

TECHNICAL SPECIFICATIONS FOR BET SURFACE AREA ANALYSER

Main features:

- **Specific surface area:** Minimum surface area of 0.01 m²/g or better with the standard nitrogen system. Any other option to measure surface area to a much lower value must be mentioned. Requirements on the purity of nitrogen for satisfactory operation of the equipment must be mentioned.
- **Gas volume range:** 1 x 10⁻³ cc - >1 x 10² cc or better
- **Reproducibility:** 0.5% or better
- **Operating environment:** 20-80% RH, 15 – 30° C or better
- **Pore diameter range:** 4 – 300 nm or better
- **Vacuum system:** The vacuum system should be capable of degassing the samples upto a vacuum level of 1 x 10⁻³ Torr or better. A separate vacuum pump for degassing and for analysis so that the vacuum pump system meant for degassing is not shared by analysis manifold is preferred.
- Minimum of three ports that can operate simultaneously and independent of each other.
- Analysis system along with appropriate high sensitivity pressure transducers should be provided.
- Possibility of taking video clips, Ethernet communication between computer and the equipment, barcode reader capability and ability to operate/perform diagnostics remotely through internet.
- Sample preparation devices if any may be separately quoted.
- **Sample tubes/ holders:** Variable IDs (inner diameter) of the sample tubes/holders **compatible** with the **BET SURFACE AREA ANALYZER** to be supplied so that samples with various geometries with irregular dimension/s could be accommodated for the measurements & analysis (total thirty numbers; ten numbers each in three different types of holders with suitable capacity). Samples holder for fine powders should have the provision to vacuum seal
- **Standard Reference Materials:** Surface area reference material and Chemisorption reference material with details to be provided
- **Electronic weighing balance** capable of measuring weight with an accuracy upto 0.1 mg level (10⁻⁴ g or better) having maximum weighing capacity of ~ 200 gm (one number) to be supplied from reputed manufactures with comparable performance to Sartorius makes

C. Power Requirements

- Power 220-240 V AC, 50 Hz
- Suitable UPS(APC/ SOCOMEC) with backup power of upto 30 minutes with details of maintenance schedule and warranty to be quoted

- **Software:** Suitable software and other interfacing & integration for carrying out the measurement and analysis with high levels of reliability and accuracy. Software should be capable of performing the following tasks
 - Generate both ‘Single- and Multi- point BET specific surface area’
 - Generate all the measured ‘Adsorption and Desorption Isotherms’
 - Langmuir surface area with slope, intercept, constant and correlation co-efficient
 - Mesopore volume and Mesopore area distribution by BJH, HK and other models
 - T-plot for micropore area & volume
 - Density functional theory to generate various parameters, e.g.,:
 - Micropore and mesopore distributions
 - Porevolume distribution of Poresize
 - Surface energy distribution of poresize
 - Surface area distribution of poresize
 - Summary report
- The software should allow the user to enter any Isotherm into the system by way of a data file or table for calculating thickness curves for T-plots; α 's plots and BJH pore size distribution. There should be capability to overlay the reference isotherm with other plotted data for comparisons.

D. Qualification criteria and other aspects

- All optional items must be separately quoted.
- The vendor must have supplied BET SURFACE ANALYSERS to national institutes such as IITs, IISc, ISERs and other national laboratories in India such as CSIR, DAE laboratories.
- Certification from customers about the satisfactory operation of the equipment must be provided.
- Should have agents in India and preferably in Chennai to provide after safes service, support and maintenance.
- The machine should be guaranteed for a period of 2 years from the date of commissioning. During warranty period, if there is any repair to be carried out, it should be done at the vendor's place and the transportation charges/replacement charges must be borne by the supplier.
- AMC charges for 3 years beyond the warranty period of 2 yrs with details of maintenance schedule, item-wise checking must be quoted.
- Photographs and catalogues related to every items should be enclosed.
- Training: Training must be provided subsequent to installation.
- Dimensions of the equipment, weight and space requirements should be submitted in the technical offer.
- Compliance statement must be provided for all the technical features asked for. Failure to provide compliance statement, the quotation is liable to be rejected. All tender specifications to be compared with machine offered line by line and documentary evidence must be enclosed by the supplier with quotation.
- Two hardcopies of the operation manual related to BET SURFACE AREA ANALYSER have to be provided after procurement of the equipment.
- Upgradation of software within the first 5 years after purchase must be provided free of charge.
- Spares and accessories for the equipment must be guaranteed for atleast 5 years from the date of purchase.
- Any non-compliance can be clearly mentioned and if there are any better features offered can be explicitly mentioned.