वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
Council of Scientific & Industrial Research
राष्ट्रीय वांतरिक्ष प्रयोगशालाएं
National Aerospace Laboratories

CSIR - NAL Estd. 1959
ISO 9001 : 2015
Certified Organization

INVITATION FOR TENDERS

Tender No. NAL/PUR/ACD/382/21-Y **Dated: 04/01/2022**

CSIR - National Aerospace Laboratories (NAL), Bengaluru, Republic of India, is one of the premier research laboratories under aegis of Council of Scientific and Industrial Research (CSIR), an autonomous body under the Department of Scientific and Industrial Research, Government of India, New Delhi. CSIR-NAL is a Science and Knowledge based Research, Development and Consulting Organisation. It is internationally known for its excellence in Scientific Research in Aerospace Engineering.

The Director, CSIR-NAL invites online quotation for procurement of the following item(s) for day to day research work.

Sl. No.	Description of Item(s)	Unit	Quantity
1	Climatic Chamber.	Nos	01
(Please refer annexure for detailed specification)			

Single / Double Bid	Single	Tender Type	Open
Bid Security (EMD) (in INR)	Bid Security Declaration should be enclosed with quotation	Bid submission end date	24-Jan-2022 10.00 Hrs
Performance Security	**3% of the purchase order value**	Bid opening date	25-Jan-2022 11.00 Hrs

01. Tender Documents may be downloaded from Central Public Procurement Portal https://www.etenders.gov.in. Aspiring Bidders' who have not registered in e-procurement can register free of cost before participating through the website https://www.etenders.gov.in. Bidders are advised to go through instructions provided at 'Instructions for Online Bid Submission'.

02. Tenderers can access tender documents on the website (for searching in the NIC site https://www.etenders.gov.in, kindly go to Tender Search option, select tender type and select 'Council of Scientific and Industrial Research', in organisation tab and select NAL-Bengaluru-CSIR in department type. Thereafter, click on "Search" button to view all CSIR-NAL, Bengaluru tenders). Select the appropriate tender and fill them with all relevant information and submit the completed tender document online on the website https://www/etenders.gov.in as per the schedule given in the next page.

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http//www.nal.res.in purchasek@nal.res.in

03. Either the Indian Agent on behalf of the Foreign principal or the Foreign principal can bid directly in a tender but ***not*** both. However, the offer of the Indian Agent should also accompany the authorisation letter from their principal. To maintain sanctity of tendering system, one Indian Agent ***cannot*** represent two different Foreign principals in one tender.

04. Unsolicited / conditional / unsigned Quotations/Quotations received after the due date and time shall be summarily rejected. The Bidder shall comply the terms and conditions of the tender, failing which, the offer shall be liable for rejection.

05. The bids failing to comply with the following clauses will be summarily rejected.

a. The Bidders proposing to supply finished products directly/indirectly from vendors' of countries sharing the land border with India should submit copy of registration done with the Ministry of Home Affairs and Ministry of External Affairs.

b. If the products supplied are not from vendors of countries sharing land border with India, the Bidders' have to enclose a declaration to that effect.

06. Bidders are requested to refer to the instructions regarding Procurement Policies for "Make in India", issued by Ministry of Commerce and Industry, Department of Industrial Policy and Promotion dated. 28-May-2018, and 4-Jun-2020 and guidelines as and when issued.

07. The prospective bidders are requested to refer to the Standard Terms and Conditions available on NAL Internet (www.nal.res.in) under the icon Tender-Purchase before formulating and submitting their bids

08. The Director, CSIR- National Aerospace Laboratories, Bengaluru reserves the right to accept any or all the tenders either in part or in full or to split the order without assigning any reasons there for.

