

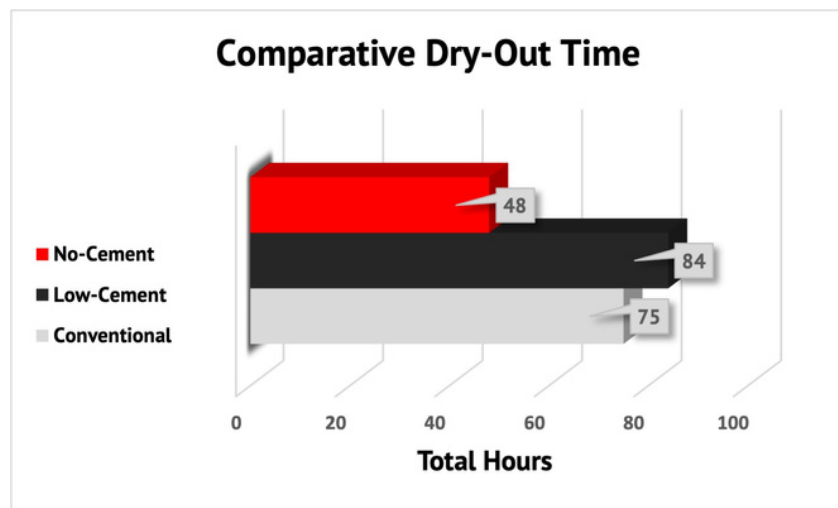
NC (Sol-Gel)



Reno Refractories offers a complete line of products based on the sol-gel principle. This bonding system utilizes colloidal silica as a source of nano-scale spherical particles and has many technical advantages over other bonding techniques. Refractories bonded with No Cement (NC) technology attain properties unachievable with cement bonds.

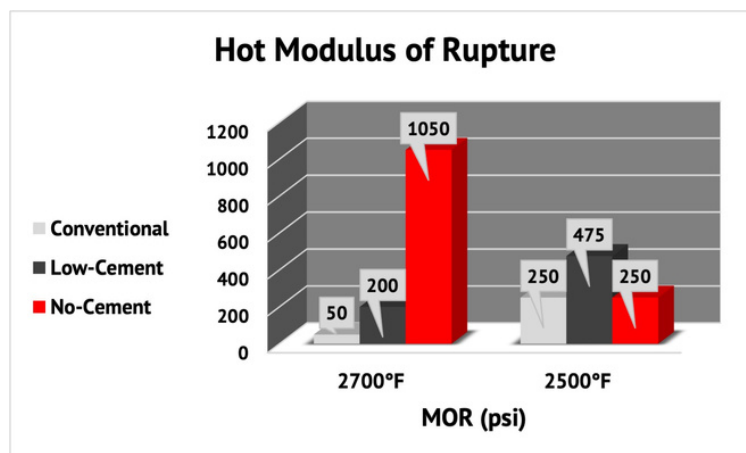
Dry-out

In cement-bonded castables, explosive spalling can quickly occur due to calcium aluminate-hydrate crystals formed with water. Dry-out for NC products can begin as soon as the installation is complete due to easy, rapid moisture release throughout the lining. This quick dry-out capability saves 4-24 hours for curing and 20-30% time savings.



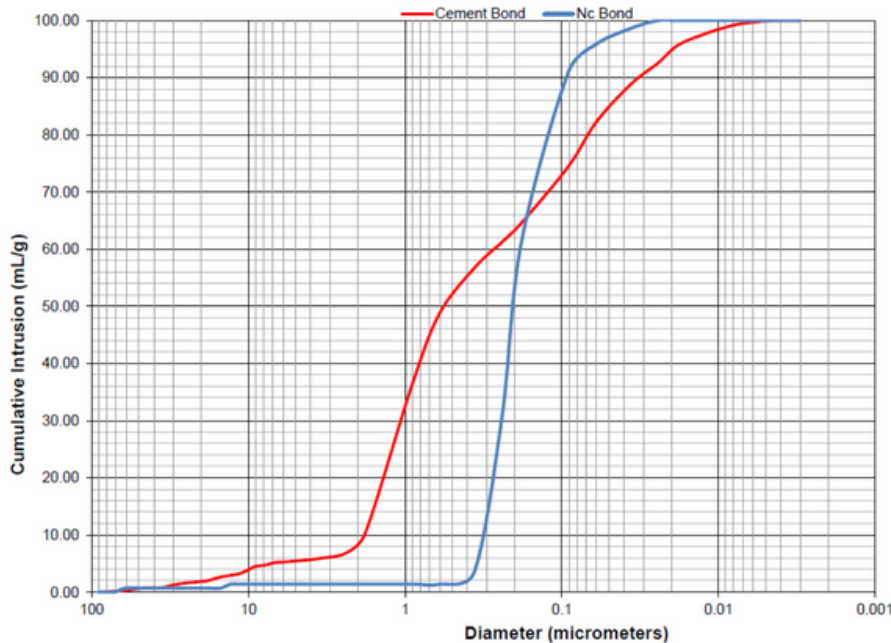
Hot Strength

NC Castables achieve a 100-300% increase in Hot Modulus of Rupture (HMOR) @2500F compared to low cement products of similar density. The bond system incorporates a mullite-forming binder that yields higher hot strengths. This hot-strength increase reduces erosion from dust-laden air streams at higher temperatures.



