

ZIRCAR Refractory Composites, Inc. produces a comprehensive range of advanced high-performance ceramic-ceramic composites and related products. Our materials are used around the world in demanding thermal, structural and electrical insulating applications at temperatures from 600°C(1112°F) to 1650°C(3002°F). For over twenty-five years we have been a problem solver working with many industries to resolve their thermal management problems. We have developed materials that have become industry standards for induction melting, forging and heat-treating applications, investment casting, glass processing, hot pressing, as well as many high temperature electrical applications.

**ZIRCAR ALUMINA COAT** is an all-alumina liquid formulation used for hardening and increasing the refractoriness of the surfaces of alumina and aluminosilicate fiber products. ZIRCAR ALUMINA COAT is composed of high purity aluminum oxide in a water base. Hardening of the surfaces of blanket and felt insulation improves the resistance to erosion by high velocity gases and reduces the permeability of gases. The tendency of flame burn-through of low density ceramic fiber insulation in many cases can be prevented by a coating of ZIRCAR ALUMINA COAT. Ceramic papers, including alumina and alumina-silica paper can be rigidized with the liquid. Strong laminated tubes or complex shapes can be built up from saturated paper. Treated materials are ready for use as soon as they become dry. These treated materials are ideal for glass slumping and fusing molds and forms due to their non-sticking properties.

The liquid is easily applied by brushing, rolling, dipping, sponging or spraying. It may be diluted with water if desired. ALUMINA COAT is non-flammable and is not affected by freezing.

When applying with spray equipment, adequate ventilation and precautions against inhalation of particles should be observed. After the water has been removed by normal evaporation or by heating, a bond forms that stiffens the fibrous material. Coverage will depend on the degree of hardening desired. One gallon covers 100 ft<sup>2</sup> if sprayed as a thin coating about 1/16" thick.



## SUGGESTED APPLICATIONS

- ALUMINA COAT is used as a surface hardening and strengthening agent for low density alumina and alumina-silica ceramic fiber paper, blanket and board insulation.
- ALUMINA COAT is used as a bonding agent in the manufacture of "All-Alumina" high temperature composites and laminates.
- ALUMINA COAT is used to stop flame and hot high velocity gas erosion of furnace linings.

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### ZIRCAR Refractory Composites, Inc.

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# COATINGS AND HARDENERS

## ALUMINA COAT, AL-HARD, SI-HARD

**ZIRCAR AL-HARD Rigidizer/Hardener** is used to increase the hardness of ZIRCAR Refractory Sheet products. AL-HARD is comprised of Aluminum Oxide and Phosphoric Acid in a water base. Refractory Sheet products treated with AL-HARD are ready for use after drying. It forms a chemical bond that hardens the fibrous material to an almost rock-hard consistency. The degree of hardening depends on the amount of AL-HARD used and the strength of the starting material.

AL-HARD is non-flammable and is not affected by freezing. It can be applied by immersing, spraying, brushing or sponging on many of ZIRCAR's Refractory Sheet products.



### SUGGESTED APPLICATIONS

AL-HARD is used as a strengthening agent for ZIRCAR Refractory Sheet Products including:

- RS-A MOLDABLE
- RS CLOTH & TAPE
- RS-MS MOLDABLE SLEEVING

**The following is a summary of the effect of AL-HARD application at a rate of 5% solids pick-up (approximately 1 gallon/roll).**

#### AFFECTS OF AL-HARD APPLICATION ON CHARACTERISTICS & PROPERTIES OF TYPE RS-A MOLDABLE

Treatment of RS-A Moldable	Dried*	Fired**	Hardened***	Hardened & Fired
Density (pcf)	100	100	105	105
Porosity	40	40	38	38
MOR, psi @ Room Temp.	500	560	1330	665
Compressive Resistance, psi @ 10% defle	1000	1400	2500	1500
Durometer "D"	50	55	70	70
Pullout Strength, (lbs. on #10 sheet metal s	30	50	90	55

