

CONATHANES® EN-20 and EN-21

CONATHANES® EN-20 and EN-21 are two-component, liquid, low viscosity, low toxicity, room temperature curing polyurethane resin systems. These systems were formulated specifically for the potting, casting, embedding, and encapsulation of electronic circuits, components, and power devices.

These non-TDI, non-MBOCA systems are easy to use, can be hand mixed or machine dispensed, and cure at room or elevated temperatures. These systems form solid elastomers, 60 Shore A and 80 Shore A, having the following outstanding characteristics:

- Excellent Electrical Properties
- Low Toxicity
- Low Viscosity
- Low Exotherm and Low Shrinkage
- Easy Handling
- Low Stress build-up on Embedded Components
- Reversion Resistance
- Excellent Moisture Resistance

These systems are ideal for use in potting transformers, coils, reed and mercury switches, inductors, solid state ignition systems, voltage regulators, ballasts, micro-circuits, rectifiers, and printed circuit assemblies.

CONATHANE® EN-21 is a UL Recognized system.

TYPICAL PRODUCT CHARACTERISTICS

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

PROPERTY	EN-20	EN-21 UL-RECOGNIZED
Color, Parts A & B	Clear Amber	Clear Amber
Viscosity @ 25°C, Part A, cps Part B, cps	19,000 500	6,000 800
Specific Gravity @ 25°C, Part A Part B	1.14 0.96	1.14 0.96
NCO Content, Part A @ ± 0.02	15.7	16.0
Shelf Life, Part A and Part B, months from date of manufacture	18	18

TYPICAL CURED PROPERTIES

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

HANDLING CHARACTERISTICS	EN-20	EN-21 UL-RECOGNIZED
Mix Ratio, by Weight, Part A/Part B	100/170	100/116
Mixed Viscosity, cps @ 25°C @ 60°C	1200 230	2000 320
Pot Life @ 25°C, 250 gms, Minutes @ 60°C	120 15	40 8
Gel Time, @ 25°C, 250 gms, Minutes @ 60°C	>120 20	90 20
Peak Exotherm, Mixed @ 25°C, °C	---	69
Recommended Cure	←7 Days @ 25°C OR 4 Hours @ 80°C -->	

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TYPICAL CURED PROPERTIES (continued)

PHYSICAL PROPERTIES	EN-20	EN-21 UL RECOGNIZED
Hardness, Shore (±5)	60A	80A
Tensile Strength, psi	400	2,000
Elongation, %	150	155
Tear Strength, psi	28	119
Linear Shrinkage, in./in.	0.015	0.014
Water Absorption @ 25°C, % 24 Hours 1 Week 4 Weeks	0.20 0.30 ---	0.07 0.15 0.16
Compression Set (Method B), %	6	10
Specific Gravity @ 25°C	1.03	1.07
Linear Thermal Expansion, in./in., °C	2.4 x 10 ⁻⁴	2.10 x 10 ⁻⁴
Hydrolytic Stability	Passes	Passes
Thermal Conductivity (CAL/SEC/CM ² /°C/CM)	5.1 x 10 ⁻⁴	7.1 x 10 ⁻⁴
Thermal Shock	All Systems Passed Olyphant Washer Test per MIL-I-16923E (-65°C to +130°C)	
Heat Stability @ 130°C 500 Hours: Shore Hardness % Weight Loss 1000 Hours: Shore Hardness % Weight Loss	57A 0.39 61A 0.55	91A 0.34 96A 0.48
Flammability (UL94)	94HB	94HB

