



RELIOBOND 1600

Friction Bonding Adhesives

THE RUSCOE COMPANY
Adhesives & Sealants

Reliobond 1600 series adhesives are nitrile rubber and phenolic resin adhesives designed for bonding friction material to metal. These adhesives offer high bond strength across a wide range of temperatures. Cured Reliobond 1600 has excellent resistance to oil, grease, transmission fluid, and brake cleaning fluid. These products are offered in five different viscosity grades to accommodate brush, spray, roll coat, curtain coat, and extrusion application methods. All Reliobond 1600 series products are supplied in a solvent blend of methyl ethyl ketone and isopropyl alcohol. Contact your Ruscoe representative for information about our new lower VOC versions of the Reliobond 1600 products.

TYPICAL PROPERTIES: (NOT FOR SPECIFICATION PURPOSES)

	RB1602	RB1603	RB1604	RB1615	RB1635	RB1651
Solids	28-32%	33-37%	32-38%	35-45%	38-45%	>40%
Viscosity¹ (Brookfield RVF)	1600-2200 cps (#2 @ 10 rpm)	2100-2700 cps (#3 @ 10 rpm)	3800-6200 cps (#3 @ 10 rpm)	1500-2500 cps (#4 @ 4 rpm)	2800-4000 cps (#5 @ 4 rpm)	4300-6000 cps (#5 @ 4 rpm)
Density (Weight per gallon)	7.5 #/gal	7.6 #/gal	7.7 #/gal	7.9 #/gal	8.0 #/gal	8.1 #/gal
Shelf Life²	12 months	12 months	12 months	12 months	12 months	12 months

1. Viscosity at time of manufacture.

2. When stored at temperatures less than 80°F (27°C) in original unopened container. See "Storage" for details.

Shear Strength

"Button & Bar" Shear Strength Test (SAE J840 Rev C)

(Grit blasted steel bonded to grit blasted steel. Cured 1 hour @ 425°F and 200 psi)

Tested at 75°F: >3500 psi

Tested at 400°F: >700 psi

APPLICATION INSTRUCTIONS:

Surface Preparation:

All metal surfaces must be free of oils, dirt, and other contaminants. Typical cleaning processes include aqueous alkaline cleaners, solvent vapor cleaners, burning or baking contaminants off the surface. After cleaning, a surface preparation process like phosphating, grit blasting, or wheel abrading will enhance the adhesive bond. Reliobond 1600 adhesives will bond very well to a clean, bare metal surface, but preparing the surface with one of these methods will improve the consistency and overall strength of the bond.

Adhesive Application:

Reliobond 1602, 1603, and 1604 should be thoroughly mixed before application. Higher viscosity grades do not require mixing before application. All Reliobond 1600 products will grow slightly in viscosity over time. This viscosity growth can be reversed with proper mixing. If the adhesive is more viscous than expected, mix the product before application using a high shear mixing blade, pail tumbler, or drum roller for 30 minutes to 1 hour. Reliobond 1600 can be reduced to a desired viscosity/solids by using methyl ethyl ketone, acetone, n-butyl acetate, methyl acetate, or t-butyl acetate in any proportion. Toluene, xylene, and alcohols can be used in small amounts but will destabilize the product if too much is added. Reliobond 1600 adhesive is typically applied to the friction material surface. In drum brake applications, the adhesive is usually extruded in a "ribbon" or "bead" pattern on the back of the lining. The channels between the beads or ribbons allow water vapor which is formed during cure of the phenolic resins to escape the bond line. Beads or ribbons of 8-15 mils (0.2-0.4 mm) dry adhesive thickness is a good starting point for drum brakes. Experimentation is necessary to determine the optimum adhesive thickness and coating pattern for each part design. For friction paper applications the adhesive is usually roll coated or curtain coated onto the paper. For clutch or transmission parts, a dry film thickness of 0.5-1.5 mils is a recommended starting range. The optimum film thickness allows for full wetting of adhesive onto the metal surface during cure, but does not squeeze out of the bond line or penetrate too deeply into the friction paper. If Reliobond 1600 adhesive consistently penetrates too deeply into the friction material, regardless of coating thickness, try Reliobond 1700 which flows very little during cure and is designed to minimize penetration into low density friction paper.

continued

Drying:

Reliobond 1600 must be fully dried before curing. Residual solvent in the adhesive can cause a weak, "spongy", "blown" bond. It is difficult to recommend exact drying parameters. Environmental conditions, coating thickness, and drying equipment type all significantly affect dry time. Here are some general guidelines for drying:

- Drying oven temperatures can range from 100°F-250°F. Do not exceed 250°F as higher temperatures can prematurely cure the adhesive or cause blistering of the adhesive film.
- Air flow in the drying oven is crucial to achieving fast dry times. More air flow will reduce dry time.
- Contact Ruscoe Technical Service for a test procedure to determine if your part is fully dried.

Curing:

The phenolic resins in Reliobond 1600 generate water vapor during cure. This water vapor must be forced out of the adhesive using pressure during the cure cycle. Most bonding problems with this type of adhesive are related to inadequate or uneven pressure. At least 100 psi must be continuously and uniformly applied during the curing process to ensure a good bond.

Reliobond 1600 adhesive will cure in the temperature range of 300-450°F. Keep in mind that this is the temperature the adhesive must reach, not the oven setting. The adhesive will take longer to cure at lower temperatures, but will allow more time for water vapor to escape and for adhesive to flow and wet the metal surface. Curing at too high a temperature can cause the adhesive to gel quickly which will trap water vapor in the adhesive and cause a weak bond. Experimentation is required to determine the optimum cure cycle for each part design. A good starting point is to cure for 30 minutes at 400°F at 200 psi.

Cleaning:

Reliobond 1600 adhesives can be cleaned prior to cure using methyl ethyl ketone, acetone, n-butyl acetate, methyl acetate, or t-butyl acetate solvents. If the adhesive is fully cured the only practical methods of removal are abrasion, burning, heating above 600°F for many hours, or soaking in a highly caustic solution. Consult MSDS for instructions on spill clean up and disposal.

Storage:

Recommended storage temperature is 40°-60°F (4°-16°C). Storage at temperatures above 60°F will cause significant increase in viscosity and eventually loss of adhesive performance. Parts that have been pre-coated and dried can be bonded within 6 months if stored in a clean, dry area at temperature below 85°F (30°C).

Legal: For your information

All statements, technical information and recommendations contained herein are based on tests believed to be reliable, but the accuracy or completeness is not guaranteed, and the following is made in lieu of all warranties expressed or implied.

Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct or consequential, arising out of the use of, or the inability to use the product. Before production, user shall determine the suitability of the product for their intended use and assumes all risk and liability in connection with and production.

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