

# Silicone Rubber Moulding – How to Use

## Introduction

There is a growing interest emerging in the Arts & Crafts world as a result of the economic situation. People are looking for a means to earn additional income by starting a home-based business that can generate money as well as starting a hobby. Moulding is just one way to start a home based business that can lead to an interest in both the art's and the commercial aspect of business.

Reproduction is the key to moulding. Whether you want to duplicate a statue or any other piece of art, or make candles or soaps, you will need to learn the basics of mould making.

## Benefits of Silicone Rubber Moulds:

- There are several mould making materials on the market but none have the reproduction capacity or the durability of silicone RTV mould making rubbers.
- Silicone Rubber have exceptional reproduction of fine details.
- RTV Silicone Rubbers are generally superior to other mould making materials such as latex, PVC and Polyurethanes in its ability to faithfully transfer finite model details over the life of the mould.
- They have good chemical resistance permitting the use of a wide range of casting materials.
- The shrinkage is very low providing high dimensional stability.
- Generally silicone RTV's have high elasticity that allows the rubber to stretch for ease of de-moulding.
- RTV's have a high tear strength enabling the mould to be stretched without the rubber tearing.
- They natural release characteristics which almost eliminates the need for additional release agents when used with most casting materials.
- Working and curing times can be controlled with the use of different catalyst combinations.
- Silicone rubbers cure at room temperature thus eliminating expensive drying ovens.
- Silicone RTV's have a high temperature resistance that can withstand the exothermic temperatures of various casting materials without the moulds becoming sticky.

## What equipment do I need?

The basic equipment needed is generally found around the home.

### 1. A mixing container.

This can be any container that is clean and dust free. Plastic metal or even paper cups can be used.

### 2. Weighing equipment.

A standard kitchen scale is ideal for mixing small quantities of rubber base. It is preferable to have a scale that allows you to tare the container before measuring the base rubber.

A Medical syringe is an excellent way to measure small amounts of catalyst. It eliminates the danger of over catalysing.

### 3. A Spatula

A flat bladed spatula (metal or plastic) is used for mixing and scraping the sides of the mixing container. Medical tongue depressors can also be used to mix small amounts of silicone rubber.

### 4. Mould supports.

The purpose of a mould support is to contain the liquid silicone around the model whilst the rubber is curing. Mould supports can be made from wood, glass, plastic, aluminium, heavy cardboard or clay. There are re-usable supports available.

The choice of mould support depends on the type of casting materials used. Mould supports should be built around the model allowing for at least 9-10mm of space on all sides of the mould.

### 5. Vacuum Equipment

Whilst this equipment is not a necessity, it will eliminate air bubbles in your moulds. It consists of a vacuum pump attached to a vacuum chamber of adequate size to de-gas the required amount of silicone rubber. The vacuum system is used to remove the air that is introduced during the mixing cycle.

## How do I make a mould?

### 1. Master design and preparation

The master must be of a high quality as the silicone rubber will reproduce every surface detail that appears. Therefore any scratch or imperfection, that is not wanted, must be eliminated from the master. Be sure to eliminate all forms of dirt and dust. All corners and crevices should be checked for contamination, as again, if present, these will be reproduced.

Here are some suggestions for treating specific surfaces.

#### A. Porous masters. (plaster, concrete, unglazed porcelain, baked clay etc.)

- Dissolve 250g of soap in one liter of boiling water. Leave to cool and then coat the master.
- Coat with a thin layer of Vaseline.
- Coat the master with shellac or an acrylic varnish.

#### B. Metal Master

- De-grease with a solvent.
- Mix 100ml of dish washing liquid in 900ml of water and clean the master.

**Allow to dry!**

#### C. Glass, Porcelain and Ceramic Masters

- Treat with Vaseline.

#### D. Wood Masters

- Coat with a varnish of Vaseline. The thickness of the coating depends on whether or not the wood grain needs to be reproduced.

#### E. Plastic Masters

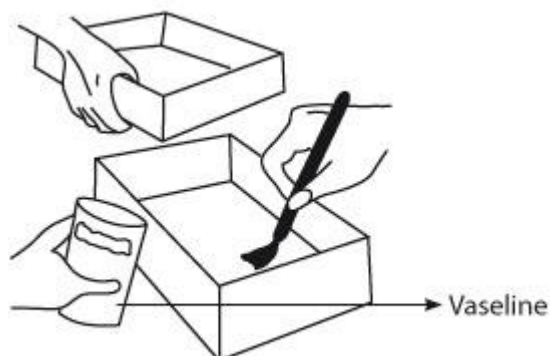
- De-greasing using a solvent appropriate to the type of plastic concerned.

### 2. Types of moulds

- A one part block mould
- A two part block mould
- A one part skin mould
- A two part skin mould

This document covers the one part block mould.

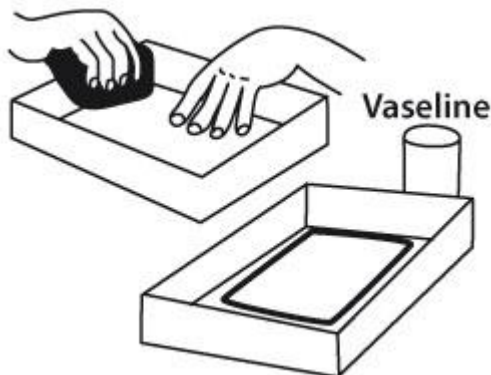
### 3. Construct a mould support.



