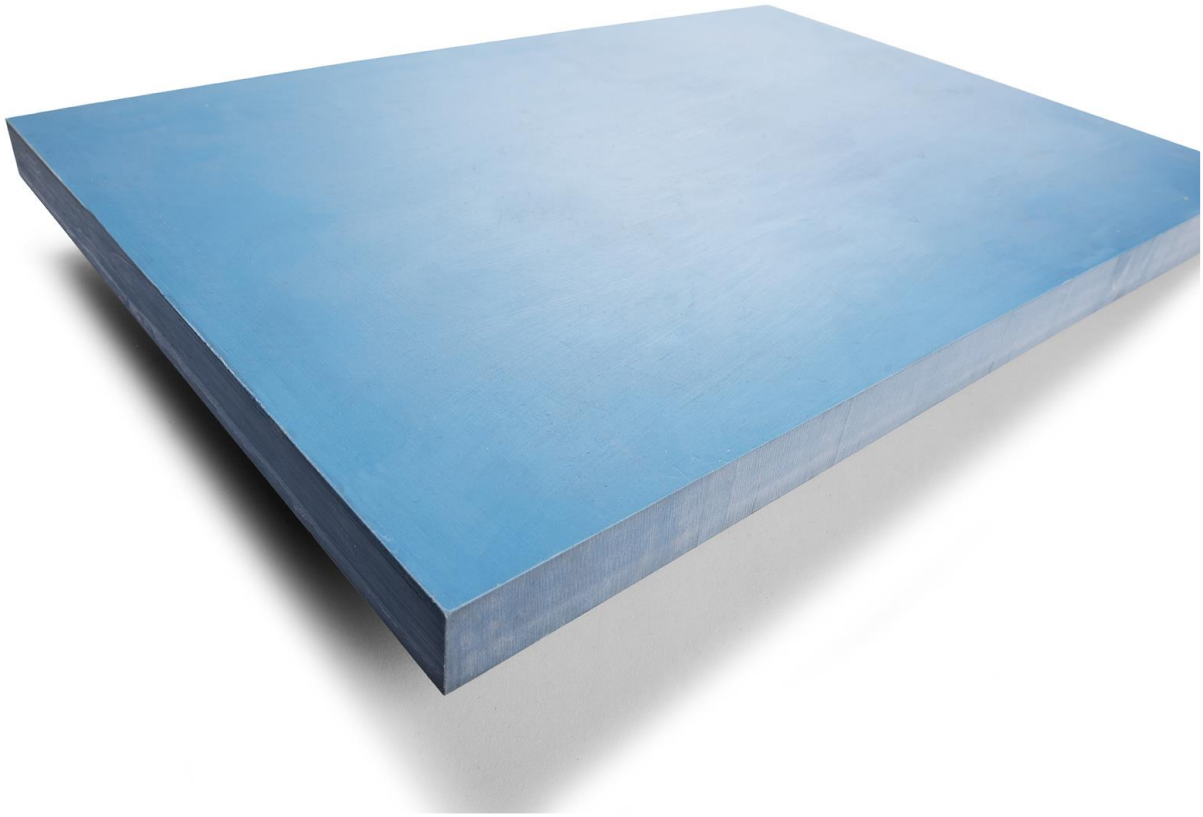
PRECISION ACOUSTICS

AptFlex F48



AptFlex F48, from Acoustic Polymers Ltd, is an acoustic absorbing tile designed to meet the requirements of applications in frequency range 50 kHz to 1.5 MHz. It is a micro-bubble filled, pre-cast polyurethane sheet that provides a cost effective balance between 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 cost-effective solution for large-scale application as anechoic linings of ultrasonic measurement tanks
- Transducer construction for devices operating < 1.5 MHz
- Acoustic de-coupling and isolation of lower frequency ultrasonic waves

AptFlex F48 is part of a family of low frequency acoustic absorbers and provides a cost-effective method of achieving high levels of echo reduction, particularly in the 100 kHz to 1 MHz range. Whilst AptFlex F48 provides moderate insertion loss, the other tiles within the range offer slightly better performance in this respect.

TYPICAL PROPERTIES

Appearance	Pale blue polyurethane sheet
Dimensions of standard tile	1200 mm x 600 mm x 10 mm or 1200 mm x 600 mm x 26.5 mm
Shore A hardness	87 ± 3
Density	1910 ± 20 kg / m^3
Average wave speed (50 kHz to 200 kHz)	990 ± 30 m / s
Acoustic impedance	1.89 MRayls
Tensile strength	3.7 ± 0.2 MPa
Poisson's ratio (estimated)	0.48
Elongation at break	160%
Resistant to	Isopropyl Alcohol (IPA) Trichloroethylene
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
Water absorption (2 years immersion)	0.8% increase in mass

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.

