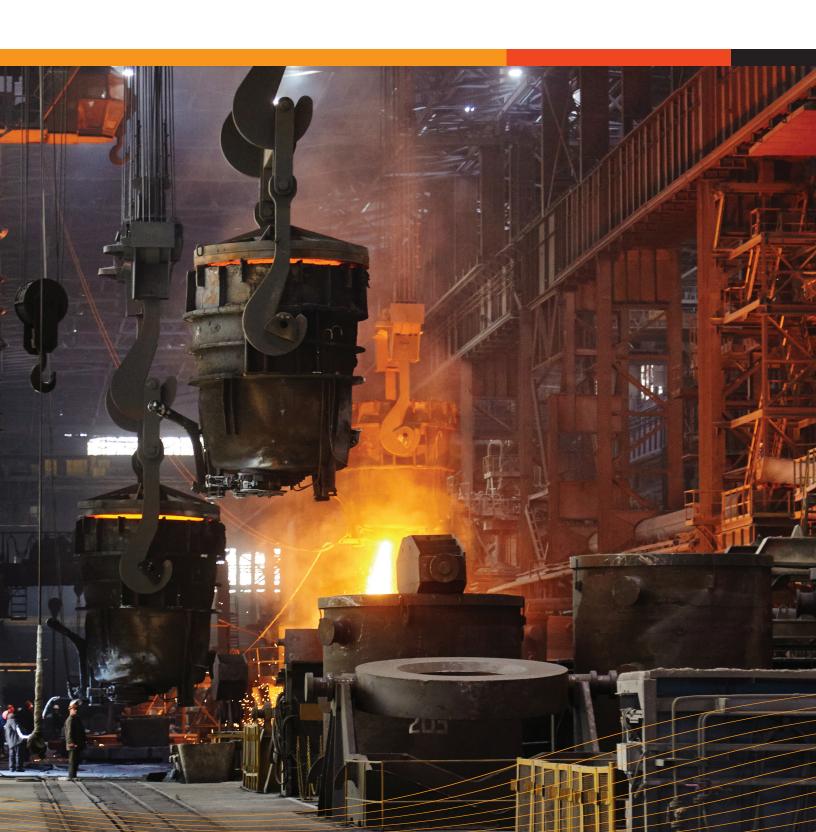
# **FRC Global**

# Ceramic Fiber







## Who We Are

FRC Global is a leading supplier of refractories, electrodes, and high temperature combustion systems. FRC Global provides outstanding results for our clients within the iron, steel, and non-ferrous industries. Our company's reputation is built by delivering high quality products made with premium raw materials. We are more global now than ever before.

We give you a competitive advantage by offering you superior proven products that positively impact your bottom line and perform better. Our knowledgeable engineers ensure the proper application of our products to give you the maximum level of output and safety. With over 25 warehouse facilities in the United States, Canada, Mexico, and South America we assure your products are readily available when you need them in these regions.

Through the use of vast global resources, all of us at FRC Global are committed to being the value creators and problem solvers for our industry.



# **Our Mission**

Embrace modern technology to increase innovation, efficiency, and transparency. Inspire the next generation by driving change, promoting curiosity, and shaping sustainable solutions in the high temp world.





## **About Us**

## **Background Information**

FRC Global is a second generation family owned company with a 30-year history.

#### **Global Offices**

FRC Global has offices, agents, or partners in 20 countries around the world.

- North America: United States and Canada
- · South America: Colombia
- Asia: China

We provide quality engineered products and services for all your high temperature applications.

#### **FRC Global facts**

Our quality control employees thoroughly inspect shipments to ensure products are within specification and are properly packaged.

# Sales force and service needs are available in the following:

- North America
- Central America
- South America
- Europe
- Middle East



# Why FRC Global?

# We show up for high-temp potential.

For over three decades, we have built strong partnerships by living up to our reputation of showing up for our customers. Our team is made up of hardworking people—many who have been in your shoes and understand the challenges you face. We are constantly thinking ahead, anticipating new barriers, and providing better solutions.

