Bettersize

BETTER PARTICLE SIZE SOLUTIONS

30TH ANNIVERSARY 1995–2025

VOLUME

DENSITY

SOLID CONTENT

OPEN CELL CONTENT

BetterPyc 380

Accuracy Meets Versatility

BetterPyc 380

Versatile Gas Pycnometer

The BetterPyc 380 is an automatic gas pycnometer that uses the gas displacement method to deliver highly accurate measurements with ease, offering precision at its best. With temperature control, pressure sensing, and intuitive software, it measures the volume, true density, solid content, and open cell content of your samples with up to 4-digit accuracy. Designed for research and production in a wide range of industries, the BetterPyc 380 will unlock the full potential of your products.

Features and Benefits

- **Multiple Functions**

  Provides four key measurements—volume, density, solid content, and open cell content—while preserving sample integrity.

- **High-Accuracy**

  Ensures extreme accuracy and reliability with temperature control, high-resolution transducers, and calibrated chamber volumes.

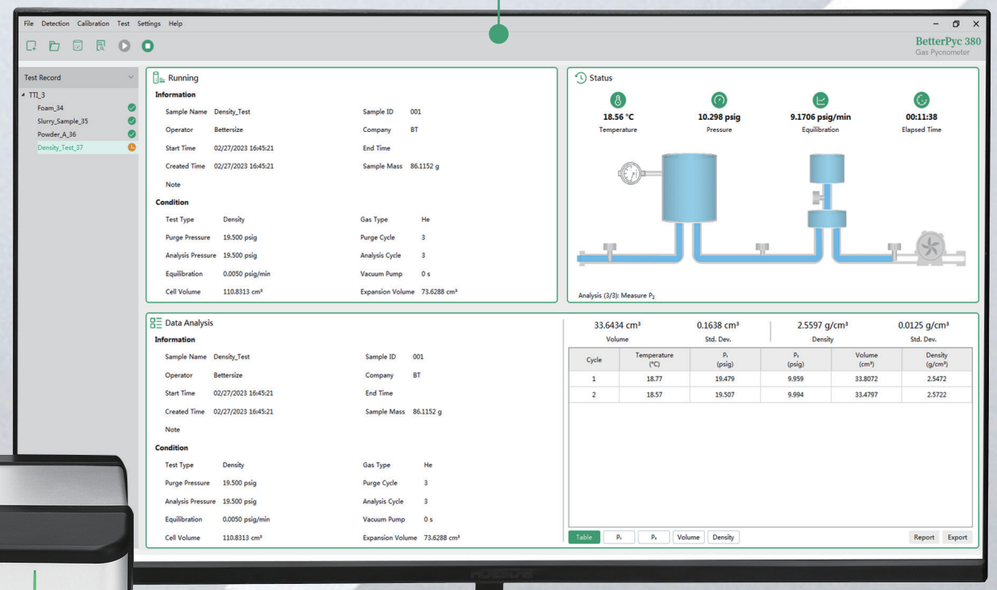
- **Effortless Operation**

  Offers automated measurement, calibration, leak detection, and SOP functionality, ensuring ease of use for operators of all experience levels.

- **Integrated Software Solution**

  Direct connection to balance and remote control to the external water bath.