Thanking you,

Yours faithfully

Controller of Stores & Purchase
For and on behalf of CSIR

Technical Specification of Climatic Chamber

Sl No	Technical Parameters	
1.	Temperature range (°C) Min	-50
2.	Temperature range (°C) Max	+125
3.	Temperature fluctuation (°C)	±1
4.	Temperature gradient (°C)	<1.5
5.	Rate of change of heating (°C/min) Average	3 (-50 to +125)
6.	Rate of change of cooling (°C/min) Average	3 (+125 to -50)
7.	Total dead load considered in (Kgs)	50
8.	Dead load temperature range in (°C)	-50 to +125°C & Vice versa
9.	Humidity range	10% to 98%
10.	Humidity control	±3%RH
11.	Display resolution	1.0% RH
12.	Working dimensions	750 mm (W) x 800 mm (D) x 900 mm (H)
13.	Volume (Ltrs)	540
14.	Multipaned viewing window	400 x 400 mm - 1 No
15.	Specific ramp rate if applicable (°C/min)	3
16.	Type of refrigeration circuit	Cascade Stage
17.	Condenser type	Air cooled
18.	Type of Controller	Enhanced SIMATIC programmable logic modular 7-inch touch screen controller integrating multi-zone PID control with data acquisition system. PLC and other controller components should be reputed make with an OEM software.
19.	Digital Events	1 digital output should be provided for switching test specimen via potential free contacts, load max. 24 VDC, 5A
20.	Ethernet	Ethernet capability for remotely monitor and control the chamber.
21.	USB	USB Type-A host port to connect a keyboard or mouse or download CSV data via pen drive (max 2GB) USB Type-B data port for connection to PC for software upgrade and access memory card storage
22.	Web Server	Built-in web server should allow remote view or control from any internet connected PC, tablet or smart phone
23.	Power Resumption Modes	In case of a power failure, should have an option of conditional restart based on temperature / time or continuous
24.	Delay Start	Real time clock based, delayed start function

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25.	Trend Graph	Real time trend graph for temperature set value, temperature process value, humidity set value and humidity process value. Options of zoom in/out, pan and individual plot selection
26.	NI Lab view	The communication should be used MODBUS RTU protocol, which is an international standard for communication in process instrumentation and automation. Necessary changes should be made in the user's software to communicate this in MODBUS RTU universal protocol. This feature can be used manual and auto mode.
27.	Process Mimic	Graphical representation of the working of the chamber, with real time status of all the components, including the current temperature / humidity process values, compressor suction / discharge pressures and return gas temperature
28.	Diagnostics	Event viewer will display a log of all errors / actions with a date and time stamp of PLC inputs and outputs status should be indicated
29.	Security	Multi level security should be provided for guest, user, admin and factory level users with individual password protection All settings should be reset to factory defaults using admin login
30.	Programs	99 independent programs should be stored with name and number. Each of these programs should have segments, which can be looped to a previous segment and repeated up to 999 cycles, creating almost unlimited number of segments. The chamber should be operated in manual mode, where the set point can directly be changed in the home screen. The ramp rate should be set as a value in °C/min or ramp time. Graphical representation of the temperature program. The time should be logged only when the set valve is within the band.
31.	PID	6 zone based PID's with auto recall of PID based on type of program, segment and zone should be set. Each of these PID's should be set by using the auto tune feature or manually based on the user's requirements.
32.	Memory	SD card of 2GB memory should be stored all the test program data and the diagnostic data. This card is accessible by USB and Ethernet.
33.	Service Monitor	Log of critical components life cycle with a predefined life cycle time and elapsed time in hours
34.	Refrigeration System	The cooling in the chamber should be accomplished by a cascade system for temperatures up to -70°C.

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		A cascade refrigeration system should consist of two interdependent refrigeration systems. The low-stage provides cooling to the chamber interior through a finned evaporator coil, which is located in the air plenum. The high stage provides cooling to the cascade condenser. The cascade condenser is a heat exchanger that has one circuit, which is the evaporator of the high-stage, and another circuit, which is the condenser of the low-stage. All the refrigeration components should be fixed in a separate compartment. The whole area should be given adequate ventilation to avoid excess heat built up inside the compartment.
35.	Compressor	The chamber should have reciprocating low temperature application compressors capable of operating in the entire temperature envelope. The compressors should be suction gas cooled with POE oil capable of handling eco-friendly refrigerants. The motor version should be suitable chosen based on the application and installation power.
36.	Refrigerant	The refrigerants used in the chamber should be CFC free eco-friendly. R-404a should be used in the high stage of the cascade refrigeration. R-23 should be used in the low stage of the cascade refrigeration system
37.	Humidification	An external low-pressure humidity generator should be used to increase the relative humidity levels inside the test space. This humidity generator should use a cartridge type heater suitable for de-mineralised water. This should ensure high reliability of the heaters. The heater surface should be mounted with a thermostat to cut-off the electrical supply in case the surface temperature reaches critical limit. The automatic level control should ensure adequate reservoir of water in the generator and avoid dry runs. The humidity generator should be connected to the test space inlet pipe through an ISO-KF connector. This should allow easy maintenance or replacement of the humidity boiler. The humidity inlet pipe should be well insulated. The water inlet connection should be 8 x 6 mm and connected through PU tubing.
	Humidity System with Capacitive type sensing	For measurement of relative humidity, a capacitive type reputed make polymer sensor should be used. This sensor should be used in place of the RTD wet bulb sensor. This sensor should be maintenance free

