



## Product Data

# RenCast™2000/Ren®2000 CASTABLE ALUMINUM EPOXY ALLOY FOR INJECTION MOLD TOOLING

**DESCRIPTION:** RenCast 2000(Resin)/Ren 2000(Hardener) is an extremely high performance castable two-component aluminum epoxy alloy. The cured alloy is formulated for the combination of high strength, high glass transition temperature, and thermal properties needed in injection molding applications. The RenCast 2000 formulation is based on thousands of successful molds built with Vantico's formulations.

RenCast 2000 is formulated as a complete two-component package that delivers an extremely high weight ratio of aluminum without the need to blend in dry metallic fillers. This pre-blended formulation eliminates the concern of undispersed aluminum present in shop blended mixtures.

The RenCast 2000 injection molding system can produce injection molds capable of molding high quality prototype and short-run production parts. These RenCast 2000 molds can be built from existing parts and models such as SLA, machined RenShape® boards, or other patterns.

RenCast 2000 complements RenShape-Express® 2000 injection molding board, and the two can be employed in combination to construct injection mold tools fast.

## APPLICATIONS:

- Construct cast tooling from existing models
- Easy one-step casting process
- Fast, accurate parts from design intent material
- Duplicates complex details

**MIX RATIO:** By weight: 100 to 7 Resin to Hardener

## Extremely Important!

**Mixing Instructions:** RenCast 2000 has an extremely high content of aluminum. It must be carefully and thoroughly mixed for best results. A mechanical mixer such as a ½ Hp. Kohl pail mixer is strongly recommended (available from many sources including Freeman Manufacturing and Supply (800) 321-8511 and INDCO Inc. (800) 942-4383). Begin by transferring the resin from the factory container to a clean metal pail that will fit on the Kohl mixer. Scrape the liner of the factory pail clean and transfer as much material as possible. Some of the aluminum filler on the bottom of the liner will be very dry. Keep the lined pail clean for later use. Mix material on the Kohl mixer for at least 10 minutes. Stop a minimum of three times to scrape down the sidewalls. The resin component is very heavy and thick. It is necessary to move the mixer bar by hand on the Kohl mixer to get good mixing action. This stage is very important to break up the resin completely. Undispersed material remaining after this stage of mixing will be very difficult to deal with in the next step.

Once the resin mixture is completely mixed, add the hardener component. Mix carefully to reduce splashing. Move the Kohl mixing blade back and forth to get good dispersion. Stop a minimum of three times to scrape down the sidewalls. Thoroughly mix until no lumps are visible. Mix for about 15 minutes.

When resin and hardener are completely mixed and the mixture is lump free, transfer the material to the clean 5-gallon pail container you saved from the first step. This will provide enough room for expansion during the deairing step. Scrape down the Kohl mixer blade. Mix again until smooth (approximately 10 minutes) scraping the sides with a spatula a few times. Use the Kohl mixer or a smooth jiffy or plunge mixer at this stage being careful to not abrade the pail liner into the mixture. Vacuum-deair with at least 29 inches of vacuum. The material will rise in the container. Shaking or breaking the vacuum may be required to get a complete fall or break of bubbles.

Once the rise of bubbles is broken, deair for a few more minutes before casting. If a high vacuum is achieved the bubbling will not stop. This is normal. The mixture will reach a steady state without a lot of rolling in the container. Deairing is complete at this point.

## TYPICAL HANDLING PROPERTIES:

Property	Criteria	ASTM Test Method	Test Value <sup>(1)</sup>
Color	Resin Hardener Cured	Visual	Gray Light amber Gray
Specific Gravity	Resin Hardener	D-792	2.00-2.20 0.92-0.95
Viscosity, cP	Resin Hardener Mixed	D-2393	Paste 20-30 10,000-30,000
Handling Time, minutes			60

<sup>(1)</sup>Tested @ 77°F (25°C) unless otherwise noted.

**NOTE:** Typical Properties – These physical properties are reported as typical test values obtained by our test laboratory. If assistance is needed in establishing product specifications, please consult with our Quality Control Department.

**PROCESSING:** RenCast 2000 can be cast using two different methods. Both methods limit the casting thickness of a single pour to about two inches in thickness.

If more than two inches of material is cast, add water/air-cooling lines spaced about two inches apart within the tool. The lines should be approximately two inches from tool face. Three-eighths to one-half inch flexible copper lines are ideal. Coat these lines with release agent and complete all angles and turns outside of the casting. Run a slow trickle of air or water through these lines while the material is gelling. These lines are essential for pours over two inches thick. If another two-inch layer is cast, repeat the installation of cooling lines.

These cooling lines are essential to reduce exotherm and shrinkage. They may be used for cooling the final injection mold during the part molding process if desired but are not essential for the injection molding process. They will keep the tool at a more uniform temperature if used, which will increase part accuracy and precision.

*Face Casting Method* is a useful method for thick and large molds. A low cost precured, undersize (by about one inch) core can be produced with RenCast 4037 (aluminum or ceramic filled). The precured core should be mechanically roughened to give RenCast 2000 a good mechanical bite. The core is suspended in the negative mold and RenCast 2000 is poured using appropriate risers and sprues. Pour carefully to avoid air entrapment.

*Squash Casting Method* can alternatively be used where the negative mold is filled partially with an adequate quantity of RenCast 2000 and the roughened core is pressed into the mixture to the proper depth.

*Solid Casting Method* is an alternative method where two inches at a time of RenCast 2000 is cast over a master model. It is important that the RenCast 2000 be fully deaired and carefully poured to avoid air entrapment on surface details.

**Important Information for All Methods:**

Details such as lettering and corners and angles should be first brushed with RenCast 2000 using a stiff brush and limited amount of material to just fill in the detail.

