CONATHANE® EN-1556

- Conforms to MIL-M-24041-C -

CONATHANE® EN-1556 is a polyether based, non-MBOCA, polyurethane resin system primarily intended for use as a molding, encapsulating, and potting compound for harness breakouts, watertight electrical connectors, cables, cable end seals, printed circuitry, and other electrical components. The system also has use in the casting or molding of mechanical parts and as a lining material for pumps, chutes, and conveyors where outstanding abrasion resistance is a necessity.

CONATHANE® EN-1556 may be cured at room or elevated temperatures. EN-1556, when fully cured, is a tough , cold-flow resistant elastomer that has good resistance to oils, gasoline, JP-4 fuel, water and sea water, and also provides outstanding protection against corrosion or contamination. The system is funginert when tested in accordance with MIL-I-46058C and ASTM G-21 and meets or exceeds all of the requirements of MIL-M-24041C.

Three primers have been developed for use in bonding EN-1556 to metals, neoprene, and polyvinyl chloride during the curing process. ***CONAP® AD-1146*** is recommended for metals, ***PR-1167*** for neoprene, and ***AD-1161*** for polyvinyl chloride.

TYPICAL PRODUCT CHARACTERISTICS

(THESE ARE TYPICAL DATA AND ARE NOT MEANT TO SERVE AS SPECIFICATIONS)

	PART A		PART B
Color	Amber		Amber or Black
Brookfield Viscosity @ 77ºF, cps	18,000		3,000
Specific Gravity @ 77ºF	1.05		1.03
Isocyanate Content, %	5.2		---
Non-Volatile Content, % (Mixed System)		99.9	

TYPICAL CURED PROPERTIES

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PHYSICAL PROPERTIES

Color	Amber or Black
Specific Gravity @ 77º	1.05
Tensile Strength, psi	5,000
300% Modulus, psi	1,400
Ultimate Elongation, %	400
Tear Strength, pli, (Die C)	200
Hardness, Shore A	80
Compression Set, % (22 hours @ 158ºF)	35
Volume Shrinkage, %	3.64
Adhesion*, peel, lbs./in. of width	
Type 316 CRES	>150
Monel	>145
Neoprene	>30
Polyvinyl Chloride	>200
Moisture Absorption, % (24 hour immersion in D.I. Water @ 200ºF)	2.08
Low temperature flexibility, -65ºF	No blistering, cracking, or loss of adhesion
Heat Aging, (Shore A Hardness loss after 24 hours exposure at 275ºF)	-6
Property Degradation - % Loss of tensile strength after 2 weeks immersion in water @ 158ºF	28.6%
Fungus Resistance (MIL-I-46058C and ASTM G-21)	Non-Nutrient
Hydrolytic Stability (160ºF @ 95% R.H. - 120 days)	-19% Shore A Hardness Loss

* Metal was primed with ***AD-1146***, Neoprene was abraded and primed with ***PR-1167***, and Polyvinyl Chloride was made tacky with MEK and primed with ***AD-1161***.

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ELECTRICAL PROPERTIES

Arc Resistance, seconds	>120
Dielectric Strength, VPM, 125 Mil. specimens	350
Dielectric Constant, 1 KHz @ 77°F	6.12
1 MHz @ 77ºF	5.06
Power Factor, 1 KHz @ 77°F	0.026
1 MHz @ 77ºF	0.060
Volume Resistivity, ohm-cm @ 77°F	2.4×10^{12}
@ 250ºF	9.6×10^{10}
Surface Resistivity, ohms @ 77°F	5.2×10^{13}
@ 250ºF	3.5×10^{10}
Insulation Resistance, megohms @ 77°F	900,000
@ 250ºF	4,200
After 10 days exposure @ 77ºF - 95% R.H. megohms	35,000
High Potential Resistance, 2,000 volts r.m.s., 60 Hz	No Breakdown
Flame Resistance, 55 amperes D.C.	No ignition or charring

PROCESSING PARAMETERS

Mix Ratio, by weight, Resin/Hardener (A/B)	100/33
Mix Ratio, by volume, Resin/Hardener (A/B)	3/1
Application Life: Type I (two-part unit) 2 lbs. mass @ 77ºF	60-70 minutes
@140ºF	15-20 minutes

Mixed Viscosity: EN-1556 exhibits the following Time/Viscosity relationship when mixed at 77ºF in a 2 lb. mass:

Time	Viscosity
Initial	10,400 cps
10 minutes	11,200 cps
20 minutes	14,800 cps
30 minutes	22,000 cps
40 minutes	36,800 cps
50 minutes	69,200 cps
60 minutes	153,000 cps
65 minutes	250,000 cps

Cure: One of the following cure schedules is recommended to obtain optimum results:

Temperature	Demolding Time*	Cure Time
@ 77ºF	24 hours	10-14 days (Shore A 80 after 3 days)
@ 180ºF	60 minutes	16 hours (Shore A 70 After 2 hours)
@ 212ºF	30 minutes	8-10 hours

* Demolding time will vary with temperature, amount of material, mold mass and complexity of unit being potted or molded. Specific demolding times should be evaluated thoroughly.