\* Dried to constant weight @100°C

\*\*Fired for 1 hour @600°C

\*\*\*Dried material treated with ZIRCAR AL-HARD @5 WT% Pick-up



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# COATINGS AND HARDENERS

## ALUMINA COAT, AL-HARD, SI-HARD

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**ZIRCAR SI-HARD Rigidizer Hardener** is an alkaline, aqueous dispersion of colloidal silica at 50% concentration. The dispersed silica is present as amorphous spheres, approximately 100 nanometers in size. The silica present is non-agglomerated and is completely dispersed. There is no mixing or dilution required. The particles carry a slightly negative charge and have a large surface-to-weight ratio. It is used for rigidizing and hardening the surfaces of ZIRCAR ceramic textile, papers and blankets. It also is ideal as a coating agent and binder.

SI-HARD is easily applied by brushing, rolling, dipping, sponging or spraying. It is nonflammable and is not affected by freezing. Coverage depends upon the desired hardness.

SI-HARD should be stored at temperatures between 5°C (41°F) and 32°C (90°F) to prevent irreversible precipitation of the silica.

Drying of treated parts can typically be accomplished at temperatures of 150°C (302°F) for one hour.

### SUGGESTED APPLICATIONS

- SI-HARD is used for coating surfaces of ZRCI textiles, blankets and papers for improved hardness, abrasion & chemical attack resistance.
- SI-HARD is used for forming of shapes (rigid tubes, boats, setters, supports, process fixtures etc.) by rigidizing flexible ZRCI materials.
- SI-HARD is used as a bonding agent in manufacture of ceramic fiber-containing refractories, composites and laminates.
- SI-HARD is used as a binder and extrusion aid in the manufacture of refractories.

### CHARACTERISTICS & PROPERTIES

Type	AL-HARD	ALUMINA COAT	SI-HARD
Color	Opaque White	Milky White	White
Composition. %			
H <sub>2</sub> O	68-75		
Al <sub>2</sub> O <sub>3</sub>	16-20	99+**	
SiO <sub>2</sub>			99+**
H <sub>3</sub> PO <sub>4</sub>	8		
Na <sub>2</sub> O			~0.12
Partical Size, mn			100
Surface Charge			Negative
Specific Gravity, gm/cc	1.2		1.4
pH	1.3		9
Solids Content, %	20	28	
Viscosity, cP			15

\*\* Dried Composition.



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# COATINGS AND HARDENERS

## TYPES ALUMINA COAT, AL-HARD, SI-HARD

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### APPLICATION INSTRUCTIONS (On Refractory Sheet Type RS-A Moldable)

ZRCI AL-HARD Rigidizer/Hardener can be applied to A Moldable at a rate of up to 1 gallon/ 24in. x 72 in. roll. It can be applied at a lesser rate depending on the degree of hardening desired.

Before applying, dry A Moldable at 100°C. Apply AL-HARD by immersing, spraying, brushing or sponging it on the surface of the dried product. Allow AL-HARD treated A Moldable to dry.

ZRCI's ALUMIA COAT and SI-HARD can be applied by spray, brush or by dipping. The amount of loading depends upon on the porosity of the material to be coated and the hardness desired.



## AVAILABILITY

ITEM #	DESCRIPTION
QS01	ALUMINA COAT, 1 QT
QS02	ALUMINA COAT, 1 GALLON
QS03	ALUMINA COAT, 5 GALLON
QS04	ALUMINA COAT, 55 GALLON

ITEM #	DESCRIPTION
LS01	AL-HARD, 1 GALLON JAR
LS02	AL-HARD, 55 GALLON DRUM

ITEM #	DESCRIPTION
LS50	SI-HARD, 1 GALLON BUCKET
LS51	SI-HARD, 55 GALLON DRUM

Larger sizes are available on request. Please contact ZIRCAR Refractory Composites, Inc. Sales department for information.



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