

**ZIRCAR Refractory Composites, Inc.** produces a wide range of insulating refractory papers. These non-woven, non-asbestos, fiber-based products are engineered as thermal barrier materials for use in high temperature applications up to **1450°C (2642°F)**.

Commonly used in the molten metal casting and heat-treating industries, ZRCI materials are also used as specialty gasketing in the fuel cell, nuclear, glass and electronic industries, as well as many other applications which require high temperature stability and low thermal conductivity. They also offer excellent corrosion resistance and unique handling strength for easy die-cutting, wrapping and forming.

ZRCI's line of refractory paper include a binderless product for applications where outgassing cannot be tolerated, non-respirable grades where fiber content is of concern, and high purity compositions where the reducing of silica cannot be permitted. One of these refractory papers consists of soluble, Non RCF fibers formed into highly insulating sheets. The fibers are soluble in body fluids and offer an alternative to refractory ceramic fiber blankets. These grades of materials meet European regulatory requirements, (Directive 97/69/EC).

### Alumina-Silica Fiber Paper

**ZRCI Alumina-Silica Fiber Paper Type ASPA-1 and ASPA-2** are premium grade, lightweight refractory material made from high purity alumina-silica fibers formed into highly flexible sheets. These alumina-silica fiber papers exhibit very low thermal conductivity and are designed for use in applications where purity, cracking resistance, high strength and resistance to heat are paramount. Due to their exceptional resistance to heat flow for their thickness, they provide maximum thermal resistance where space is at a premium. These materials are virtually shot free and are the cleanest refractory papers available. They are ideal for applications up to **1260°C (2300°F)**.

Type ASPA-1 contains an organic binder to provide increased handling strength at room temperature. It possesses excellent chemical stability and resists attack from most corrosive agents. Because of its high purity chemistry, it resists oxidation and reduction. If it becomes wet due to water, steam or oil, its physical and thermal properties will return upon drying. Type ASPA-2 is produced with no organic volatiles and will not produce smoke or odor when heated.

**ZRCI Alumina-Silica Fiber Paper Type ASPA-970** is an industrial grade, lightweight refractory material made from alumina-silica fibers formed into highly flexible sheets. This alumina-silica fiber paper exhibits very low thermal conductivity and is designed for use in applications where flexibility, high strength and resistance to heat are of paramount. Type ASPA-970 is ideal for applications up to **1260°C (2300°F)**.

Type ASPA-970 is available in a variety of thickness.



*ZRCI papers are ideal as high temperature gasketing.*

### Uses Include:

- Annealing Cover Seals.
- Flexible High Temperature Pipe Insulation.
- Furnace, Kiln, Reformer and Boiler Lining.
- Furnace Door Linings and Seals.
- Investment Casting Mold Wrap.
- Expansion Joint Seals.
- High Temperature Filtration.
- Glass Furnace Crown Insulation.
- Useful When Refractory Ceramic Fiber Are Not Desired.
- Thermal Reactor Insulation.
- Soaking Pit Seals.
- Insulation for Primary Reformer Header.
- High Temperature Gasketing.
- High Temperature Kiln and Furnace Insulation.

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### ZIRCAR Refractory Composites, Inc.

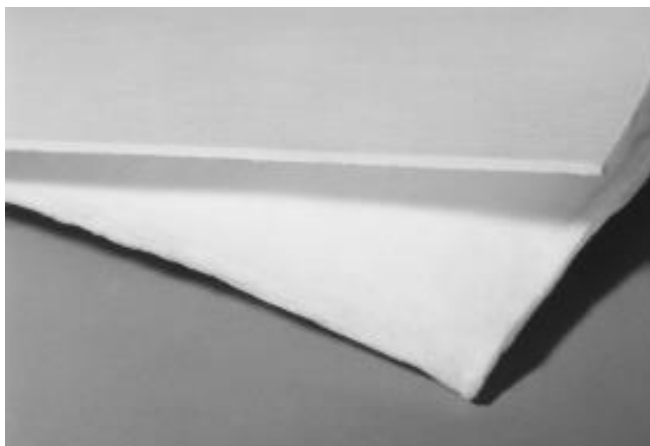
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### Technical Data

Bulletin No. ZRCI-425  
Rev December 2017

# REFRACTORY PAPERS

**ZRCI Alumina-Silica Fiber Paper Type ASPA-880** is a high temperature, lightweight refractory material made from alumina-silica fibers formed into highly flexible sheets. It is made from shorter and smaller diameter fibers with a higher alumina content and are laid up at significantly higher density. These factors lead to high temperature, slow shrinkage, higher strength, and better chemical resistivity. This alumina-silica fiber paper exhibit very low thermal conductivity and is designed for use in applications where flexibility, high strength and resistance to heat are paramount. Type ASPA-880 exhibits low thermal conductivity and is ideal for applications up to **1450°C (2642°F)**. It is used in environments where standard ceramic fiber papers will not survive.