Our team knows that no two challenges are the same. When we show up to understand you and your operation, we study it to ensure we propose solutions, not just products.

As a company full of dedicated product managers and meticulous quality control teams, we travel around the world to produce high-end products from only the best raw materials. With seasoned engineers on staff, we identify opportunities for performance and production improvements.

We are committed to excellence. Our strong relationships with global enterprises —primarily in strategic raw materials—ensure availability, performance, and consistent high quality. Our vast network serves as a cornerstone in our ability to deliver results on a global scale.

As proactive problem-solvers, we see your challenges as our own and look forward to achieving your project's greatest potential.



## **Ceramic Fiber Blanket**

## **Product Description**

FRC Global's ceramic fiber blanket presents unparalleled refractories and thermal insulation due to its long spun fiber needing technique. These blankets offer superior insulating performance, flexibility and resilience. Our ceramic fiber blanket products are unaffected by most chemicals (except hydrofluoric & phosphoric acids and concentrated alkali). Thermal and physical properties are retained after drying following wetting by oil, steam or water. Our ceramic fiber blankets are completely inorganic, so there are no fumes when heating for the first time.

## **Performance Highlights**

#### **Features**

- High tensile strength and Low shrinkage
- · Good resiliency with low heat storage
- Low thermal conductivity
- Thermal shock resistance

- Annealing furnaces
- Soaking pit covers and seals
- Furnace hot face repairs
- Reheating furnace and ladle covers

Description	STD RC	F Board	HP RCG Board			HZ RCF Board		ard	
	Chemical Composition (%)								
Al <sub>2</sub> O <sub>3</sub>	≥4	14		≥45			≥34		
SiO <sub>2</sub>	≥,	52		≥54			≥50		
Fe <sub>2</sub> O <sub>3</sub> +TiO <sub>2</sub>	≤	:1		≤0.5			≤0.5		
ZrO <sub>2</sub>		-		-			≥15		
K₂O+Na₂O	≤	:1		≤0.2			≤0.2		
Physical Properties									
Density (kg/m³)	96	128	96	128	160	96	128	160	
Classification Temperature (°C)	1000 °C	C *24<-3	1100 °C *24<-3			1350 °C *24<-3			
Fiber Diameter (um)	0.0	74		0.055		0.078			
Shot Content (%)	0.0	92		0.073		0.102			
Linear Shrinkage After Heating (%)	0.1	03		0.086		0.116			
Thermal Conductivity (W/M.k)									
400 °C	0.090	0.905	0.124	0.114	0.101	0.138	0.122	0.118	
500 °C	0.119	0.123	0.145	0.135	0.120	0.179	0.153	0.149	
600 °C	0.152	0.158	0.202	0.191	0.175	0.233	0.184	0.172	
Tensile Strength (MPa)	0.040	0.050	0.050	0.060	0.075	0.050	0.060	0.075	

<sup>\*</sup> The data shown are average results and are subject to variation.

## **Ceramic Fiber Board**

## **Product Description**

FRC Global's ceramic fiber board is manufactured and designed for the thermal applications requesting high demands on rigidity, the thermal insulation properties and abrasion resistance of ceramic fiber board have been further improved due to the higher density. Ceramic fiber board is a vacuum formed product that resists higher gas velocities than ceramic fiber blanket. It is ideal for furnaces, boiler duct and stack lining thanks to its low thermal conductivity and low heat storage, which makes the shorter cycle times and quicker access for maintenance in the industrial furnaces possible.