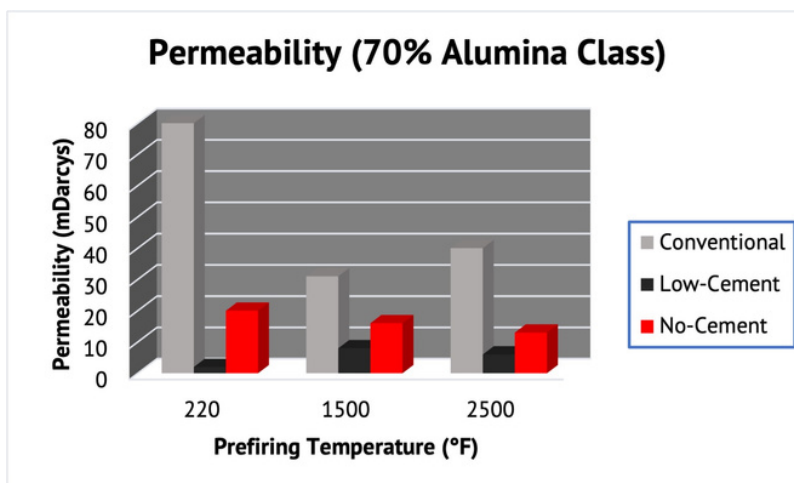
Pore Size Reduction

Pore size openings are considerably smaller in NC sol-gel castables. Generally, the pore size is 1-2 microns compared to 10-30 microns in low cement products. Smaller pores inhibit the ability of slag or other liquids to enter the structure and react with the refractory. This reduction in pore size makes the NC castables “non-wetting” to most metals by nature, with a stronger and more dense bond structure at higher temperatures.



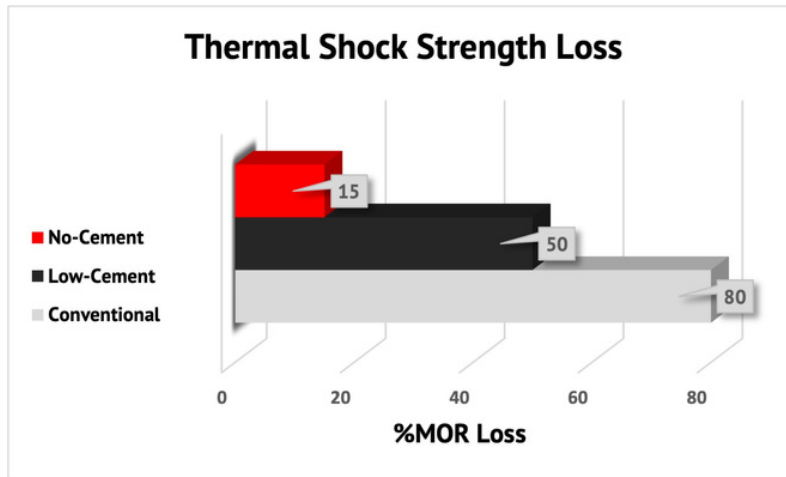
Permeability

Permeability is the ability of a gas or liquid to pass through a material under a certain pressure. Permeability is critical in determining the corrosion resistance of a refractory from harsh slags and vapors. Slags penetrate refractory pores and corrosively destroy the life of the lining. Reno’s Sol-Gel bond creates low permeability on the scale of millidarcys (mD). This prevents virtually all penetration to slags and vapors while yielding an easy escape for liquid for a rapid dry-out.



Thermal Shock

NC Castables retain over 70% of their original strength tested under shock procedure (ASTM C-1171). These values are 50-100% better than competitive cement-bonded castables. The non-crystalline nature of the gel bond is more flexible and resists damage due to expansion/contraction.



Alkali Resistance

The No Cement bond does not contain calcium compounds that cause cracking after reactions with sodium or potassium vapors. The gel bond is much more resistant to reaction with alkali vapors in the 1100-2000°F temperature range.

Porosity

The smallest common particles used in low/ultra-low cement castables average ~4 microns in diameter. The average size of silica colloids in Reno's No Cement products is 14 nanometers in diameter. This size comparison is equal to that of a 40 foot hot air balloon to a golf ball's diameter.

