

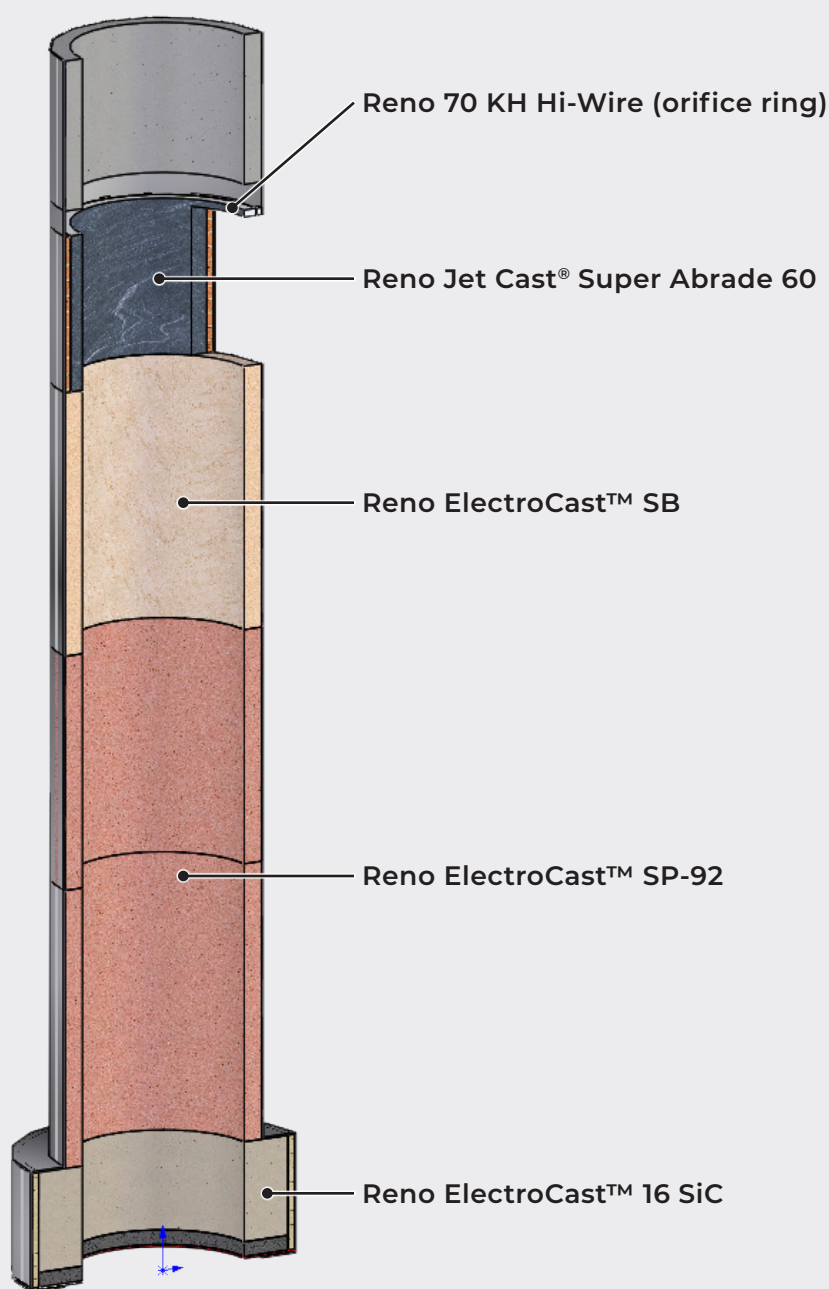


RENO
REFRACTORIES, INC.

NEW TECHNOLOGY FOR SIDE CHARGING CUPOLAS

NEW TECHNOLOGY

Reno Refractories, Inc. is proud to introduce our new Refractory Technology, "**Reno ElectroCast™**." When mixed with our world-leading no-cement nano-bonded colloidal silica products, cupola furnaces will perform longer and provide coke and alloy savings, as well as, lower turnaround and maintenance costs for our valued customers.



NEW RENO ELECTROCAST™ TECHNOLOGY

All of these new products provide properties that are unmatched, by any other refractory supplier. These are:

- Almost Zero Permeability
- Super High Hot Strengths
- Pore Sizes as low as 0.01 micron
- Abrasion Values below 3 CC Loss
- No Alkali or Iron Oxide Penetrations
- Impact Resistance
- Vapors or Molten Slags do not Wet the Structure
- Lasts Longer with High Volume Charging

Well

Wall and Floor Safety
Hot face
Maintenance

4.5" Arch Brick (walls) Straights (floors) x 70% Low Iron Brick
Reno ElectroCast™ 16 SiC
Reno NC Gun 6044

Combustion & Melt Zones

Well to 10' above Tuyeres

Reno ElectroCast™ SP-92, Cast and Dried or Pre-Cast Design.
Hottest temperatures, and exposure to high amounts of
Ferrous Oxides in the slag, similar to a steel melting furnace.

Maintenance

Reno NC Gun 90

Pre-Heat & Charge Zone

Reno ElectroCast™ SB, Cast and Dried or Pre-Cast Design.
Many cupolas use bauxite containing products, 85% Brick, etc.
Over time, the high iron contents will allow carbon monoxide
to exfoliate the grains and the refractory becomes weak. The
new product from Reno is made from Fused Alumina Grains
(same as grinding wheels) to eliminate carbon monoxide
destruction and provide the abrasion resistance for longer
campaigns.