## **Performance Highlights**

#### **Features**

- · High rigidity and light weight
- · Low thermal conductivity
- Resistance to thermal shock and gas erosion
- Easy cutting and engineering, mechanical flexibility
- Resists penetration by molten aluminum and other non-ferrous metals

- Refractory lining for industrial furnaces
- Combustion chamber liner, broilers and heaters
- Back-ups insulation for monolithic refractories
- Transfer of non-ferrous metals
- Expansion joint boards
- Barrier against flame



Description	STD RCF Board	HP RCG Board	HZ RCF Board	
Density (Kg/M³)	280/300/320	280/300/320	280/300/320	
Classification Temperature (°C)	1260	1260	1430	
Maximum Operating Temperature (°C)	1100	1100 1200		
Water Content (%)	≤1			
Linear Shrinkage After Heating (%)	1000 °C *24<-3	1100 °C *24<-3	1350 °C *24<-3	
Ther	mal Conductivity	/ (W/M.k)		
200°C	0.074	0.055	0.078	
400°C	0.092	0.073	0.102	
500°C	0.103	0.086	0.116	
600°C	0.127	0.105	0.135	
Cold Crushing Strength (Mpa)	0.2	0.12-0.2	0.12	
Loss Of Ignition (Wt%)	≤7	≤7	≤7	

# **Ceramic Fiber Textile**

Description	GF-R- Rope	SS-R- Rope	GF-T- Rope	SS-T- ROPE
Density (Kg/M³)	500	500	500	500
Classification Temperature (°C)	1260			
Maximum Operating Temperature (°C)	500-600	1000	500-600	1000
Water Content (%)		≤1		
Organic Content	≤15			
Reinforced Material	Glass Fiber	Stainless Steel	Glass Fiber	Stainless Steel

Description	GF-S-Rope	SS-S-Rope	
Density (Kg/M³)	500	500	
Classification Temperature (°C)	1260		
Maximum Operating Temperature (°C)	500-600	1000	
Water Content (%)	≤1		
Organic Content	≤15		
Reinforced Material	Glass Fiber	Stainless Steel	

**KEY | GF**: Glass Fiber | **SS**: Stainless Steel | **R-Rope**: Round Braided Rope

**T-Rope**: Twisted Rope | **S-Rope**: Square Braided Rope



Description	GF-Yarn	SSO-Yarn	Woolen Rope	
Density (Kg/M³)	500	500	330-430	
Classification Temperature (°C)	1260			
Maximum Operating Temperature (°C)	500-600	1000	500-600	
Water Content (%)	≤1			
Organic Content	≤15			
Reinforced Material	Glass Fiber	Stainless Steel	Glass Fiber	

## **Ceramic Fiber Cotton**

## Common silk throwing cotton

FRC Global's ceramic fiber cotton is produced by electric melting ore with the blowing/silk throwing process. Our high-alumina ceramic fiber is produced by electric melting alumina and silicon dioxide with the fiber blowing process.

#### Ceramic fiber textile cotton

Our ceramic fiber textile cotton is produced from the standard ceramic fiber silk throwing blanket with a special process. This fiber features uniform diameter and high weaving rate, so it is an ideal raw material to produce the textile.

#### Common silk throwing cotton:

#### **Features**

- Low thermal capacity and low heat conductivity
- Excellent heat stability and pulverization stability at high temperature
- Excellent chemical stability
- No adhesive or erosive materials

- Raw materials of fiber blanket, plate and fiber textile products
- High-temperature furnace, heating device and wall lining gap filling material
- Fiber spraying, casting material and coating raw material
- Heat insulation and filling material for edges, corners and complicated spaces

Description	Common	Standard	High- purity	High- alumina	Low- zirconia	Zirconium- inclusive	
Chemical Composition (%)							
$Al_2O_3$	≥40	≥43	44-47	51-53	43-45	-	
Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub>	≥95	≥96	≥98	≥99	≥90	-	
Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> +ZrO <sub>2</sub>	-	-	-	-	-	≥99	
ZrO <sub>2</sub>	-	-	-	-	5-7	-	
Fe <sub>2</sub> O <sub>3</sub>	<0.5	<0.5	≤0.3	≤0.3	-	≤0.2	
$Na_2O+K_2O+Fe_2O_3$	<0.9	-	-	-	-	-	
Slag content (Ø≥0.212mm)(%)	≤15	≤15	≤12	(Particle≥100 holes) ≤10	≤15	≤15	
<b>Physical Properties</b>							
Fiber Diameter (M)	3~5						
Packing Form	Textile bag						
Quality & Environment System Certification		ISOS	9001-200	08, ISO14001-2	2004		

