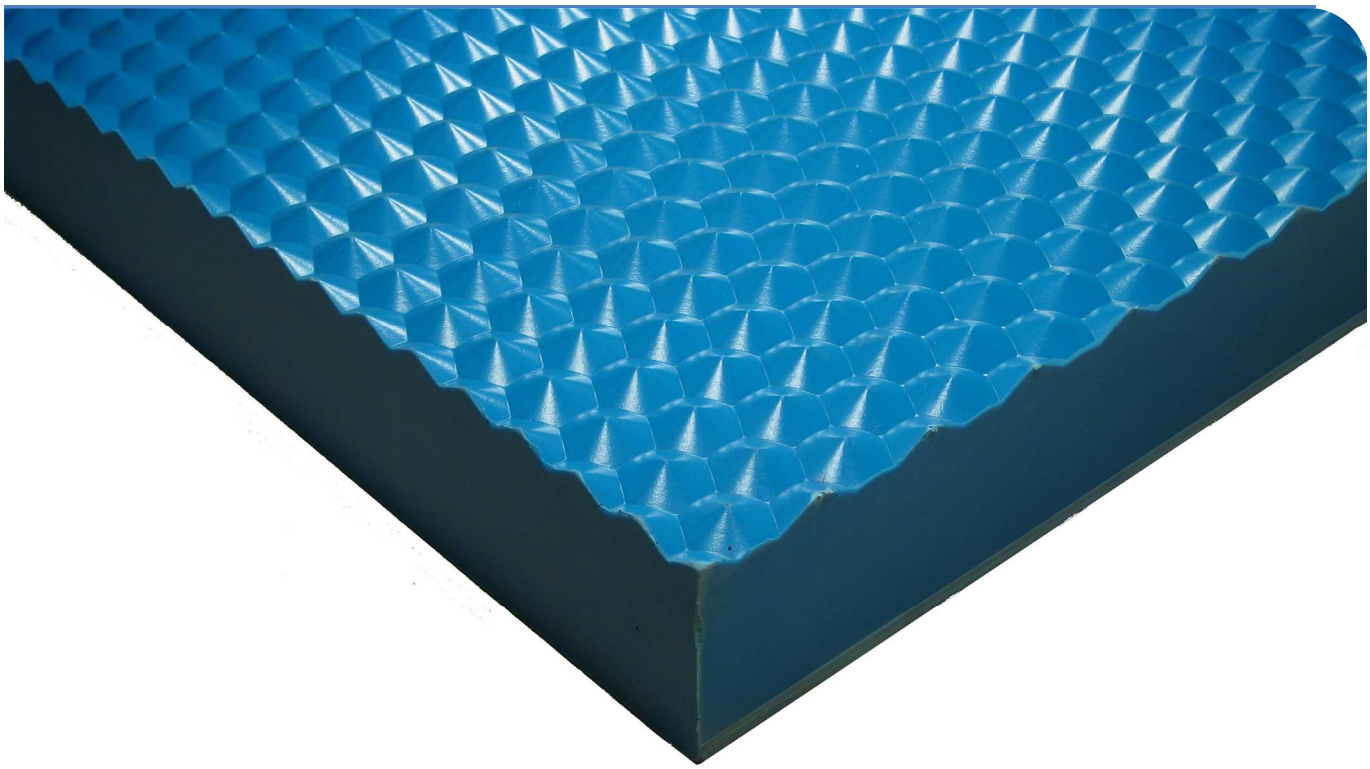
PRECISION ACOUSTICS

Aptile SF5048



Aptile SF5048, from Acoustic Polymers Ltd, is a single ply acoustic absorbing tile with a structured outer surface designed to meet the requirements of applications in frequency range 20 kHz to 200 kHz. It is a micro-bubble filled, pre-cast polyurethane tile that has high levels of both echo reduction and insertion loss.

