



TECHNICAL PRODUCT BULLETIN

PRODUCT DESCRIPTION

NUWC XP-1 is a high performance polyurethane encapsulant developed for protection of marine acoustic and optical equipment. The two-part polyurethane exhibits excellent hydrolytic stability and exceptional acoustic properties while also being optically clear. NUWC XP-1 can be cured at room or elevated temperatures in less than 24 hours.

APPLICATIONS

- Acoustic equipment encapsulant
- Hydrophone encapsulant
- Underwater transducer encapsulant

ADVANTAGES

- US Navy protected proprietary formulation
- Rapid curing at room temperature
- Hydrolytically stable
- Exception acoustic properties
- Optically clear

PHYSICAL PROPERTIES (Typical properties for cured NUWC XP-1)	
Tensile strength (ASTM D-412, die C)	1600 psi
Ultimate elongation (ASTM D-412, die C)	900%
Tear strength (ASTM D 624)	400 pli
Water absorption	
After 2 days at 23°C	+0.5%
After 14 days at 55°C	+2.0%
Hardness (Shore A)	75
Density	1090 kg/m ³
	1.09 g/cc
Glass transition temperature (DMA/tan δ peak)	- 31°C

MIXING AND CURING	
Mix ratio (by weight, A:B)	100:11.5
Cure time, 25°C	24 hours
Cure time, 60°C	12 hours
Viscosity, mixed, 23°C	
After 12 minutes	9250 centipoise
After 25 minutes	12300 centipoise
After 40 minutes	25000 centipoise
Viscosity, mixed, 50°C	
After 5 minutes	2500 centipoise
After 10 minutes	3500 centipoise
After 16 minutes	5800 centipoise
After 22 minutes	25000 centipoise



TECHNICAL PRODUCT BULLETIN

ACOUSTIC DATA		
Acoustic Impedance, 20°C		
At 10 kHz	1.60 x 10 ⁶ M Rayls	
At 100 kHz	1.63 x 10 ⁶ M Rayls	

INSERTION LOSS, 90° ANGLE OF INCIDENCE		
Temperature	10 kHz	100 kHz
3°C	0.2 dB	3.2 dB
20°C	0.1 dB	1.5 dB
35°C	0.01 dB	1.0 dB

Primer	Peel strength and dominant failure mode
PR-420	20-25 pli; primer/PU adhesive
AD-1146-C-1	20-35 pli; primer/PU adhesive
Chemlok 213	235 pli; PU cohesive (tear)

ACOUSTIC ATTENUATION		
Temperature	10 kHz	100 kHz
3°C	0.01 nepers/cm	0.12 nepers/cm
20°C	0.005 nepers/cm	0.06 nepers/cm
35°C	0.004 nepers/cm	0.036 nepers/cm

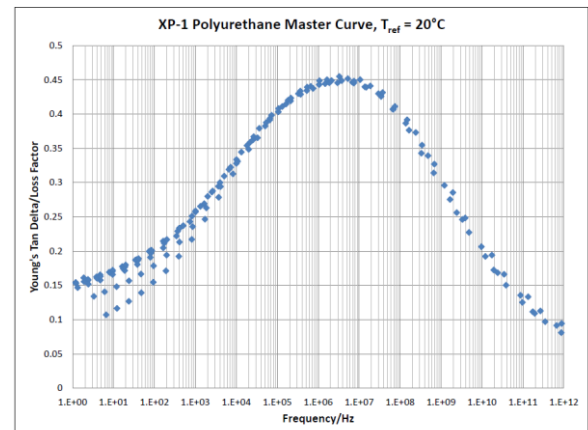
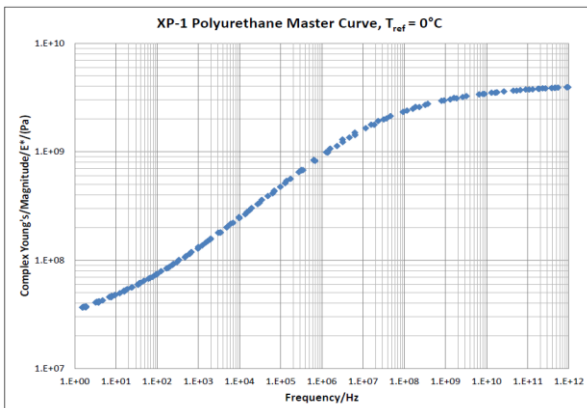
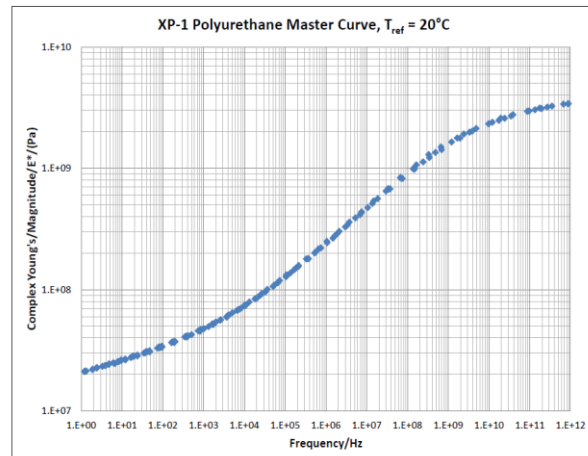
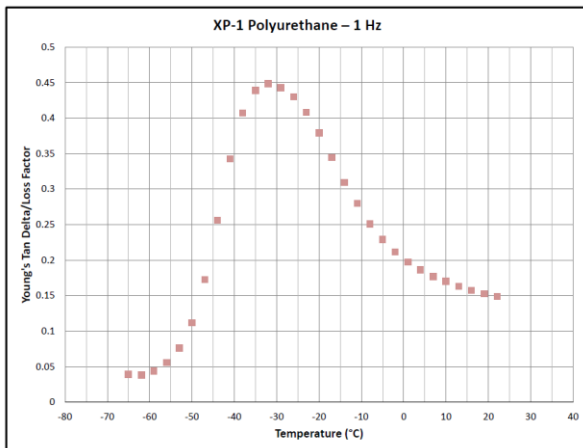
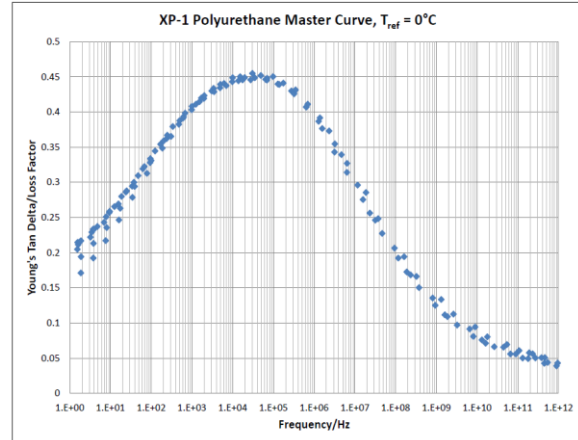
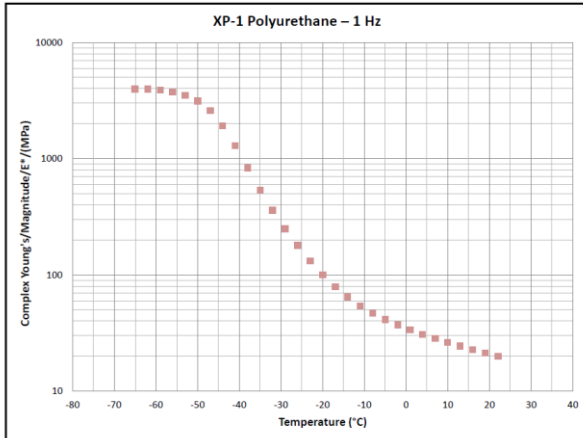
LONGITUNDINAL SOUND SPEED		
Temperature	10 kHz	100 kHz
3°C	1564 m/sec	1635 m/sec
20°C	1465 m/sec	1495 m/sec
35°C	1402 m/sec	1419 m/sec

