Sound Absorption Coefficients

The sound absorption coefficient indicates how much of the sound is absorbed in the actual material. The absorption coefficient can be expressed as:

$\alpha = I_a / I_i$ *(1)*

where

I_a = *sound intensity absorbed* (W/m^2)

I_i = *incident sound intensity* (W/m^2)

Absorption coefficient - α - for some common materials can be found in the table below:

Material	Sound Absorption Coefficient - α -
Acoustic belt, 12 mm	0.5
Acoustic tiles	0.4 - 0.8
Asbestos, sprayed 25 mm	0.6 - 0.7
Brickwork, painted	0.01 - 0.02
Brickwork, unpainted	0.02 - 0.05
Cork sheet, 6 mm	0.1 - 0.2
Fiberboard on battens, 12 mm	0.3 - 0.4
Hardwood	0.3
Mineral wool, 100 mm	0.65
Persons, each	2.0 - 5.0
Plaster walls	0.01 - 0.03
Plywood panel, 3 mm	**0.01 - 0.02**

Material	Sound Absorption Coefficient - α -
Polystyrene, expanded on 50mm battens	0.35
Polystyrene, expanded rigid backing	0.15
Polyurethane foam, flexible	0.95
Rubber sheet, 6 mm porous	0.1 - 0.2
Slag wool or glass silk, 50 mm	0.8 - 0.9
Snow	0.75
Wood wool cement on battens, 25 mm	0.6 - 0.07

Note! The absorption coefficient varies with the frequency of sound. A rooms acoustic characteristics can be calculated with the formulas above, or estimated for typical rooms.

Total Room Sound Absorption

The total sound absorption in a room can be expressed as:

$A = S_1 \alpha_1 + S_2 \alpha_2 + .. + S_n \alpha_n = \sum S_i \alpha_i \qquad (2)$

where

A = *the absorption of the room (m^2 Sabine)*

S_n = *area of the actual surface (m^2)*

α_n = *absorption coefficient of the actual surface*

Mean Absorption Coefficient

The mean absorption coefficient for the room can be expressed as:

$a_m = A / S \qquad (3)$

where

a_m = *mean absorption coefficient*

A = *the absorption of the room (m^2 Sabine)*

S = total surface in the room (m^2)

Open Doors and Windows	**1.00 across the spectrum**					
Materials	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**
Brick – Unglazed	.03	.03	.03	.04	.05	.07
Brick – Unglazed, Painted	.01	.01	.02	.02	.02	.03
Carpet – Heavy, on Concrete	.02	.06	.14	.37	.60	.65
Carpet – Heavy, on 40oz Hairfelt or Foam Rubber on Concrete	.08	.24	.57	.69	.71	.73
Carpet – Heavy, with Impermeable Latex Backing on 40oz Hairfelt or Foam Rubber on Concrete	.08	.27	.39	.34	.48	.63
Concrete Block – Light, Porous	.36	.44	.31	.29	.39	.25
Concrete Block – Dense, Painted	.10	.05	.06	.07	.09	.08
Gypsum Board – 1/2″, Nailed to 2×4, 16″ O.C.	.29	.10	.05	.04	.07	.09
Marble or Glazed Tile	.01	.01	.01	.01	.02	.02
Plaster – Gypsum, or Lime, Smooth Finish on Tile or Brick	.013	.015	.02	.03	.04	.05
Plaster – Gypsum, or Lime, Rough Finish on Lath	.14	.10	.06	.05	.04	.03
Plaster – Gypsum, or Lime, Smooth Finish on Lath	.14	.10	.06	.04	.04	.03
Plywood Paneling – 3/8″ Thick	**.28**	**.22**	**.17**	**.09**	**.10**	**.11**
Fabrics	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**
Light Velour – 10oz/sq yd, Hung Straight, in Contact with Wall	.03	.04	.11	.17	.24	.35
Medium Velour – 14oz/sq yd, draped to half area	.07	.31	.49	.75	.70	.60
Heavy Velour – 18-oz/sq yd, Draped to Half Area	.14	.35	.55	.72	.70	.65
Floors	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**
Concrete or Terrazzo	.01	.01	.015	.02	.02	.02
Linoleum – Asphalt, Rubber, or Cork Tile on Concrete	.02	.03	.03	.03	.03	.02
Wood	.15	.11	.10	.07	.06	.07
Wood Parquet in Asphalt on Concrete	.04	.04	.07	.06	.06	.07
Glass	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**
Large Panes of Heavy Plate Glass	.18	.06	.04	.03	.02	.02
Ordinary Window Glass	.35	.25	.18	.12	.07	.04
Other	**125Hz**	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**	**4000Hz**
Water Surface, e.g. Swimming Pool	.008	.008	.013	0.15	.020	0.25
Air, Sabins per 1000 Cubic Feet	.09	.20	.49	1.20	2.90	7.40