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THIS COMBINATION OF PROPERTIES PRODUCES A MATERIAL THAT CAN BE USED IN AREAS SUCH AS:

- A high-performance solution for large-scale application as anechoic linings of ultrasonic measurement tanks.
- Acoustic baffles for de-coupling and isolation of lower frequency ultrasonic waves.

Aptile SF5048 is part of a family of low frequency acoustic absorbers and provides a high-performance material optimised for frequencies <200 kHz. Aptile SF5048 has the best echo reduction within the range and offers good insertion loss above 50 kHz. Other tiles within the range offer slightly better performance insertion loss below 50 kHz.

TYPICAL PROPERTIES

Appearance	Pale blue polyurethane sheet
Dimensions of standard tile	600 mm X 600 mm X 50 mm
Shore A hardness	87 ± 3
Density	2100 ± 30 kg / m3
Average wave speed (50-200 kHz)	990 ± 30 m / s
Acoustic impedance	2.1 MRayls
Resistant to	Isopropyl Alcohol (IPA) Tricholethylene
Affected by	Ketones (MEK, Acetone) – Swell Dichloromethane – Swell and Break down
Avoid prolonged exposure to	Ozone UV
Stability	Very stable due to cross-linked nature of polymer
Coefficient of linear thermal expansion	200 ppm / °C

INSERTION LOSS

Insertion loss (IL) is defined as

$$IL = -20 \log_{10}\left(\frac{P_t}{P_i}\right)$$

where P_t is the amplitude of the acoustic pressure transmitted through a sample and P_i is the amplitude of the acoustic pressure incident upon it.

Due to the frequency range of interest for Aptile SF5048 IL has been characterized in two experimental configurations:

1. As an unbacked tile over the range 20 – 200 kHz as shown in Figure 1.
2. Mounted on a 5 mm steel backing plate over the range 2 – 50 kHz as shown in Figure 2.

The dynamic range of these IL measurements is approximately 60 dB and values higher than this cannot be guaranteed.