Do not open containers until ready to use. Part A and Part B may solidify when stored at temperatures below 75ºF. If solidification has occurred, loosen lid and warm to 120º-140ºF and mix thoroughly before using. Liquefaction is complete when the material is of a smooth, homogeneous consistency.

The two components should be mixed together thoroughly at 77ºF. Containers and stirrers should be metal or glass. DO NOT USE WOOD. Degas the mixed system until foaming subsides; approximately 5 minutes at less than 5 mm of mercury vacuum. Large quantities may require slightly longer periods of degassing. Containers should be large enough to allow for frothing during degassing. If the material is to be transferred to a cartridge, it is suggested that the material be flowed down the side of the cartridge carefully so as not to entrap air.

For best results, it is suggested that both Part A and Part B be heated to 140ºF and degassed separately for about 10 minutes at 1-5mm of mercury. The two components can then be mixed together thoroughly at this temperature or allowed to cool to room temperature before combining. After having mixed the two components together, they should be degassed again at 1-5 mm of mercury.

NOTE: After mixing the two components together, any subsequent operation should be performed as quickly as possible in order to minimize loss of application life.

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EN-1556 potting and molding compound may be applied by ordinary casting techniques or by injection molding techniques.

For most injection molding applications, injection pressures of 40-120 psi are generally used. If the molding compound is injected at elevated temperatures (140º-180ºF), lower injection pressures (10-30 psi) should be used to prevent air from being trapped in the compound. Best results are obtained when the part being molded and the mold itself are approximately 10-20ºF warmer than the compound being injected. It is recommended that injection holes be located in the bottom of the mold and air bleed holes located in the top to prevent air pockets in the mold. Flash may be trimmed with a sharp knife or razor blade. Molds should be coated with CONAP® MR-5002 Mold Release to insure easy removal of cast parts.

NOTE: Parts that come in direct contact with the mold should be brush coated with EN-1556 to prevent contamination of the primer or loss of adhesion.

Equipment should be cleaned immediately after use with methyl ethyl ketone.

BONDING CONATHANE® EN-1556 TO VARIOUS MATERIALS

To obtain satisfactory adhesion, EN-1556 should be applied only to dry surfaces that are free of dirt, grease, oil, and mold release agents, and have been properly primed with primers recommended herein.

1. METALS - Clean and treat as recommended in Bulletin A-143. Apply ***AD-1146*** primer and air dry for 1 hour then bake for 2 hours at 160º-180ºF. Apply EN-1556 and cure as recommended.

2. NEOPRENE - Wash neoprene thoroughly with MEK to remove dirt, oil, and grease. Abrade with suitable abrasive and clean loose particles with a clean, dry brush. Apply ***PR-1167*** primer and air dry for 1-2 hours or until tack free. See Bulletin A-144 for complete details. Apply EN-1556 and cure as recommended.

3. POLYVINYL CHLORIDE - Make the surface tacky with MEK and apply a thin, uniform coat of ***AD-1161*** primer to the tacky surface then air dry for 30 minutes. See Bulletin A-117 for complete details. Apply EN-1556 and cure as recommended.

STORAGE AND HANDLING

CONATHANE® EN-1556, as normally supplied, cures to a clear amber or black solid

EN-1556 two-component units, and the recommended primers, have a shelf life of 15 months from date of manufacture when stored in the original, unopened containers below 80ºF. EN-1556 Part A is an isocyanate prepolymer and will react with atmospheric moisture. If containers are opened and the contents only partially used, the containers should be flushed with dry nitrogen, or dry air (see ***CONAP® Dri-Purge***), before being resealed.

CAUTION: EN-1556 Part A contains small traces of free toluene diisocyanate (TDI). Good ventilation should be provided in areas where EN-1556 is being processed. Avoid breathing vapors. Avoid contact with skin. If contact does occur, wash with soap and water.

This material contains DI-(methylthio)-Toluene Diamine which is subject to a Significant New Use Rule (SNUR) under TSCA guidelines. For further information please request Material Safety Data Sheets (MSDS) or contact Cytec Industries Inc.

AVAILABILITY

CONATHANE® EN-1556 is available in two component units in gallon, and 5-gallon containers.

Primers ***AD-1146***, ***AD-1161***, and ***PR-1167*** are available in quart, gallon, and 5-gallon containers.

An Evaluation Kit is available for a nominal fee.

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