PRECISION ACOUSTICS

AptFlex F30

AptFlex F30, from Acoustic Polymers Ltd, is a glass-sphere syntactic foam made by using a high-performance epoxy resin as the polymeric binder. The product can be supplied as a 2 part 'liquid' kit, or as a moulded product in rod or sheet form. Supplied in 2 component kit form it presents the end-user with the option of casting detailed shapes without subsequent and costly machining. The cured product is hard, tough and of low specific gravity. Mouldings can be easily machined to produce intricate and detailed components.

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

- Structural buoyancy modules
- Transducer construction
- Thermal insulation cladding
- Acoustic de-coupling and isolation

The system exhibits a high hydrostatic compressive strength and excellent chemical resistance to a wide range of media.

AptFlex F30 is part of a range of syntactic foams and provides a good compromise between buoyant uplift, operating pressure and price. However, AptFlex F30 provides the lowest acoustic absorption of all the syntactic foams.

TYPICAL PROPERTIES

Appearance	Green
Mix ratio (by mass)	2.13 : 1 (A:B)
Shore D hardness	70 ± 3
Density	650 ± 20 kg / m^3
Density Part A	500 ± 20 kg / m^3
Density Part B	973 ± 20 kg / m^3
Average wave speed (1 MHz to 10 MHz)	2173 ± 30 m / s
Acoustic impedance	1.41 MRayls
Tensile strength	28.0 ± 2 MPa
Tensile modulus	1.7 ± 0.05 GPa
Poisson's ratio	0.375 ± 0.05
Hydrostatic crush strength	45 MPa (6500 psi)
Equivalent ocean failure depth	4,500 m (14,750 ft)
Operating temperature of cured material	130 °C (long-term) 160 °C (short-term < 30 mins)

CURING TIMES

Pot life	2 hours to 3 hours	
Gel time	5 hours to 6 hours	
Cure time	@ 20 °C	2 weeks
	@ 60 °C	16 hours

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 two samples of AptFlex F30, 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.

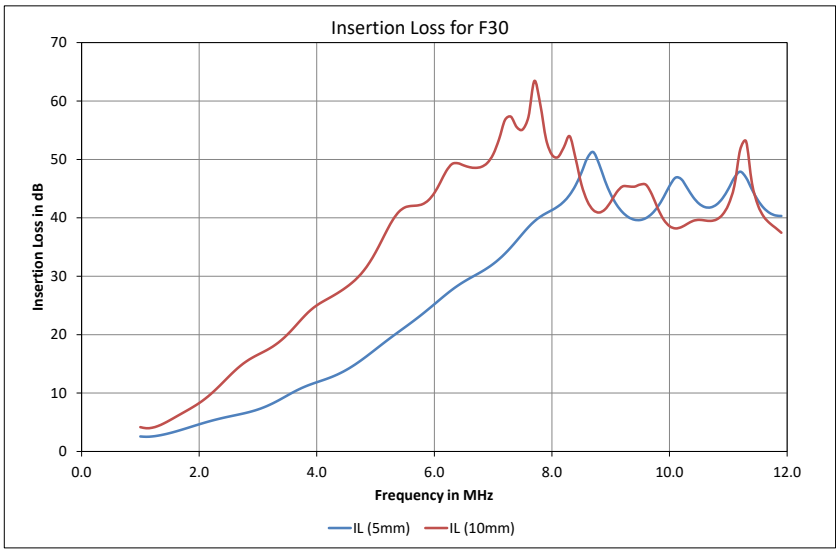

Figure 1 – Insertion loss vs Frequency for AptFlex F30

ATTENUATION

Attenuation (α) is evaluated from the measurement of Insertion Loss for 2 samples of the same material, but of different thicknesses. It is calculated as

$$\alpha = \frac{IL_1 - IL_2}{\Delta z}$$

where IL_1 is Insertion loss of sample 1, IL_2 is Insertion loss of sample 2 and Δz is the difference of between the thickness of the two samples. This has been experimentally determined for AptFlex F30, and this is shown in Figure 2.

