

CoolTherm® UR-2000 Urethane Gap Filler

Application Notes

Uncured Material Properties*

	UR-2000 Resin	UR-2000 Hardener
Appearance	Red to Pink Paste	White Paste
Viscosity, Pa·s @ 25°C		
0.5/sec Shear rate	1200	1250
1/sec Shear rate*	745	780
5/sec Shear rate	305	270
Density, g/mL**	2.3	2.8

*Data is typical and not to be used for specification purposes.

**Individual lot values can be found on Certification of Analysis.

Application Recommendations:

Surface Preparation: Inhibitors – Avoid applying CoolTherm UR-2000 gap filler to surfaces that contain silicone oils and compounds with low volatile silicone content. Surfaces should be free of grease, dirt and other contaminants. Water also reacts with CoolTherm UR-2000 hardener; remove water condensation prior to applying CoolTherm UR-2000 gap filler to the substrate.

Surface Preparation: Cleaning – Surfaces may need to be cleaned prior to application of CoolTherm UR-2000 gap filler. Isopropyl alcohol (IPA) is recommended for PET substrates. For powder-coated, epoxy-coated or aluminum substrates, IPA or acetone can be used. Ensure that all solvent is dried before applying gap filler, as any remaining solvent could act as a contaminant.

Mixing – Mix CoolTherm UR-2000 resin with CoolTherm UR-2000 hardener at a 1:1 ratio, by volume (100:125, by weight). Handheld cartridges or automatic meter/mix/dispense (MMD) equipment can be used to avoid any air entrapment in the material which will significantly impact mechanical, electrical, and thermal properties. Manual mixing is not recommended. Mixed & cured properties may vary with mix ratio.

Mix Ratio and Weight Checks – At least once a day (preferably at the start of each shift), perform a mix ratio check on each MMD unit dispensing CoolTherm UR-2000 gap filler. Simultaneously dispense the resin and hardener into separate cups, then record the weight of each. The resin-to-hardener weight ratio should be between 0.7 to 0.9.

The static mixer should then be attached, purged with twice the volume of the mix tip, and a second weight check should be performed. This is to ensure that the correct amount of material is dispensed with the mix tip attached.

The additional pressure could lead to mix ratio issues if the equipment is not properly maintained.

Hardness Checks – Checking the hardness of a mixed sample of material is a good way to check for issues with the MMD equipment, mixing quality, and different cure profiles. Shore D value should be between 35 and 75 after cure (2 hours at 80°C or after 48 hours at 25°C). Be sure to use a calibrated durometer with test stand and follow ASTM 2240 for reliable results.

Production Environment Control – Upon mixing, CoolTherm UR-2000 gap filler is sensitive to humidity. Temperature and humidity need to be controlled below 35°C and 50% humidity to ensure mechanical properties remain within the specification limits upon cure.

Dispense Equipment Selection:

There are many things to consider when selecting automated dispense equipment. The volume of material used in each application, desired flow rates, bead patterns, placement and volume accuracy will all be items that factor into the final decision on equipment type and specific manufacturers. CoolTherm UR-2000 gap filler is heavily filled and contains filler particles that are abrasive, which also factors into the type of equipment that should be selected for use. Gear/rotor pump systems, as well as certain piston pump systems, do not work well with this material as both contain tight tolerances around their moving parts, which maximizes the amount of wear that these systems can experience and therefore significantly impacts the Preventative Maintenance (PM) schedule. Metering units using rod displacement or progressive cavity technology will result in the least wear and tear, offering less frequent preventative maintenance and downtime. Internal surfaces and components that come into contact with the liquid gap filler should also be designed to accommodate for increased wear. This might require metal components (valve seats, fluid chambers, etc.) to have special coatings and/or be manufactured from higher hardness materials.

When choosing equipment to be used with urethanes, moisture sensitivity of the hardener needs to be considered. If exposed to moisture, even from ambient air, the isocyanate can react and begin to gel. The rate of gelation depends on humidity level and temperature. Work with the equipment manufacturer to ensure the hoses, connections, material feeding system, and any exposed shafts are protected from moisture and air ingress.



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Installation on MMD:

CoolTherm UR-2000 gap filler should be loaded onto MMD equipment as it arrives from the Parker LORD manufacturing plant. Containers should be shipped and handled upright. No pre-treatment or degas is recommended and agitation should be avoided.

CoolTherm UR-2000 gap filler comes in a vacuum-sealed protective liner inside the drums or pails that acts as a moisture barrier. Desiccant pouches are placed on the top of the liner to act as an additional layer of protection. The desiccant pouches should be removed from the pail or drum prior to use. Cut and open the liner right below the seal prior to installation under the MMD plate. Fold and secure the liner around the pail or drum rim. Duct tape could be used to secure the foil liner around the pail rim, and a drum bolt ring could be used to secure the liner around the drum rim.

During the installation, the upper plate and follower plate should be completely sealed to protect the material from ambient moisture. CoolTherm UR-2000 hardener is moisture sensitive and could be cured with ambient moisture over time. Synthetic grease should be used to cover around the follower plate seal. This helps to protect material against moisture, eases installation and helps the plate to travel down the pail or drum. This is the standard operating procedure, especially on pails or drums with liners to help prevent liner damage and pulling the liner down into the pail or drum during use.

