to maintain the desired vacuum level during the process using the capacitance gauge and to avoid choking of the pumping line.
3.4	Vacuum Plumbing Lines	:	Vacuum Plumbing Lines and flexible bellows made of SS should be used to connect the Vacuum Pumping System to the Chamber with necessary flexible metallic bellow adaptors of make **Leybold/Edwards/ Pfeiffer**. All pipes shall be provided with suitable coating to avoid corrosion. The pumping line shall be designed with automatic cleaning of the line as well as pump after the process without dismantling the lines and the pumps.
4.	**VACUUM MEASUREMENT**		
4.1	Dial Gauge	:	A Dial gauge (Analog type Bourdon Vacuum Dial Gauge) having a measuring range from -760 to 760 mm Hg/Torr should be provided in the chamber and the pumping chains.
4.2	Pressure transmitters with controls	:	Pressure transmitter of make **BOC/Edwards/ Pfeiffer/Leybold/Inficon/Fuji** having pressure measuring range from the lowest pressure achievable in the furnace to the atmospheric pressure should be provided.
5.	**GAS SUPPLY AND CONTROL SYSTEM**		

5.1	Gas cabinet	:	The Gas Cabinet of make **Schneider/Rittal/Schroff/Sarrel** with transparent front door and door lock assembly should be provided with a forced ventilation constructed out of GFRP system. Gas cabinets/manifolds should be equipped with suitable pressure gauges, isolation valves, inert gas purging lines with fittings of make **SWAGELOK/FLOWLINK/WIKA** must be provided for all the gases. The gas mixing and control sub-assemblies' parts should be mounted in a cabinet with a door.
5.2	Mass flow meters	:	Mass flow controllers of make **Brooks/MKS/Bronkhorst/ Millipore/Emerson** and of appropriate capacity for the gases BCl_3, CH_4, H_2, Ar and N_2 are to be provided. The flow of liquid Methyltrichlorosilane (MTCS) shall be precisely controlled by a liquid mass flow controller/Coriolis flow meter in the range 0.3 to 1 Kg/h. One spare liquid mass flow controller shall be provided in parallel to the main line for easy switchover in case of failure. Party needs to provide details of the range and accuracy of the controllers.
5.3	Gas inlet system/ Gas supply manifold	:	There shall be suitable number of gas inlets with coaxial tubes for introducing two gases at a time. Separate manifolds made of suitable material for each gas should be designed as per ASME codes. Suitable plumbing lines and valves of make **SWAGELOK/FLOWLINK.**
5.4	MTCS storage		i) Suitable capacity MTCS Storage Vessel in the gas cabinet and Main MTCS storage chamber made of suitable material should be designed to store and supply MTCS. ii) Suitable arrangement shall be provided for safe transfer of MTCS from the commercially available MTCS drums (200 L) to the MTCS storage chamber (500 L).
5.5	Metal chloride Generator for Zr/Hf Metal	:	Chloride generator suitable for generation of metal chlorides including $ZrCl_4$ and $HfCl_4$ and with suitable heater for chlorination reaction shall be provided. The metal chloride generator shall allow easy/safe changing of the target metal. Separate chloride generators are required for Zr and Hf and the cost for each generator has to be specified.
5.6	Scrubber system	:	Scrubber system made of suitable corrosion resistant material and should be able to neutralize the effluents coming out of the furnace to an admissible neutral pH level for discarding. The design should avoid agglomeration of any solid particles like SiO_2, ZrO_2, HfO_2, etc. inside the scrubber. A redundant scrubber system is also required for easy switch over. The effluents coming out of the facility should confirm to the international standard environmental regulations.
6.	**CONTROL SYSTEM**		
6.1	Control Instrumentation	:	The furnace should be provided with instrumentation and control system for complete operation of the system both in vacuum cycle and temperature cycle in Auto, Semi- Auto and Manual modes. The system should be designed in such a way that the process should be completed even in the case of the PLC failure. The control system should comprise of (a) Programmable logic controller PLC of make **AB/ABB/Schneider/Siemens/Allen Bradley/ Modicon**, with

