



TECHNICAL TIPS

A Guide to Binder & Refractory Choices for the Small Investment Caster or Art Caster

There are a wide variety of materials available to the investment caster today. This guide is designed to assist in binder, refractory and stucco choices. The choices you make for your slurries will depend on the alloy and casting temperature you are using. The variety of slurries you use will depend on the number of tanks and mixers you have available.

BINDERS

As commercial investment foundries have grown - so have the varieties and attributes of the binders available to the caster. The following products are options for the smaller caster and art caster as a result:

1. *Primcote® binder* - Specifically formulated for use in primary slurries. It is designed to eliminate buckling, lifting and cracking of the primary shell coats. The colloidal silica based formulation contains proprietary additives as well as wetting agent, antifoam and color indicator to monitor shell dryness. To make up slurries, simply add the refractory of your choice.

Primcote binder can also be used for backup slurries, if only one binder is desired, although the Fascote® system is recommended.

2. *Fascote system* - An innovative, colloidal silica based binder to be used exclusively with Fascote refractory to form the Fascote backup slurry system. The Fascote system produces strong ceramic shells quickly. This system provides greater versatility than conventional backup systems and is widely used by art casters.

3. *Customcote® binder* - Based on Fascote system technology, Customcote binder can be used for primary and backup shell coats. This binder can also be used with a variety of refractories depending on the individual foundry's process and casting requirements. The binder's lower viscosity allows for better coverage in slots and shorter drain times.

4. *Colloidal silica* - A generic binder used in construction of ceramic shells. This binder usually requires additives and has drawbacks that include long dry times, bulky shells and primary coat cracking.

REFRACTORIES & STUCCOS

1. *Zircon* - Chosen as a primary slurry refractory and stucco due to its nonreactive nature with common metals and its ability to chill the metal in the mold. Zircon has the highest density of any of the conventional refractories. Zircon is not normally necessary for low melting alloys (aluminum, bronze, etc.) Zircon is often used in combination with fused silica in primary slurries.

2. *Fused silica* - Chosen as a slurry refractory and stucco, it provides superior shell strength and easy knockout. Shells constructed with fused silica hold their dimensions better. It is excellent for all common alloys cast. If

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DENSPLY®

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used in primary slurries for high temperature alloys, it is normally used in combination with zircon. Fused silica has very stable thermal expansion properties.

3. *Fascote refractory* - A fused silica based backup slurry refractory to be used exclusively with Fascote binder.

4. *Alumina silica* - Chosen typically for use as a backup stucco and/or refractory, usually because it is inexpensive. However, low alumina type alumina silicas can bulge under the temperature and pressure of casting. The thermal expansion of alumina silica is higher than fused silica, therefore, the castings will be slightly larger. Alumina silica shells are more difficult to remove from the castings than fused silica shells.

The following list of slurries are recommended depending on the number of tanks available and the desired quality of the final castings. NOTE: Refer to specific product application instructions for appropriate usage details.

ONE SLURRY TANK

Primcote binder and the refractory of your choice: Use one of the recommended primary formulations from the Primcote binder application instructions and change to a coarser stucco after the primary coats have been completed.

TWO SLURRY TANKS

a. Primary: Primcote binder slurry

Backup: Colloidal silica slurry

Use this when the drawbacks of colloidal silica are of little concern. Also use if no slurry controls are in place.

b. Primary: Primcote binder slurry

Backup: Primcote binder slurry

Use this when slurry controls are in place and quality is a concern.

c. Primary: Primcote binder slurry

Backup: Fascote binder slurry OR Customcote binder slurry

The ultimate ceramic shell, requires good slurry control and well-controlled process to optimize system benefits and attributes. This system will produce excellent castings quickly and safely in a moderate to high volume investment casting foundry.

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