

Information About Dow Corning® 3110, 3112, and 3120 RTV Rubbers

Type

Two-part RTV silicone rubber

Color

Dow Corning 3110 and 3112

RTV Rubbers – White

Dow Corning 3120 RTV Rubber –

Red

Physical Form

– As Supplied

Pourable liquid –

As Cured

Firm, flexible silicone rubber; at room temperature, choice of four catalysts offers cure times ranging from 12 minutes to 12 or more hours

Primary Uses

Potting and encapsulating of electrical/electronic products; moldmaking RTV Rubbers

DESCRIPTION

Encapsulants

Dow Corning® 3110, 3112 and 3120 RTV Rubbers are pourable rubber bases that become firm, flexible silicone rubber when cured. They can be cured with any of four catalysts. The cured rubbers exhibit good dielectric prop-

erties, and various combinations of base and catalyst allow a wide range of working times and curing rates that can satisfy most potting, coating and moldmaking needs.

These RTV rubbers:

- Are easily mixed and poured
- Cure at room temperature in any thickness
- Give accurate reproduction of masters for moldmaking
- With primer, can obtain strong adhesion to many surfaces
- Provide wide service temperature ranges
- Absorb mechanical shock and vibration

Catalysts

Usually, a recommended mixing ratio of 10:1 base to catalyst assures more accurate measuring and mixing of catalyst, particularly when automatic equipment is used to mix and/or dispense the RTV silicone rubber.¹ Do not use Dow Corning® RTV Catalyst S or F when molding polyesters because the polyester can be inhibited.

HOW TO USE

Preparation of Units

To ensure maximum reliability and complete environmental protection, the following procedure should be followed:

1. Clean assembly of all contaminants such as oil, grease, solder flux, moisture and dirt.
2. For strong adhesion, dip, spray or brush surfaces with Dow Corning® 1201 RTV Primer and allow to cure at least 30 minutes. Silicone rubber surfaces should not be primed, but should be abraded and cleaned.

Catalyst Selection

A common catalyst concentration is 10 percent by weight of the RTV base. Varying the catalyst concentration will change the curing rate as indicated in Table II. Decreasing the catalyst level will slow the cure and give longer working and demold times.

Dow Corning® RTV Catalyst 4 is used where very fast curing is necessary for polyester molds. The recommended mixing ratio is 200:1.

Dow Corning RTV Catalyst F is used for high speed production. It is ideally suited for use with automated mixing-dispensing equipment, where the mixing is done in a mixing head immediately before dispensing. Dow Corning RTV Catalyst F will lose its activity rapidly when exposed to air. Keep all catalyst containers tightly closed when not in use.

Mixing

Dow Corning 3110 RTV Rubber base should be stirred before using, since filler separation may occur upon prolonged standing.

Catalysts can be added to the base material in its shipping container or any clean, dry container. If vacuum deairing is planned, the container should be no more than one-half full to allow for the expansion during the vacuum cycle.

Either hand mixing or mechanical mixing is satisfactory. With either method, care should be taken not to whip large amounts of air into the mixture. Avoid vigorous mechanical mixing since sufficient frictional heat may be generated to accelerate the cure rate.

¹A 10:1 mixing ratio is not recommended for Dow Corning RTV Catalyst 4.

TYPICAL PROPERTIES

These values are not intended for use in preparing specifications.