# **Ceramic Fiber Paper**

FRC Global's ceramic fiber paper is produced by high-purity ceramic fiber and is used in high-temperature heat insulation areas. The advanced production technology makes the fiber distribute very evenly and the paper thickness and volume is controlled. Our ceramic fiber paper is produced with a small amount of adhesive under scientific selection and strict control. The insulation paper features excellent high temperature resistance, heat insulation performance and excellent melting and penetration resistance, so it is very suitable for replacement and insulation of casting cushion along with the building and glass industry.

#### **Features**

- Excellent electric insulation performance
- Excellent mechanical processing performance
- High strength and tearing resistance
- High flexibility
- · Low slag content

- Heat insulation material of instrument devices and electric heating component
- Heat insulation material of car industry
- Expansion gap filling material
- Insulation material of building material, metallurgy and glass industry
- Sealing cushion of melting metal

Description	Standard	High-alumina	Zirconium-inclusive		
Physical Properties					
Pull Resistance Srength (Mpa)	≥0.3	≥0.3	≥0.3		
Water Content Rate (%)	≤2	≤2	≤2		
Organic Material Conent	≤10	≤8	≤8		
Theoretical Volume Density (Kg/M3)	190-210				
Product Specification (Mm)	Normal length and width, thickness 0.5mm-10mm (customized to demand)				
Packing Form	Paper box				
Quality & Environment System Certification	ISO9001-2008, ISO14001-2004				

## **Ceramic Fiber Felt**

## **Product Description**

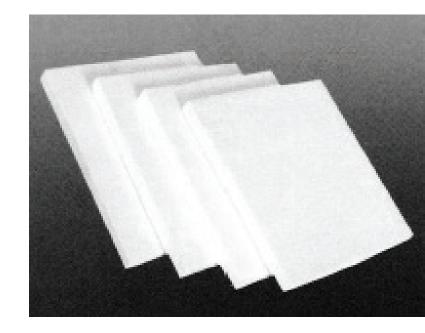
FRC Global's ceramic fiber felt is produced from ceramic fiber cotton with a vacuum shaping process and is a light elastic fire-resistant, heat insulation material. This product has strength and elasticity and is a multifunctional product. It is applicable to furnace lining and back lining of different furnaces and boiler walls.

## **Performance Highlights**

#### **Features**

- Low thermal capacity and low heat conductivity
- · Excellent chemical stability
- Excellent heat stability and thermal shock
- Soft and elastic

- Wall lining and back lining of furnaces and heating devices
- Heat insulation and preservation of high-temperature devices
- · Heat insulation of melting metal



Description	Common	Standard	High- purity	High- alumina	Low- zirconia	Zirconium- inclusive
	Che	mical Com	position	(%)		
Al <sub>2</sub> O <sub>3</sub>	≥40	≥43	44-47	51-53	43-45	-
Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub>	≥95	≥96	≥98	≥99	≥90	-
Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> +ZrO <sub>2</sub>	-	-	-	-	-	≥99
ZrO <sub>2</sub>	-	-	-	-	5-7	≥15
Fe <sub>2</sub> O <sub>3</sub>	<0.5	<0.5	≤0.3	≤0.3	≤0.3	-
Na <sub>2</sub> O+K <sub>2</sub> O+Fe <sub>2</sub> O <sub>3</sub>	<0.9	-	-	-	-	-
		Physical P	roperties			
Heating Permanent Linear Change (%)	950°C x24h≤-4	1000°C x24h≤-4	1100°C x24h≤-4	1200°C x24h≤-4	1250°C x24h≤-4	1350°C x24h≤-4
Heat Conductivity (An Average Of 500°C) W/(Mk)	≤0.153					
Water Content Rate (%)		≤1				
Organic Material Content (%)			;	≥7		
Theoretical Volume Density (Kg/M3)	180~220					
Product Specification (Mm)	600x400x20~50 900x600x10~50 1000x600x10~50 (customized to demand)					
Packing Form	Paper carton					
Quality and Environment System Certification		ISO9	001-2008	, ISO14001	-2004	

<sup>\*</sup> The data shown are average results and are subject to variation.

