

Tender Notification for the procurement of a cryogen-free dilution refrigerator at IISc (Last Date for submission of tenders: 1st April 2016)

REF: PH/VS/2016/075 dated:10-03-16

Dear Sir/Madam,

Kindly send your best quotation for the following item on C.I.P. Bangalore basis. Your quotation should clearly indicate the terms of delivery, delivery schedule, E.D., payment terms etc. The tender should be submitted in two separate sealed envelopes - one containing the technical bid and the other containing the commercial bid, both of which should reach us, duly signed on or before 1700 hours 1st April 2016.

Please enclose an compliance statement along with the technical bid.

Specification of the cryogen-free dilution refrigerator

- 1) Base unit : Cryogen-free dilution refrigerator with bottom load lock compatibility for cold swapping of samples. Cryostat : The cryostat should have single vacuum space with O-ring seal at room temperature. No exchange gas; No indium seal; No Kapton seal. Light-weight outer vacuum jacket and radiation shields for one-person manual assembly.
- 2) Base temperature and total cool-down time : Base temperature < 10 mK at the sample position with factory installed wiring. Total cool-down time should be less than 24 hrs to reach the base temperature from room temperature.
- 3) Cooling power : 8 micro-Watt or more of cooling power at 20 mK at the mixing chamber plate. 200 micro-Watt or more of cooling power at 100 mK. Pulse tube: 1 Watt cooler with remote motor. System should have appropriate amount of He3/He4 mixture to achieve the cooling power specified above. Please specify the amount of He3/He4 gases.
- 4) Mechanical vibrations: Less than 100 nm amplitude near 100 Hz (in both horizontal and vertical directions) at the mixing chamber plate while the fridge is in operation.
- 5) Temperature controller : Fully automated temperature control with appropriate temperature sensors, heaters, and heat switches.
- 6) Wiring :
DC woven loom wiring :
 - a) Two twisted pair copper woven loom with at least 24 wires from 300 K to 4 K.
 - b) Two twisted pair CuNi clad NbTi woven loom with at least 24 wires from 4 K to mixing chamber plate.

Common specifications for a), and b) : All wires should be terminated with suitable connectors at room temperature, 4-K plate, and at mixing chamber plate. All wires should have proper thermal anchoring at each temperature stage. Wire diameter 100 micron.

7) Dimensions of the cold plate and sample space : The cold plate at mixing chamber should be at least 210 mm in diameter and it should give at least 210 mm of vertical sample space (between the mixing chamber plate and coldest radiation shield).

8) Isolation : Pulse tube should have vibration isolation from the rest of the cryostat. Pulse tube and compressor should be electrically isolated from the cryostat.

9) Pumping system : Suitable dry pumping system for the dilution unit having turbo molecular pump with oil-free backing pump. Compressor for the mixture. Please specify the specification of all pumps and compressors.

10) Suitable gas handling unit : with required pressure gauges and overpressure valve etc. The pumps should be electrically isolated from the cryostat. The gas handling system should have appropriate pressure release valves to collect the mixture back to the dump in the event of power failure or emergencies.

11) Support feature : Floor mounted standard support for the pumping bellows and the cryostat.

12) Cold trap : Appropriate cold traps to operate the fridge for long durations (> 6 months) without blockage issues in the circulation loop.

13) Cool-down procedure, safety and control software : Automatic cool down to base temperature. Safety interlocks allowing unattended operation; remote control operation; continuous monitoring and logging of the system parameters.

Control software should be based on windows 7 or higher version operating system architecture. Free upgrades of software.

14) Testing, and training should be done during onsite installation.

15) Provide soft and hard copy of the manual and supporting documents.

16) Warranty : Three years comprehensive warranty for the whole system with all the components. Please specify the service plan like whether the local distributor will address the issue or parent company. Please mention which parts are field replaceable.

17) Delivery time: 4 months or less.

18) List of customers: Five global sites and preferably at least one in India.

19) Terms and conditions for the annual maintenance contract beyond the warranty period should be mentioned.

20) The payment terms should be clearly mentioned.

21) Optional specifications :

- a) Suitable UPS backup system for the whole setup with 2 hour backup
- b) Appropriate water chiller for the system
- c) Air compressor for pneumatic valves
- d) Warm-up heaters to reduce the warm up time from base temperature to room temperature
- e) Coaxial wiring:
 - I) 12 semi-rigid 2.19 mm CuNi (outer conductor)-silver plated CuNi (central conductor) coaxial cables from RT to 4 K plate.
 - II) 9 semi-rigid 0.86 mm CuNi (outer conductor)-silver plated CuNi (central conductor) coaxial cables from 4 K plate to mixing.
 - III) 3 semi-rigid 2.19 mm NbTi (outer conductor)- NbTi (central conductor) from mixing chamber plate to 4K, with suitable lengths to accommodate microwave components such as isolators and amplifiers.

Common specifications for I), II) and III): Cables should have 50 ohm characteristic impedance using PTFE dielectric, and terminated with SMA-male connectors. Each temperature stage has to include appropriate attenuators at the bulkhead connectors for thermal anchoring. The coax wiring should not show any cable resonance up to 18 GHz.
- f) Bulkhead connector sets (SMA-F-F) for the line of sight ports at each temperature flange for mounting and thermal anchoring of coaxial cables.

Yours sincerely,
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