Long term storage of material under MMD plate is not recommended. To prevent prolonged storage of material under MMD plate, it is recommended to use pails for lower manufacturing rates and volumes. Adding leftover material from one drum/pail to the next drum/pail upon switching containers under the MMD is not recommended.

Liquid Separation and “Bleed”:

The vacuum sealed liner that enclosed CoolTherm UR-2000 material inside the pails or drums helps reduce the amount of ‘bleed’. Bleed is a thin layer of liquid that may appear on the top surface of the material. This is a normal condition inherent to highly-filled gap fillers and is often removed during the purge process performed each time a pail is changed out.

Filler Separation and “Pack-out”:

“Pack-out” occurs when the liquid portion of the material is forcibly separated from the filler. This occurs when systems are left under high pressure and there are available leak paths by which the liquid portion of the material can be filtered from the material and weep out. Improperly cleaned or tightened fittings, hose connections, and worn/loose fluid chamber seals are common areas where pack-out can occur. To defend against this, all pressure fittings, threaded

components or sealed joints should be clean (no dirt, debris, material on threads) and assembled properly to prevent leak paths. Additionally, any automated dispense system that will be left unused for significant periods of time (>15 minutes) should be relieved of all system pressure to minimize any possibility of filler separation. Many systems are designed with auto-depressurization features to accommodate for this.

Dispensing Condition:

Decreasing temperature below 25°C causes a significant increase in viscosity, so heated lines are recommended to ensure uniform process throughout the year and at different production environment temperatures. 35°C is the recommended temperature to ensure fluctuations in plant temperature do not impact the production cell and takt time.

Observations of the refill time in the production cell is highly recommended. Refill time should be set using material at upper viscosity spec limit to ensure the refill time meets the required takt time for the production cell. In addition, the refill time should be determined at the temperature recommended for the production cell, 35°C.

For further questions regarding the automated MMD processing of CoolTherm urethane gap filler materials, please review Parker LORD Technical Tips: Meter/Mix/Dispensing of LORD Urethane Gap Filler Materials. If technical assistance is needed, please contact your local Parker LORD representative, or e-mail electronicmaterials@parker.com for assistance.

Shelf Life/Storage:

Shelf life of each component is six months when stored in clean, dry environment at 18-30°C in original, unopened container. The material should be used within its shelf life to ensure a good product.

After opening, protect each component from exposure to moisture by using dry nitrogen or argon as an inert cover each time material is removed. Do not return dispensed material to its original container.

Personal Protection Measures/Equipment:

Respiratory Protection – CoolTherm UR-2000 hardener contains isocyanates which have poor odor warning properties. If occupational exposure limits are exceeded, a NIOSH approved supplied-air respirator is required. For respirator use, observe OSHA regulations (29CFR 1910.134) or use in accordance with applicable laws and regulations of your country or particular locality.

When working with CoolTherm UR-2000 resin, respiratory protection is not required under normal working conditions where adequate ventilation is present.

Skin Protection – Use neoprene, nitrile, or rubber gloves to prevent skin contact.

Eye Protection – Use safety eyewear including safety glasses with side shields and chemical goggles where splashing may occur.

Other Protective Equipment – Use disposable or impervious clothing if work clothing contamination is likely. Remove and wash contaminated clothing before reuse. Wear long-sleeved shirt to minimize skin exposure.

Hygienic Practices – Wash hands before eating, smoking, or using toilet facility. Food or beverages should not be consumed anywhere this product is handled or stored. Wash thoroughly after handling.

Cautionary Information:

Before using this or any Parker LORD product, refer to the Safety Data Sheet (SDS) and label for safe use and handling instructions.

For industrial/commercial use only. Must be applied by trained personnel only. Not to be used in household applications. Not for consumer use.

Cure Profiles and Behaviors

Working Time:	Temperature (°C)	Time to Double Viscosity (minutes)
	25	80
	35	30
	45	20

Purging Time & Volume:	Temperature (°C)	Purging Time (minutes)
	25	40
	35	15
	45	10

The above data includes suggested purging time at different temperature. It is suggested that 100% of mix tip volume should be purged each time. The static mixers should also be routinely replaced due to possible abrasion and wear of the mixing elements.

Cured Material Properties

Thermal Conductivity*, W/m·K Hot Disc Transient Method ISO 22007-2	2
Lap Shear Strength*, MPa ASTM D 1002	
Powder-coated Aluminum	6
E-coated steel	9
180° Peel Strength**, gf/cm ASTM D 903	
Bare PET film, 0.25 mm	2000
Aluminum-coated PET	600
Flammability Rating** 0.3mm thickness on aluminum	UL 94 V-0

*Individual lot values can be found on Certification of Analysis (COA).

**Data was collected on a one-lot combination.

Values stated in this document represent typical values as not all tests are run on each lot of material produced. For formalized product specifications for specific product end uses, contact the Customer Support Center.

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Parker LORD
Engineered Materials Group

111 LORD Drive
Cary, NC 27511-7923
USA

phone +1 877 ASK LORD (275 5673)

www.lord.com