

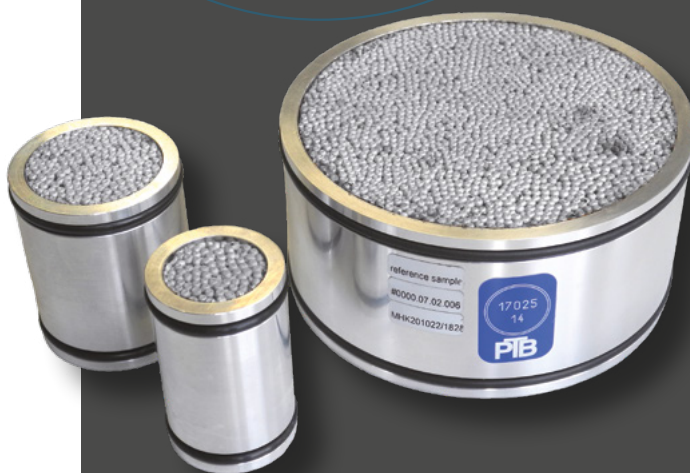


## Measuring system AED 1000 – AcoustiTube® for determining the sound absorption coefficient, the sound reflection factor and the impedance ratio

The impedance tube AED 1000 – AcoustiTube® is a measuring system for determining the sound absorption coefficient, the sound reflection factor and the impedance ratio of materials in the laboratory on the basis of the transfer function method described in DIN EN ISO 10534-2 and ASTM E1050

### Principle of impedance tube

In the impedance tube a plain sound wave is generated and sent against a sound absorbing specimen in front of a reverberant termination. The resulting sound pressure is measured by using two microphones in front of the material sample. The sound absorption coefficient of the material is determined by evaluating the incoming and reflected sound energy.



Certified reference specimen (calibration sample)

## Measuring system AED 1000 – AcoustiTube®

### Specimen holders

Depending on the application, different specimen holders are available – special types can be delivered on request.

#### Specimen holder I

- **Application:** determination of sound absorption coefficient of materials in the laboratory according to DIN EN ISO 10534-2
- **Specimens:** cylindrical specimens with a diameter of 15 mm, 30 mm, 40 mm or 100 mm
- **Method:** prepared cylindrical specimens of variable thickness are mounted and sealed into the specimen holder, which can be continuously positioned and adjusted

#### Specimen holder II

- **Application:** determination of sound absorption coefficient in situ according to DIN ISO 13472-2 (sound absorption coefficient < 0,15)
- **Specimens:** road surfaces and plates of specimens with a dimension of at least 300 mm x 300 mm
- **Method:** adapter for tight attachment of impedance tube to the surface of the specimen

### Software

The measurement system AED 1000 is supported by the analysis software AED 1001.



- determination of material properties as a function of frequency
- averaging of results of various material samples
- simple management and comparability of results by application of database

### Extension of Impedance Tube

An extension of the impedance tube to the transmission tube (**AED 1200 + analysis software AED 1401**) allows the determination of the characteristic absorber values (wave number and characteristic impedance), the transmission coefficient and the sound insulation (transmission loss) by applying the Two-Load Method with 4 microphones according to ASTM E2611 (Transmission Matrix Method). On such basis, the insertion loss of mufflers (see software for acoustic design of mufflers AED 8001 – AcoustiCalc® Silencer) and the diffuse sound absorption coefficient (see software for

acoustic design of sound absorbers AED 3001 – AcoustiCalc® Absorber, comparison to measurements in the reverberation chamber according to DIN EN ISO 354, especially rated sound absorption coefficient of the material according to DIN EN ISO 11654) can be computed directly (see overview measuring systems vs. analysis software).

### Compression specimen holder

As of now, a novel compression specimen holder extends the application range of the impedance tube, transmission tube and the airflow resistivity meter AED 300 – AcoustiFlow®. The specimen holder can be adjusted in length nearly continuously and allows the defined compression of cylindrical specimens and fills to measure the sound absorption coefficient, transmission loss, absorber values and the airflow resistance. Also, thin fabrics can be installed with control.

### Technical Data

#### Impedance tube

- Type I (Standard)
  - Inner diameter: 40 mm
  - Frequency range: 100 Hz – 4.950 Hz
- Type II
  - Inner diameter: 100 mm
  - Frequency range: 50 Hz – 2.000 Hz
- Type III
  - Inner diameter: 30 mm
  - Frequency range: 150 Hz – 6.600 Hz
- Type IV
  - Inner diameter: 15 mm
  - Frequency range: 150 Hz – 10.200 Hz
- Thickness of specimen
  - AED 1000: 260 mm
  - AED 1200: 80 mm
  - Compression specimen holder: 170 mm

#### Microphones

- Type: 1/4", BNC (female), class 1
- Frequency range: 20 Hz – 20 kHz

#### Data acquisition

- 2/4 simultaneously sampled analog input channels, BNC, IEPE-conditioning
- compatible to MATLAB\* and LabVIEW\*\*

\* MATLAB is a registered trademark of The Math Works, Inc.

\*\* LabVIEW is a registered trademark of the National Instruments Corporation