

# ACOUSTIC TESTING AT THE BTC

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**The Building Test Centre**

Fire Acoustics Structures

# The Building Test Centre

The Building Test Centre is owned by British Gypsum Limited which is part of the global gypsum operation of BPB.

We have UKAS accreditation to provide test services in five distinct areas from our Leicestershire site.

**FIRE RESISTANCE**

**REACTION TO FIRE**

**STRUCTURES**

**ACOUSTICS**

Laboratory

In the field (out on the building site)

# THE ACOUSTIC LABORATORY

- Purpose built in 1967
- First UK acoustics laboratory to achieve UKAS accreditation



# THE BTC AND UKAS

- United Kingdom Accreditation Service (UKAS) is the sole UK national accreditation body covering certification, testing and calibration.
- UKAS monitors the performance of the laboratory annually.
  - Laboratory impartiality
  - Technical competence
  - Measurement Traceability
  - Appropriate resources and facilities
  - Actual laboratory performance to the required standard
  - Capability to sustain the required level of performance
- Risk limitation - choosing a laboratory which is not accredited is at best risky and at worst inappropriate. Decisions made following a test can have life safety implications.
- Our clients require a UKAS test report to demonstrate to Building Control Authorities compliance with the UK Building Regulations



## Why do we test?

- Product and system development
- Acoustic consultants set sound insulation and sound absorption standards for major projects
- To comply with Building Regulations (Approved Document E)

# Testing Portfolio

- Lightweight partitions and masonry walls
- Cinema Walls
- Suspended ceiling systems
- Lightweight and concrete floors
- Floating Floor Treatments
- Internal buildings elements
- Doors, Glazing and other composite tests

# Acoustic Test Chambers

Horizontal Test Suite (partitions)

Vertical Test Suite (floors and ceilings)

Reverberation Room

## Values required from testing

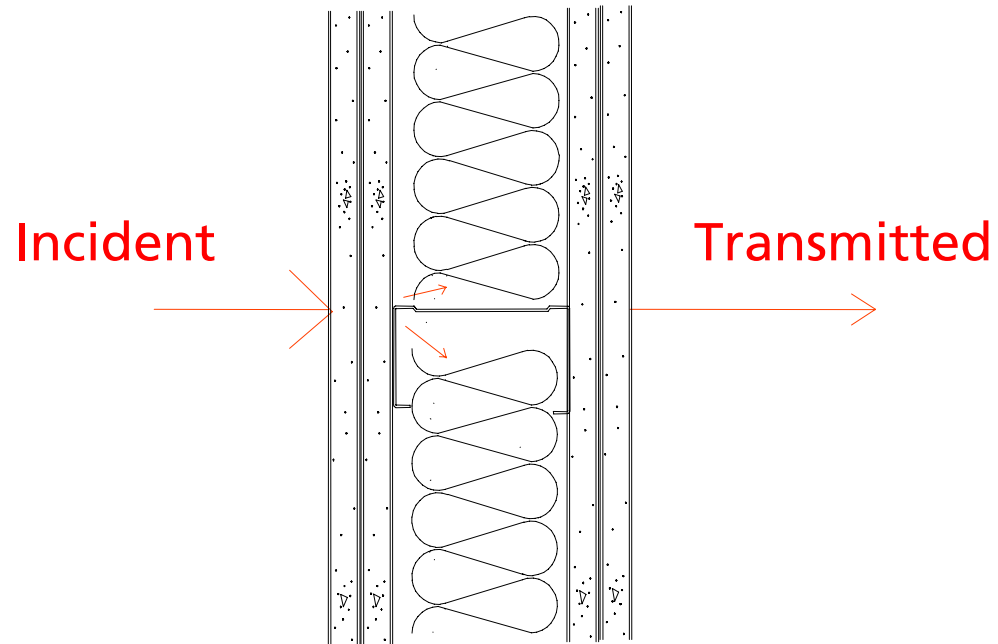
Values required from testing are dependant on the use for the product or system.