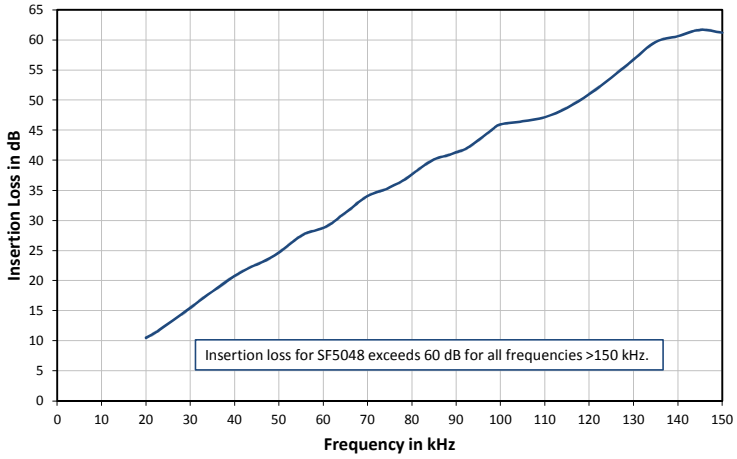

Figure 1 – Insertion loss vs Frequency for Aptile SF5048 in the range 20-200 kHz

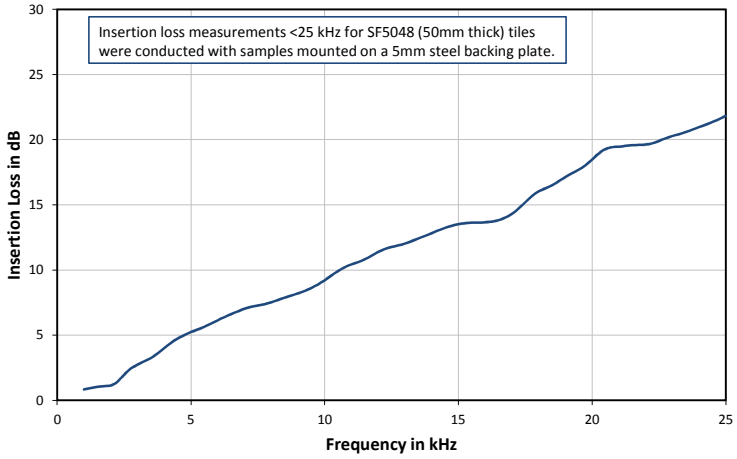

Figure 2 – Insertion loss vs Frequency for Aptile SF5048 in the range 2-25 kHz

IL data relating to Aptile SF5048 has been provided by the National Physical Laboratory, London. Aptile SF5048 has been extensively calibrated and further data relating to its variation of performance as a function of temperature and hydrostatic pressure is available from Precision Acoustics Ltd on request.

ECHO REDUCTION

Echo Reduction (ER) is defined as

$$ER = -20 \log_{10}\left(\frac{P_r}{P_i}\right)$$

where P_r is the amplitude of the acoustic pressure reflected from a sample and P_i is the amplitude of the acoustic pressure incident upon it.

Due to the frequency range of interest for Aptile SF5048 ER has been characterized in two experimental configurations:

1. As an unbacked tile over the range 20 – 200 kHz as shown in Figure 3.
2. Mounted on a 5 mm steel backing plate over the range 2 – 25 kHz as shown in Figure 4.

The dynamic range of these ER measurements is approximately 60 dB and values higher than this cannot be guaranteed.

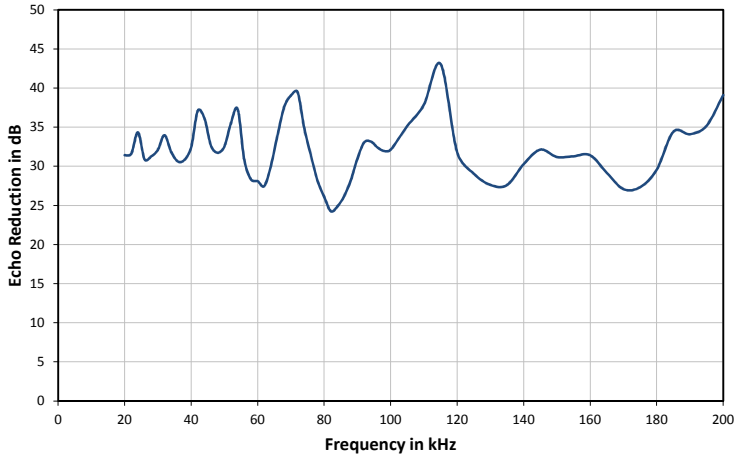

Figure 3 – Echo Reduction vs Frequency for Aptile SF5048 in the range 20-200 kHz

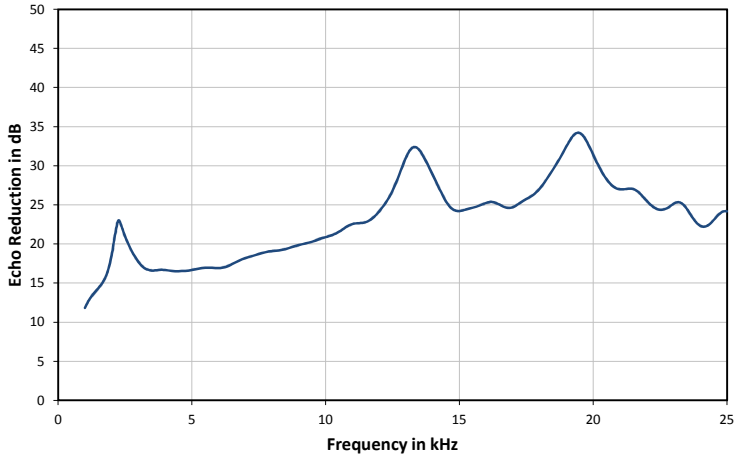

Figure 4 – Echo Reduction vs Frequency for Aptile SF5048 in the range 2-25 kHz

ER data relating to Aptile SF5048 has been provided by the National Physical Laboratory, London. Aptile SF5048 has been extensively calibrated and further data relating to its variation of performance as a function of temperature and hydrostatic pressure is available from Precision Acoustics Ltd on request.