This has been experimentally determined for a 26 mm thick sample of AptFlex F48, and this is shown in Figure 1.

The dynamic range of IL measurement is approximately 40 dB and values higher than this cannot be guaranteed

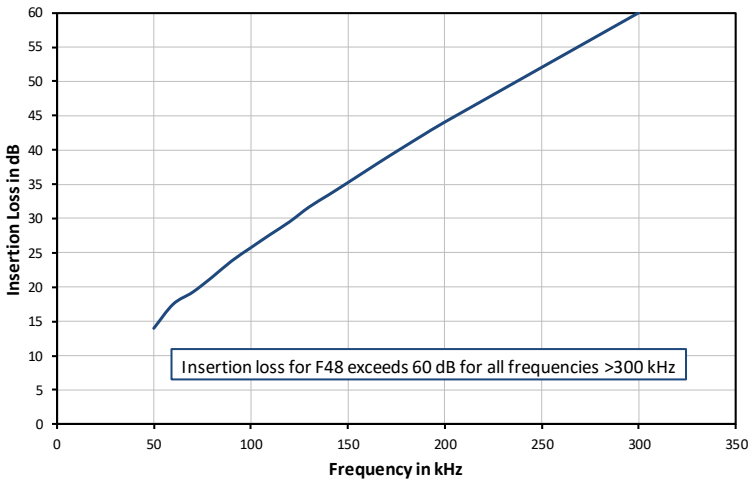

Figure 1 – Insertion loss vs Frequency for AptFlex F48

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.

This has been experimentally determined for two samples of AptFlex F48, and this is shown in Figure 2.

The dynamic range of ER measurement is approximately 40 dB and values higher than this cannot be guaranteed.

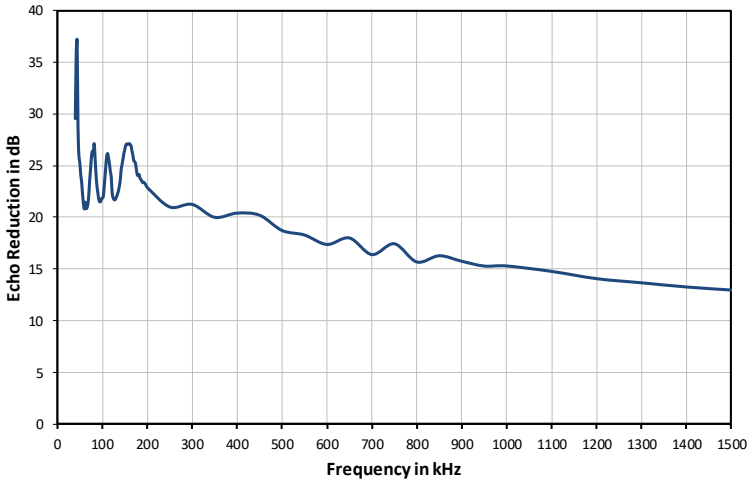

Figure 2 – Echo Reduction vs Frequency for AptFlex F48

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 AptFlex F48, and this is shown in Figure 3.

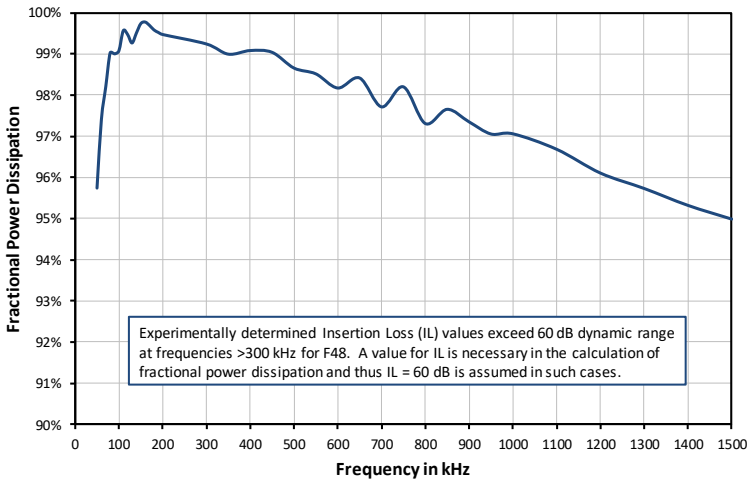

Figure 3 – Fraction Power dissipation vs Frequency for AptFlex F48

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.