	<i>Dow Corning</i>	<i>Dow Corning</i>	<i>Dow Corning</i>
	3110 RTV Rubber ¹	3112 RTV Rubber ¹	3120 RTV Rubber ¹
Processing Considerations			
Color	White	White	Red
ASTM D 1084B Viscosity at 25°C (77°F), poise	130	280	280
ASTM D 792A Specific Gravity at 25°C (77°F)	1.14	1.30	1.45
MIL-S-23586 Corrosion Resistance.....	Good/Pass ²	Good/Pass ²	Good/Pass ²
Physical and Chemical Properties			
Radiation Resistance, Cobalt 60 Source, 25°C (77°F), megarads	100	100	100
Useful Temperature Range, °C (°F)	- 55 to 200 (- 67 to 392)	- 55 to 250 (- 67 to 482)	- 55 to 300 (- 67 to 572)
ASTM D 2214 Thermal Conductivity, Cenco-Fitch, 25-100°C (77-212°F), gm cal/cm ² sec-(°C/cm)	5.7x10 ⁻⁴	—	7.5x10 ⁻⁴
Volume Expansion, 25-150°C (77-302°F), cc/cc/°C	7.35x10 ⁻⁴	8.85x10 ⁻⁴	10.5x10 ⁻⁴
Mechanical Properties			
ASTM D 412 Tensile Strength, die C, psi	400	700	900
ASTM D 412 Elongation, die C, percent.....	175	130	120
ASTM D 2240 Durometer Hardness, Shore A, points	45	60	60
Electrical Properties			
ASTM D 150 Dielectric Constant at 25°C (77°F), at 100 Hz	2.29	3.25	4.19
100 kHz	2.20	3.20	3.54
ASTM D 150 Dissipation Factor at 25°C (77°F), at 100 Hz	0.010	0.030	0.070
100 kHz	0.0010	0.004	0.017
ASTM D 149 Dielectric Strength, 1/16" sample, volts/mil	434	545	457
ASTM D 257 Volume Resistivity, 500 V dc, ohm-cm	7.3x10 ¹³	4.2x10 ¹³	2.7x10 ¹³

¹Using *Dow Corning* RTV Catalyst F or S at 10:1 base to catalyst ratio. Wide departures from normal 10:1 ratio may slightly alter physical properties such as hardness and elongation.

²With *Dow Corning* RTV Catalysts F and S.

Specification Writers: Please obtain a copy of the Dow Corning Sales Specification for this product and use it as a basis for your specifications. It may be obtained from any Dow Corning Sales Office, or from Dow Corning Customer Service in Midland, MI. Call (517) 496-6000.

Table I: Catalysts

Catalyst	Color	Consistency	Demold Time	Cure Conditions
F (Fast rate)	light tan	paste	25 minutes - 2 hours	room temperature – any thickness or in confined spaces
S (Standard rate)	light blue	paste	5-12 hours	room temperature – any thickness or in confined spaces
1 (Same as S but no corrosion inhibitor)	light blue	paste	5-12 hours	room temperature – any thickness or in confined spaces
4 (Fast rate, 200:1 ratio, no corrosion inhibitor)	clear straw	liquid	10 minutes-2 1/2 hours	room temperature – any thickness or in confined spaces

Table II: Base/Catalyst Ratios, Working Times and Demold Times

	Base/Catalyst Mixing Ratio by Weight	Approximate Working Time	Approximate Demold Time
Dow Corning 3110 RTV Rubber			
<i>Dow Corning 1, S Catalysts</i>	5:1	1 hour	5 hours
	10:1	2 hours	7 hours
	20:1	3 hours	12 hours
<i>Dow Corning F Catalyst</i>	10:1	10 minutes	27 minutes
	20:1	40 minutes	80 minutes
<i>Dow Corning 4 Catalyst</i>	100:1	3 minutes	10 minutes
	200:1	5 minutes	20 minutes
	400:1	20 minutes	2 hours
Dow Corning 3112 RTV Rubber			
<i>Dow Corning 1, S Catalysts</i>	5:1	30 minutes	6 hours
	10:1	1 hour	8 hours
	20:1	2 hours	12 hours
<i>Dow Corning F Catalyst</i>	10:1	12 minutes	37 minutes
	20:1	28 minutes	100 minutes
<i>Dow Corning 4 Catalyst</i>	100:1	2 minutes	10 minutes
	200:1	5 minutes	20 minutes
	400:1	15 minutes	1-1/2 hours
Dow Corning 3120 RTV Rubber			
<i>Dow Corning 1, S Catalysts</i>	5:1	30 minutes	6 hours
	10:1	1 hour	8 hours
	20:1	2 hours	12 hours
<i>Dow Corning F Catalyst</i>	10:1	8 minutes	25 minutes
	20:1	25 minutes	1-1/2 hours
<i>Dow Corning 4 Catalyst</i>	100:1	2 minutes	10 minutes
	200:1	5 minutes	30 minutes
	400:1	15 minutes	2-1/2 hours

Vacuum deairing may not be necessary, particularly with *Dow Corning 3110 RTV Rubber*. When it is necessary, it should be done first in the mixing container. A vacuum of at least 28 inches of mercury should be held until most bubbling has ceased. For best results, the mixture should be vacuum deaired again after it has been poured in place, especially when densely packed circuit components are being potted. For impregnation of units such as coils or transformers, the vacuum cycle can be followed by the application of 10 to 50 psi air pressure.