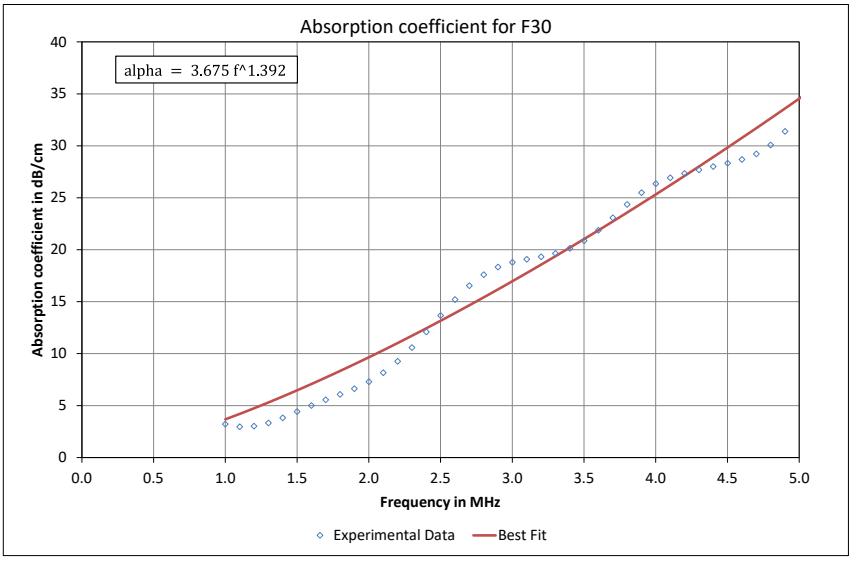

Figure 2 – Attenuation vs Frequency for AptFlex F30

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 F30, and this is shown in Figure 3.

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

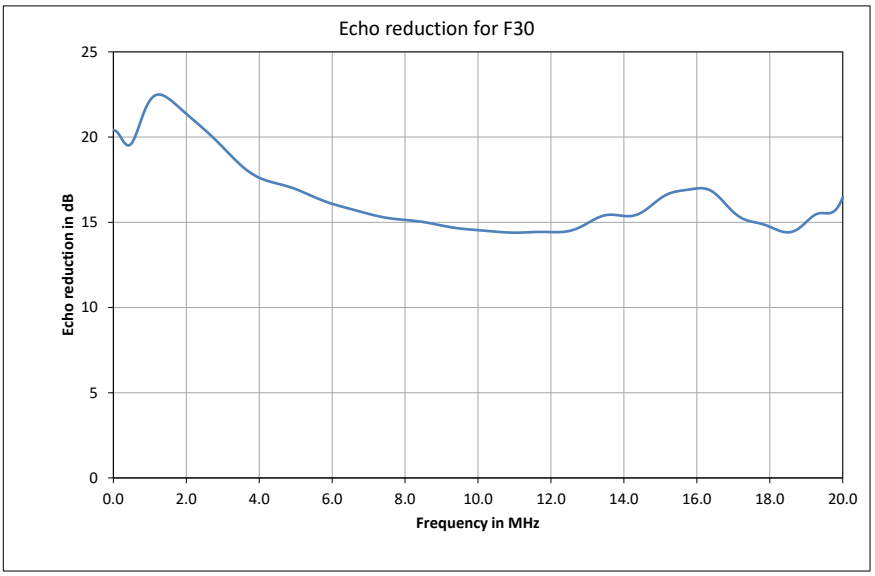

Figure 3 – Echo Reduction vs Frequency for AptFlex F30

PHASE VELOCITY

Phase velocity is evaluated from the measurement of transit time across 2 samples of the same material.

This has been experimentally determined for AptFlex F30, and this is shown in Figure 4.

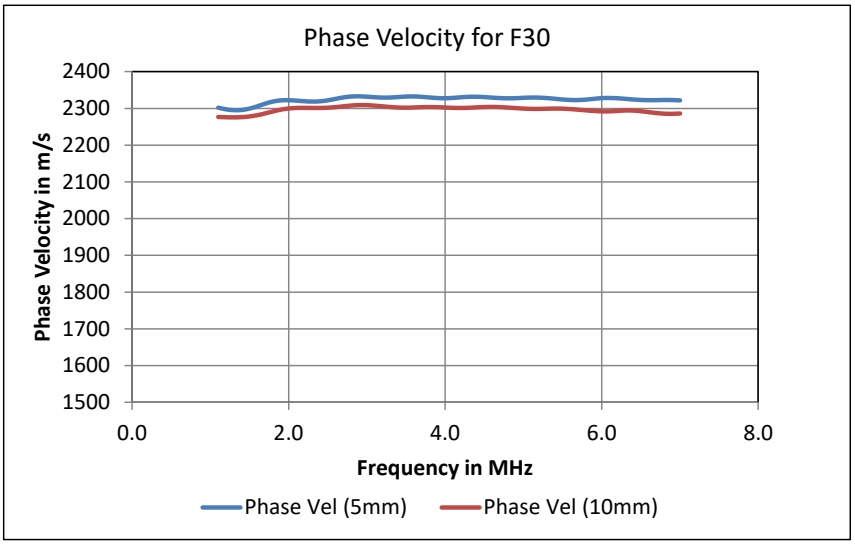

Figure 4 – Phase velocity vs Frequency for AptFlex F30

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.