PRECISION ACOUSTICS
A Coda Octopus Company

Aplex R3

Aplex R3, 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 3 part 'liquid' kit, or as a moulded product in rod or sheet form. Supplied in 3 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.

Aplex R3 is part of a range of syntactic foams and provides the greatest buoyancy strength within the range whilst also achieve a high crush strength.

TYPICAL PROPERTIES

Appearance	Orange
Mix ratio (by mass)	2.80:1.63:0.57 (A:B:C)
Shore D hardness	70 ± 3
Density	570 ± 20 kg / m^3
Average wave speed (1 MHz to 10 MHz)	2035 ± 30 m / s
Acoustic impedance	1.16 MRayls
Tensile strength	28.0 ± 2 MPa
Tensile modulus	1.7 ± 0.05 GPa
Poisson's ratio	0.375 ± 0.05
Hydrostatic crush strength	>6.2 MPa / >900 psi
Equivalent ocean failure depth	>600 meters / >2050 feet
Operating temperature of cured material[1]	130 °C (long-term) 160 °C (short-term <30 mins)

[1]These figures are maximum temperatures, beyond which the chemical structure of the components may begin to thermally degrade; they are not intended as guides to the mechanical or acoustic properties of the material at elevated temperatures. We recommend carrying out thorough testing, specific to your application, prior to integration into devices.

CURING TIMES

Pot life		2-3 hours
Gel time		5-6 hours
Cure time	@ 20 °C	1-2 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 Aplex R3, 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.

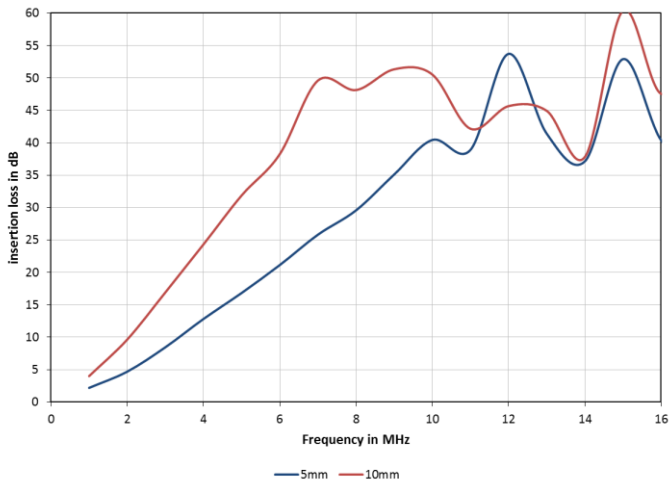

Figure 1 – Insertion loss vs Frequency for Aplex R3

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 Aplex R3, and this is shown in Figure 2.

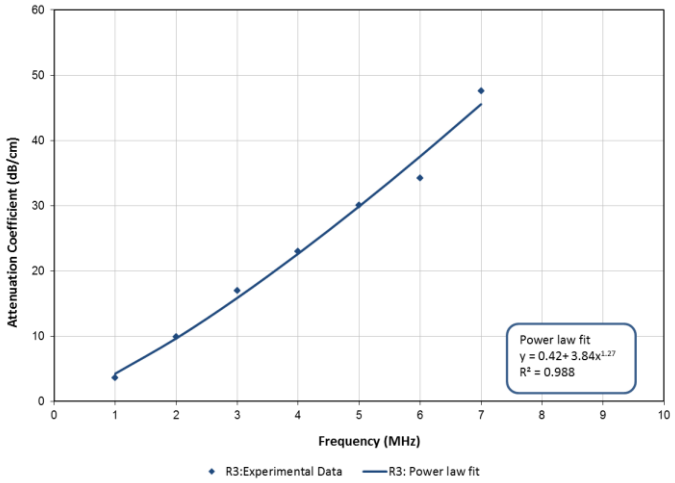

Figure 2 – Attenuation vs Frequency for Aplex R3

ECHO REDUCTION

Echo Reduction (ER) is defined as

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

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

Echo reduction data has not yet been measured. This will be provided as the data becomes available

PHASE VELOCITY

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

Phase velocity data has not yet been measured. This will be provided as the data becomes available