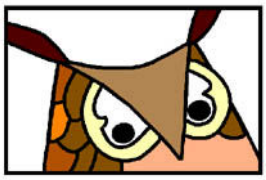


Basics of Slip Casting

INTRODUCTION

In theory, slip casting is a simple procedure, but in practice contains some complex variables. These include the base materials, water, the shape to be cast, mould design, and type & amount of deflocculant used. Following a few rules and employing accurate testing procedures will go a long way in helping you achieve good slip casting results.

MATERIALS & CHEMICALS USED IN CASTING SLIP

Talc is a non-plastic material that is used as a filler and body flux. It controls thermal expansion in the fired bisque, which results in a proper glaze fit. Clay is a plastic or elastic material that comes in a variety of grades. Ball clays are most commonly used because of their plasticity and added green strength to the piece. The fluidity of a slip is related to the amount of organics & the variety of particle sizes it contains. Clays higher in organics tend to require a higher percentage of deflocculant to make the slip fluid. Particle size is also critical in that a greater variety of particle sizes will produce a more fluid slip. Less water is also used due to a denser packing of particles.

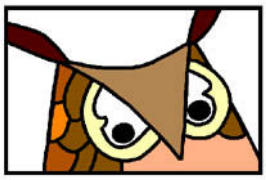
Deflocculants are electrolytes that cause clay particles to become electrically charged and thus repel each other. The degree to which this occurs is the most important factor in creating a good casting slip. A good casting slip should contain no more than 50% water by weight and this can only be achieved through the use of deflocculants. They allow the clay particles to move more freely, thinning the mixture without increasing the amount of water.

Water is often overlooked when mixing slip. Chemicals such as chlorine are added to the water supplies by municipal water companies. These chemicals may make it necessary to use slightly more or less deflocculant. Changes in the water can occur whenever the water companies make adjustments to their supply. It is important to carefully measure the water each time you mix. Making a mark on the side of the mixing tank is not an accurate way to measure water.

MIXING YOUR OWN SLIP

Start off by reviewing mixing instructions and be sure to have all equipment and pre-measured materials ready to go before you start. The following formula shows the typical amounts for 100kg dry slip:

Dry Casting Slip 100kg.
Water 25 litres



Up to 1 litre deflocculant

Mixing Instructions

1. Pour 20 litres water into the slip mixer.

2. Slowly add dry clay to mixer. Dumping the clay in too quickly will cause it to "ball up" & take much longer to mix.

3. Work any dry, unmixed clay into the mixer's vortex, avoiding contact with the propeller.

4. After approximately 15 minutes of mixing, observe the mixing action of the slip. Deflocculant can be added to bring the slip close to its proper viscosity. This is a critical stage since adding too much deflocculant will over deflocculate the slip and cause a number of casting problems.
   The slip should appear a little thick at this stage.

5. Mix until smooth

6. If feasible, leave for 24 hours, to allow slip particles to have fully wetted. It's now time to fine tune the slip with the deflocculant. Before doing this, perform the test below. "Eye balling" the slip is not adequate. It must be tested properly.

TESTING PROCEDURE - WEIGHING TO FIND SPECIFIC GRAVITY - the density of the slip

1. Using a gram scale, place a 250 ml graduated cylinder on the platform & "zero out" the scale.
2.
2. Fill the cylinder with slip to the 250 ml mark, weigh it & make a note of the weight.

3. Fill the cylinder with water to the 250 ml mark, weigh it & make a note of the water's weight.

4. Divide the weight of the slip by the weight of the water. This will give you the specific gravity. The proper specific gravity should be around 1.85.

If still too thick and spec gravity is about right, add more deflocculant.

Any further questions about slip mixing should be directed to Matthew, who can assist you further – matt@hobbyceramicraft.co.uk