EasyPyc Software

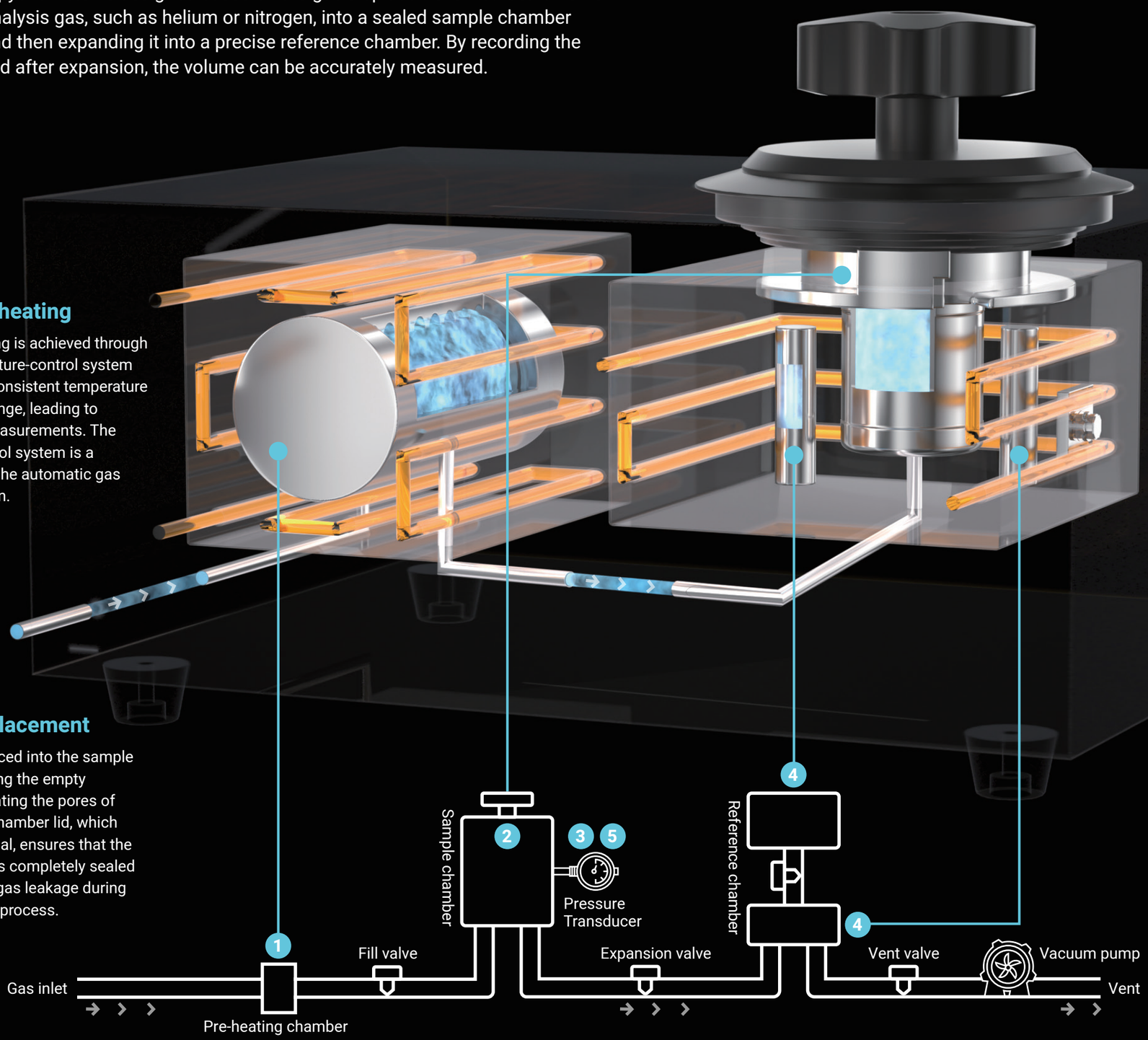


Main Device

Sample Cups & Calibration Standard

Working **Principle**

This automatic gas pycnometer is designed based on the gas displacement method. It works by introducing an analysis gas, such as helium or nitrogen, into a sealed sample chamber of known volume and then expanding it into a precise reference chamber. By recording the pressures before and after expansion, the volume can be accurately measured.



1 Gas Pre-heating

The gas pre-heating is achieved through a precise temperature-control system that maintains a consistent temperature within a narrow range, leading to more accurate measurements. The temperature-control system is a crucial feature of the automatic gas pycnometer design.