Typical values are:

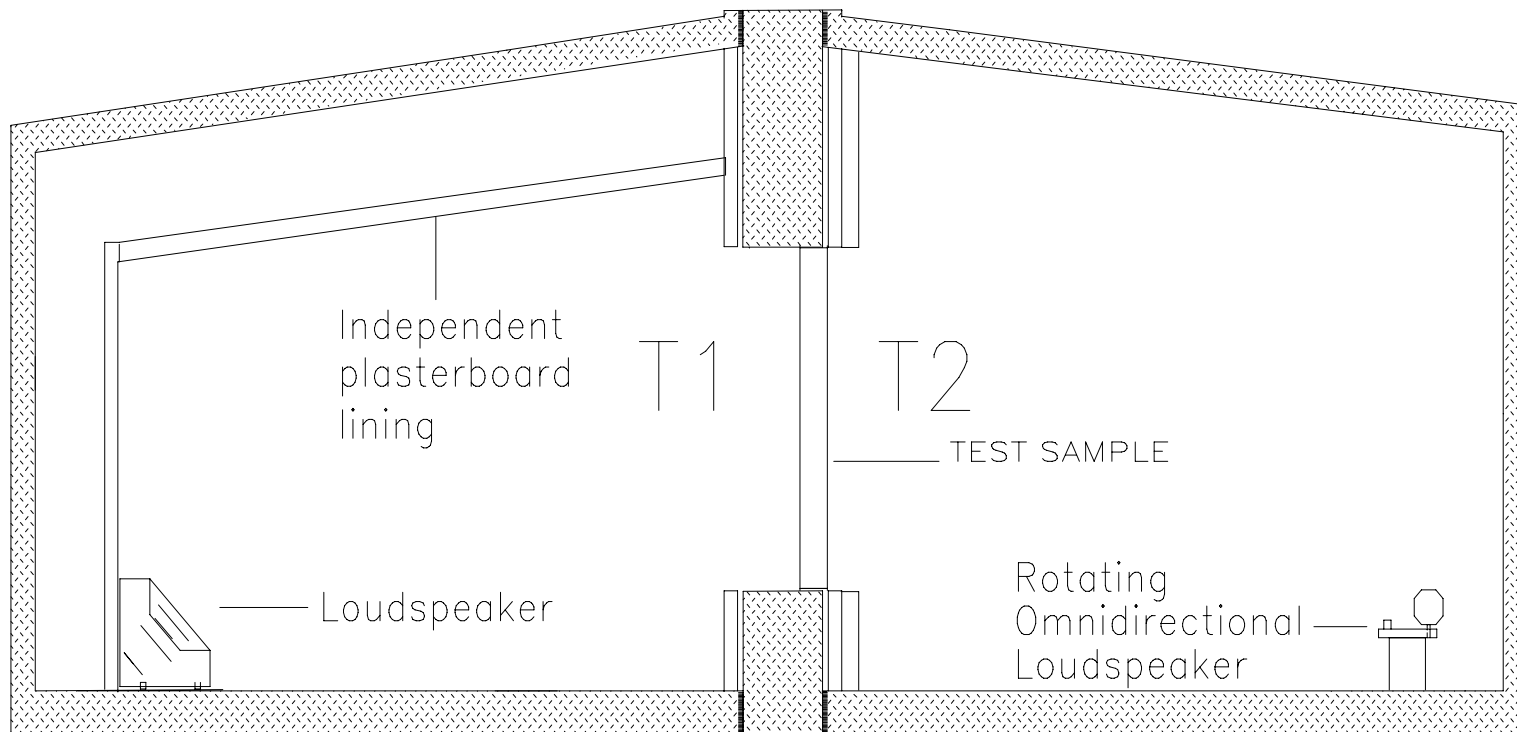
Internal walls and floors Airborne  $R_w$  40 dB