The base should be constructed of a rigid flat material such as wood, glass, plastic or metal. The sides can be constructed of wood, glass, plastic or heavy cardboard. There should be a 10mm space between the edge of the master and the walls of the mould support. The height of the support must be at least 10mm above the master.

Mould supports that are porous, such as wood or plaster should be sealed with a thin layer of petroleum jelly (Vaseline) or a clear lacquer. The same applies to the master should it be made of a porous material.

#### 4. Prepare the Master.



Make sure the master is clean and dust free. Seal between the master and the base using a wax, clay or Vaseline to prevent the liquid silicone rubber from going under the mould. In the same way seal all the edges of the mould support to prevent the silicone from leaking out before it has a chance to cure.

Apply a thin layer of Vaseline to the master model.

#### 5. Prepare the Moulding Rubber.

This is probably the most critical part of the operation. It is essential that the mixing proportions are correct otherwise very slow curing or no curing at all may result.

Weigh out the moulding rubber on a scale (a kitchen scale will be acceptable). Determine the percentage catalyst required for the rubber you are using. This can vary between 2% and 5% depending on the make and type of rubber supplied to you.

Always insist on some sort of data sheet when buying a silicone RTV moulding rubber. Check that the catalyst is matched for the rubber that you are using. Some catalysts are not interchangeable.

Most catalysts are designed to give a 24 hour full cure and have a working time of up to two hours. There are however some catalysts that enable de-moulding within 90 minutes. However these very fast catalysts only give a working time of 5 – 8 minutes including the mixing. The thing to remember is the faster the cure, the shorter the working time.

If the catalyst has a low percentage addition rate, use a medical syringe to measure it out. The specific gravity of most of the catalysts range from 0,97 to 1,14. Therefore it is close enough to assume that 1ml equates to 1 gram.

##### For example:

##### If a rubber has a 2% catalyst addition rate

1kg (1000g) of Rubber requires 20ml of catalyst  
500g of Rubber requires 10ml of catalyst  
100g of Rubber requires 2ml of catalyst  
50g of Rubber requires 1ml of catalyst

##### If a Rubber has a 5% catalyst addition rate

1kg (1000g) of Rubber requires 50ml of catalyst  
500g of Rubber requires 25ml of catalyst

100g of Rubber requires 5ml of catalyst  
50g of Rubber requires 2.5ml of catalyst

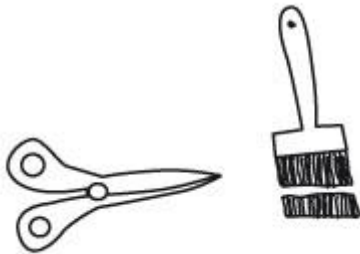
Be careful when adding the catalyst to the rubber from a syringe. If you press the syringe plunger too hard the catalyst could bounce off the surface of the rubber into your eyes. Safety glasses are recommended.



**Tip:** Cover the top of your mixing vessel containing the rubber with cling wrap and puncture the wrap with the syringe. This will prevent the catalyst from splashing out when the plunger is depressed.

Mix a small amount of rubber and catalyst for this operation. **Do not mix a full batch.**

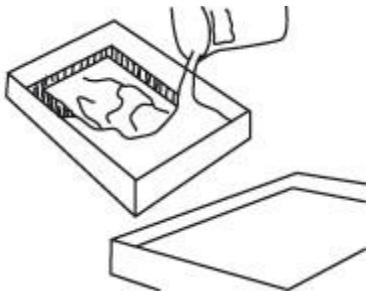
It is recommended that you cut the bristles of the paint brush short so that they are stiff and can break any air bubbles that may be trapped in the undercuts.



Wait for this layer to get tacky. Then mix the full batch that you need for filling up the mould block.

Use a flat bladed spatula for mixing and gently fold the catalyst into the rubber taking care not to create air bubbles.

## 6. Pouring the RTV

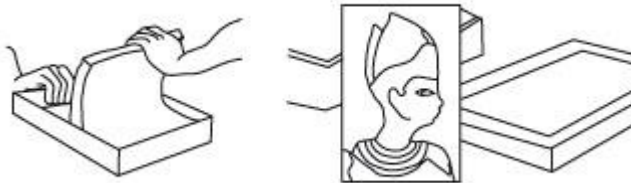


Slightly tilt the mould box and pour in the catalysed rubber at the lowest point and let it fill very slowly to avoid any air bubbles. Allow to fill up to a point about 10mm above the highest point of the master.

Once the mould box is filled to the desired level tap the box a few times against the table to allow any air bubbles to rise. These can then be broken using a pin or a tooth pick.

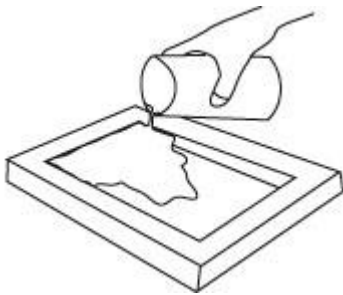
Allow to stand for between 6 and 24 hours depending on the curing time of the catalyst that you have chosen.

## 7. Releasing the mould



Once the mould has cured remove it from the mould support and peel it from the master.

## 8. To Reproduce



Choose whichever casting material you wish to use to reproduce your master. The most common items are plaster of Paris, polyester resins, polyurethane resins, epoxy resins, wood pulp cement waxes, soap, and even some low melting point alloys.

Mix your chosen casting material according to the manufacturers' instructions and pour into the mould. Do not use any mould release in a silicone rubber mould as silicone has natural mould release properties.



## 9. Releasing the copy

Because the silicone rubber is flexible and has natural non-stick properties, the reproduction can be easily removed.

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