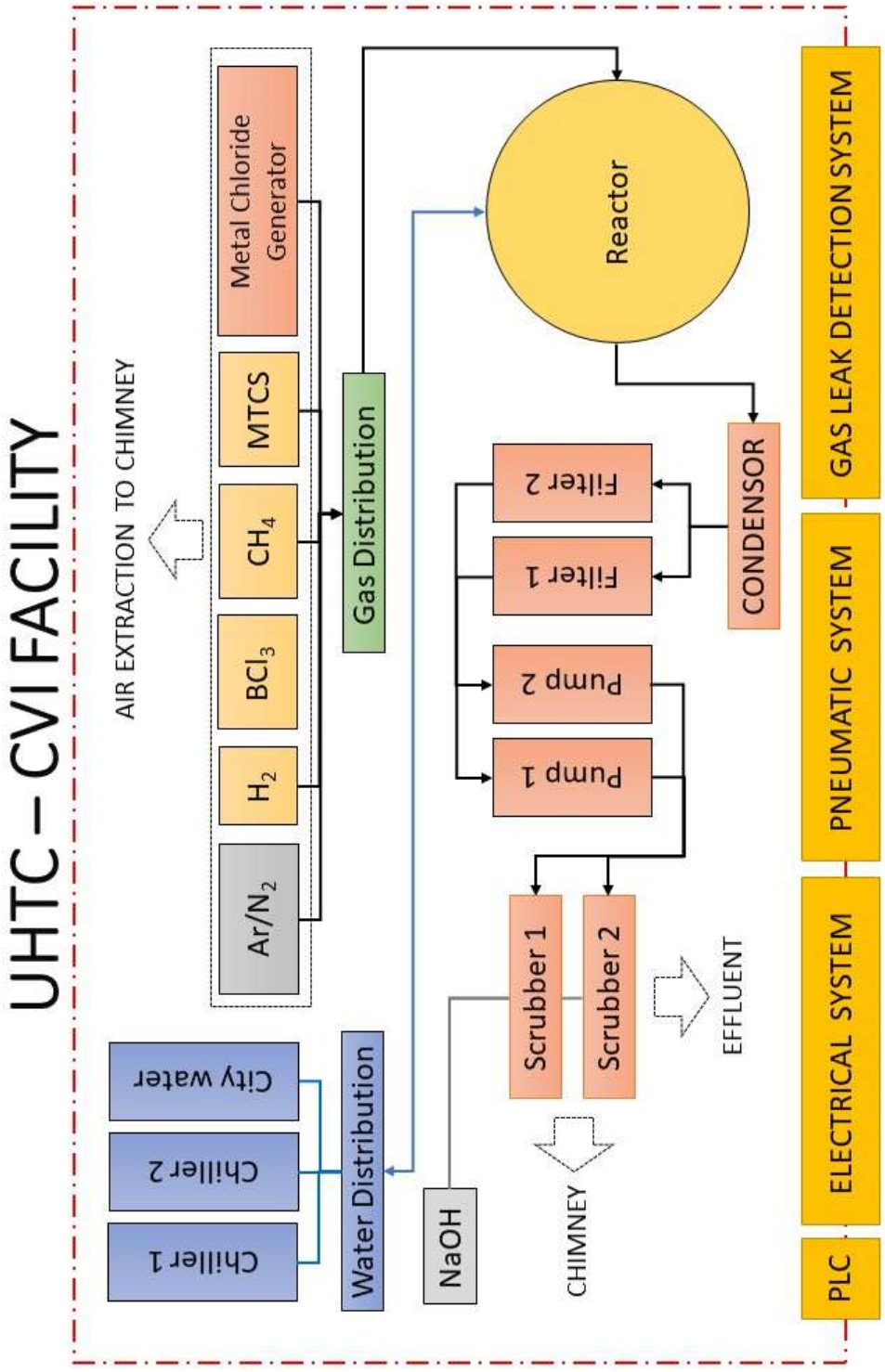
			PC based supervisor controller and data acquisition system (SCADA) backed by un-interrupted power supply (UPS) (b)Temperature programmer controller - One for each zone and Over temperature controller of make **Eurotherm/Yokogawa**
7.	**CONTROL CONSOLE**		
7.1	Control Console	:	The control cubicle of make **Schneider/Rittal/Schroff/ Sarrel** should be made from sheet steel with air-conditioned construction accommodating all electrical switchgear, circuit breakers, contactors, automatic/ manual vacuum controller, PLC,etc. The electrical wiring of the panel should conform to applicable international standards. The power panel should be provided with RYB indicator, fuses, selector switch, main isolator switch, current and voltmeters. The above control console should be fully wired to operate 415VAC, 3phase, 50Hz mains power supply along with power neutral and ground connection.
8.	**SAFETY DEVICES**		
8.1	Safety Devices	:	The furnace should be provided with number of safety devices to protect the system and the operator from mal-function and possible operator's errors. The vendor, in their quote, shall clearly indicate the safety hazards in each sub-system, and the means to mitigate them. The system shall include appropriate safety devices for the following: Overload protection, Cooling water lines, Pressure relief valves, Over temperature alarm, Gas leak detectors for all the gases used, Safety interlocks and alarms for the furnace
9.	**PAINTING**		
9.1	Painting	:	As given in section 2.3, the equipment parts that are prone to corrosion should be suitable painted. The reactor should be buffed. Also, we have observed pitting corrosion in the gas lines in our area and hence it is recommended to paint the gas tubing's with colour coded epoxy paint. Surface finish for all the systems has to be mentioned.
10.	**GUARANTEE/POST-WARRANTY SERVICING**		
10.1	Guarantee/Post-Warranty Servicing	:	a) The total UHTC CVI furnace system must be guaranteed for trouble free service for a period of 3 years after installation and commissioning at our works. Any extended warranty beyond 3 years for bought out items should be passed on to us. The party should carry out maintenance free of cost during guarantee period including software updates. b) Beyond warranty period the party should explicitly give undertaking to extend service in the form of non-comprehensive Annual Maintenance Contract (AMC)and spares support for at least 7 years on mutually agreed terms.

