ADDITION CURE SILICONE RUBBER

AS40

Key Features

- Very accurate dimensional accuracy
- Very low shrinkage
- Translucent
- High tear strength
- Styrene and PU resistant

Product Description

AS40 is a high quality 'addition cure' (platinum cure) silicone rubber for more demanding mould making applications. Addition cure silicone rubber is a more advanced type of RTV (Room Temperature Vulcanising) silicone than the more cost effective 'Condensation Cure' silicone.

Our addition cure silicone has been chosen for its excellent dimension reproduction; it is incredibly low shrink and therefore can be used to make a mould for prototype parts that interconnect (like a nut and bolt) to engineering tolerances. It has excellent styrene and polyurethane resistance and a high tear strength.

Recommended Uses

Use our Addition Cure Silicone Rubber to produce accurate moulds of complicated parts, precisely reproducing the dimensions of the original part. Completed silicone moulds can be used for repetitive casting applications, ceramics, vacuum casting and general mould making.

Properties

The table below shows the typical uncured properties:

Property	Units	Resin	Hardener	Combined
Material	-	Silicone Rubber	Clear Liquid	Silicone Rubber
Appearance	-	Translucent Viscous Liquid	Amber Liquid	Translucent Viscous Liquid
Viscosity @20 °C	mPa.s.	40000 - 78000	200 - 300	30000 - 70000
Density @20 °C	g/cm^3	1.08	1.07	1.08

How to Use

AS40 is a chemical product for professional use. It is essential to read and understand the safety and technical information before use.

Follow the guidelines for safe use outlined in the SDS which include the use of appropriate hand and eye protection during mixing and use.

Mix Ratio

Mix Ratio 100:10 by Weight

AS40 Addition Cure Silicone should be mixed with Addition Cure Catalyst at a ratio of 100 parts of silicone to 10 parts of Catalyst, by weight. Failure to do so will result in a poor or only partial cure of the silicone, greatly reduced mechanical properties and possibly other adverse effects. Under no circumstances add 'extra catalyst' in an attempt to speed up the cure time; Addition Cure Silicones do not work in this way.

Mixing Instructions

Only weigh out and mix as much silicone as you can use within the pot life. Weigh or measure the exact correct ratio of silicone and catalyst into a straight sided container. Using a suitable mixing stick begin to mix the silicone and catalyst together to combine them completely.

Mix thoroughly together both parts of the system ensuring the container used is at least five times the volume of the material being mixed e.g. For a 2 Kg mix use a 10 litre container.

Due to the difference in viscosity of the two components extra care should be taken when mixing to ensure a homogeneous mix. When you think the mixture is homogeneous, mix again to ensure thorough mixing.

Before use the mixed silicone should be correctly de-gassed in a vacuum chamber to remove air trapped within the mix that will seriously impair the surface finish quality of the resulting mould.

Inhibiting Materials

Addition cure silicone rubbers are susceptible to cure inhibition by a number of products and materials. Take special care to ensure that the uncured silicone does not come into contact with any of the following materials or substances otherwise you may well find that the silicone does not cure at all in the contaminated areas.

Products with a high moisture content or a high sulphur content are potentially the most damaging. The known inhibiting substances include:

- Wood-mastic epoxy resin
- Natural rubber
- Silicone sealants
- Neoprene adhesive
- Vinyl adhesive
- Transparent wood glue
- Flexible compact PUR
- Plasticised PVC film*
- Foam latex and latex gloves*
- Cyanoacrylate adhesive* (super glue)
- Polyester resin
- Adhesive tape
- Coachwork polyester mastic
- Shellac
- Transparent PVC tubing*
- Condensation cure RTV
- CAF Sealant (all types)

* PARTICULARLY ACTIVE

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Translucent Colour

AS40 is unpigmented and highly translucence, making it particularly suitable for use both in making moulds where being able to see the casting inside is helpful, and for making silicone components where its clear appearance mean it can be easily pigmented to any colour, including pure black or white, or vivid red and blue, which is not possible to achieve when using opaque silicones or those which use a pigmented catalyst as a visual indicator.