## Physical Properties and Characteristics

Type,	ASPA-1	ASPA-2	ASPA-970	ASPA-880
Typical Composition, %				
Al <sub>2</sub> O <sub>3</sub>	47	51	49	55
SiO <sub>2</sub>	52	49	50	44
MgO	-	-	-	-
Other Oxides	1	trace	1	1
LOI, %	6 - 10	.5 max	5	8
Density, g/cc(pcf)	0.14(9)	0.128(8)	0.16(10)	280(17.5)
Color,	White	White	White	White
Type of Binder,	Organic	none	Organic	Organic
Fiber Index, %	70	75	70	45
Maximum Use Temp.*,C(F)	1260(2300)	1260(2300)	1260(2300)	1450(2642)
Melting Temp, C(F)	1760(3200)	1760(3200)	1760(3200)	1930(3500)
Mullen Burst, kPa(psi)	186(27)	138(20)	172(25)	255(37)
Tensile Strength‡, g/in	9300	-	5100	6500
Thermal Conductivity**, W/m K(BTU/hr. ft °F/in)				
500°C(932°F)	0.06(0.43)	0.05(0.38)	0.06(0.40)	0.08(0.57)
800°C(1472°F)	0.08(0.57)	0.08(0.59)	0.12(0.83)	0.12(0.83)
871°C(1600°F)	0.14(0.98)	0.13(0.85)	0.14(0.98)	0.14(0.98)
1100°C(2012°F)	0.16(1.18)	0.16(1.18)	0.17(1.26)	0.16(1.18)
Dielectric strength, V/mil	55	-	-	-

\* Maximum use temperature is dependent on variables such as stresses, both thermal and mechanical, and the chemical environment that the material experiences.

\*\* Properties expressed parallel to thickness.

‡ Properties expressed perpendicular to thickness.



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# REFRACTORY PAPERS

## SILICA-MAGNESIA, NON-RCF PAPER

ZRCI Silica-Magnesia Papers Type RSPA-SOL are thermal insulation products capable of withstanding continuous operating temperatures up to **1260°C (2300°F)**. Type RSPA-SOL papers are designed to have enhanced in-vitro solubility characteristics which enable them to meet European regulatory requirements for synthetic vitreous fibers (European regulatory requirements directive 97/69/EC).

These unique papers exhibit excellent chemical stability and resistance to attack from most corrosive agents. Exceptions include hydrofluoric acid, phosphoric acid and strong alkalis. Type RSPA-SOL papers also provide superior wetting resistance to molten aluminum alloys at high temperatures. Type RSPA-SOL papers will generate small amounts of smoke and trace element outgassing during initial exposure to temperatures above 230°C (446°F).

### Physical Properties and Characteristics of RSPA-SOL

Type,	RSPA-SOL
Typical Composition, %	
SiO <sub>2</sub>	74
MgO	24
Other Oxides	2
LOI, %	7 - 10
Density, g/cc(pcf)	0.16(10)
Color,	White
Type of Binder,	Organic
Fiber Index, %	70
Maximum Use Temp.*,C(F)	1260(2300)
Melting Temp, C(F)	1500(2730)
Mullen Burst, kPa(psi)	385(55)

\* Maximum use temperature is dependent on variables such as stresses, both thermal and mechanical, and the chemical environment that the material experiences.

\*\* Properties expressed parallel to thickness.

\* Properties expressed perpendicular to thickness.