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		and should not require the wick water to be maintained.
38.	Dehumidification	The dehumidification should be done using the refrigeration system. This output should be enabled in ramp up mode after a low temperature cycle, to avoid condensation on the test specimen. A refrigeration based de-humidification system should be provided in the chamber. This system should reduce the relative humidity levels in the test space by maintaining the dew point temperature of the dehumidification coil. The test space drain should drain out the condensed moisture. This dehumidification output should be enabled in the controller during ramp up cycles. This feature should be used after a low temperature cycle, to avoid condensation on the unit under test.
39.	Oil Management	The oil separator should return any entrained oil back to the compressor when the hot, high-pressure vapour is forced out of the compressor discharge valve. Any further traces of oil that may have escaped the separator should return back by ensuring adequate slope on the suction line. The compressor should have a sight glass to monitor the oil levels and should have crankcase heaters installed, properly sized to minimize the amount of liquid refrigerant present in the oil sump during off cycles.
40.	Evaporator	The evaporator coil should be 3/8" copper tubes mechanically bonded to configured aluminium plate fin as standard. Factory pressure and leak tested to 420 psig minimum air pressure and design working pressure should be 376 psig. The evaporator should be placed in the conditioning space and the thermostatic expansion valve feeds the finned evaporator coil where heat is absorbed to provide a cooling effect within the chamber. The refrigerant vapour travels through the suction line to the compressor suction inlet.
41.	Pressure Monitoring	The suction and discharge pressures of the high stage and the low stage should be monitored using electronic pressure sensors. These pressures should be indicated in the controller. High pressure and low-pressure mechanical cut-out switches should be provided for high stage and low stage compressors. These cut-outs are factory set and should be manually reset.

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42.	Bypass System	A suction line cooling thermostatic expansion valve should be provided, which senses the suction line temperature and injects liquid refrigerant to cool the hot gas within safe limits. This hot gas conditions are possible during a high temperature pull down or a continuous bypass condition. A hot gas regulator should be provided to keep the suction pressure at safe operating limits during light loading conditions.
43.	On Demand Cooling	Based on the time and the cooling demand, in different modes such as soak and ramp up, the compressor should automatically turn off for a significant power saving.
44.	Air Cooled Condenser	The condenser coil should be 3/8" copper tubes mechanically bonded to configured aluminium plate fin as standard. Factory pressure and leak tested to 420 psig minimum air pressure and design working pressure should be 376 psig. The condenser should be placed in the rear of the chamber and should need adequate circulation of air in a well ventilated room. The direct-drive, statically and dynamically balanced propeller fan[s] with aluminium blades and electro-coated steel hubs should be used in a blow-out horizontal discharge position.
45.	Heaters	Heaters should be mounted in the conditioning space below the air circulation fan. Low static ni-cr wire heaters should be used with stainless steel sheathing. There should not be any direct radiation onto the test space. The heater outputs should be controlled either through solid state relays and thyristor for high ramp models
46.	High Temperature Fuse	A high temperature safety fuse should be provided which is a onetime fusible link. This fuse should not be reset and is a single use device. In a rare occurrence of overheating this device should be replaced. This fuse should cut off at 214°C for safety of the chamber.
47.	Circuit Breakers	Motor protection circuit breakers should be used to protect the motors of the compressor and the air circulation system from over current conditions. Miniature circuit breakers should be used for the protection of control circuit and heaters.
48.	Emergency Stop	A mushroom head emergency stop switch should be provided on the side of the chamber for immediate shutdown of all chamber operations.

		An alarm should popup on the controller to indicate this event.
49.	Single Phase Protection Device	A single-phase protection device should be used to protect against single phase and phase reversal at input power supply. This device is set to protect the chamber at + 10% of the rated voltage. An alarm should popup on the controller to indicate any of the above failures.
50.	Door Limit Switch	A snap action switch should be provided on top of the door to stop all chamber operations if the door is opened.
51.	Product Safety Temperature Protection	A specimen temperature sensor is placed in the test space and connected to a temperature indicator. This indicator has independent adjustable temperature limits of tmin and tmax. Based on the limits of the unit under test, these independent temperature limits can be set and the sensor should be placed on or around the unit. An alarm should popup on the controller to indicate this event.
52.	Air Circulation Motor	The air circulation motor should be a TEFC totally enclosed fan cooled motor. This motor has a custom shaft, which is connected to the air circulation fan inside the conditioning space. Special sealing should ensure protection to the motor against test space temperature changes and also ingress of humidity.
53.	Power Supply	The power supply to the chamber should be connected through the 5 mtrs cable crimped with terminal lugs should be provided along with the chamber. The power supply should be as per the equipment label by the side of the chamber. A control / isolation transformer should be provided to the instrumentation circuit to protect and isolate the single phase. A regulated power supply should also be provided for the low voltage devices through EMI filter. This combination of regulated power supply with EMI filter should ensure protection against power surge and spikes.
	Test Space	The inner chamber should be constructed using AISI-304 grade of stainless steel (SS). This should be polished with a suitable finish. The entire test space is TIG welded and reinforced. The test space floor should handle a uniform distributed load.

