

CONATHANE® EN-7 and EN-8

CONATHANE EN-7 and EN-8 are two-component, non-MBOCA-based, high strength liquid polyurethane resin systems designed to ensure the performance of electrical/electronic assemblies exposed to severe environmental extremes. Elastomers prepared from these systems exhibit the following outstanding properties:

- Superior hydrolytic stability
- Low viscosity
- Fungus resistance
- Exceptional dielectric properties
- Thermal shock resistance
- High strength
- High elongation

These systems are recommended for use as molding and potting compounds for electrical cables, connectors, modules, wire wound devices, strain sensitive devices, as well as 100% solids coatings for printed circuitry. Their excellent adhesion to most substrates, and good flexibility, also suggest their use as staking and filleting adhesives.

Both EN-7 and EN-8 cure to a nominal Shore A hardness of 90. EN-7 has a working life of approximately 30-35 minutes, and cure at elevated temperatures is recommended. EN-8 has a working life of approximately 15 minutes and will cure at room temperature.

TYPICAL PRODUCT CHARACTERISTICS

	EN-4 Part A	EN-7 or EN-8 Part B
Appearance	Amber Liquid	Amber Liquid
Viscosity @ 25°C, cps	9,000	1,000
Specific Gravity @ 25°C	0.97	1.00
NCO Content, %	8.9 – 9.1	---
Shelf Life, from date of manufacture	15 months	15 months
Volatile Organic Compounds (Mixed), %	<1	---

TYPICAL CURED PROPERTIES

CONATHANE EN-7 test specimens were cured 16 hours at 80°C and conditioned at 25°C for 3 days prior to testing. CONATHANE EN-8 test specimens were cured 7 days at 25°C. When processed as recommended, EN-7 and EN-8 have very similar properties.

Physical Properties

	EN-7 / EN-8	TEST METHOD
Color	Amber or Black	Visual
Specific Gravity @ 25°C	1.01	ASTM D-792
Hardness, Shore A	90	ASTM D-2240
Tensile Strength, psi	>2000	ASTM D-412
100% Modulus, psi	800	
300% Modulus, psi	1200	
Ultimate Elongation, %	>400	ASTM D-412
Tear Strength, (Die C), pli	>200	ASTM D-624
Linear Shrinkage, %	1.15/3.7	CYTEC/ MIL-M-24041
Water Absorption, %, 24 hours @ 25°C	0.20	ASTM D-570
30 days @ 25°C	0.43	
Heat Aging, % Wt. Gain, After 7 days @ 135°C (275°F)	0.41	MIL-M-24041
Shore A Hardness Change	+5	
Fungus Resistance	Non-Nutrient	MIL-E-5272C MIL-STD-810B
Thermal Shock, 10 cycles, Olyphant washer 130°C to -70°C	Passes	MIL-I-16923E
Compression Set, %, 22 hours @ 70°C	31	ASTM D-395
Peel Strength, piw		MIL-M-24041
Aluminum primed with AD-1146-C	>20	
Stainless Steel primed with AD-1146-C	>20	
Neoprene primed with DPPR-7156	>20	
PVC primed with CONAP®AD-1161	>20	

TYPICAL CURED PROPERTIES (continued)

Electrical Properties

	25°C	105°C	130°C	TEST METHOD
Dielectric Constant,	100 Hz	3.0	4.0	ASTM D-150
	1 KHz	2.9	3.8	
	1 MHz	2.8	3.1	
Dissipation Factor,	100 Hz	0.032	0.030	ASTM D-150
	1 KHz	0.033	0.022	
	1 MHz	0.026	0.045	
Volume Resistivity, ohm-cm	>4.3 x 10 ¹⁵	4.1 x 10 ¹²	7.4 x 10 ¹¹	ASTM D-257
Surface Resistivity, ohms	>1.0 x 10 ¹⁵	4.2 x 10 ¹²	1.6 x 10 ¹²	ASTM D-257
Insulation Resistance, ohms	>2.5 x 10 ¹³	2.3 x 10 ¹¹	2.3 x 10 ¹⁰	MIL-M-24041
Dielectric Strength, vpm (1/16")	785	---	---	MIL-M-24041
Arc Resistance, sec.	>120	---	---	ASTM D-495

HYDROLYTIC STABILITY

Elastomers prepared from these systems exhibit unsurpassed hydrolytic stability. The following table presents the properties of these elastomers after continuous exposure at 97°C - 95% R.H. for the periods indicated. Specimens were tested within 24 hours upon removal from the chamber.

Property	Original	28 Days	56 Days	84 Days	112 Days
Hardness, Shore A	94	94	94	88	87
Tensile Strength, psi	2250	1600	1400	900	775
300% Modulus, psi	1750	1175	1100	800	700
Ultimate Elongation, %	400	420	430	390	370
Tear Strength (Die C), pli	322	281	285	197	187
Dielectric Constant @ 25°C, 1KHz	2.9	---	---	---	3.0
Dissipation Factor @ 25°C, 1KHz	0.033	---	---	---	0.030
Volume Resistivity @ 25°C, ohm-cm	>4.2 x 10 ¹⁵	---	---	---	2.8 x 10 ¹⁵
Dielectric Strength, vpm (1/16")	785	---	---	---	566

RECOMMENDED PROCESSING PARAMETERS

	EN-4 Part A / EN-7 Part B	EN-4 Part A / EN-8 Part B
Mix Ratio, by Weight, EN-4 Part A/EN-7 Part B or EN-8 Part B	100/17.5	100/17.5
Mixed Viscosity @ 25°C, cps	Initial	5,550
	10 Minutes	6,500
	20 Minutes	23,000
	30 Minutes	- GEL -
Exotherm (2 lb. Mass), Mixed @ 25°C	55°C	55°C
Cure Time @ 25°C	10-14 Days	5-7 Days
	@ 60°C	16 hours
	@ 80°C	8-10 hours
	@ 100°C	4-6 hours
Demold Time @ 60°C	8 hours	2 hours
	@ 80°C	3 hours

NOTE: The CONATHANE EN-4 Part A component may crystallize upon storage or during shipment. If this has occurred, heat the Part A to 60°C, mix thoroughly, and cool to room temperature before processing.

Mix the CONATHANE EN-4 Part A component thoroughly with either the CONATHANE EN-7 Part B or the EN-8 Part B at 25°C-40°C using metal, plastic, or glass stirrers and containers. Degas the mixed material at 1-5 mm of mercury and pour into molds at 25°C-100°C. Containers should be large enough to allow for volume expansion during the degassing cycle. Any material or container that could introduce moisture into the system should be avoided.

HANDLING AND STORAGE

The shelf life of CONATHANE EN-4 Part A, EN-7 Part B, and EN-8 Part B is 15 months from date of manufacture when stored in the original unopened containers at temperatures of 70°F-85°F. If containers are opened and the contents only partially used, containers should be flushed with dry nitrogen (See CONAP® Dri-Purge) before resealing to prevent waste of material.

CAUTION

Responsible handling of Cytec products requires a thorough preview of safety, health, and environmental issues prior to use. Review the Material Safety Data Sheet(s) for the specific Cytec 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 (P.E.L.'s). 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 representative or our office noted below.

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