2 Gas Displacement

The gas is introduced into the sample chamber, displacing the empty space and penetrating the pores of the sample. The chamber lid, which provides a tight seal, ensures that the sample chamber is completely sealed and prevents any gas leakage during the measurement process.

3 First Pressure Equilibrium

Pressure 1 is recorded after the first equilibrium. The temperature-control system maintains a stable gas temperature, allowing pressure to equilibrate to lower 0.005 psig/min. A high-resolution transducer measures the pressure inside the sample chamber after equilibration.

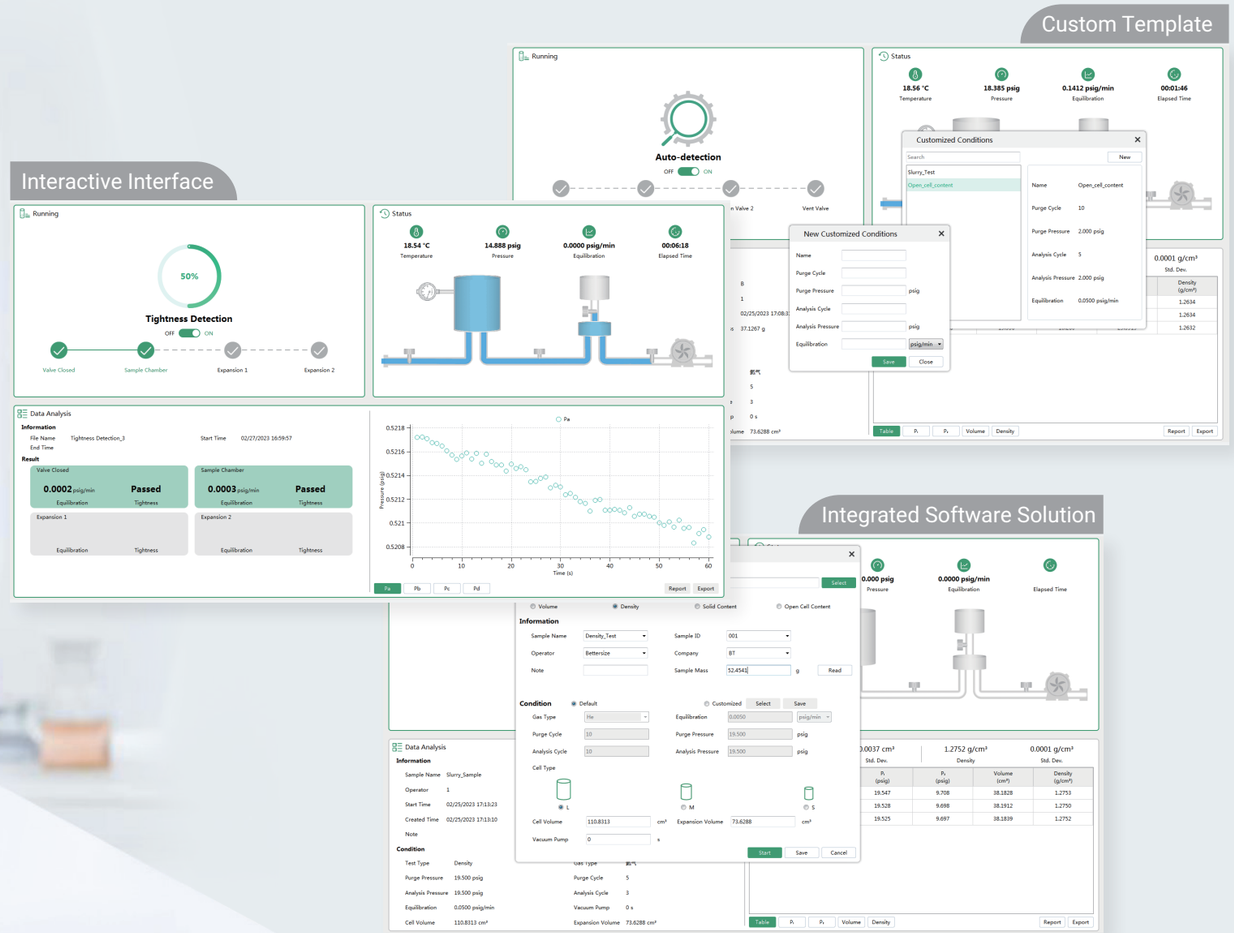
4 Gas Expansion

The gas is then allowed to expand into a reference chamber. Dual built-in reference chambers match the free space in the sample chamber for accurate results. The appropriate chamber is selected automatically based on the sample cup size, making it an ideal choice for precise density measurements.

5 Second Pressure Equilibrium

Pressure 2 is recorded after the second equilibrium and the gas is vented into the atmosphere. After that. the result is calculated. An integrated vacuum pump extracts gas to improve purge efficiency and reduce measurement errors.

Powerful Software - **EasyPyc**



Integrated Software Solution

The EasyPyc software allows operators to effortlessly perform four key measurements—volume, density, solid content, and open cell content—from a single, user-friendly platform.

For enhanced precision, an external water bath can be connected to the software to regulate the gas system's temperature.

The balance configuration enables seamless mass readings with a single click, eliminating potential manual errors.

Interactive Interface

The running status feature of the EasyPyc software provides real-time updates on critical system parameters such as temperature, gas pressure, equilibration, and elapsed time. These parameters are key to monitoring the measurement process and ensuring reliable results. The software also features an animation of the measurement process, making it easy for users to track progress visually.

Efficient Workflow

With the EasyPyc software, users can easily set up test conditions and report templates. The addition of an SOP (Standard Operating Procedure) testing function further simplifies the process, enabling faster measurements and allowing new operators to perform tasks efficiently using predefined templates.