FRACTIONAL POWER DISSIPATION

Fractional power dissipation (FPD) is defined as

$$\mathrm{FPD} = 1 - \left(\frac{P_r}{P_i}\right)^2 - \left(\frac{P_t}{P_i}\right)^2$$

where P_r is the acoustic pressure reflected from the sample, P_t is the acoustic pressure transmitted through the sample and P_i is the acoustic pressure incident upon the sample. This has been derived from the ER and IL measurements for Aptile SF5048 in two experimental configurations:

1. As an unbacked tile over the range 20 – 200 kHz as shown in Figure 5.
2. Mounted on a 5 mm steel backing plate over the range 2 – 50 kHz as shown in Figure 6.

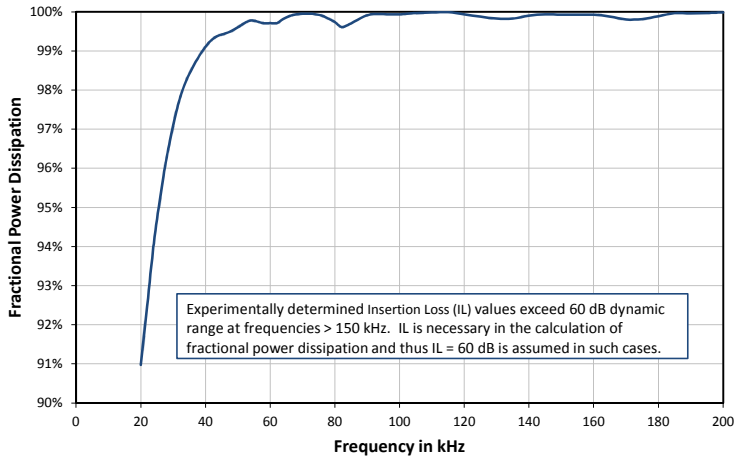

Figure 5 – Fraction power dissipation vs Frequency for Aptile SF5048 in the range 20-200 kHz

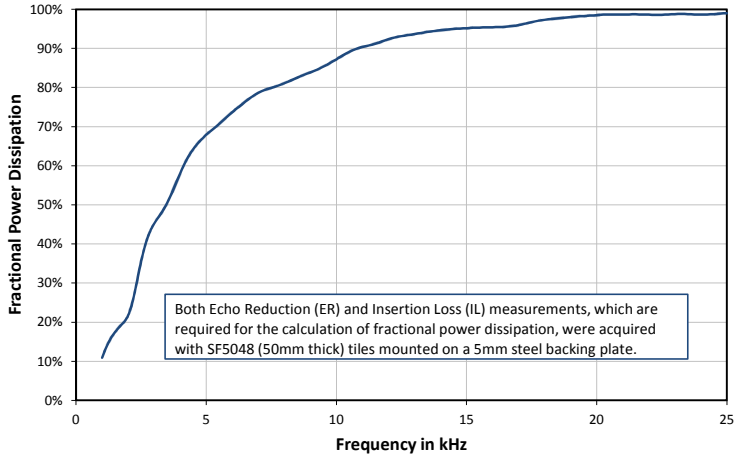

Figure 6 – Fraction power dissipation vs Frequency for Aptile SF5048 in the range 2-25 kHz

All information is based on results gained from experience and tests, and is believed to be accurate but is given without acceptance of liability for loss or damage attributable to reliance thereon as conditions of use lie outside the control of Precision Acoustics Ltd or Acoustic Polymers Limited.