

Casting Stones in Place

Although casting stones in place is not a new method of production for jewelry manufacturing, there has been a renewed interest and an increase in the use of this process in the last five years. Investment manufacturers and jewelry casters are currently conducting research and development for an investment material that is specifically formulated for this process.

The use of extra-fine-grain, “zero – mineralized cristobalite” investments is highly recommended for casting stones in place. A jewelry caster can purchase the high – purity cristobalite investments currently available and, by using simple modifications, cast stones in place. These high – quality investments will produce a smooth, lustrous finish to the as-cast piece, reducing the need for intense polishing processes once the stones are in place.

With the addition of boric acid to the investment slurry, the stones are not damaged by oxidation during burnout or the actual introduction of molten metal into the mold. However, the boric acid should be mixed into the water prior to the addition of the investment powder. This will ensure that the boric acid is homogeneous throughout the investment slurry mixture.

The boric acid powder is dissolved into 82°C water at about 15g per 450ml of water and not exceed 40g per 1000ml of water. After the water/boric acid solution has been allowed to cool to room temperature, the investment powder should be mixed quickly into the water/boric acid solution. With the boric acid addition, the investment has a tendency to set up rapidly.

In the case of stones that require low burnout schedules, residual carbon from an incomplete burnout may exist in the flask. Extend the top temperature of the burnout schedule for a couple of hours to eliminate as much carbon as possible. You will not be able to eliminate all of the carbon from the standard investment formulas.

While you may achieve success with casting the stones in place, you may also develop some slight gas porosity. Gas porosity results from the residual carbon combining with the free oxygen released by the decomposition of the gypsum-bonded investment to form CO₂. Some companies produce a liquid additive for investment powder that helps eliminate carbon from low-temperature burnout and simultaneously protects the stone.

Burnout Temperature for Casting Stones in Place

Cubic Zirconia	732°C
Ruby and Sapphire	593°C
Diamond with boric acid addition	566°C
Diamond without boric acid addition	510°C

After casting, allow the as-cast flask to cool to room temperature before attempting to break out the cast pieces. Always break out stone-in-place flasks over a separate container to retrieve any stones that may have fallen out. Be aware that the flask will be harder to break out due to the

boric acid content in the investment. If necessary, soak the as-cast tree in a warm pickle bath for several hours.

By using slightly modified investment mixtures, burnout schedules, and flask temperatures; by adding 50°-75°C to the metal liquids temperature; and by allowing for the cooling effect of the stones; many jewelry casters should be able to cast stones in place successfully.

The liquids temperatures for typical jewelry casting alloys are listed below.

Metal	°C	Metal	°C	Metal	°C
Sterling Silver	900°C	18KY	920°C	18KW	955°C
10KY	855°C	10KW	975°C	14KPdW	1120°C
14KY	835°C	14KW	950°C	18PdW	1150°C