



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

Powai, Mumbai - 400076

PR No.1000020191

RFx No. 6100000973

TECHNICAL SPECIFICATIONS

High Performance Heat Flux Type Differential Scanning Calorimeter (DSC)

1. **Instrument Specifications: (-150 C to 700 C or better):**
 - 1.1 **Furnace and sensor** should be of a robust design, resistant against corrosion due to condensation of volatiles inside the furnace.
 - 1.2 Temperature Range: -150 C to 700 C or better.
 - 1.3 Heating rate: 0.01C to 100 C/min (For both heating and cooling)
 - 1.4 Cooling time (100 C to 0 C) should be <10 mins.
 - 1.5 Temperature Accuracy: +/- 0.1 C or better
 - 1.6 Temperature Precision: +/- 0.05 C or better
 - 1.7 Temperature Reproducibility: < 0.1 C
 - 1.8 DSC Measurement Range: +/- 100 mW or better
 - 1.9 DSC Sensitivity: 0.3 μ W or better.
 - 1.10 DSC RMS Noise: 1 μ W or better
 - 1.11 Calorimetric Accuracy: 1% or better
 - 1.12 Calorimetric Precision: 0.5% or better
 - 1.13 Baseline linearity (Flatness) <300 μ W or better for temperature range -50 C to 300 C.
 - 1.14 **Cooling Units:** Appropriate liquid Nitrogen dewars (for temperatures <-80 C) and other appropriate coolers (for temperatures from -80 C to 500 C) pumps and controllers should be a part of the supply. Both Intracooler (Electrical Cooling Unit) and Liquid Nitrogen cooling units should be supplied with the main system.
 - 1.15 Appropriate automatic/digital temperature controls with feedback from sensors should be provided to (a) run between -80 C to 500 C by using Electrical Cooling Unit or Intracooler or Chiller (in a cryogen-free manner) and below -80 C to RT using Liquid Nitrogen.
 - 1.16 **Auto Gas Flow Controller** for two gases with flow setting on Rotameter and Gas Switching purpose through software.
 - 1.17 Should have capability for Inert gas Measurement Atmosphere and Oxidative Measurement Atmosphere
 - 1.18 **Autosampler** with 50 or more positions should be quoted with the system.
 - 1.19 **Personal Computer** with the following Specs or better – CPU i7 or better. Windows 10 or later, 16GB RAM, 1TB HDD, Graphics Card with 4GB memory, 24-inch LED Screen, Keyboard and Mouse (Branded).

- 1.20 **UPS system:** Appropriate standard make UPS (and isolation transformer) with at least one hour back up for the uninterrupted and smooth functioning of the entire system. The power requirement for proper functioning of the system along with all accessories should also be provided by the vendor.
- 1.21 **Appropriate Sample sealing press** should be provided to **crimp all types** of pans for solids and liquids.
- 1.22 All the tools required for analysis (like Tweezers, Micro Spatula, sample cutter and piercing device for sealed crucibles to open a hole in the lid before measurement, etc.) should be a part of the supply.

2. Consumables and Accessories : (Vendor must quote inclusive of all mention below items, should be compatible with the respective main instrument mentioned in point I):

- 2.1 400 Numbers of Aluminum Pans & Covers should be supplied along with the system for solid samples.
- 2.2 10 numbers of Platinum and 10 numbers of Alumina pans, to be supplied by Vendor.
- 2.3 Standard samples, 5 gm each Indium (In) and Tin (Sn), Sapphire, for temperature and heat flow calibration and Specific Heat measurements should be provided.
- 2.4 Gases (High Purity), Regulators required for DSC system i.e., Nitrogen, Air and Oxygen gas cylinder with dual stage regulators should be quoted along with the system.
- 2.5 Analytical balance (upto 5 decimals or 0.01mg) for accurate weight measurement must be quoted.

3. Software:

- 3.1 Windows 10-based Thermal Analysis software for data collection and further analysis in Thermal Analysis. Multitasking and multi-module software with licensed version and working under Windows O/S for data acquisition and storage. It should provide all the features like calibration routines, method parameter entry, peak area, onset, heating and cooling rates, cyclic heating/ cooling, smoothen, peak temperature, glass transition temperature, melting temperature, crystallization temperature, heat enthalpy, second and higher derivative, normalization, X-Axis with respect to time, temperature. Simultaneous real time analysis etc., analysis routines. The system should be included with various advanced software like Kinetics (activation energy calculation & life time estimation), Purity analysis study, Heating rate conversion software, Specific heat capacity, MDSC, etc., with DSC unit. Output data collection in the form of ASCII files, word/Excel format compatibility, PDF formats should be possible.

4. Warranty:

- 4.1 The supplied system should have a minimum of 5 years on-site comprehensive warranty. The warranty should include all parts of quoted system and its accessories.

4.2 Supply of spares and service should be guaranteed for 10 years from date of purchase.

5. The following technical requirements should be strictly met and necessary document has to be enclosed along with the main quotation:

5.1 Maintenance network: Mention address of the institutions including the contact person where the systems are in working conditions. Mention the maintenance network in India for the instrument.

5.2 The vendor should have installed the quoted machine in India and a documentary evidence of the same and evidence of satisfactory working & after sale support to be submitted along with tender document.

5.3 All specifications should be demonstrated through verifiable results against each specification submitted with the technical bid. All such results presented should be demonstrated on the instrument at the time of installation.

5.4 Technical bid should include all the necessary electrical, mechanical, civil and environmental requirements for the instruments to be installed and operated.

5.5 Availability of applications/service Engineer to handle instrument problems immediately.

5.6 All manuals (service & operational) should be given as hard copies and/or soft copies on USB drives.

5.7 Complete product catalogues describing all the required basic items should be produced.

5.8 Installation: An OEM trained engineer should install, on site, including all the electrical and mechanical systems, and accessories. This should be included in the quote.

5.9 Onsite Training by competent Application Scientist for 1 week on applications and capabilities of the System and all the components. This should be included in the quote.

5.10 Upgradation of software should be given free of cost as and when the new extension versions are released by the manufacturer/vendor at no additional cost during the period of warranty.

5.11. A compliance certificate duly signed by the OEM against all the specifications, with a yes or no for each specification, as listed under items 1, 2 and 3 above.
