

Starting Formulation

SF 4031 One-Package Adhesive 828 Dicyandiamide One-Package Adhesive EPON™ Resin 828 / Dicyandiamide

Introduction This one package epoxy adhesive, properly formulated, can yield a shelf life of approximately 6 months at 25°C (77°F) and cures rapidly at temperatures above 116°C (240°F). High bond strengths are maintained at temperatures over the range of -55 to 135°C (-100 to 275°F). Shear strengths useful in many applications are retained at temperatures as high as 177°C (350°F). A maximum service temperature of 149°C (300°F) is suggested for long term performance.

Suggested Uses

- Applications requiring toughness (peel, impact) along with high shear strengths over a wide temperature range. Adhesion is good with metals, ceramics, glass and other polar materials.

Features

- One Pack
- Rapid cure above 116°C (240°F)
- High bond strength from -73 to 135°C (-100 to 275°F)
- 149°C (300°F) Maximum service temperature

Formula Material	Supplier	% wt.	Pounds	Gallons
EPON Resin 828	Hexion	66.58	100	10.31
Hycar 1300X13 (CTBN rubber toughener)	Noveon Specialty Chemicals	6.66	10	1.25
Dyhard 100SF (micronized dicyandiamide)	Degussa Corporation	6.66	10	0.86
Dyhard UR 300 (substituted urea catalyst)	Degussa Corporation	3.46	5.2	0.58
Bentone 27 (ground bentonite clay – thixotropic filler)	Elementis Specialties, Inc.	3.32	5.0	0.33
Aluminum Powder 120	Alcoa – Specialty Metals Division	<u>13.32</u>	<u>20</u>	<u>0.89</u>
	Total	100.00	150.2	14.22

Mixing Instructions Combine all ingredients and grind to a thixotropic, smooth paste on a 3-roll mill or other efficient, low temperature disperser. The powdered components (Bentone 27, Dyhard 100SF, Dyhard UR 300, and Aluminum), must be finely dispersed for effective utilization. Adequate dispersion is obtained on a laboratory 3-roll mill by passing the blend through 3 times.

This formulation is a basic starting point and can be modified with a large range of commercial fillers, depending on cost/performance/processing requirements.

Typical Handling Properties Table 1 / Handling Properties

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	<u>Units</u>	<u>Value</u>
Expected Working Life		
@ 25°C (77°F)	months	>6
@ 37.8°C (100°F)	months	>1
Form / Viscosity @ 25°C, Blend		Thixotropic Paste
Density @ 25°C, Blend	lb/gal	10.6

Application Instructions Coat surfaces to be bonded with the adhesive and press together lightly; contact pressure is sufficient to develop maximum bond strength. The bond line temperature should be brought to 250 °F and maintained for a minimum of 40 minutes to effect a thorough cure. Shorter cure periods at higher temperatures may also be employed. Only surfaces free of dirt, oil, grease, or other contaminants should be bonded. While sandblasting or acid etching are the preferred procedures for preparing metal surfaces, vapor degreasing or solvent wiping may be the only practical method in some applications.

Cure Schedule 40 minutes @ 121°C (250°F) or 30 minutes @ 149°C (300°F)

Shorter cure periods at temperature up to 204°C (400°F) may also be employed.

Typical Cured State Properties Table 1 / Adhesive Properties – Aluminum to Aluminum ^{1, 2}

<u>Test Property</u>	<u>Type of Break</u>	<u>ASTM</u>	<u>Units</u>	<u>Value</u>
Tensile Shear Strength		D-1002		
Test Temperature:				
-67°F	cohesive		psi	3,100
77°	cohesive		psi	3,500
180°F	cohesive		psi	4,100
250°F	cohesive		psi	3,400
300°F	cohesive/adhesive		psi	700
90° Peel Strength @ 25°C (77°F)			lb/inch width	8.1

¹ Data was obtained on acid etched aluminum test specimens cured 40 minutes at 250 °F.

² 003" aluminum to aluminumplate.

Storage Recommendations regarding storage conditions can be obtained by visiting our web site at www.hexion.com

General Information

These are starting formulations and are not proven in the user's particular application but are simply meant to demonstrate the efficacy of the products and to assist in the development of the user's own formulation. It is the user's responsibility to fully-test and qualify the formulation, along with the ingredients, methods, applications or equipment identified herein ("Information"), by the user's knowledgeable formulator or scientist, and to determine the appropriate use conditions and legal restrictions, prior to use of any Information.

Safety, Storage & Handling

Please refer to the MSDS for the most current Safety and Handling information.

Exposure to these materials should be minimized and avoided, if feasible, through the observance of proper precautions, use of appropriate

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