Applying

In potting with *Dow Corning RTV Rubbers*, the part or assembly to be packaged is placed in a form with clearance at all points when sealing is necessary. This form may be made of paper, aluminum foil, metal or plastic. A release agent may be used to aid in demolding.

Where printed circuit boards and similar assemblies are to be dip coated, select the viscosity grade that will give the desired coating thickness. To apply *Dow Corning RTV Rubbers* as

conformal coatings, immerse parts in the catalyzed compound, withdraw them slowly, pausing just before the part leaves the dip tank to minimize

stringing, and hang on a rack to cure. Allow one to two hours between dips. Two dips in a low-viscosity-grade encapsulant are suggested for optimum protection.

For maximum assurance of void-free potting, pour the silicone RTV rubber, then apply a vacuum of more than 28 inches of mercury to facilitate the removal of air.

Color Coding

Dow Corning 3110 and *3112 RTV Rubbers* can be readily color coded by mixing in master batch pigments. These should be mixed into the base material in proper proportion just prior to adding catalyst.

Curing

Curing rate is a function of temperature and humidity. Curing time will increase at temperatures below 23°C (73°F). Although the RTV Rubbers are formulated to cure in dry atmospheres, exposure to high humidity will tend to decrease curing time.

Deep-Section Cure

Dow Corning 3110, 3112, and 3120 RTV Rubbers may depolymerize when overheated in total confinement. To minimize this effect, pottings which must operate in total confinement at elevated temperatures must be given a graduated post cure which allows volatiles to escape. During the graduated post cure, the temperature should be increased approximately 25°C per hour depending upon thickness of potted section. A final bake of two to four hours at a temperature 50°C degrees above the maximum operating temperature of the device is recommended.

LIMITATIONS

Not intended for medical use.

SHIPPING LIMITATIONS

None.

STORAGE AND SHELF LIFE

Dow Corning 3110, 3112, and 3120 RTV Rubber bases and *Dow Corning* RTV Catalysts should be stored in closed containers. The shelf life of the 3110 is 18 months, 3112, and 3120 is 24 months from date of manufacture. The shelf life of catalysts S and 4 is 24 months from date of manufacture when stored in original, unopened containers at 23°C (73°F). The shelf life of F catalyst and 1 catalyst is 12 months from date of manufacture under the same storage conditions. In all cases, rubbers should be stored at temperatures below 32°C (90°F).

Shelf life information is subject to change. Refer to the Sales Specification for current shelf life information.

PACKAGING

Dow Corning RTV Rubber bases are supplied in 1, 9 and 40 lb (0.45, 4.1 and 18.2 kg) containers, net weight.

Additionally, *Dow Corning* 3110 and 3112 RTV Rubber bases are available in 400 lb (182 kg) containers, net weight.

Catalysts are not supplied with rubber bases. They must be ordered separately.

Dow Corning RTV Catalysts S and 1 are supplied in 0.1 lb (45 g) tubes and 0.9 and 4.0 lb (.41 and 1.82 kg) containers, net weight. Additionally, 1 Catalyst is available in 40 lb (18.2 kg) containers, net weight. *Dow Corning* RTV Catalyst F is supplied in 0.1 and 3 x 1/3 lb (45 and 154 g) tubes and 40 lb (18.2 kg) containers, net weight. *Dow Corning* RTV Catalyst 4 is supplied in 0.01 and 0.1 lb (4.5 and 45 g) tubes, net weight.

SAFE HANDLING INFORMATION

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED. BEFORE HANDLING, READ PRODUCT AND MATERIAL SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE MATERIAL SAFETY DATA SHEET IS AVAILABLE FROM YOUR DOW CORNING REPRESENTATIVE, OR DISTRIBUTOR, OR BY WRITING TO DOW CORNING CUSTOMER SERVICE, OR BY CALLING (517) 496-6000.

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