In common with all clear silicones, because both the silicone and the catalyst are clear, this does mean there is no visual indication as the catalyst is mixed into the silicone and so extra care should be taken to ensure they are thoroughly combined. In applications where the silicone does not need to be clear, a small amount of one of our liquid silicone pigments can be added to the AS40 catalyst before it is added to the silicone, thus providing a visual indication of when the catalyst is fully combined.

De-Gassing

When the material is thoroughly mixed it should be placed in a vacuum chamber to de-gas. When vacuum degassing the material will expand to approximately five times its original volume and then collapse, it is at this point that the material has been successfully vacuumed.

To achieve its excellent properties for tear-strength, stability and longevity, AS40 does have a higher viscosity compared to less high-specification silicones. This high viscosity does tend to mean more air entrapment during mixing and also means that only very high levels of vacuum will achieve the 'self-collapsing' point necessary to fully degas the silicone. Situations where AS40 does not seem to fully degas under vacuum can be resolved by fixing small leaks in vacuum fittings, or by servicing worn-out vacuum pumps.

If no vacuum chamber is available it might be possible to de-gas the mixed silicone using the 'stretch-pour' method whereby the silicone is poured into the mould by means of a very small hole in the bottom of a vessel containing the mixed silicone. The vessel should be positioned at a height of more than 1m above the set-up box and allowed to pour into a corner of the set-up box in a very thin trickle.

Pot-Life / Working Time / Cure Time

Transfer the Silicone from the mixing pot onto the part as soon as possible to extend the working time and avoid the risk of rapid cure in the mixing pot.

The pot-life/working time will vary significantly depending on the ambient temperature and the starting temperature of the silicine and Catalyst.

AS40 can be used in ambient temperatures between 15°C (59°F) and 30°C (86°F). For best results, an ambient temperature of at least 20°C (68°F) is recommended.

Pour carefully in one place in to the set-up box to avoid air inclusion. Once pouring is complete place the set-up box back in to the vacuum chamber (if possible) and degas again. If curing at elevated temperatures the mould should be allowed to stand for 10 minutes before being placed in the oven at the appropriate temperature. Shrinkage of the silicone will increase when cured at elevated temperatures.

The table below gives an indication of pot-life and cure times:

Pot-Life @ 20 °C	Demould Time @ 20 °C	Demould Time @ 60°C	Demould Time @ 70°C	Demould Time @ 80°C
30 Minutes	24 Hours	2 Hours	1 Hours	30 mins

Expansion of Cured Mould

If the silicone mould will be used at elevated temperatures it should be understood that the mould will expand to a degree. The amount of expansion for a given temperature can be calculated as follows:

L_o = Original length
L = Length at temperature
T = Temperature of silicone mould
Coefficient of expansion = $2.6x10^{-4}$ (mm/mm)/°C
T_{room} = 20°C

$(L - L_o) = Coef \times (T - T_{room}) \times L_o$

e.g. Increase in length of a 500 mm mould at 60°C
$(L - L_o) = 2.6X10^{-4} X (60-20) X 500 = 5.2mm$

Mechanical Properties

Cured Silicone Properties

	Units	Result
Colour		Translucent
Density 25°C	g/ml	1.05 – 1.09
Linear Shrinkage	%	0.1
Hardness 25°C	Shore A	36 - 45
Tensile Strength	MPa	> 3.5
Tear Strength	kN/m	> 13.0
Elongation at break	%	> 250
Service Temperature	°C	-60 to 250

Transport and Storage

Silicone and catalyst should be kept in tightly seal containers during transport and storage. Both the resin and hardener should be stored in ambient conditions of between 10°C (50°F) and 25°C (77°F).

When stored correctly, the silicone and catalyst will have a shelf-life of 12 months. Although it may be possible to use the silicone after a longer period, a deterioration in the performance of the silicone will occur. Pay particular attention to ensuring that containers are kept tightly sealed.

Disclaimer

This data is not to be used for specifications. Values listed are for typical properties and should not be considered minimum or maximum.

Our technical advice, whether verbal or in writing, is given in good faith but Easy Composites Ltd gives no warranty; express or implied, and all products are sold upon condition that purchasers will make their own tests to determine the quality and suitability of the product for their particular application and circumstances.

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