Industries
We Serve

The **BetterPyc 380**, which complies with **USP**, **Ph.Eur**. **ASTM** and **ISO** standards, is a versatile instrument that can be used in a wide range of industries. It is able to accurately measure the density of a wide range of materials, the solid content in slurries, and the open cell content in
plastic foams, enabling process optimization and quality assurance in relevant industries.

Food

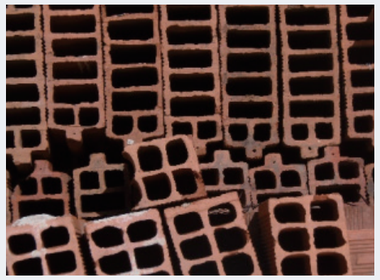
True density is crucial for ensuring the consistency and quality of dry food, affecting its processing, shelf life, and nutritional value.

Pharmaceuticals

USP 699
Ph. Eur. 20934

Product density determines and controls active or excipient composition. Product forms, purity, etc. can be determined by comparing measured density with theoretical and historical values.

Refractory



ASTM C604

True density is useful for: classification, identifying chemical differences, revealing mineral phases or alterations, determining total porosity and calculating results for other tests.

Soil

ASTM D5550

Soil specific gravity (SG), which is related to soil density, must be corrected due to precipitate formation after drying. A precipitate with lower SG leads to lower results, while one with higher SG leads to higher results.

Powder Metallurgy

ASTM B923

The skeletal density of metal determines its properties and processing results, and the performance of metal structures can be predicted from powder skeletal density.

Calcined Coke

ASTM D2638

The density of calcined petroleum coke is a crucial quality specification for coke calcination, as it affects the properties of the resulting artifacts.

Pigments

ASTM 6093

Dried film density helps determine the VOC content of clear and pigmented coatings, which is regulated by the government.

Cement

True density is essential for ensuring the quality and performance of cement powder, influencing its flowability, strength, and environmental impact.

Coating Powders

ASTM D5965
ISO 8130-2

Total solids content helps determine coating coverage potential. Dry pigment blends are monitored by comparing measured and theoretical densities based on composition.