ELECTRICAL PROPERTIES	EN-20	EN-21 UL-RECOGNIZED
Dielectric Strength, vpm	650 (1/16")	650 (1/16")
Volume Resistivity, ohm-cm @ 25°C @ 130°C	9.9 x 10 ¹³ 4.1 x 10 ¹⁰	7.2 x 10 ¹⁴ 1.8 x 10 ¹¹
Surface Resistivity, ohms @ 25°C @ 130°C	>6.0 x 10 ¹⁷ 8.5 x 10 ¹¹	>1.0 x 10 ¹⁵ 6.9 x 10 ¹²
Dielectric Constant @ 1 KHz @ 25°C @ 105°C	4.9 4.6	3.4 6.1
Dissipation Factor @ 1 KHz @ 25°C @ 105°C	0.109 0.033	0.017 0.030
Insulation Resistance, ohms @ 25°C @ 130°C	>2.5 x 10 ¹³ 1.5 x 10 ⁹	>2.5 x 10 ¹³ 1.4 x 10 ⁹

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RECOMMENDED PROCESSING PARAMETERS

The following procedure is suggested for hand processing:

1. Mix the two components together thoroughly at room temperature in metal, plastic, or glass containers, using a metal spatula. **DO NOT** use paper containers or wooden sticks. Any moisture introduced into the system **will** cause bubbling and/or foaming during curing.
2. If void-free castings are required for the particular application, degas the mixed system at 1-5 mm of mercury vacuum. Allow froth to rise and collapse; continue vacuum for 2-5 minutes. Containers should generally have twice the volume of mixed material to allow for frothing.
3. Pour into dry preheated units. Best results are generally obtained when the unit is at least 10°C warmer than the mixed material. Pour down the side of the unit to be potted to avoid air entrapment.
4. If the potted device is to be heat cured, it is best to allow the device to sit at room temperature for 1-2 hours to permit air bubbles, entrapped during pouring, to dissipate.
5. When containers are opened and the contents only partially used, be certain to flush them with dry nitrogen or **CONAP® Dri-Purge** (Request Technical Bulletin AC-105) to prevent moisture contamination and subsequent waste of material.

MOLD RELEASE AGENTS

If the potted device is to be removed from a mold, apply a quality CONAP® mold release to ensure proper release.

PRIMERS

If improved adhesion is required, use one of the following recommended primers:

1. To Metals -Heat Curing - **CONAP® AD-1146-C** (Bulletin A-143)
2. To Plastics and Rubber - **CONAP® PR-1167** (Bulletin A-144)

HANDLING PRECAUTIONS

Although the very low vapor pressure of these systems greatly reduces the vapor hazard as compared to TDI-based systems, careless handling of any isocyanate should be avoided. The user is cautioned to avoid contact with the resins and hardeners. The use of protective clothing is recommended. Should contact occur, the skin should be washed immediately with mild soap and water. In case of eye contact, flush eyes immediately with water and obtain medical attention.

Use in well-ventilated areas and avoid prolonged or repeated breathing of vapors. Accidental spills in the work area should be wiped up right away. (For additional information, request Bulletin GI-4).

STORAGE

The Part A and Part B components of these systems are storage stable in their original, unopened containers for 18 months from date of manufacture when stored at 65-85°F.

AVAILABILITY

All systems are available in quart, gallon, 5-gallon, and 55-gallon drum units. Each **UNIT** consists of pre-weighed quantities of Part A and Part B components.

An **EVALUATION KIT** of each system is available at a nominal cost.

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The information presented here is based on carefully conducted laboratory tests and is believed to be accurate. However, results cannot be guaranteed and it is suggested that customers confirm results in their own laboratory before plant tests are made. Nothing contained in this bulletin shall be construed as a recommendation to use any product or process in violation of the claims of any patent now in effect.

NOTICE: Precautionary labels and Materials Safety Data Sheet(s) for all materials referred to, whether the materials are produced by CYTEC INDUSTRIES, INC. or other manufacturers, should be fully read and understood by all supervisory personnel and employees before using. For additional safety and health information, contact CYTEC INDUSTRIES INC. Purchaser has the responsibility for determining any applicability of and compliance with federal, state, and local laws and/or regulations involving labeling, use, and waste disposal, particularly in making consumer products.