Note:

1. Any other sub-systems/utilities required for trouble free operation of the UHTC-CVI system may be suggested by the vendor.

2. System has to be demonstrated for Pre-delivery inspection at vendor’s site before dispatch.
3. The performance of the system to its potential has to be demonstrated at VSSC after installation and commissioning.
4. Training has to be provided to two VSSC engineers during commissioning trials at VSSC.

Schematic of UHTC-CVI furnace



Annexure - 1

Checklist for the supporting documents
*(**Filled checklist to be submitted by the Vendor along with the Expression of Interest**)*

Sl. No.	Document/Proof	Attached or Not-attached with EOI	Remarks
1.	Company registration details		
2.	Certified copies from Chartered Accountant / tax consultants for balance sheet showing profit/loss for the last 3 years (FY 2018-19, 2019-20, 2020-21)		
3.	Documents in support of prior experience of more than 3 years in working with aerospace/defense/space sectors		
4.	Copy of previous purchase orders executed with ISRO/Defense/Aerospace sectors if any		
5.	Company profile, management structure and human resources and their experience		
6.	Company brochure		
7.	Copies of similar purchase/work orders executed by the Company		
8.	Attach proof of successful execution of one purchase order of INR 1500 Lakhs or two purchase orders of INR 1100 Lakhs each and three purchase orders of INR 760 Lakhs each during the last 5 years for the design, manufacturing and supply of UHTC-CVI/CVD Furnace systems capable of providing any one of the ceramic coatings of ZrC, ZrB_2, HfC, HfB_2, SiC over C/C or C/SiC composites by CVD process.		
9.	Testimonials from customers/user agencies with full contact details		