MT. SAVAGE SPECIALTY REFRACTORIES

THE BUZZ

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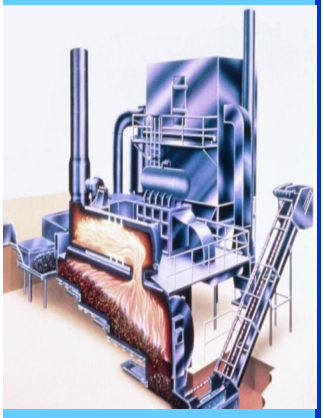
- Silicon Carbide Specialties, Page 2
- Pumpable Lightweights, Not so Easy, Page 3
- Workhorse Refractory Aggregate, 60% Alumina, Page 3
- No Cement Gunning at its Finest, Page 1
- Dr. Dirt, Page 2



Savage X™ Gun Mixes are ideal for incineration units. The bonding phase is resistant to both alkali and acids, a unique combination. The bonding system attaches it well to used refractory making it an ideal repair material.

No Cement, Today's Way to Gun!

SAVAGE X™, Mt. Savage Specialty Refractories' (MSSR) remarkable new cement free bonding system, is taking the refractory world by storm. Developed as a single component silica gel (sol gel) bond, it has performed remarkably well in numerous types of furnaces. Since its introduction, MSSR improvements to the technology have opened up even more applications.

From its inception, the bonding phase in SAVAGE X™ gunning mixes has been remarkably versatile and successful. Improvements over the past year, which include higher green and intermediate temperature strengths, have made the product even more versatile. These improvements have been applied to castable versions of SAVAGE X™ and they will now develop a good set in 10 to 16 hours, making it easier to remove forms. An activator system for shotcrete is now available that allows the product to develop a set in a couple of hours, again removing the need for heat to generate green strength.

Though cement free, SAVAGE X™ still requires a controlled dry out to prevent spalling. Having no hydraulic phases, all the water is contained as free water. Still, care must be taken to heat slowly until a majority of this water is gone through the entire lining. To address applications that cannot be dried out in a controlled fashion, MSSR has introduced SAVAGE X-II™, a two component system that is much less prone to steam spalling. Shotcrete and castable versions of this product are available.

SAVAGE X™ 60 GM has become one of MSSR's biggest selling products. Because of this, our Curwensville plant is making every effort to keep product in stock. This may be the most versatile refractory gun mix in the world. The product guns very easily, with several contractors commenting that it might be the best gunning material they ever shot. It works in a wide range of temperatures, develops good hot strength and is resistant to both alkali and acidic environments. It can be gunned cold or hot, maybe being the best hot gunning mix available. Gunning mixes, because of their higher porosity than castables and shotcretes, also are much easier to dry out, so no X-II versions are necessary. Have an emergency repair, SAVAGE X™ 60 GM may just be what the doctor ordered (Dr. Dirt anyway).

A section of a cement kiln calciner roof being shot with SAVAGE X™ 60 GM. Overhead installation? No problem.

Silicon Carbide Specialties

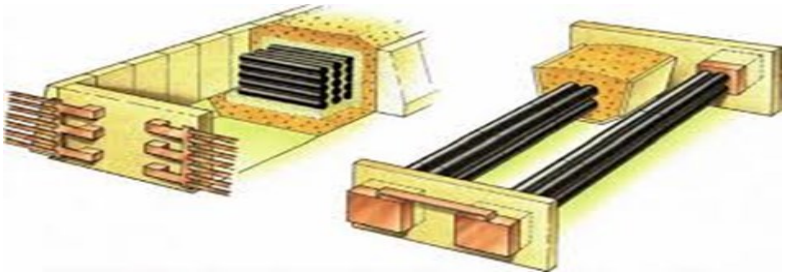
Producing silicon carbide takes a lot of electricity. For many years the hydro-electric energy of Niagara Falls was harnessed to produce SiC.