Charge Openings / Upward

Reno Jet Cast® Super Abrade 60

Reno was the first company to provide shot-crete. This is our
premium low cement, alkali resistant product for extreme
thermal cycling conditions.

Orifice Rings

Pre-Cast Designs made from **Reno 70 KH Hi-Wire Technology**

Cross Over Ducts

Reno ElectroShot™ SIL 99

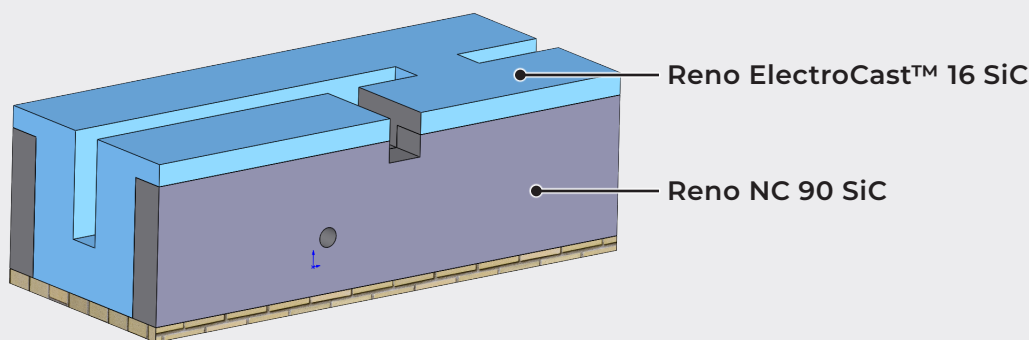
This application must be tight and stable. Our new, all silica,
based refractory can tolerate the temperature swings easily
and remains slick in service due to the extremely low pore size
openings.

Tap Hole

Pre-Cast Block made with **Reno ElectroCast™ SP-92**
Reno Rock BTW Plastic rammed around to seal the tap hole block

Many cupolas start up with an open tap-hole. This super-hot blast air can oxidize the carbon containing surfaces of castables or resin bonded plastics, and shorten the tap-hole's useful life.

Reno's new ElectroCast™ Technology seals the porosity and almost zero permeability withstands the molten iron/slag mixtures as well as or better than the traditional products, such as our resin-bonded Reno Rock BTW Plastic, etc. The difference is that with our new technology coupled with magnesia /alumina spinel, the composition does not contain carbon or silicon carbide. Thus no oxidation at start up or during the campaign.



Front Slagging Trough

Reno NC 90 SiC castable as the safety lining next to the steel shell
Reno ElectroCast™ 16 SiC as the hot face working lining

The front trough hot face must experience and resist 100% of the molten iron and slag produced in the cupola. The most extreme wear is experienced at the cut-line, the metal/slag mixture as this is the most corrosive portion of the layered bath. Velocity and temperatures can affect the wear rates, as well as the metals / alloys / limestone mixtures charged into the cupola. While we cannot control the operational factors, we can offer general rules that can impact the refractory performances; these are: Shape, Safety Lining Selection, and Hot Face Refractory Selection.

Shape

The troughs hot-face surface can benefit from slowing the velocity of the slag swirling against the slag dam, and circulating back and out of the side cut exit channel. It is imperative to keep the slag chute free and open which reduces the total quantity of slag carried in the trough. Another action that can be done is to reduce the sidewall thickness at the top of the trough to form a V-Shape. This will provide a wider pool which will reduce the height of the slag bath. By using the refractory products selected, this can be safely done in steps, until the pool is enlarged as much as possible. The wider opening also helps when patching as it gives more space if ramming a plastic patch, etc.

Safety Lining 33% of Thickness

Our safety lining, Reno NC 90 SiC, is a 90% containing silicon carbide, no-cement castable. This product is key as it has the highest thermal conductivity to rapidly transfer the heat away from the hot-face. Faster heat sinks, will slow the corrosion at the surface and extend wear rates.

Hot Face Refractory 67% of Thickness

The hot face must exhibit high hot strengths to resist the metal and slag rubbing against the sides, as well as the temperatures of the corrosive mixtures. At the cut line, you will see a concave line as if the bath is eating away in a "C-Shape." Many factors are at play such as miniature explosions of lighting created by the electrical static electricity generated by the passing iron on the grounded refractory. These miniature storms are pushing gases into the refractory structure – this is why the cut line extends above the metal / slag line. These hot dirty gases are the reason they are being forced into the surface when these electrical charges take place. The only effective way to combat this is to seal the permeability of the refractory structure and prevent these gases from penetrating the structure. Reno's new scientific breakthrough in refractory bonding technology, Reno ElectroCast™, has produced products unknown to science before now, with almost zero permeability, and extremely high hot strengths. These new characteristics provide the longest lasting refractory for cupola trough campaigns.

It is the mission of Reno Refractories to investigate, develop, communicate and deliver valuable refractory products and services to our customers in North America. We have a responsibility to supply the best value in refractory technology by optimizing the profits and safety of our customers. We take pride in our reputation as a leader in these endeavors.