Fiberfrax® Silplate® Mass 1500 High-Temperature Coating

New Construction and Maintenance Solutions For High-Temperature Furnaces

The Silplate® family of products was developed by Unifrax to meet the demanding performance requirements of the steel industry. The uses of high-performance fibers, refractory oxides and proprietary binder systems have significantly improved the physical and thermal characteristics of conventional refractory ceramic fiber product forms. These developments have resulted in a new class of insulating materials that extend the benefits of ceramic fiber into applications that were not practical with existing insulating products.

Silplate structural insulation is recognized by many global steel makers as the preferred backup insulation in iron and steel transfer vessels. This material combines high compression strength, thermal stability, and excellent insulating performance when used as backup insulation in transfer ladles, torpedo cars, and steel tundishes.

The first products developed in the Silplate family were a series of insulating boards. Recently Unifrax engineers expanded the product portfolio by introducing a series of mastic coatings based on the Silplate technology. High-purity refractory oxides and polycrystalline fibers are bonded with an inorganic binder system to create a wet mix that can be applied as a hot face lining over brick, castable or ceramic fiber linings.

Once dried, this mastic provides a hard, tough armor-like shell over the surface of the substrate material. The cured Silplate Mass surface is highly resistant to flame impingement, flue gas velocities and chemical attack from fluxing agents common in industrial furnaces and kilns.

At high temperatures (>1300°C/2372°F) Silplate Mass forms Mullite, creating a ceramic bond between the fibers and fillers in the material. This bond provides high physical stability to the lining surface and protects the backup material over which it is applied. The Mullite chemistry makes the coating extremely stable at high temperatures. This thermal stability protects the substrate material from thermal shrinkage and reduces maintenance to the hot face lining.

Installation Techniques

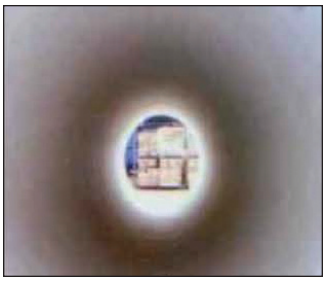
Silplate Mass high-temperature coating material may be installed using a variety of techniques. Typical installation techniques are outlined below:

- Placement through a furnace or vessel casing with a pneumatic pump to repair lining hot spots.
- Troweled on the surface of the refractory or fiber lining to increase service temperature.
- Pumped, troweled or gunned over existing linings to caulk cracks and extend lining life.
- Hot gunning over an existing furnace lining to replace lost or damaged refractory.
- Supplied as a “hard module” with factory-installed Silplate Mass coating for new furnace linings.

Typical Applications

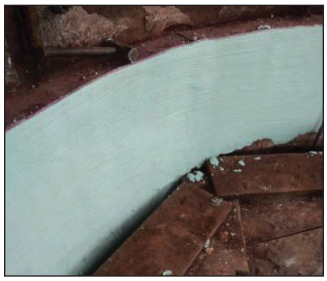
Hot Spot Repair

Mineral wool is frequently used as backup insulation behind refractory brick or castable furnace linings. Over time this backup insulation may degrade due to burnout of the organic binders, over compression or shrinkage of the material. The hot spots which result from the failure of the backup insulation are easily repaired without shutting down the unit. Silplate Mass may be pumped in through the casing or poured in place to stabilize the working lining.



Shop Fabrication of Ducts, Incinerators and Stacks

Silplate Mass is troweled in place over the module face to provide a lining surface resistant to high gas velocities and resistant to chemical attack. The material is easy to install in the shop and does not require special dry out procedures. The construction technique is ideally suited to the fabrication of furnaces and vessels that must be shipped for field assembly.

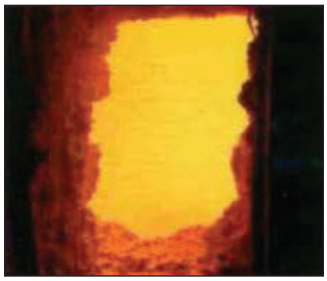


Application Over Refractory Linings

Silplate Mass may be applied in thicknesses up to 1" over the refractory or fiber surface. The mastic coating can be placed by gunning or hand troweling over the new or existing linings. Application of Silplate Mass 1500 will increase resistance to gas velocity, protect the lining from direct flame impingement, and repair or eliminate cracking due to thermal shrinkage.

Door for Heat Recovery Coke Oven

Installation of Silplate Mass 1500 has permitted the successful application of ceramic fiber linings in the severe environment of the heat recovery coke oven. The door lining pictured here features the “hard module” concept with a Silplate Mass 1500 layer protecting the fiber lining from high temperatures, chemical attack and mechanical abuse.



Hot Gunning Repair

To meet the challenges associated with the in-service repair of refractory, Unifrax has developed a hot gunning technique for installing Silplate Mass. Once access to the damaged area is established, a water-cooled lance is inserted in the furnace and Silplate Mass 1500 is gunned on to the lining. The proprietary binder system provides adhesion to the hot refractory surface while reducing rebound of the gunned material.

Doors for Aluminum Furnaces and Reheating Furnaces

Ceramic fiber module linings provide many operating benefits when used as a lining for a high-temperature furnace door. Operators have recognized that the use of ceramic fiber in steel reheat and aluminum melting furnace doors saves energy, reduces weight and eliminates damage due to thermal shock. To extend the service life of high-temperature doors, Silplate Mass 1500 was installed to protect the fiber from thermal shrinkage and provide a barrier to chemical attack from fluxes in the process.

Industries Served

Silplate Mass has been installed successfully over a wide range of applications. The material can be used to improve new linings or repair existing furnaces in the industries listed below:

- Iron and Steel
- Forging
- Aluminum
- Refining
- Chemical Processing
- Ceramic
- Power Generation
- Incineration
- Metals Processing

Silplate Mass Physical and Chemical Characteristics

Description		1500		1500
Color		Orange		Orange
Class of Temperatures	°C	1500	°F	2732
Max temperature	°C	1500	°F	2732
Wet density	Kg/m³	1280	Lb/Ft³	80
Dry density	Kg/m³	880	Lb/Ft³	55
Basic composition		Alumina-silica		Alumina-silica
Thermal conductivity	W/m°C		Btu in/h² ft°F	
	@ 350°C	0.135	@ 662°F	.94
	@ 600°C	0.458	@ 1112°F	1.10
	@ 760°C	0.462	@ 1400°F	1.12
Cold strain resistance	MPa	2.22	psi	322
Shrinkage @ 1500°C	%	< 1.0	%	< 1.0
Mass loss @ 1500°C	%	1.5	%	1.5

The test data shown are average results of tests conducted under standard procedures and are subject to variation. Results should not be used for specification purposes.

Main Characteristics

- Low thermal conductivity
- Excellent thermal shock resistance
- Strong adhesion to any surface
- Low thermal shrinkage
- Surface hardness
- Mechanical strength

Application Methods

- Trowel
- Gunning
- Pouring
- Molding
- Pump Injection

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For additional information about product performance, to identify the recommended product for your application, or for a specific heatflow calculation, please contact the Unifrax Application Engineering Group at 716-278-3888.

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Refer to the product Safety Data Sheet (SDS) for recommended work practices and other product safety information.

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