

BONDING CASTABLE URETHANES TO METAL

INTRODUCTION

All **Cilbond 40** series bonding agents can be used alone or possibly in combination with each other. Therefore, you have several cement systems to choose from.

1. **Cilbond 41** : This is used as a single coat system for low temperature curing castable PU elastomers, foams and RIM systems. It will also bond fast cure sprayable systems.
2. **Cilbond 45SF** : This is the industry standard for hot cure polyurethane prepolymers such as Duothane®, Adiprene®, Vibrathane® and Vulkollan®, at temperatures above 90°C. **Cilbond 45SF** also bonds TPU during the injection process and will effectively bond quasi systems at or above 80°C.
3. **Cilbond 48** : A fast drying general-purpose PU bonding agent which bonds hot-cure prepolymers, quasi and low-temperature (RTV) curing castable elastomers.
4. **Cilbond 49SF** : Developed from **Cilbond 45SF**, **Cilbond 49SF** is the standard grade for high performance prepolymers and quasi systems curing at 90°C or above, where good hydrolysis resistance and corrosion resistance is required. **Cilbond 49SF** is the first choice for TPU's and will bond quasi systems at, or above 70°C. Where staining of the PU by the **Cilbond 49SF** is undesirable, a top coat of **Cilbond 45SF** solves this problem without compromising bonding quality.

CASTING/CURING TEMPERATURE

20 - 90°C
 80 - 180°C
 20 - 180°C
 70 - 180°C

GRADE TO USE

Cilbond 41
Cilbond 45SF
Cilbond 48
Cilbond 49SF

THE FOLLOWING PROCEDURE CAN BE USED AS A GUIDE FOR BONDED PARTS:-

1. Degrease the metal before grit-blasting, in order to prevent grit from being contaminated.
 Prepare the metal by grit or sandblasting using a 40-60 alumina or G17 grit, followed by thorough degreasing in a completely volatile solvent such as Methyl Ethyl Ketone, Toluene, V M & P Naphtha, or Perchloroethylene.
2. Do not use very fast evaporating solvents such as Acetone, Methylene Chloride or petroleum ether. They evaporate too fast and have a tendency to condense moisture on the metal surface. Cast iron, Aluminium, stainless steels and other hardened steels often referred to as Cr or Ni steels may require a high temperature desorption prior to any degreasing.

NOTE: Some forged parts may use a process oil containing solvent insoluble ingredients. In such cases, an aqueous degrease in addition to or instead of a solvent degrease may be required.

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BONDING PROCEDURE (continued)

3. When the degreasing solvent has completely evaporated, apply one coat of **Cilbond** cement as primer. Allow to dry approximately 45 minutes at room temperature. Pre-warming parts to approx. 60°C prior to coating will reduce the drying time.
4. Apply a second coat of **Cilbond** cement and dry for at least 45 minutes. This second coat may not be necessary, but will guarantee minimum defects.
5. For hot-cure elastomers preheat the coated metal parts at 100°C (212°F) until the metal reaches casting temperature. At least 30 minutes preheating is desired, even on small parts, as this thoroughly cures the cement to the metal and drives off the last traces of high boiling solvent.

With **Cilbond 45SF** and **49SF** a pre-bake of at least one hour (preferably ≥ 2 hrs) at 100°C (212°F) maximises the bond strength and percentage rubber tear. A high temperature prebake is frequently required for aluminium bonding and for cast iron bonding. Hardened steel, certain Cr and Ni steels including stainless steel may also require special pre-bakes.

Cilbond 45SF can be preheated for up to at least 16 hours at 120°C (250°F) or 48 hours at 100°C with little or no sacrifice of adhesion **Cilbond 49SF** will also resist long pre-baking, but it is not quite as tolerant as **Cilbond 45SF**. **Cilbond 48** will withstand pre-bakes of 105°C for up to 24 hours.

Cilbond 41 should never be pre-heated for more than a short period at temperatures exceeding 120°C (250°F). If the **Cilbond 41** is overheated, the film may turn brown. If the discolouration is very intense, it will be necessary to reclaim the parts and re-apply the bonding agent.

6. Prepare the urethane by preheating the prepolymer and curing agent to the recommended casting temperature. Degas the prepolymer as recommended; mix the curative and urethane prepolymer thoroughly, cast and cure.
7. Immediately after de-moulding, cast urethane parts should be placed into a forced air oven for the continuation of the post cure cycle so the cross linking process between the polymer and bonding agent will not be disrupted. Follow the urethane suppliers' suggested post cure cycle.

Rapid mould turnaround is necessary to reduce costs and keep production going. However, it is false economy to demould too quickly.

If an excessive force is required to demould, then the time in the mould should be increased so the urethane will cure sufficiently to withstand the shock of demoulding - or better release agents should be used.

In the case of fast cure Quasi systems it is advised to prebake the metal coated parts at $\geq 80^\circ\text{C}$ and post cure at between room temperature and 80°C. Do not post cure at above the prebake temperature.

All mould release agents should be used with care around bonded parts. They are the number one enemy of bonding. **CilRelease® 1711E** and **1812E** aerosols are recommended for all PU cast elastomers.

Registered Trade Marks:- *Adiprene® and Vibrathane® - Uniroyal, Vulkollan® - Bayer and Duothane® - Dow Hyperlast*