

## TECHNICAL DATASHEET

**UP409** is a single coat bonding agent for TPU, castable and RIM polyurethane elastomers to metal. In addition, **UP409** will bond polyurethane elastomers to ceramics, nylon, and other engineering thermoplastics such as polyesters and polyether sulphones.

**UP409** is characterised by bond strengths greater than the tear strength of the polyurethane substrate, with excellent retention of properties after exposure to harsh environments.

**UP409** will bond RIM urethane elastomers directly to aluminium or steel without the need for primers or for prebaking.

### Product Specification

<b>Composition</b>	A mixture of polymers, resins and curing agents in an organic solvent system
<b>Appearance</b>	Blue liquid
<b>Viscosity at 25°C</b>	
<b>No.2 Spindle at 20 rpm (cPs)</b>	100 - 200
<b>Zahn Cup No.2 (sec)</b>	120
<b>DIN Cup No.4 (sec)</b>	50
<b>Solids Content (%)</b>	24
<b>Flash point (°C)</b>	5
<b>Specific Gravity at 25°C</b>	0.90
<b>Theoretical Coverage*</b>	9,5 m <sup>2</sup> /L @ 20 microns dry film thickness
<b>Recommended DFT</b>	20 - 40µm
<b>Shelf Life at 20-25°C</b>	12 months
<b>Diluents</b>	MEK, Ethylene Glycol Monoethyl Acetate (Cellosolve Acetate) , Methoxy Propyl Acetate (MPA), Xylene

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

Values stated in this bulletin represent typical values as not all tests are run on each lot of material produced. For a formalised product specification for specific product end uses, contact our Customer Service Department.

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## Features and Benefits

- **Versatile** Bonds a wide variety of both polyether and polyester compounds.
- **Wide Latitude** Accommodates a wide range of processing conditions, including long prebake cycles.
- **Durable** Bonded assemblies are particularly resistant to exposure to harsh environments thus giving longer service life to products.
- **One Coat** Only a single coat is required thus minimising application costs.
- **Fast Drying** Allows rapid turnaround times in the plant to minimise inventories of coated parts.

## Where to Use

The environmental resistance of **UP409** makes it ideal for use in the manufacture of all types of rollers for the paper and textile industries, solid tyres and pipe linings and all applications requiring a strong bond between a polyurethane elastomer and a metal, ceramic or plastic substrate. It can be bonded at temperatures of 70°C or above.

## Substrate Surface Preparation

Metal surfaces may be prepared by using one of several treatments which have been found to produce satisfactory bonds. The best treatment is usually governed by the usage the part will receive in service. The most common treatments are, roughening with emery cloth, steel grit blasting, sand blasting, aluminum oxide grit blasting and various chemical treatments. Steel, copper, brass, and magnesium usually are roughened. If blasting equipment is available, it is recommended that either sand or aluminum oxide be used to obtain maximum cleanliness and better ultimate resistance to environmental conditions. If blasting equipment is not available, emery cloth may be used.

Excellent bonds are obtainable when aluminium surfaces are treated with chromate or phosphate conversion coating processes. The operational sequence of such treatments involves the usual steps:

1. Caustic clean or degrease
2. Water rinse
3. Chemical conversion treatment
4. Water rinse
5. Dry.

Other methods of treating aluminium that have proven to be generally satisfactory are blasting with sand or aluminium oxide and roughening with emery cloth or sandpaper. Anodising, even with a subsequent water seal, sometimes presents an unsatisfactory bonding surface. Degreasing is usually sufficient cleaning for stainless steel. However, some surface roughening is desirable. Grease and oil and some loose soil may be removed by trichloroethylene degreasing. In many instances, it is desirable to use a vapour degrease, and a surface roughening followed by a final vapour degrease, and a surface roughening followed by a final vapour degrease. The main concern is to present a fresh, clean surface to which the bonding agent will be applied.

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Non-metallic surfaces must be carefully prepared. The requirements for a clean surface described above are generally applicable whether bonding metals, glass, fabric, or plastics. Fabric is usually de-sized by a scouring operation, glass may be cleaned in an alkaline bath, and plastic surfaces are prepared by cleansing with an appropriate solvent.

## Protection of the Prepared Surface

The freshly prepared surface must be protected against contamination and corrosion. Care must be exercised to avoid handling freshly prepared metal parts. The best way to accomplish this is by applying the adhesive as soon after surface preparation as is practicable. **UP409** provides a tough barrier to protect the surface, even for many months after the parts have been coated. The surface need only be protected from contamination by dirt, oil, or moisture to preserve the ability for bonding with applied TPU, RIM or castable polyurethane.

