

Tender notification for the procurement of a '14T Cryogen free Dilution Refrigerator with Bottom load-lock'

Last Date for submission of tenders: 29th June 2020, 5 pm

Reference No: PH/AD/433/2020-21

Dear Sir/Madam,

Kindly send lowest quotation for the following item on C.I.P. Bangalore basis. The quotation should clearly indicate the terms of delivery, delivery schedule, transportation charges, if any, payment terms etc.

Terms and Conditions

1. The bid should be submitted in the two-cover system, i.e. technical bid and commercial bid separately in sealed covers. The technical bid should contain all commercial terms and conditions, except the price.
2. In the commercial bid, the price should be inclusive of all discounts.
3. All technical bid must contain a point-by-point technical compliance document.
4. If needed, a meeting for any technical clarifications can be scheduled with the undersigned by sending an email.
5. The lead time for the delivery of the equipment should not be more than 10 months from the date of receipt of our purchase order. It should be clearly mentioned in the technical and commercial bids.
6. The Institute reserves the right to accept or reject any bid, or to annul the bidding process and reject all bids, at any time prior to the award of contract without thereby incurring any liability of the affected bidder or bidders.
7. **Three years comprehensive warranty** is a must for all the components. Please specify the service plan like whether the local distributor will address the issue or the parent company.
8. All the quotations must be valid for at least 60 days at the time of submission.
9. List of customers and references: Proven track record of installation and service to customers based in India and at least five sites globally.
10. Terms and conditions for the annual maintenance contract beyond the warranty period should be mentioned.
11. Payment Terms: The quotation should be in the currency of the country of origin. The payment will be through confirmed irrevocable Letter of Credit (LoC). Alternate modes of payment can be suggested with suitable justification.
12. After the award of purchase order, the vendor must provide an Order Acknowledgement within 30 days from the receipt of the Purchase Order.
13. Please quote the price of each optional line item, separately.
14. Custom Duty Exemption and GST exemption -- IISc is registered with DSIR for availing custom duty exemption (CDE) for import orders and GST exemption (for INR orders in India). IGST is NIL for import order for IISc. Bidders should consider all these facts while submitting their bid. For import order, the Bill of Entry must be in the name of IISc for availing CDE. GST exemption certificate will be provided subject to submission of proforma invoice.

Technical specifications of dilution refrigerator:

Mandatory requirements:

1. Cryogen free dilution refrigerator with 14T magnetic field with bottom load lock for quick sample exchange mechanism while the fridge is cold.
2. Base Temperature: <10mK at the sample position with factory installed wiring and magnet fully energized. Should be demonstrated at the time of installation.
3. Dimensions of the cold plate: The mixing chamber should be at least 290 mm in diameter and more than 250 mm in length below mixing chamber.
4. Stable Operating temperature range: 10mK to 30K, ± 1 mk below 100mk and $\pm 1\%$ > 100 mk.
5. Cooling Power: More than 250 μ w at mixing chamber at 100mK.
6. 3He/4He mixture: Appropriate amount of mixture for the system. Please specify the volume of He3.
7. Mixture compressor bypass manifold to allow circulation of mixture after condensation without requiring the mixture to go through the compressor.
8. Vibration: ≤ 100 nm at the mixing chamber. The data sheet should be provided.
9. Temperature Controller with appropriate temperature sensors and heaters for the dilution fridge.
10. Wiring: (A) DC wiring: 24 (12-twisted pair) constantan or phosphor-bronze from RT to MC, and 24 (12-twisted pair) Cu from RT to PT2, and SC (NbTi) from PT2 to MC. (B) **16** Flexible Coaxial Cables (~ 100 MHz) with suitable termination up to mixing chamber (SSMC) and isolated termination at room temperature (SMA). (C) **8** Flexible Coaxial Cables up to 4K plate having suitable termination (SSMC) and isolated termination at room temperature (SMA). (C) **8** Flexible Coaxial Cables from 4K plate with suitable termination (SSMC) to mixing chamber with suitable termination (SSMC).

All the mating connectors need to be provided.
All wiring needs to be thermally anchored at different stages of the cryostat.
11. 14T Superconducting magnet with cold bore diameter >65mm having $\leq 0.1\%$ homogeneity; magnet should have quench protection, persistent switch and generically calibrated temperature sensors etc.
12. Magnet Power Supply: Four quadrants magnet power supply. Appropriate interfaces, Mechanism of quench protection in case of power failure or problem with the pulse tube.

13. Sample loader: Appropriate bottom load lock for fast sample exchange mechanism while the refrigerator is cold (~4K). Cool-down time to reach base temperature during this procedure has to be less than 10 hours.
14. Cryogen Free Unit: Pulse tube should have vibrational isolation from rest of the cryostat. Pulse tube and compressor should be electrically isolated from the Cryostat. Cooling power of the pulse tube should be at least 1.5W at 4K plate.
15. Appropriate Pumping System for the dilution system having turbo with Oil free dry backing pump and compressor for the mixture. Please specify the specification of the pumps and compressor.
16. Appropriate gas handling system having required pressure gauges etc,. The pumps should be electrically isolated from the Cryostat. Pressure release valves should be installed to collect the mixture back to the dump in case of power failure or emergencies.
17. Support Features: Floor mounted standard support for the pumping bellows and Cryostat and Bottom load lock.
18. Cold Traps: Appropriate LN₂ trapsto operate the fridge for long durations (> 6 months) without blockage issues in the circulation loop.
19. Cool-down procedure and running the system: Automatic cool down to base temperature. Safely interlock, unattended operation; Remote control operation, continuous monitoring of the system parameters. Free upgrades of software; windows 10 based system or higher version.
20. Electrical isolation: Cryostat should be electrically isolated from Frame, Controller unit, gas handling rack and compressor.
21. Testing, installation and training should be done during onsite installation.
22. Manual and supporting documents; Soft Copy as well as hard copy.

Optional Items:

1. 12 Flexible Coaxial Cables (~100 MHz) with suitable termination up to mixing chamber (SSMC) and isolated termination at room temperature (SMA).
2. Cryo-free dilution refrigerator rapid warm-up heater and heater power electronics kit.
3. 2x0.86mm SCuNi-CuNi (center conductor is silver plated) attenuated semi-rigid SMA (18 GHz) coaxial lines from RT to mK flange with suitable thermalization at different intermediate flanges. Appropriate attenuators consist of 10dB@70K, 20dB@4K, 10dB@Still plate, 10dB@cold plate, 10 dB@MC plate.

4. 2x0.86mm SCuNi-CuNi (center conductor is silver plated) attenuated semi-rigid SMA (18 GHz) coaxial lines from RT to 4K plate with suitable thermalization at different intermediate flanges. 2x0.86mm NbTi-NbTi semirigid superconducting SMA (18GHz) co-axial line from 4K flange to MC plate with suitable thermalization at different intermediate flanges.
5. One spare PUCK for chip carrier.
6. Air compressor for pneumatic valves
7. One-hour UPS back up for full system
8. Appropriate Water chiller
9. OVC pumping station

Yours sincerely,

Prof. Anindya Das

Email Id: anndya@iisc.ac.in

dasanindy@gmail.com

Associate Professor

Department of Physics

Indian Institute of Science

Bangalore - 560012, India.