As discussed in an earlier Buzz Newsletter, silicon carbide (SiC) is a refractory and abrasive raw material made in an electric furnace called an Acheson Furnace, named after its inventor, Edward Goodrich Acheson. He made the first commercial silicon carbide in 1893 and formed the Carborundum Company. SiC is an excellent refractory material, having an extremely high melting temperature in reducing atmospheres (4946°F) and excellent resistance to many ferrous and non-ferrous slags. One of the principle uses of SiC is for its high thermal conductivity. This makes it ideal for boiler tube refractory, offering protection to the tubes while still allowing efficient transfer of heat.

Mt. Savage Specialty Refractories (MSSR) offers a number of silicon carbide containing refractories for a variety of applications. SiC at lower levels (10 – 20%) are used for applications that see ferrous slags such as troughs and slag runners. Higher SiC levels can be used for cement applications as this has been shown to resist build up from cement feed reactions. Still higher SiC containing products, like BLACK JACK RAM 80 (80% SiC) or BLACK JACK CASTABLE (83% SiC) are used for heat transfer in boiler tube operations due to SiC's high thermal conductivity.

MSSR is now buying larger lots of SiC directly from manufacturers, making us extremely competitive in the refractory market. If you have an application that could use a SiC specialty product, contact your local MSSR representative and ask for more information.

Acheson Furnaces use electricity to heat graphite electrodes to very high temperatures



Ask Dr. Dirt

Stinger says "Q-TEK™ SUPER and SAVAGE X™ may be the most unique refractory products in the world"

Dear Dr. Dirt: MSSR has these two new products, one called SAVAGE X™, one called Q-TEK™ SUPER, when do you use one versus the other? **Coin Flipper in Michigan**

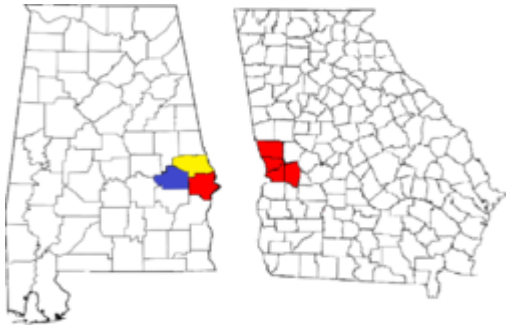
Dear Coin: Both products are lime free alternatives to conventional and low cement products. Both give excellent acid and alkali resistance and have had tremendous success in a number of applications. The main difference is that SAVAGE X™ is a concrete while Q-TEK™ SUPER is a plastic.

SAVAGE X™ GM is the easier of the two to install, many contractors say it is the easiest refractory product they have ever worked with. SAVAGE X™ also generates high hot strengths as the bond converts to mullite at high temperatures, and is the better product where hot strength is needed. Q-TEK™ SUPER, being a plastic, has much better macro-thermal shock resistance than any concrete. Q-TEK™ is also the easiest of MSSR's products to dry out so is recommended when controlled dry out is not possible. In short, use Q-TEK™ SUPER when you would use a plastic, SAVAGE X™ for a hard castable or gunning mix.

Sixty Percent Alumina Calcines

The most common aggregate used by Mt. Savage Specialty Refractories Co. (MSSR) is a 60% alumina calcine. This aggregate starts as a bauxitic-kaolin lying just south of the fall line in Southern/ Central Alabama and Georgia. The fall line is the natural border between the hilly Piedmont region and the coastal plain. Two manufacturers mine this material, blend it, extrude it, and fire it to high temperatures so that all the kaolin and bauxite react with each other to form mullite and a alumina-silicate glass. Basically three products come from these mines, they are a 47% alumina calcined kaolin, a 60% alumina, and a 70% alumina aggregate.
In the 60% alumina aggregate, both the mullite and the silicate glass offer interesting properties for the use of this grain in refractory products. Mullite is highly refractory, having a melting point around 3600°F. It forms long, needle like crystals in the aggregate, giving it a super structure to resist high temperatures, creep, and thermal shock. The silicate glass helps densify the aggregate making it strong and offers resistance to alkali that are often present in refractory applications.

The aggregate is processed in a ¾ inch sized "noodle" that can be crushed down to various sizes. Many MSSR products such as ULTRA-TEK 60, SUPER HEATCRETE 30, Q-TEK™ 30, and SUPER HI-MUL Mortar are based on this aggregate. They are also used as a base for many 60% alumina brick that are used in a variety of applications that range from iron production through incineration.