## Application Details

**UP409** may be easily applied by brush, dip or spray using standard application equipment. No agitation of the adhesive is required prior to application. Optimum applied dry film thickness is 0,00075 to 0,001 inches (18 to 25 microns).

If using with Part B Curing Agent, mix Part B into **UP409** at the ratio of 100 parts by weight of UP409 to 5 to 8 parts by weight of Part B and stir well. The use of 5 parts of Part B will improve the environmental resistance of the bond, whereas 8 parts of Part B will improve adhesion to cured elastomers. Once mixed, use within 24 hours or while it is still brushable and not viscous or gelatinous.

## Brushing

**UP409** can be applied by brush as received or, if used for large areas, slightly thinned with MEK, Oxitol Acetate or diluent blend prior to use. Use of 100 parts of bonding agent to 25 parts of diluent blend (see below) has been found suitable in practice.

## Dipping and Spraying

**UP409** can be used as received for dip applications. As supplied dipping will result in a dry film thickness of 0,00075 to 0,001 inches (18 to 25 microns) on a vertical surface. However, for both dipping and spraying applications **UP409** can be diluted, as for brushing. Dilute the bonding agent to a viscosity of 16 to 24 seconds Zahn 2 Cup or 13 to 20 seconds DIN 4 Cup with MEK, Oxitol Acetate or diluent blend (see below) prior to use. MEK will give a fast-drying coating. If cobwebbing occurs on spraying, dilute with the diluent blend, or use a higher boiling ester, such as Methoxy Propyl Acetate (MPA).

## Diluent Blend

The recommended diluent blend for **UP409** is a blend of 80 parts MEK, 10 parts Cellosolve acetate and 10 parts Methoxy Propyl Acetate (MPA). The 10 parts Methoxy Propyl Acetate may be substituted by 10 parts Xylene or Toluene if required.

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## Drying

**UP409** will air dry in 10 to 30 minutes at room temperature. Porous substrates may require a longer time for the solvent to evaporate completely.

Coated parts should be bonded as soon as possible after drying to avoid contamination, but tests have shown that a layover time of several weeks does not adversely affect bond strength. Storage of coated parts in high humidity environments should however be avoided. Drying the parts at elevated temperatures is acceptable. Test strips dried for 15 minutes at 70°C - 90°C have shown excellent bonding. To prevent blistering of the film, **UP409** should not be applied to substrates hotter than 80°C.

## Prebaking

After **UP409** has been applied and dried, large metal parts, which can act as heat sinks, are preheated prior to casting of the polyurethane. The bonding agent then becomes precured to the part and the overall environmental resistance of the bonded part is enhanced by this procedure. **UP409** shows a wide tolerance for prebaking, accepting prebake periods as long as 16 hours at 120°C without adverse effect on adhesion.

A recommended minimum prebake of 1 hour at 100°C will considerably enhance adhesion and remove final traces of solvent from the coated part. Longer prebakes of up to 4 to 8 hours at 100°C will further enhance bond strength, bond retention and heat and environmental resistance of the bond.

## Performance Data

When properly applied **UP409** provides a strong environmental resistant, durable bond. Typical results to grit blasted steel are shown in Table 1.

**TABLE 1**  
**EFFECT OF PREBAKING ON PERFORMANCE OF UP409**

	NO PREBAKE		PREBAKED 16 HOURS at 120°C	
	N/mm	%R	N/mm	%R
<b>Initial Adhesion</b>	42	100	39	100
<b>2hrs boiling water</b>	37	30	27	40
<b>2hrs boiling water with use of primer under UP409</b>	29	100	29	55

1. Castable Urethane 95A TDI/PTMEG - MOCA cured 30 minutes at 100°C in mould. Oven post-cured 90 minutes at 100°C.
2. ASTM D429 Method B modified to a 45° peel angle (% R =% of rubber retained).

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## Handling Precautions

The solvents used in **UP409** are flammable. Avoid prolonged breathing of vapours and mists. Keep away from heat, sparks, and open flames. Use particular care when spraying. Avoid prolonged contact with skin. Avoid all contact with eyes. Wash thoroughly after using or before smoking or eating.

Harmful or fatal if swallowed. If swallowed, do not induce vomiting. Call a physician immediately. Treat symptomatically.

Please read the Material Safety Data Sheet (SDS) on **UP409**.

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