



Casting Process: Silica Sol Casting

Silica Sol Casting is a form of investment casting. The process is very similar except that the investment mould is made from Silica Sol Zircon sand mixed with refractory powder. Silica Sol Zircon sand is exceptionally fine-grained (10-20 Microns) and can be mixed to a slurry with very low viscosity when creating the mould. The result is a casting method that delivers dimensionally accurate castings with excellent as-cast surface finishes. Crucially, the Silica Sol Zircon moulds can withstand temperatures up to 2000°C, making them very useful when casting high temperature alloy steels and stainless steels.

This process data sheet describes the basic steps involved in the silica sol casting process as well as the benefits and limitations of the process:

- 1** A metal die is made, the impression being the same as required in the final mould.
- 2** Molten wax is injected into the metal die to create a pattern, allowed to solidify and then removed. Complex wax patterns can be created by joining several patterns together.
- 3** The waxes can be assembled on a wax tree consisting of many parts. Components are usually in the weight range 0.1kg to 50kg.
- 4** The tree is immersed in fine, low viscosity, Silica Sol Zircon slurry to coat the wax. This coating process with a refractory material is repeated several times until a shell is created around the wax pattern.
- 5** The drying process is critical. The shells must be allowed to dry naturally in a constant temperature to allow the Silica Sol gels and refractory particles to bond, the result is a strong, high quality shell mould.
- 6** The trees of wax are put into ovens of about 200°C to melt out the wax. When all wax is removed the trees are heated up to over 1000°C to complete preparation for casting.
- 7** The metal is then poured into the hot moulds, which allows the alloy to reach the thinnest sections of the mould before it solidifies. Finally, the shell moulds are broken away to reveal the finished casting.



Silica Sol Casting

Why use NovaCast Silica Sol Casting?

Silica Sol casting delivers many benefits including:

- Great versatility; suitable for casting most metals.
- Will allow very intricate castings to be produced with thin walls.
- Smooth surface finishes with no parting line so machining and finishing are reduced/eliminated.
- Allows un-machinable parts to be cast accurately instead.
- Excellent dimensional accuracy
- High volume production can be achieved with low repeat costs.
- Can be used to prototype and prove designs prior to die casting tooling investment.
- Is ideally suited to smaller, intricate or complex designs.
- Low material wastage.

Limitations of the process

There are some disadvantages including:

- Preparation of the wax patterns and shell moulds is time consuming due to the need to naturally dry the moulds in temperature-controlled conditions, so can be expensive.
- Investment casting is not well suited to very high volume manufacturing due to the cycle times.

About NovaCast

NovaCast has over 40 years of ferrous and non-ferrous metal casting experience extending into markets as diverse as transport, utilities, offshore and general engineering. Our non-ferrous foundry, in Melksham, England, is supported by a fully risk-managed supply chain that extends out to the Far East allowing us to provide a single source solution for precision cast and machined components.

To find out more, get a quote or just to discuss your project, give us a call on +44 (0)1225 707466 or email sales@novacast.co.uk