This map shows the fall line area where 47 to 70% alumina aggregate is mined for refractory applications. Other deposits exist along the fall line from Western Alabama through the Carolinas, but are not currently mined.

Mortar Samples

In May and June of this year, Mt. Savage offered 15 pound mortar pail samples to customers for them to try SUPER HI-MUL. The feedback has been interesting, everything from, "You make mortar?", to "The finest mortar we have ever worked with!". Not all the comments were positive and we learned a lot. One customer said the mortar was too "wet" for their application, they needed a much stiffer mortar. Others didn't feel the mortar was as sticky as what they were used to. We are already working on ways to address customers' requirements not served by SUPER HI-MUL.

Mt. Savage will always take feedback on any and all products and attempt to improve their characteristics and performance. Still, the overwhelming response was that SUPER HI-MUL was an easy to use, very spreadable mortar that they would like to use in future brick laying operations.

High intensity mixing as supplied by an Eirich mixer is essential to having a smooth easy to use mortar.

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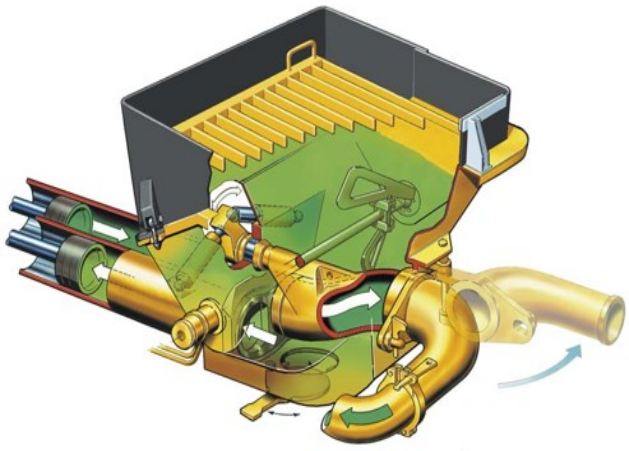
Pumping Lightweights is Hard ; Mt. Savage made it Easy!

What is the best way to get non-fiber insulation on top of a reheat furnace roof? If you use buckets to cast it, it will take forever. If you try to gun it or slobber cast it, you will get a lot of material on the support beams. Then the obvious thing to do is pump a lightweight refractory up, which would make avoiding material on the beams much easier. One would think that pumping lightweight would be easy; one would be wrong. Under pressure, lightweight aggregate has the water driven out of it and locks up a pipe and hose very quickly if not properly treated. Pumping lightweights is hard.

Mt. Savage Specialty Refractories (MSSR) discovered a trick that kept pump pressures from doing this to lightweight aggregates back in 2006. Since that time, they have advanced the technology significantly and offer a family of reliable, pumpable lightweight materials.

MSSR offers 4 different lightweight mixes that can be pumped, three of which can be shotcreted. They are DELTA t CRETE 23 ESP, DELTA t CRETE 25 ESP, DELTA t CRETE 28P, and DELTA t CRETE 28-110 ESP. The first two are about 60 pcf, the 28P about 80 pcf, and 28-110 ESP, well, 110 pcf.

A full 75% of the tonnage produced by MSSR is installed through a swing tube pump. Along the way we have learned a thing or two about what constitutes a good pumping mix. Working time, setting time, pumpability, flow and consistency are all important properties to be considered when developing a good pumping mix. When developing pumpable lightweights, MSSR took all of these factors into consideration to develop the most easy to use and reliable lightweight pumpables on the market. If you have a need to pump or shotcrete lightweights, calling your MSSR representative would be the smartest move you can make!



This is a diagram of a typical swing tube pump (courtesy of Putzmeister) showing how material fills the tubes, a swing tube moves over the now filled tube and a piston will push the material out through the opening. Until recently it was difficult to get lightweight materials to pump. Mt. Savage has solved that issue.

Stinger says "If you are going to pump lightweight refractories, go with the experts and contact Mt. Savage Specialty Refractories."