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		Channels for adjustable shelving should be provided where each shelf has a loading capacity of uniform distributed load.
54.	Exterior	The exterior of the chamber should be constructed of 14-guage welded galvanized steel chassis, with 14 and 16-gauge galvanized steel panels and access doors. The surface should be phosphatized and finished with an epoxy based powder coating. The colour of the exterior should be RAL-7035 light grey. The chamber should have removable side panels which allow easy access to major components for maintenance in the refrigeration compartment. The control panel door should be mounted in front of the chamber and will have easy access to all the electrical and controls.
55.	Inner test space finish	SS matte finish
56.	Door	The door should have full access to the test space and should be hinged to the chamber. The door should be locked using a pull-action type latch clamp. The exterior of the door should be constructed with 16-guage galvanized steel and the surface should also be phosphatized and finished with an epoxy based powder coating. The colour of the exterior should be RAL-7035 light grey. The interior of the door should be protected using AISI-304 grade of stainless steel. This should be polished with a suitable finish. The door should be fitted with a limit switch and when ajar should indicate "door open" in the controller and also be interlocked with the air circulation. The door should be fitted with heaters to avoid condensation during low temperature cycles
57.	Door Cladding	The door should be cladded using a galvanized steel panel. The surface should be phosphatized and finished with an epoxy based powder coating. The colour of the cladding should be RAL-7037 dusty grey. A 7-segment large LED indicator should display the process value or the test condition parameter. This should be useful to monitor the status of the chamber from a distance
58.	Mounting	The chamber should be mounted on levelling casters. These casters are a combination of wheels for mobility, locking and adjustable rubber mounts for levelling the chamber. The chamber should only be wheeled-in or fork lifted to the installation area.

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59.	Inspection Lamp	The test space should be lit using a halogen-based lamp. This lamp will be housed in a silicone enclosure and covered with a tempered glass top. The lamp is easily replaceable.
60.	Gasket	The test space frame should be fitted with two sets of silicone based extruded gaskets. These should act as thermal breakers between the inner and exterior surfaces Heaters should be used on the test space frame to avoid condensation during low temperature cycles.
61.	Entry Ports / Port Holes	Non-conducting silicone entry ports on both the side (LH+RH) with a non-conducting silicone plug should be provided to access cables or any other connections that may be required for the unit under test.
62.	Insulation	The test space should be insulated using multi layered mineral wool. This mineral wool should have a low 'k' factor and high density of up to 48Kg/m3 This insulation should be non-hygroscopic in nature and asbestos free
63.	Conditioning Space	The conditioning space should be isolated from the test space using a stainless steel ducting sheet. This sheet should be removed easily for maintenance. All components such as the air circulation fan, heaters, evaporator, dehumidification, Thermal fuse and humidity inlet are positioned within this space. There should be no direct contact to any of these components from the test space
64.	Warranty Period	12 months from the date of installation and commission or 18 months from the date of supply, whichever is earlier
65.	Additional trays for fluid contamination	4 Nos of SS 304A standard trays for conducting fluid contamination test
Factory Acceptance Test:		
66.	Vendor should organize a factory acceptance test, to show the performance test of the chamber as per military, ASTM standards (i.e MIL-STD-810F & G, ASTM and IEC etc., for CSIR-NAL personnel.	

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BID-SECURING DECLARATION FORM

Date: _____

Bid No. _____

To (insert complete name and address of the purchaser)

I/We. The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

(a)	have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
(b)	having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or refuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown)
in the capacity of (insert legal capacity of person signing the Bid Securing Declaration).

Name: (insert complete name of person signing he Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of: (insert complete name of Bidder)

Dated on _____ day of _____(insert date of signing)

Corporate Seal (where appropriate)

Note:

1. In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid.
2. Bid Security declaration must be signed in by the Proprietor/CEO/MD or equivalent level of Officer of the company.