## **Ceramic Fiber Module**

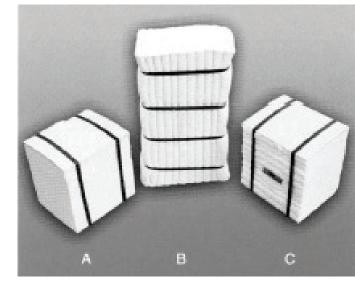
## **Product Description**

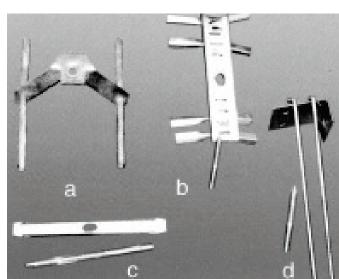
Different ceramic fiber modules are produced by the ceramic fiber needle blanket of the corresponding material. Shrinkage of a certain proportion should be kept in processing to guarantee that the ceramic fiber module expands in different directions and the ceramic fiber modules are extruded mutually as a seamless whole after the ceramic fiber module wall is bricked. The ceramic fiber module can be directly fixed onto the steel plate anchoring nail of the industrial furnace shell via different anchoring parts.

## **Performance Highlights**

#### **Features**

- Different anchoring parts on the rear of the module
- After unbinding, the folding blanket can mutually extrude in different directions without any gaps
- Elastic fiber blanket can resist mechanical external force
- Low heat conduction performance yilding higher energy savings
- After the lining body is installed, it can instantly be put into operation without drying
- The anchoring system is remote from the heating surface of the component, so the metal anchoring fixture is under low temperature
- A. Cutting block (level on four sides)
- **B.** Folding block
- **C.** Module (with anchoring part)
- a. Butterfly (type M)
- **b.** Suspension
- c. Horizontal inner container type
- d. Angular iron type





#### **Typical Applications**

Lining of different industrial furnaces and heating furnaces in industries such as metallurgy, machinery, building material, petroleum processing and non-ferrous metal.

Description	Common	Standard	High- purity	High- alumina	Low- zirconia	Zirconium- inclusive
Chemical Composition (%)						
Al <sub>2</sub> O <sub>3</sub>	40	43	44-47	51-53	-	39-40
Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub>	96	97	99	99	-	-
Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> +ZrO <sub>2</sub>	-	-	-	-	-	99
ZrO <sub>2</sub>	-	-	-	-	-	15-17
Fe <sub>2</sub> O <sub>3</sub>	<0.5	<0.5	0.2	0.2	-	0.2
Na <sub>2</sub> O+K <sub>2</sub> O	≤0.5	≤0.5	0.2	0.2	-	0.2
	1	Physical Pro	operties			
Heating Permanent Linear Change (%)	950°C x24h≤-4	1000°C x24h≤-4	1100°C x24h≤-4	1200°C x24h≤-4	1250°C x24h≤-4	1300°C x24h≤-4
Theoretical Volume Density (Kg/M3)			200	-240		
Specification Of Routne Product (Mm)	Process according to customer requirement					
Packing Form	Paper box					
Quality and Environment System Certification		ISO90	001-2008,	ISO14001-	-2004	

<sup>\*</sup> The data shown are average results and are subject to variation.

# **Ceramic Fiber Heteromorphism**

**Shape and supply:** various vacuum shaped irregular products of different sizes and shapes can be produced, including tubes, cones, domes and square boxes. Most irregular shapes can be produced according to the customer's requirement. **Special processing:** if required, the vacuum shaped hardening agent or fire-resisting mud can be coated on the irregular product as the protection layer.