### Uses Include:

- Annealing Cover Seals.
- Flexible High Temperature Pipe Insulation.
- Furnace, Kiln, Reformer and Boiler Lining.
- Furnace Door Linings and Seals.
- Investment Casting Mold Wrap.
- Expansion Joint Seals.
- High Temperature Filtration.
- Nuclear Insulation Applications.
- Glass Furnace Crown Insulation.
- Useful When Refractory Ceramic Fiber Are Not Desired.
- Thermal Reactor Insulation.
- Soaking Pit Seals.
- Reusable Insulation for Field Stress Relieving Welds.
- Insulation for Primary Reformer Header.
- High Temperature Gasketing.
- High Temperature Kiln and Furnace Insulation.
- Fire Protection for Pressure and Cryogenic Vessels.
- Lining for Incineration Equipment and Stack.

### Insulating Value of RSPA-SOL

The following table summarizes the insulating characteristics of RSPA-SOL Paper.

Insulation Thickness	3mm (1.12")	6mm (0.24")
Hot Face °C(°F)	Cold Face °C(°F)	
650(1202)	377(711)	296(565)
900(1652)	513(956)	408(766)
1175(2147)	659(1218)	530(985)

All heat flow calculations are based on a surface emissivity factor of 0.90, an ambient temperature of 27°C (80°F) and zero km/h (mph) wind velocity, unless otherwise stated.

**ZRCI Silica-Magnesia Papers Type RSPA-SOL** according to directive 97/69/ec, possess a fibre chemistry within the regulatory definition of a "man-made vitreous (silicate) fibre with random orientation with alkaline oxide and alkaline earth oxide content greater than 18% by weight." These fibres have been tested pursuant to EU protocol ECB/TM/26, Revision 7, Nota Q, Directive 97/69/ EC, with results that are below regulatory thresholds. As a result, these papers do not require additional labeling or further testing. In addition, Intratracheal Instillation Biopersistence Testing per the German Hazardous Substance Ordinance has been conducted on these fibres with results that are below German regulatory thresholds. Refer to the product Material Safety Data Sheet (MSDS) for recommended work practices and other product safety information.



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# REFRACTORY PAPERS

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## SHEETS

PS01 ASPA-1, 18" X 24" X 1/32"  
PS02 ASPA-1, 18" X 24" X 1/16"  
PS03 ASPA-1, 18" X 24" X 1/8"  
PS04 ASPA-1, 18" X 24" X 1/4"

## SHEETS

PS09 ASPA-2, 18" X 24" X 1/32"  
PS06 ASPA-2, 18" X 24" X 1/16"  
PS07 ASPA-2, 18" X 24" X 1/8"  
PS08 ASPA-2, 18" X 24" X 1/4"

## ROLLS

PS10 ASPA-1, 12" X 320' X 1/32"  
PS11 ASPA-1, 12" X 800' X 1/32"  
PS12 ASPA-1, 12" X 1300' X 1/32"  
PS13 ASPA-1, 24" X 160' X 1/32"  
PS14 ASPA-1, 24" X 400' X 1/32"  
PS15 ASPA-1, 24" X 1300' X 1/32"  
PS16 ASPA-1, 48" X 160' X 1/32"  
PS17 ASPA-1, 48" X 400' X 1/32"  
PS18 ASPA-1, 48" X 1300' X 1/32"  
PS19 ASPA-1, 12" X 200' X 1/16"  
PS20 ASPA-1, 12" X 500' X 1/16"  
PS21 ASPA-1, 12" X 720' X 1/16"  
PS22 ASPA-1, 24" X 100' X 1/16"  
PS23 ASPA-1, 24" X 250' X 1/16"  
PS24 ASPA-1, 24" X 720' X 1/16"  
PS25 ASPA-1, 48" X 100' X 1/16"  
PS26 ASPA-1, 48" X 250' X 1/16"  
PS27 ASPA-1, 48" X 720' X 1/16"  
PS28 ASPA-1, 12" X 100' X 1/8"  
PS29 ASPA-1, 12" X 250' X 1/8"  
PS30 ASPA-1, 12" X 360' X 1/8"  
PS31 ASPA-1, 24" X 50' X 1/8"  
PS32 ASPA-1, 24" X 125' X 1/8"  
PS33 ASPA-1, 24" X 360' X 1/8"  
PS34 ASPA-1, 48" X 50' X 1/8"  
PS35 ASPA-1, 48" X 125' X 1/8"  
PS36 ASPA-1, 48" X 360' X 1/8"  
PS37 ASPA-1, 12" X 50' X 1/4"  
PS38 ASPA-1, 12" X 100' X 1/4"  
PS39 ASPA-1, 12" X 190' X 1/4"  
PS40 ASPA-1, 24" X 25' X 1/4"  
PS41 ASPA-1, 24" X 50' X 1/4"  
PS42 ASPA-1, 24" X 190' X 1/4"  
PS43 ASPA-1, 48" X 25' X 1/4"  
PS44 ASPA-1, 48" X 50' X 1/4"  
PS45 ASPA-1, 48" X 190' X 1/4"