Cellular Plastics

ASTM D6226
ISO 4590

Plastic foam properties vary based on the open/closed cell ratio. Insulation foams reduce thermal conductivity with trapped gas in closed pores. Flotation devices float due to closed air-filled pores.

Challenges We Solve

Powders | Void Fraction

Void fraction, also known as porosity, is a crucial factor that affects the properties of powder materials such as flow behavior, compaction behavior, and thermal conductivity.

Accurate measurement and control of void fraction are therefore essential for informed decision-making and optimal powder engineering.

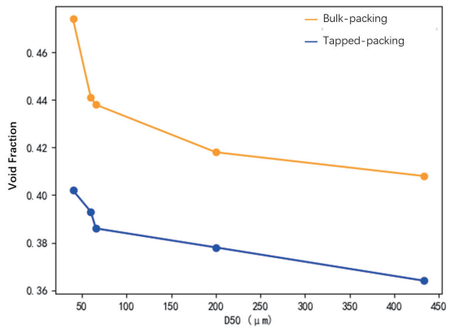
The **BetterPyc 380** enables powder engineers to quickly measure true or skeletal density. By the combination with the BeDensi T Pro to measure the bulk density and tapped density, the void fraction of powder materials can be easily calculated.

Suitable configurations are as follows:

- 10 cm^3, 35 cm^3 and 100 cm^3 nominal cups
- Temperature-controlled system

Application Case

By analyzing the relationship between the median particle size (D50) and the void fraction of powder materials, it is recognized that product quality can be improved through the optimization of particle size and distribution.



Slurry | Solid Content

Processing a slurry can be challenging due to issues such as flowability and corrosion, which can disrupt the smooth operation of your processing system.

Accurately measuring and understanding the solid content of your slurry product is crucial to mitigating these challenges and optimizing your manufacturing process.

The **BetterPyc 380-S** is ideal for rapid density and solid content measurement of slurries with sample integrity. It features a chamber lid with a thermocouple for slurry temperature detection and an anti-corrosion cup for corrosive samples.

Suitable configurations are as follows:

- A chamber lid with a thermocouple
- Upgraded software with slurry measurement
- 10, 35, and 100 cm^3 stainless steel anti-corrosive cups (optional)

Application Case

By measuring solid content of a group of slurries, the measured results are in good agreement with the known values, which indicates that the desired slurry with the appropriate solid content can be accurately determined by using the BetterPyc 380.

Sample	Theoretical solid content (w/w)	Measured solid content (w/w)				Relative error. (%)
		1	2	3	Average	
Clay slurry	2.86	2.85	2.87	2.89	2.87	0.35
	19.58	18.94	18.99	19.03	18.99	3.03
	40.78	40.18	40.18	40.19	40.18	1.46

Challenges We Solve

Foam | Open Cell Content

In the plastic foam industry, meeting performance requirements is crucial, with properties such as compression strength, thermal insulation, and moisture resistance being critical considerations.

The open cell content of plastic foams is a key factor that affects their properties and performance, making it essential to accurately measure this parameter for optimal foam manufacturing and selection.

The **BetterPyc 380-F** is equipped with a foam cutting tool specifically designed to determine the corrected open cell content of rigid foams. It is fully compliant with the ASTM and ISO method and is able to provide accurate results by correcting surface cells opened by cutting.