#### **Product Description**

FRC Global's ceramic fiber irregular shapes are produced by high-quality ceramic fiber cotton with vacuum shaping technology. The ceramic fiber shapes are produced to meet specific production steps of various industrial departments. Each product is used to make special molds by its shape and size. According to the performance requirements of the products, different adhesives and additives are selected to meet use requirements. All irregular products feature low shrinkage within its operation temperature and high heat insulation performance.

#### **Performance Highlights**

- Lower thermal capacity and low heat conductivity
- Excellent chemical stability
- Excellent thermal stability and thermal vibration
- Excellent wind erosion resistance

Description	Standard	High-purity	High-alumina	Zirconium- inclusive	
Physical Properties					
Heating Permanent Linear Change (%)	1000°C x24h≤-4	1100°C x24h≤-4	1200°C x24h≤-4	1300°C x24h≤-4	
Product Specification (Mm)	Provide drawing processing according to user (customized to demand)				
Packing Form	paper carton or wooden box				
Quality and Environment System Certification	ISO9001-2008, ISO14001-2004				

<sup>\*</sup> The data shown are average results and are subject to variation.

# **Crystal Fiber**

#### **Product Description**

FRC Global's multicrystal mullite fiber is produced by a special process with arrangement, cutting and compression. It has no adhesive or other contents and features excellent elasticity and flexibility. The top highest use temperature can reach 1600 °C / 2912 °F. When this fiber bears this temperature for a long period under the oxidized atmosphere, neutralized atmosphere, or reductive atmosphere, it can keep original tenacity, strength, softness and fiber structure without any slag. This fiber can be used for different thermal surface internal lining pasting of different high-temperature industrial furnaces.

## **Performance Highlights**

#### **Features**

- Low conductivity and low heat storage
- Thermal vibration resistance
- Excellent chemical stability
- Resistance to air flow flushing
- Excellent sound absorption performance and high heat reflective performance
- Equable fiber diameter and resistance to air flow flushing

- Furnace inner lining and furnace internal lining
- Furnace door and furnace cover closing
- Heating furnace and thermal processing furnace
- Shuttle furnace, tunnel furnace and roller kiln

Description	Crystal Fiber Bar 72	Crystal Fiber Bar 80	Alumina fiber blanket						
	Chemical Composition (%)								
$AI_2O_3$	72	80	72						
Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub>	98.8	99	99						
Fe <sub>2</sub> O <sub>3</sub>	-	-	0.1						
Physical Properties									
<b>Classification Temperature °C</b>	1600	1600	1600						
Capacity (Kg/M3)	100	100	128						
Pull Resistance Srength (Mpa)	-	-	0.04						
Heavy Burning Shrinkage Rate (%)	(1500°Cx6hr)<1.5	(1500°Cx6hr)<1	(1500°Cx6hr)<1						
Supply Specification	200x100x50	200x100x50	7200x610x6/12.5/20						
Quality And Environment System Certification	ISO9001-2008, ISO14001-2004								

# **High Temperature Paint**

## **Product Description**

FRC Global's high-temperature paint is a fiber spraying heat insulation and fire-resisting layer.

## **Performance Highlights**

#### **Features**

- High whole performance, is an excellent heat insulation performance of fiber spraying furnace body
- · This product is easy to construct and very suitable for special parts, narrow areas and finishing and emergency repair of the furnace lining
- Low thermal capacity, low thermal conductivity and easy construction
- Equitable fiber distribution, stable performance and excellent sound absorption and noise reduction performance

- Metallurgy and petroleum chemistry
- Machinery, power and building material

Description	Low-temperature	High-temperature 1300	High-temperature 1600			
Physical Properties						
Top Operation Temperature °C	1000	1300	1600			
Status	Slurry	Liquid	Liquid			
Main Contents (%)	(Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> ) ~45	(Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> ) ~60	(Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> ) ~75			
Line Shrinkage After Burning (%)	2(1000°C)	2(1300°C)	2(1500°C)			
Supply Specification (Powder + Liquid)	Individual or mixing	Liquid form	Liquid agent			
Coat Thickness	1-3	1-2	1-3			
Packing Form	Barrel package	Barrel package	Barrel package			
Quality and Environment System Certification	ISO9001-2008, ISO14001-2004					

# **High Temperature Adhesive**

## **Product Description**

FRC Global's high-temperature adhesive is designed and prescribed for bonding between the fiber products or surface blocks pasted on the furnace wall. It is composed of a liquid agent and powder agent. The material can be mixed slurry or be packed for field mixing and prescription.