## ROLLS

PS46 ASPA-2, 24" X 500' X 1/32"  
PS47 ASPA-2, 48" X 250' X 1/32"  
PS48 ASPA-2, 24" X 250' X 1/16"  
PS49 ASPA-2, 48" X 120' X 1/16"  
PS50 ASPA-2, 24" X 125' X 1/8"  
PS51 ASPA-2, 48" X 62.5' X 1/8"  
PS52 ASPA-2, 24" X 62.5' X 1/4"  
PS53 ASPA-2, 48" X 31.25' X 1/4"

## ROLLS

PS85 RSPA-SOL2, 24" X 150' X 2mm  
PS86 RSPA-SOL2, 24" X 570' X 2mm  
PS87 RSPA-SOL2, 48" X 75' X 2mm  
PS88 RSPA-SOL2, 48" X 570' X 2mm  
PS89 RSPA-SOL3, 24" X 100' X 3mm  
PS90 RSPA-SOL3, 24" X 350' X 3mm  
PS91 RSPA-SOL3, 48" X 50' X 3mm  
PS92 RSPA-SOL3, 48" X 350' X 3mm  
PS93 RSPA-SOL4, 24" X 80' X 4mm  
PS94 RSPA-SOL4, 24" X 320' X 4mm  
PS95 RSPA-SOL4, 48" X 40' X 4mm  
PS96 RSPA-SOL4, 48" X 320' X 4mm

**Note: These products  
can be further  
processed to provide  
finished sizes.  
Processes such as  
slitting, cutting, die  
punching and CNC  
machining are available  
upon request.**

## ROLLS

PX01 ASPA-970, 12" X 320' X 1/32"  
PX02 ASPA-970, 12" X 800' X 1/32"  
PX03 ASPA-970, 12" X 1300' X 1/32"  
PX04 ASPA-970, 24" X 160' X 1/32"  
PX05 ASPA-970, 24" X 400' X 1/32"  
PX06 ASPA-970, 24" X 1300' X 1/32"  
PX07 ASPA-970, 48" X 80' X 1/32"  
PX08 ASPA-970, 48" X 200' X 1/32"  
PX09 ASPA-970, 48" X 1300' X 1/32"  
PX10 ASPA-970, 12" X 200' X 1/16"  
PX11 ASPA-970, 12" X 500' X 1/16"  
PX12 ASPA-970, 12" X 720' X 1/16"  
PX13 ASPA-970, 24" X 100' X 1/16"  
PX14 ASPA-970, 24" X 250' X 1/16"  
PX15 ASPA-970, 24" X 720' X 1/16"  
PX16 ASPA-970, 48" X 50' X 1/16"  
PX17 ASPA-970, 48" X 125' X 1/16"  
PX18 ASPA-970, 48" X 720' X 1/16"  
PX19 ASPA-970, 12" X 100' X 1/8"  
PX20 ASPA-970, 12" X 250' X 1/8"  
PX21 ASPA-970, 12" X 360' X 1/8"  
PX22 ASPA-970, 24" X 50' X 1/8"  
PX23 ASPA-970, 24" X 125' X 1/8"  
PX24 ASPA-970, 24" X 360' X 1/8"  
PX25 ASPA-970, 48" X 25' X 1/8"  
PX26 ASPA-970, 48" X 62.5' X 1/8"  
PX27 ASPA-970, 48" X 360' X 1/8"  
PX28 ASPA-970, 24" X 62.5' X 1/4"  
PX29 ASPA-970, 24" X 180' X 1/4"  
PX30 ASPA-970, 48" X 31.3' X 1/4"  
PX31 ASPA-970, 48" X 180' X 1/4"

## ROLLS

PX50 ASPA-880, 24" X 220' X 1/16"  
PX51 ASPA-880, 48" X 110' X 1/16"  
PX52 ASPA-880, 12" X 215' X 1/8"  
PX53 ASPA-880, 24" X 110' X 1/8"  
PX54 ASPA-880, 24" X 55' X 1/8"



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