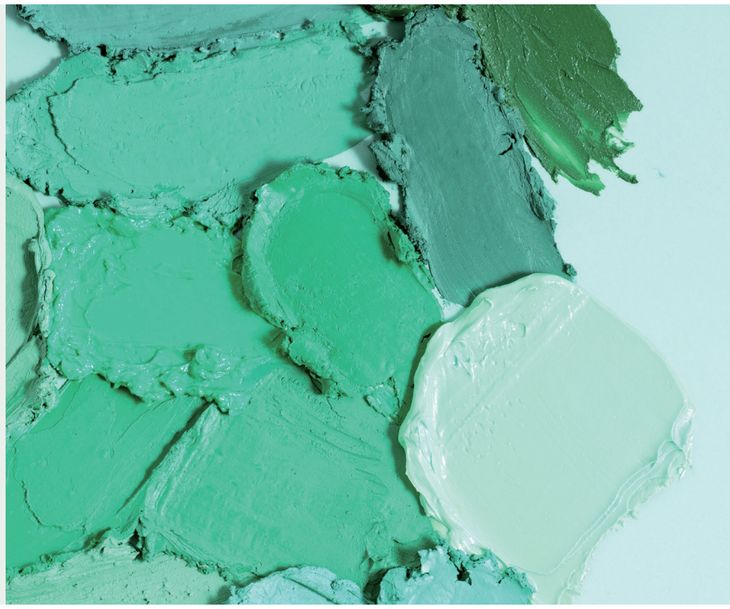
Suitable configurations are as follows:

- A foam cutting tool
- Upgraded software with foam measurement

Application Case

In a comparison of the open cell content of three foams, the Foam-A, with the lowest open cell content, offers the best thermal insulation properties and moisture resistance among them.

Sample	Open cell content (%)				Std. Dev. (%)
	1	2	3	Average	
Foam-A	48.09	48.39	48.22	48.23	0.12
Foam-B	73.49	73.51	73.79	73.60	0.14
Foam-C	51.61	51.24	51.45	51.43	0.15



Specific Samples | True Density

Due to the diverse nature of samples encountered in different industries, using a gas pycnometer can present challenges, which are generated by thermal sensitivity, corrosive substances, fine powders, or highly viscous samples.

Bettersize considers the needs of various industries and provides accessories that ensure accurate and reliable density measurements every time.

The temperature control system maintains the thermal stability of the entire gas system, which allows the pycnometer to accurately analyze the density of thermal-sensitive materials.

Non-elutriating cups are ideal for measuring samples with fine particles. Anti-corrosion cups prevent damage to the pycnometer and ensure accurate results. Disposable cups are used for samples that are difficult to clean, such as asphalt.

Application Case

By measuring the density of both solid and liquid asphalt, test results with good repeatability confirm that the BetterPyc 380 offers a professional option for density testing of asphalt.

Asphalt	Temperature (℃)	Measured density (g/cm³)				Std. Dev. (g/cm³)
		1	2	3	Average	
Solid	25	1.0607	1.0588	1.0576	1.0590	0.0013
Mix liquid	25	1.4722	1.4739	1.4740	1.4735	0.0008

Selection Guide

Choose the right accessories for accurate and reliable results with our easy-to-follow selection guide.

BetterPyc 380

- Density
- Volume

BetterPyc 380-S

- Density
- Solid content
- Volume

BetterPyc 380-F

- Density
- Open cell content
- Volume

BetterPyc 380-FS

- Density
- Open cell content
- Volume
- Solid content

Specifications

General	
Measuring Principle	Gas Displacement Method
Measuring Parameters	Volume, Density, Solid Content, Open Cell Content
Cup Capacity	10 cm^3, 35 cm^3, 100 cm^3 (nominal)
Measurement Performance	
Temperature Range	10-65 ℃
Temperature Stability	0.05 ℃
Transducer Accuracy	≤ 0.1%
Accuracy	0.02%
Repeatability	0.01%
Resolution	0.0001 g/cm^3
Analysis Gas	
Pressure Range	0 - 22 psig (0 - 152 kPag)
Type	Helium or Nitrogen (suggested)
Instrument Dimensions	
Weight	10.6 kg
W×D×H	345 mm × 297 mm × 221 mm
Supply Voltage	100/240 V, 50/60 Hz
Software	
System	Windows 7 or higher
Connections	USB ports

Bettersize
BETTER PARTICLE SIZE SOLUTIONS

BREAKING
BOUNDARIES
SHAPING
THE FUTURE

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