BONDING AND ADHESION
Sandblasted aluminum substrate, ASTM D-429 samples.



TECHNICAL PRODUCT BULLETIN

WLF Time-Temperature Superposition DMA Data for NUWC XP-1 Polyurethane



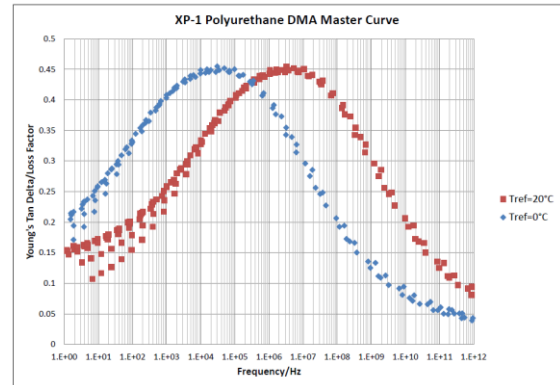
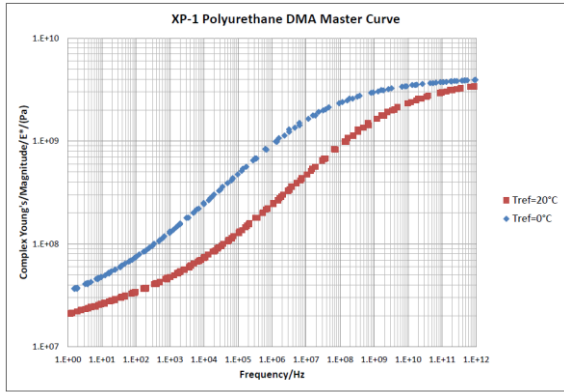
The information given and the recommendations made herein are based on our research and are believed to be accurate but no guarantee of their accuracy is made. In every case we urge and recommend that purchasers before using any product in full scale production make their own tests to determine to their own satisfaction whether the product is of acceptable quality and is suitable for their particular purposes under their own operation conditions. No representative of ours has any authority to waive or change the foregoing provisions but, subject to such provisions, our engineers are available to assist purchasers in adapting our products to their needs and to the circumstances prevailing in their business. Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute a permission, inducement or recommendation to practice any invention governed by any patent, without the authority from the owner of this patent. We also expect purchasers to use our products in accordance with the guiding principles of the Chemical Manufacturers Association's Responsible Care® program.



ALFA INTERNATIONAL CORPORATION
www.alfaadhesives.com

NUWC XP-1 Polyurethane Encapsulant

TECHNICAL PRODUCT BULLETIN



The information given and the recommendations made herein are based on our research and are believed to be accurate but no guarantee of their accuracy is made. In every case we urge and recommend that purchasers before using any product in full scale production make their own tests to determine to their own satisfaction whether the product is of acceptable quality and is suitable for their particular purposes under their own operation conditions. No representative of ours has any authority to waive or change the foregoing provisions but, subject to such provisions, our engineers are available to assist purchasers in adapting our products to their needs and to the circumstances prevailing in their business. Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute a permission, inducement or recommendation to practice any invention governed by any patent, without the authority from the owner of this patent. We also expect purchasers to use our products in accordance with the guiding principles of the Chemical Manufacturers Association's Responsible Care® program.