TECHNICAL DATA SHEET Formulated Resins

CONATHANE® EN-1556

- CONFORMS TO MIL-M-24041-C-

DESCRIPTION

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. CONATHANE EN-1556, when fully cured, is a tough, cold-flow resistant elastomer that has good resistance to oils, gasoline, JP-4 fuel, water, and seawater, 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-24041-C.

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

CHARACTERISTICS AND PROPERTIES

Table 1 | Product Description

Property	Prepolymer PART A	Curative PART B Amber or Black
Viscosity @ 25ºC	18,000 cps	3,000 cps
Specific Gravity	1.05	1.03
Color	Amber	Amber or Black
Isocyanate Content, %	5.2	---
Non-Volatile Content, % (Mixed System)	99.9	

Table 2 |Cured Properties

Property	Value
Color	Amber or Black
Specific Gravity @ 25°C	1.05
Tensile Strength, psi 300% Modulus, psi	5,000 1,400
Ultimate Elongation, %	400
Tear Strength, pli, (Die C)	200
Hardness, Shore A	80
Compression Set, % (22 hours @ 70°C)	35
Volume Shrinkage, %	3.64

Adhesion,, * peel, lbs./in. of width Type 316 CRES Monel Neoprene Polyvinyl Chloride	 >150 >145 >30 >200
Moisture Absorption, % (24 hour immersion in D.I. water @ 93°C)	2.08
Low temperature flexibility, -54°C	No blistering, cracking, or loss of adhesion
Heat Aging, (Shore A Hardness loss after 24 hours exposure at 135°C)	-6
Property Degradation — % Loss of tensile strength after 2 weeks Immersion in water @ 70°C	28.6%
Fungus Resistance (MIL-I-E-5272C and MIL-STD-810B)	Non-Nutrient
Hydrolytic Stability (160°F @ 95% R.H. - 120 days)	-19% Shore A Hardness Loss

* Metal was primed with CONAP AD-1146, neoprene was abraded and primed with CONAP PR-1167, and polyvinyl chloride was made tacky with MEK and primed with CONAP AD-1161.

Table 3 | Cured Electrical Properties

Property	Value
Arc Resistance, seconds	>120
Dielectric Strength, VPM, 125 mil specimens	350
Dielectric Constant, 1 KHz @ 25°C 1 MHz @ 25°C	6.12 5.06
Power Factor, 1 KHz @ 25°C 1 MHz @ 25°C	0.026 0.060
Volume Resistivity, ohm-cm @ 77°F @ 121°C	2.4×10^{12} 9.6×10^{10}
Surface Resistivity, ohms @ 25°C @ 121°C	5.2×10^{12} 3.5×10^{10}
Insulation Resistance, megohms @ 25°C @ 121°C After 10 days exposure @ 25°C - 95% R.H. megohms	900,000 4.200 35,000
High Potential Resistance, 2000 volts r.m.s. , 60 Hz	No breakdown
Flame Resistance, 55 amperes D.C.	No ignition or charring

Table 4 | Processing Parameters

Property	Value
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 lb. mass @ 25°C @ 60°C	60-70 minutes 15-20 minutes

Mixed Viscosity: CONATHANE 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:The following procedure is suggested for hand processing:

Temperature	Demolding Time*	Cure Time
@ 25°C	24 hours	10-14 days (Shore A 80 after 3 days)
@ 82°C	60 minutes	16 hours (Shore A 70 after 2 hours)
@ 100°C	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 may solidify when stored at temperatures below 24°C. If solidification has occurred, loosen lid, warm to 49°C-60°C, 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 25°C to 82°C depending on the viscosity and pot life desired. 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). 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 60°C and degassed separately for about 10 minutes at 1-5 mm of mercury. The two components can then be mixed together thoroughly at this temperature or allowed to cool to room temperature before combining. After the two components have been mixed together, they should be degassed again at 1-5 mm of mercury.

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

CONATHANE 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 (60°C-82°C), lower injection pressures (10-30 psi) should be used to prevent air from being entrapped in the compound. Best results are obtained when the part being molded and the mold itself are approximately 10°C-20°C warmer than the compound being injected. It is recommended that injection holes be located at the bottom of the mold and air bleed holes at 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® mold releases to ensure easy removal of cast parts.

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

Equipment should be cleaned immediately after use with methyl ethyl ketone or a CONAP® solvent.

CONATHANE EN-1556 TO VARIOUS MATERIALS

To obtain satisfactory adhesion, CONATHANE 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 CONAP AD-1146 primer and air dry for 1 hour, then bake for 2 hours at 71°C-82°C. Apply CONATHANE EN-1556 and cure as recommended.

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

3. POLYVINYL CHLORIDE - Make the surface tacky with MEK and apply a thin, uniform coat of CONAP AD-1161 primer to the tackified surface and air-dry for 30 minutes. See CONAP AD-1161 technical data sheet for complete details. Apply CONATHANE EN-1556 and cure as recommended.

COLORING

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

HANDLING AND STORAGE INSTRUCTIONS

CONATHANE EN-1556 two-component units and the recommended primers have a shelf life of 15 months from the date of manufacture when stored in the original, unopened containers below 32°C. CONATHANE EN-1556 Part A is a reactive 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 (see CONAP® Dri-Purge) or dry air before being resealed.

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

CONATHANE EN-1556 Part B contains 4,4'- Methylene-bis (2-chloroaniline) (MbOCA), a regulated material. Handle in accordance with local, state, and federal regulations. For further information, please request the Material Safety Data Sheet (MSDS).

AVAILABILITY

CONATHANE EN-1556 is available in two-component units in gallon, 5-gallon, and 55-gallon containers.
CONAP primers AD-1146, AD-1161, and PR-1167 are available in quart, gallon, and 5-gallon containers.

CAUTION

Responsible handling of Cytec Industries Inc. products requires a thorough review of safety, health, and environmental issues prior to use. Review the Material Safety Data Sheets(s) for the specific Cytec Industries Inc. product(s) and container label information before opening containers. Ensure that employee exposure issues are understood, communicated to all workers, and controls are in place to prevent exposures above Permissible Exposure Limits (PELs). Review safety and environmental issues to be certain controls are in place to prevent injury to employees, the community, or the environment, and ensure compliance with all applicable Federal, State, and Local laws and regulations. For assistance in this review process, please call your Cytec Industries Inc. representative or our office noted below.

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