## **Performance Highlights**

#### **Features**

- High temperature resistance
- Temperature-resisting match and stronger bonding with the fiber
- Stable chemical performance

- Adhesion between fiber products
- Adhesive fiber products for inside wall of the furnace

Description	Construction Adhesive	High-Temperature Adhesive				
Physical Properties						
Use Temperature (°C)	1000-1350	1500				
Status	Slurry	Slurry				
Main Contents (%)	(Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> ) ~45	(Al <sub>2</sub> O <sub>3</sub> +SiO <sub>2</sub> ) ~60				
Dry Line Shrinkage (%)	2-3	2-3				
Adhesion Strength (Kgf/M2) After Adhesion After Burning	40 400 (900 °C)	40 400 (900 °C)				
Supply Specification (Powder +Liquid)	Individual or mixing	Packing or mixing				
Packing Form	Barrel packing	Barrel packing				
Quality And Environment System Certification	ISO9001-2008, ISO14001-2004					

<sup>\*</sup> The data shown are average results and are subject to variation.

# **Fiber Spray Pouring Material**

## **Product Description**

FRC Global's ceramic fiber casting material is produced by the ceramic fiber cotton as the base material with different filling material, adhesives and additives. It features excellent performance of the shaped fiber products, excellent construction performance and can further expand application area of the ceramic fiber products. This casting material features easy and quick construction and is very suitable for the wall lining where there are irregular shapes. It features easy construction, high whole performance of the furnace wall and excellent application effect.

## **Performance Highlights**

#### **Features**

- Low-conductivity, low thermal capacity and thermal vibration resistance
- Excellent pressure resistance and folding resistance
- High adaptability to the furnace ambient: you can remove the mold
   4-8 hours after furnace wall casting and meet certain hardness requirements

- Whole casting of steel package roasting cover
- High-temperature tube wall lining

Description	Standard	High-aluminum	Zirconium-inclusive		
Physical Properties					
Use Temperature °C	1000	1200	1300		
Drying And Pressure Resistance Strength (Mpa)	≥1.0	≥1.0	≥1.0		
Drying Volume Density (Kg/M3)	0.5-1.0	0.5-1.0	0.5-1.0		
Heat Conductivity W/(M K)	0.25	0.25	0.25		
Packing Form	Bag package	Bag package	Bag package		
Quality and Environment System Certification	ISO9001-2008, ISO14001-2004				

<sup>\*</sup> The data shown are average results and are subject to variation.

# **Fiber Spray Pouring Material**

## **Product Description**

Fiber spraying is a ceramic fiber application technology from the fire-resisting materials and particle spraying process based on the traditional application technology. After the ceramic fiber is processed by the special spraying device, it will be sprayed with the high-pressure air, mix with the foggy adhesive around the sprayer equably and be sprayed on the working surface to form the ceramic fiber spraying wall.

## **Performance Highlights**

#### **Features**

- High temperature resistance
- · No damage to fiber after burning
- Smaller drying and roasting shrinkage

Description	Standard	High-aluminum	Zirconium- inclusive		
Physical Properties					
Use Temperature °C	1000	1200	1300		
Density (Kg/M3)	220 ± 15	220 ± 15	220 ± 15		
Heat Conductivity W/(M K)	1.153 (1000 °C)	1.153 (1200 °C)	1.153 (1300 °C)		
Line Shrinkage After Heafy Burning	-3 (1000 °C x 6h)	- 3 (1200 °C x 6h)	- 3 (1300 °C x 6h)		
Quality And Environment System Certification	ISO9001-2008, ISO14001-2004				



# **High Temp Innovation**

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