If more than **two** inches thickness of material is cast, add water-cooling lines spaced about two inches apart within the tool. The lines should be about two inches of the tool face. Three-eighths to one-half inch flexible copper lines are ideal. Coat these lines with release agent and complete all angles and turns outside of the casting. Run water through these lines while the material is gelling. These lines are essential for pours over two inches thick. If another two-inch layer is cast, repeat the installation of cooling lines.

Proper support of a RenCast 2000 mold is essential. Thousands of successful molds have been constructed using a minimum of 30mm to 50mm steel as sidewall and backside support plates. While support requirements vary with part profile, only the lowest profile parts should be considered for reduced sidewall support. Backside support is essential. Pillars should be added wherever possible on support plate cutout areas.

Sealing: Cured molds should be sealed with RenShape-Express™ Sealer No. 1. Refer to the product data for application instructions. Sealing the finished mold will help decrease mold wear especially with mineral filled and high melt temperature plastics.

Part Injection: Please ask for our tips for running Ren® composite epoxy injection molding tools. Call our product literature department for the latest copy at (800) 955-5509.

**RECOMMENDED CURE SCHEDULES:**

	<b>Temperature</b>	<b>Time</b>	
<b>Initial Cure</b>	140°F (60°C)	3 hours	<b>Plus</b>
<b>Postcure</b>	302°F (150°C)	6 hours	

**Curing Instructions:** Allow mold to gel overnight using cooling as described if required. Then follow postcure schedule. Temperature is mold-temperature not oven-temperature. Use a thermocouple buried in the mold.

**TYPICAL CURED PROPERTIES:**

<b>Property</b>	<b>ASTM Test Method</b>	<b>Test* Values</b>
Density, lb./ft <sup>3</sup> (g/cm <sup>3</sup> )	D-792	124 (2.0)
Cubic inch per lb.		13.9
Hardness (Shore D)	D-2240	91
Ultimate Flexural Strength (psi)	D-790	16,500
Flexural Modulus (psi)	D-790	2.0 x 10 <sup>6</sup>
Ultimate Tensile Strength (psi)	D-638	11,000
Tensile Modulus (psi)	D-638	2.0 x 10 <sup>6</sup>
Tg by DMA, E' onset, °F (°C)	D-4065	396 (202)
Deflection Temperature (264 psi) °F(°C)	D-648	>446 (230)
Linear Shrinkage, in/in ** Mold #2	D-2566	0.001
Ultimate Compressive Strength, psi	D-695	38,000
Izod Impact, notched, ft-lb./in	D-256	0.7
Coefficient of Thermal Expansion -4°F to 212°F, in/in/°F -20°C to 100°C, in/in/°C	D-3386	17 x 10 <sup>-6</sup> 30 x 10 <sup>-6</sup>
Thermal Conductivity, W/m °K		1.65
Peak Exotherm 8"x8"x8" block, °F (°C)		291 (144)

\* Cured 3 hours at 140°F (60°C) plus 6 hours at 302°F (150°C)

Tested @ 77°F (25°C) unless otherwise noted.

\*\* Radius Depth 2.250" Length 10"

<b>PACKAGING:</b>	<u>Unit</u>		<u>Weight</u>
	5-gallon pail, lined	<i>Resin</i>	20 lb.
	Small container over-packed in a 5-gallon pail	<i>Hardener</i>	1.4 lb.
	1 pint	<i>Sealer No. 1</i>	15 oz.

Please call Customer Service (800) 367-8793 for price and availability.

## **STORAGE/HANDLING INFORMATION:**

### **Resin**

Store material at 40°F to 80°F. Do not exceed 100°F.

### **Hardener**

Store at 60-100°F in a dry place. After use tightly reseal.

Work in a well ventilated area and use clean, dry tools for mixing and applying. For two component system, combine the resin and hardener according to mix ratio. Mix together thoroughly and use immediately after mixing. Material temperature should not be below 65°F (18°C) when mixing.

**SHELF LIFE:** Provided materials are stored under the recommended storage conditions in their original containers, they will remain in useable condition for six months from date of shipping.

**SAFETY/HANDLING PRECAUTIONS:** Do not use or handle this product until the Material Safety Data Sheet has been read and understood.

### **RenCast 2000**

**WARNING!** Causes skin and eye irritation. May cause allergic skin reaction. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling.

### **Ren 2000**

**DANGER! CORROSIVE** – Causes eye burns and skin burns. Harmful if absorbed through skin. May cause allergic skin reaction. Do not get in eyes, on skin, or on clothing. Avoid breathing vapor or mist. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

**FIRST AID:** In case of contact with:

**Skin:** Immediately wash with soap and water. Remove contaminated clothing and launder before reuse. Destroy contaminated shoes.

**Eyes:** Immediately flush with water for at least 15 minutes. Call a physician.

**Ingestion:** If conscious, give plenty of water to drink. Do not induce vomiting. Call a physician.

**Inhalation:** Remove to fresh air. Administer oxygen or artificial respiration if necessary. Call a physician.

**Other:** Referral to physician is recommended if there is any question about the seriousness of any injury.

**PRECAUTIONARY NOTE:** Thermosetting systems generate heat when curing. The amount of heat and the period of time in which heat is released vary significantly between systems. Additionally, ambient or compound temperature, amount of material mixed, and construction and shape of the mold or container can also be factors in the temperature profile of a mixed system.

In some cases, the thermosetting reaction can be vigorous, generating heat sufficient to cause decomposition of the system with subsequent liberation of large volumes of acrid smoke.

A good rule of thumb is never mix more material than can be applied during the stated pot life or gel time. Also take care when using materials in applications other than stated on the Product Data Sheet, i.e., a laminating resin for casting.

Please feel welcome to call our Product Information Department or your local Ren representative for instructions before you start your job.

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