Separating wall, Doors Airborne  $R_w$  29 dB

# SOUND INSULATION



# Horizontal Test Suite (HTS)



Test Standard : ISO 140-3

# Airborne Sound Insulation

$$R_w = L_1 - L_2 + 10 \lg \frac{S}{A}$$

$R_w$  = Sound Reduction Index

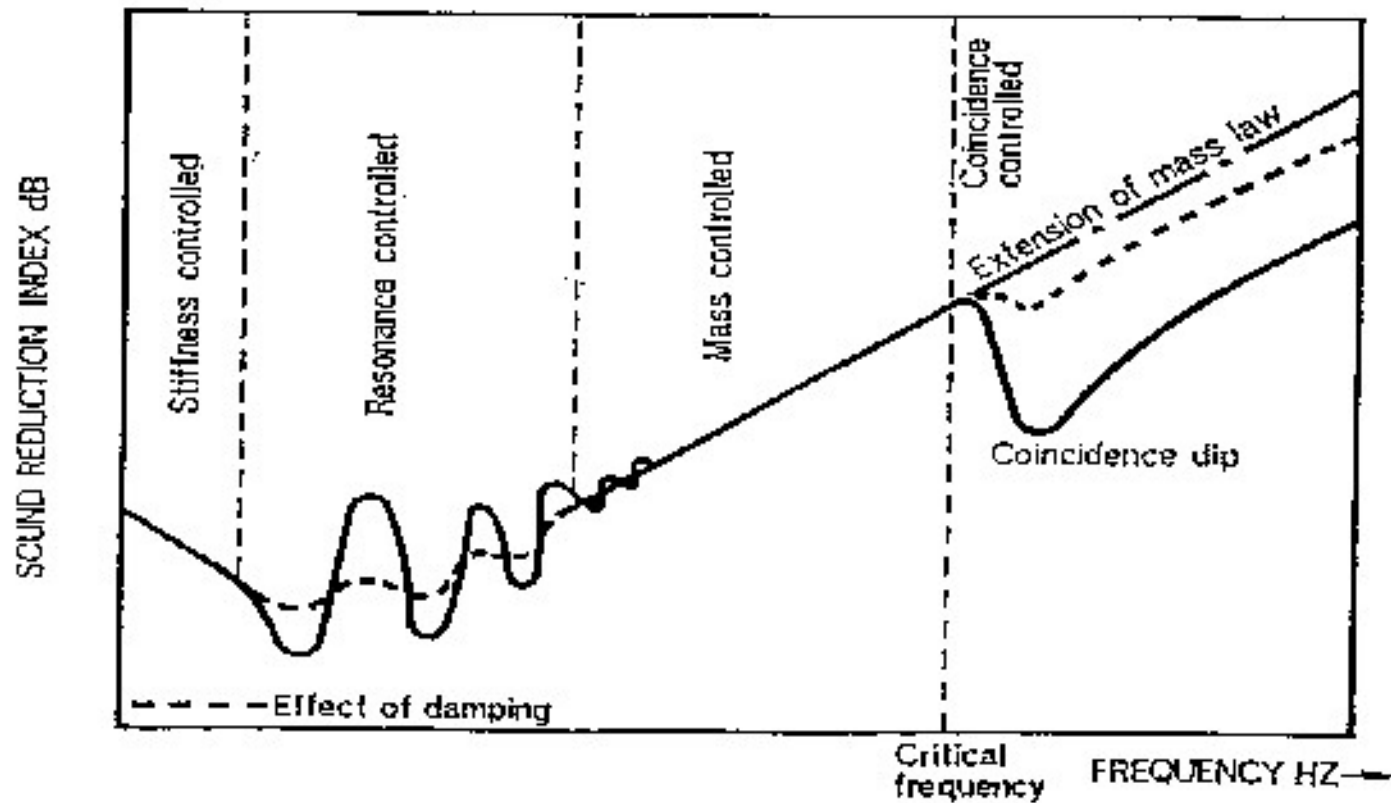
$L_1$  = Average Sound pressure level in source room (dB)

$L_2$  = Average Sound pressure level in receiving room (dB)

$S$  = Area to the test specimen

$A$  = Equivalent sound absorption area in receiving room (m<sup>2</sup>)

