



5MS.011 FBD Zirconium Oxide Fibre Composite

Applications

- Gasketing in high temperature wind tunnels.
- Insulation for laser machining applications
- Hot face insulation in solar thermochemical reactors
- Crucible insulation in crystal growth stations
- Oxygen / carbon protector sleeve in industrial sensors

Physical variables included in this documentation are provided by way of indication only and do not, under any circumstances, constitute a contractual undertaking. Please contact our technical service if you require any additional information.

Final Advanced Materials Sàrl
4 avenue de Strasbourg
68350 Didenheim – France
Tel : +33 (0) 3 67 78 78 78

Final Advanced Materials GmbH
Basler Strasse 115
79115 Freiburg – Deutschland
Tel: + 49 (0) 761 47 87 336

www.final-materials.com

Overview

FBD is our strongest, highest density, premium product of the Zircar Zirconia range. FBD boards and cylinders are rigid refractory structures composed of ZYBF bulk fibres stabilized with yttria. Fibres used to manufacture FBD undergo multiple processing and heat treatments. It is composed of highly sintered fibre with the shortest fibre length contained in any of our rigid ZrO₂ products. The finished FBD product is a tightly bonded, nearly dust free, hard, strong fibrous ceramic.

They have extremely high stability for use as high as 2,000 °C and can be exposed to significantly higher temperatures, depending on the application. It has good hot strength up to 1,700 °C, and can be used as protection sleeve, insulation for industrial furnaces or setter for loads up to twice its weight. This product can be machined with conventional tooling.

Available Products

FBD	Dimensions
Square Board	from 76.2 x 76.2 x 6.3 mm to 304.8 x 304.8 x 38.1 mm
Rectangular Board	from 228.6 x 457.2 x 6.3 mm to 228.6 x 457.2 x 76.2 mm
Cylinder	from 12.7 x 19.0 x 152.4 mm to 203.2 x 254.0 x 152.4 mm

**The dimensions depend on the article number.
Customized designs are available on request.**

info@final-materials.com

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FBD Zirconium Oxide Fibre Composite

Technical Data

Property		Unit	FBD
Composition	ZrO ₂ *	Wt. %	90
	Y ₂ O ₃		10
Typical Impurities	HfO ₂	Wt. %	1 to 2
	SiO ