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From: Director, CSIR-NPL
Tender No. 14-VI/PKS(1135)23PB/T-104 Dated: 12.10.2023

CORRIGENDUM

With reference to NPL's Global Tender ID: **2023_CSIR_727883_1**, Pre-Bid Conference (PBC) was concluded on 03.10.2023 for "Helium Based Closed Cycle Cryocooler for Resistivity/Electrical Transport Measurements". Consequent upon the outcome of PBC, **some changes have been made in the technical specification of captioned tender. Revised specifications are as follows:**

EQIPMENT	**: Helium based closed cycle cryocooler for resistivity/electrical transport Measurements**
SCOPE OF THE SYSTEM	: Supply, installation & integration of **"Helium based closed cycle cryocooler for resistivity/ electrical transport measurements"** from Experienced Original Equipment Manufacturer (OEM) or their Indian Authorized Distributor with minimum one year on site comprehensive warranty from date of installation.

DETAIL TECHNICAL SPECIFICATIONS

S. No.		SPECIFICATIONS
1	**Cryocooler**	
	(i) Cryocooler type	: GM type two-stage cryocooler with reduced vibrations, i.e., RMS displacement ≤ 20 microns at the sample
	(ii) Sample mounting type	: Sample in a vacuum and in direct contact with the cold head
	(iii) Power supply compatibility of all components	: Single Phase as per Indian Standard (220-250V AC @ 50 Hz)
	(iv) Mounting Support/Stand	: A suitable mounting stand appropriate for fixing/holding the cryostat vertically should be supplied.
2	**Cold Head & Temperature Sensor, Min./Max. Temperatures/Ranges/Stability**	
	(i) Cold Head's Minimum Temperature	:≤ 4.2 K
	(ii) Cold Head's Maximum Temperature	:≥ 325 K
	(iii) Minimum Temperature at	:≤ 5.0 K

	the Sample	
	(iv) Cold Head Temperature Sensor	:Calibrated Si diode sensor mounted at Cold Head
	(v) Sample Temperature Sensor	: Calibrated CERNOX sensor, mounted on copper sample holder close to the sample location (typical sample size: LxWxt=5×5×2 mm^3up to10 x 10 x 2 mm^3)
	(vi) Temperature stability	: ± 0.1K or better over 30 minutes
	(vii) Electrical access to cold head sensor/ heater	: This should be provided fitted using thermally anchored wires with a dedicated 8-10 pin connector with other mating connector and cable(s) (for connecting to temperature controller)
3	**COOLING POWER AND COOLDOWN TIME**	
	(i) Cooling power @ 50 Hz	: ≥ 0.16 W at 4.2K and (≥ 3 W at 45 K or ≥ 7W at 77K)
	(ii) Time to attain base temperature from a warm state	: ≤ 150 minutes
4	**Compressor and Helium Hoses**	
	(i) Compressor Cooling type	: Water-cooled type (Water Chiller supported)
	(ii) Length of flexible self-sealing type pair of Helium hoses	: Min. 10 ft (or 3 m)
	(iii) Power supply compatibility of Cold head and cables	: Single Phase as per Indian Standard (220-250V AC @ 50 Hz)
	(iv) Mobility of compressor	: Compressor should be either on a movable trolley or fixed with wheels that can be locked and unlocked.
5	**Sample Holder/Mount, Sample Heater/Cryostat Tail/Vacuum Shroud**	
	(i) Sample Holder	: A compact OFHC sample holder fitted to the cold tip for *direct cooling (sample in vacuum)*
	(ii) Electrical isolation for conducting samples	: The design of the above-offered sample holder should be compatible with the measurement of resistance on conducting samples (with resistance ~ few mOhm or so), *i.e.,* electrical isolation between the conducting sample and conducting OFHC sample holder underneath be ensured via an isolation disk made of either AlN or Sapphire or any other appropriate material. (Provide sufficient details with pictures, with the tender documents, clearly showing how this electrical isolation is ensured.)
	(iii) Sample Heater	: A compatible rugged 50 Ohm heater, fitted on cold tip/head, having sufficient wattage so as to achieve variable sample temperature in the range of 5- 325 K or wider.
	(iv) Ease of Sample Change	: The design of the vacuum shroud surrounding the sample holder (i.e., sample) should be such that one can easily and quickly exchange samples without requiring any tool
	(v) Size of Vacuum Shroud	: The vacuum shroud encapsulating the sample inside should be sufficiently narrow (OD ≤ 55 mm) and long enough so that it can be fitted easily inside the pole pieces/gap of an external electromagnet for the resistivity measurement in the presence of the magnetic field. The construction of the vacuum shroud should be Nonmagnetic to avoid any interference with the

magnetic field of the external electromagnet.