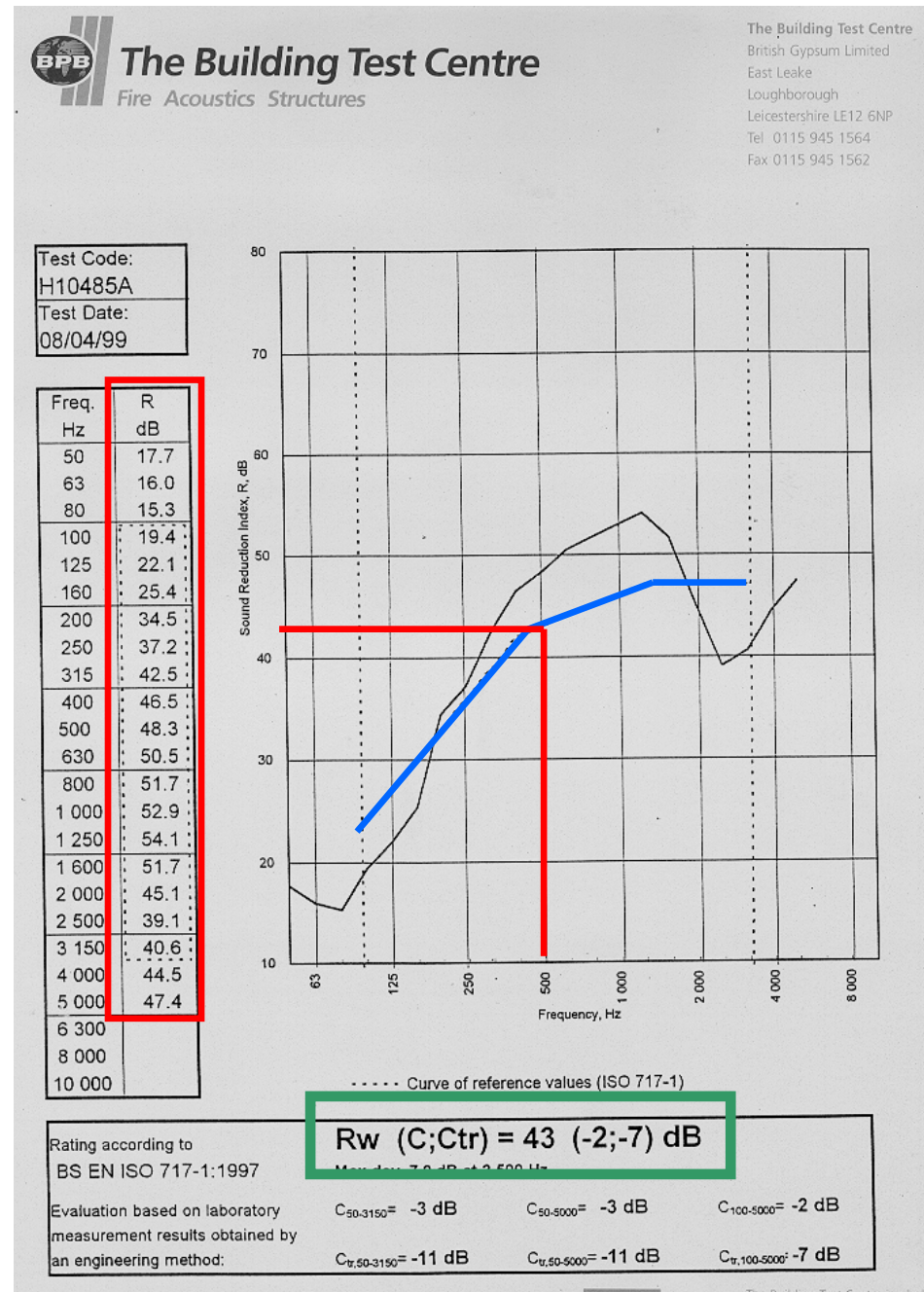
# Sound Insulation Spectrum



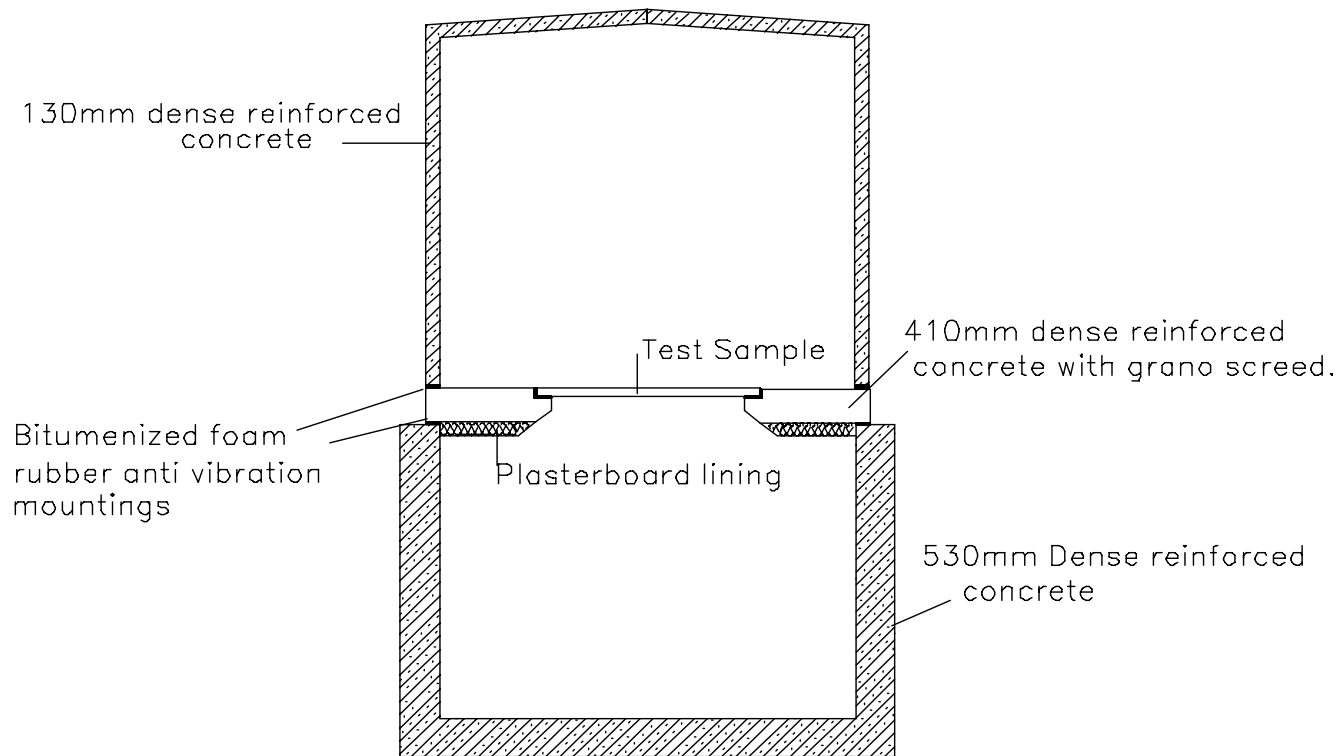
# Test Results

- Sound reduction values
- Plot R values
- Rating Curve
- Area under reference curve
- Unfavourable deviations  $\leq 32$
- Take value off reference curve at 500Hz

Single figure  $R_w$



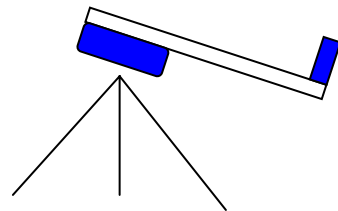
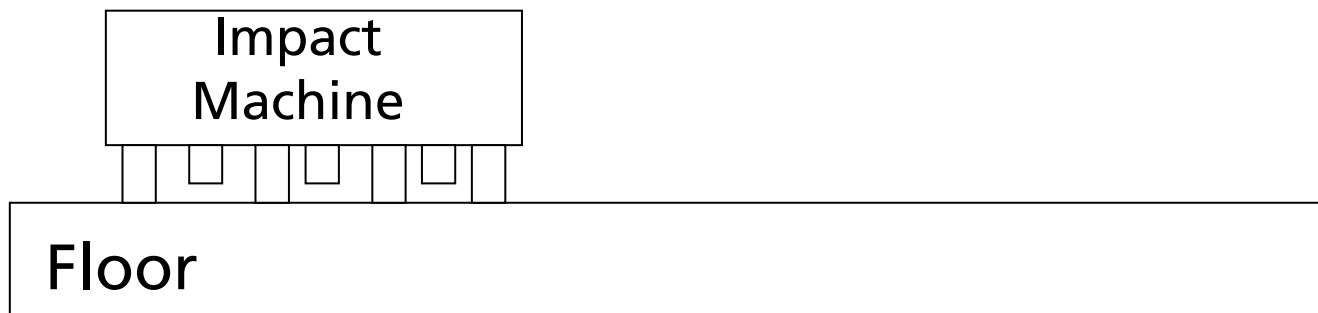
# Vertical Test Suite (VTS)



**Test Standard : ISO 140-6**

## Vertical Test Suite (VTS)

Airborne test same as in the HTS  
Impact test in addition



Microphone and  
boom

## Vertical Test Suite (VTS)

### Impact test

Average Sound pressure level in receiving room is recorded and the Normalised Sound pressure level ( $L_n$ ) value calculated from the formula below:

