



## *Acoustic Impedance Tube B400*



- *Clearly demonstrates acoustic attenuation of a range of common building materials (carpet, cork and fibre board).*
- *Oscilloscope enables students to visually see immediate changes to acoustic attenuation*
- *Safe for use without ear protection as noise source is enclosed.*
- *A Low cost alternative to the well-known Laboratory Standard Acoustic Impedance tube.*
- *Two year Warranty.*



## ***Introduction***

Noise is the most widespread hazard to which people are exposed at work and noise induced hearing loss and tinnitus can have devastating effects on the occupational ability and the social life of victims. Legislation has been introduced in many countries to limit the daily noise exposure levels that employees may be subjected to. This has brought about the need in many factory workshops for acoustic attenuation to be applied to many machines and processes.

It is becoming increasingly important that students of engineering and architecture be made aware of the methods and materials that are an effective barrier to sound. Certain materials such as light acoustic foam can be extremely effective at reducing high frequency noise but be totally ineffective at the lower frequencies that can be more obtrusive.

The Hilton Acoustic Impedance Tube/Acoustic Insulation Test Apparatus, B400 has been designed to provide students with a simple and easily understood method of investigating the relative acoustic properties of various materials.

The unit is applicable for the teaching of students in:

- Sound and Vibration Engineering.
- Mechanical Engineering.
- Aeronautical Engineering.
- Civil Engineering.
- Architecture.
- Building Services.
- Plant Engineering
- Health and Safety

## ***Description***

The B400 consists of a transparent plastic tube fitted at one end with a glass reinforced plastic enclosure containing two loudspeakers and at the other with a heavy sample holder.

A small microphone may be moved axially along the tube and its position measured. The loudspeakers are fed with a common pure tone from a function generator and the sound waves pass along the tube to the sample. Dependent upon the type of material and the tone frequency, a portion of the sound energy is absorbed and the remainder is reflected back along the tube. The portion absorbed being converted into heat by the viscous action of the airborne wave as it passes through the absorber.

Interference between the incident sound waves and those reflected result in a standing wave field whose amplitude varies along the length of the tube.

With the aid of an oscilloscope the amplitude of the maximum and minimum signals received by the travelling microphone may be measured and from these values the Sound Absorption Coefficient at the test frequency may be measured.

## ***Experimental Capabilities***

The unit enables students to conduct the following experiments.

- Determine the Sound Absorption Coefficient for many of the normal building lining materials such as carpet, cork, fibre board and many of the better acoustic attenuating materials.
- Determine the Sound Absorption Coefficient of these and some poor absorbers at a range of frequencies between approximately 300 and 4000Hz.
- Determine the speed of sound in air at ambient temperature and comparison of this with the calculated value.



## Specification

### DETAILED

#### **B400 Acoustic Impedance Tube/Acoustic Insulation Test Apparatus**

An acoustic standing wave apparatus driven by twin loudspeakers and a separate console mounted power amplifiers.

A miniature travelling microphone in the clear plastic tube allows the acoustic signal to be fed to the console mounted microphone amplifiers.

The clear tube combined with a mm scale and marker allow the microphone axial position to be measured.

An extensive range of test samples allow a wide range of tests on differing materials.

#### **Optional Function Generator**

A square, triangle and sine wave generator having adjustable frequency output between push button controlled ranges. Frequency ranges between 1Hz and 1MHz. Output frequency indicated by integral digital panel meter.

#### **Optional Oscilloscope**

A20MHz dual beam oscilloscope having variable sweep and amplitude ranges

Dual trace allows investigation of input frequency magnitude relative to reflected standing wave amplitude.

All required connecting leads supplied.

#### **Operating Manual**

Installation, operation and maintenance manual include theoretical analysis, suggested experimental procedures, sample test results and worked example calculations.

## Dimensions

Height 200mm Depth 500mm  
Width 1500mm Weight 9 kg

## Services Required

### Electrical

Either: **A.** 300W 220/240 Volts, 50Hz.  
(With earth/ground)

or: **B.** 300W 110/120 Volts, 60Hz.  
(With earth/ground)

## Optional Equipment

- B400A Instrumentation Package

## Ordering Information

**Order as:** Acoustic Impedance Tube B400

## Electrical Specification

Either: **A:** 220-240 Volts, Single Phase 50Hz  
(With earth/ground).

### OR

**B:** 110-120 Volts, Single Phase 60Hz  
(With earth/ground).

## Language

Either: English, Spanish or French

## Shipping Specification (Approx.)

**Nett Weight:** 9 kg

**Gross Weight:** 62 kg (approx.)

**Packing Case Size:** 1.676 x 0.357 x 0.686m (approx)

**Packing Case Volume:** 0.410m<sup>3</sup> (approx)

## Also Available on Request

- Further detailed specification
- Additional copies of instruction manual
- Recommended list of spares for 5 years operation

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