6 **Connections for electrical access to the sample**

(i) **Connector & shield wires (outside):** :Standard 10-pin (19-pin preferred) rugged connector fixed on the body of cryostat supplied with mating connector together with min. 10 ft long wires (shielded). One end of these wires (min 10 of different colors) be soldered to the supplied mating connector and the other end of these wires be provided loose/free for connecting to the current source and nanovoltmeter.

(ii) **Electrical leads/wires (inside):** :Single-stranded Copper/PhBr/any other low thermal conductivity material wires (such that the minimum temperature on the sample location is not compromised), a minimum 10 Nos. should be provided installed/thermally anchored to have the electrical access to the sample from the standard 10 pin connector for routine measurements of dc-resistivity/Hall- effect.

The above **(i)outside and (ii) inside wiring** connections are irrespective of the default connections and wiring for the temperature controller (e.g. Lakeshore Model 335 & 336) and control sensor on the cold head.

7 **Connection to cryostat** : Standard KF25Pump-out port with appropriate isolation valve on the skirt of the cryostat for connecting vacuum pump should be provided.

8 **Other Requirements:**

(i) The vendor (OEM/Indian Authorized Distributor) should provide details of users/ research institutions in India where at least 3 Nos. of similar type of Helium-based closed cycle cryocooler have been delivered, successfully installed, and fully operational. The vendor must provide copies of the most recent successful installation certificates alongwith the details of faculty-In-charge of the installed setup.

(ii) Supporting data sheets/brochures must be provided with all the technical details, pictures, and dimensions along with the offer.

(iii) Essential Installation/maintenance kit (including wrenches and setup tools) and essential spares required for connecting to pumps etc. and routine maintenance should be provided.

(iv) All necessary tools for future Helium recharge for the compressor should be provided.

(v) Operational, technical, and maintenance manuals with detailed drawings and design schematics must be provided.

(vi) The vendor should fully integrate the system and demonstrate a minimum temperature of 5K or lower and a maximum of 325 K or higher during installation and provide onsite training including general maintenance at CSIR-NPL. The CCR system should have provision for future upgrades for higher temperatures up to 400K or higher by integrating only the high-temperature interface/heater assembly without compromising the existing vacuum shroud/radiation shield and wiring.

(vii) Minimum warranty 01 years from the date of successful installation and details of services provided under warranty should be clearly mentioned. Original warranty certificate to be provided for the whole system as well as for individual items.

(viii) Vendor should ensure spare parts availability and service support for the next ten years from the date of expiry of warranty.

Note: Please quote the individual price of various items in your detailed price bid.

Therefore, following extension in due date of submission & date of opening of the said tender may be read exactly as follows:

Due date & time of tender submission
For : 17.10.2023 up to 3:00 PM (IST)
Read as: 26.10.2023 up to 3:00 PM (IST)

Date & Time of Tender Opening
For : 18.10.2023 at 3:00 PM (IST)
Read as: 27.10.2023 at 3:00 PM (IST)

All other terms & conditions of said tender will remain the same.

Sr. Controller of Stores & Purchase

Date: 9th Oct. 2023

Purchase File No. : 14-VI/PKS(1135)23PB/T-104
Sub: Minutes of Pre-Bid meeting
Item: Helium based closed cycle cryocooler for resistivity/electrical transport Measurements
Venue: Director Conference Room, Ground Floor, Main Building, CSIR-NPL (hybrid mode)
Date and Time: Tuesday 3rd Oct. 2023 at 11:00 AM

The Pre-Bid meeting for Helium based closed cycle cryocooler for resistivity/electrical transport Measurementswas held under the chairmanship of Dr H K Singh, Chief Scientist and the following members were present.

1. Dr. H. K Singh, CSIR-NPL — Chairman TSC
2. Dr. Anjana Dogra, CSIR-NPL — Member
3. Dr. T. K. Mandal, CSIR-NPL — Member
4. Dr. Bhasker Gahtori, CSIR-NPL — Domain Expert
5. Dr. P. K. Siwach, CSIR-NPL — Indentor/PI

Two vendors, Mr ParthSanyal (ATOS Instruments Marketing Services, Bangalore) representing ColdEdge Technologies, USA and Mr Manish Jha (Quantum Design India, Navi Mumbai) representing Lake Shore Cryotronics, USA participated in the pre-bid meeting and discuss their respective queries and suggestions regarding the specifications.

The TSC deliberated over their queries/suggestions and the technical requirements of IO and accordingly the specifications has been revised.

Following changes have been made for enhance vendor participation in the tender.

(i) Cooling power @50 Hz : $\geq$ 0.16 W at 4.2K and ($\geq$ 3 W at 45 K or $\geq$ 7 W at 77K) **[S.No. 3(i)]**

(ii) The CCR system should have provision for future upgrades for higher temperatures up to 400K or higher by integrating only the high-temperature interface/heater assemblywithout compromising the existing vacuum shroud/radiation shield and wiring.**[S.No. 8(vi)]**

The amended specifications are attached as **Annexure A**.The purchase section is requested to do the needful and upload the revised specifications.