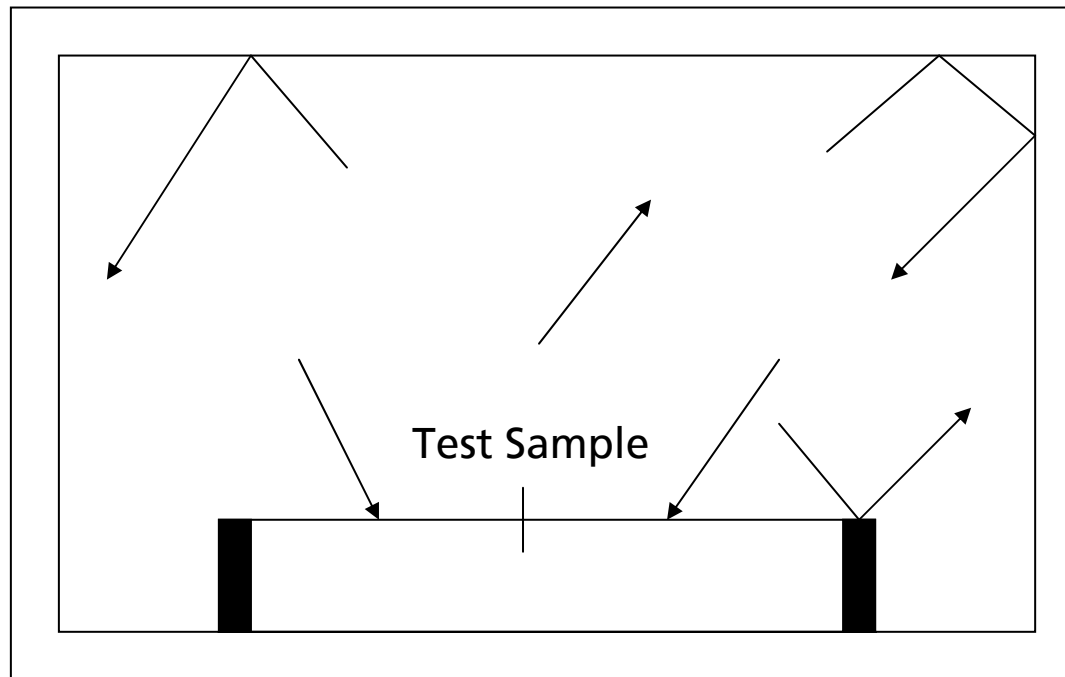
$$L_n = L_i + 10 \lg \frac{A}{A_0}$$

$L_i$  = Average Sound pressure level

$A$  = Equivalent absorption area

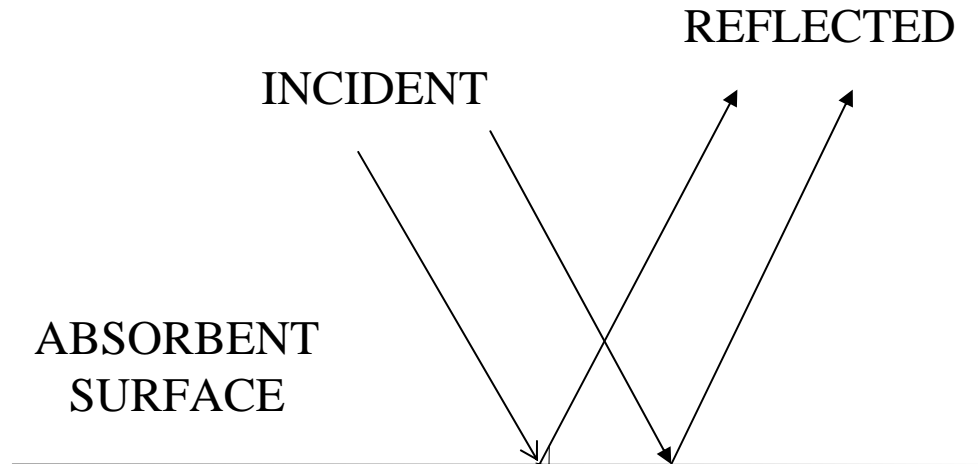
$A_0$  = Reference absorption area

# Reverberation Room



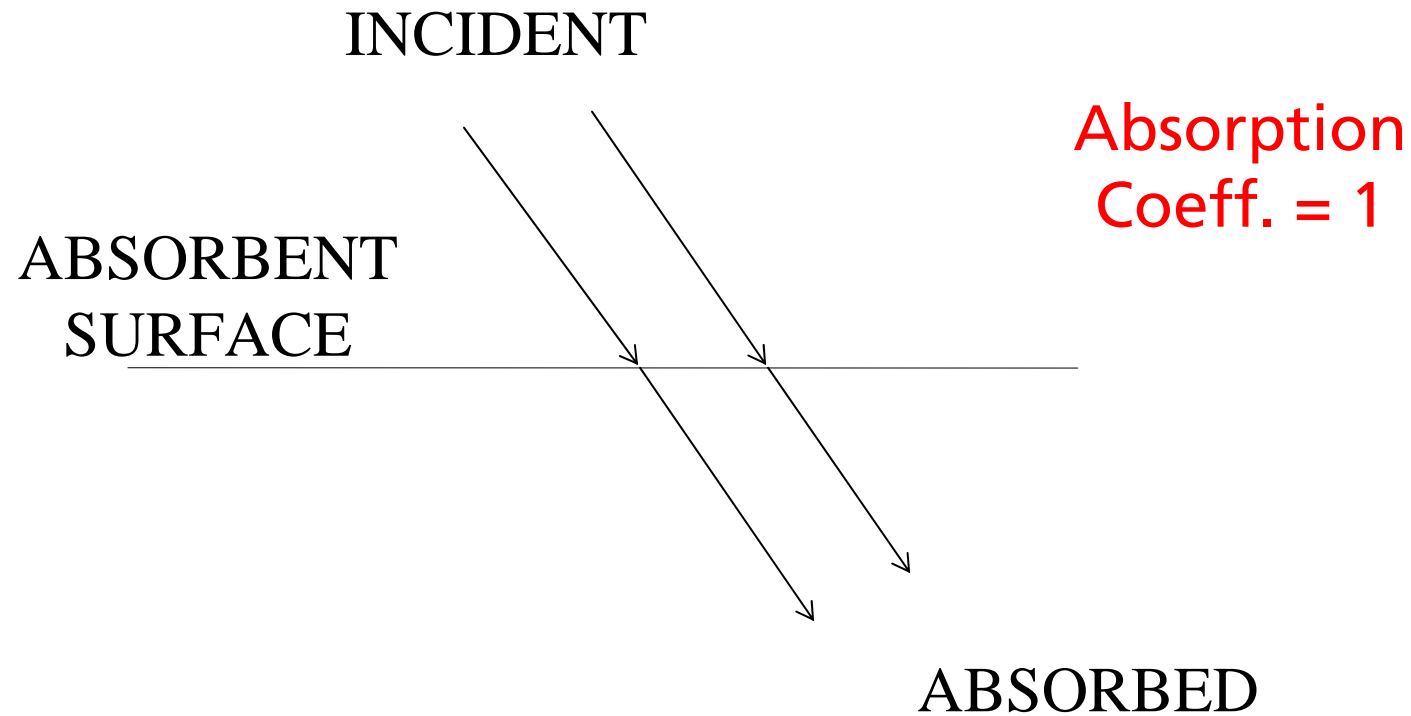
**Test Standard : BS EN ISO 354**

# Sound Absorption



Absorption  
Coeff. = 0

# Sound Absorption



# Sound Absorption

## Sabine's Formula

$$RT = \frac{0.16V}{A}$$

RT = Reverberation time

V = Volume of Reverberation

A = Absorption

$$A = 0.16 V/RT$$

# Absorption Coefficient

Empty Room

$$A_{\text{EMPTY}} = 0.16 V/RT_{\text{EMPTY}}$$

Room plus Sample

$$A_{\text{R+S}} = 0.16 V/RT_{\text{R+S}}$$

Absorption of Sample Only

$$A = A_{\text{R+S}} - A_{\text{EMPTY}}$$

Absorption Coefficient

$$\alpha = A/S$$

$\alpha$  = Absorption Coefficient

S = Surface area under measurement

A = Absorption

# Summary

Horizontal Test

Airborne

Vertical Test

Airborne and Impact

Reverberation Test

Sound absorption test

[www.btconline.co.uk](http://www.btconline.co.uk)

If you have any queries regarding acoustic testing please contact us at:

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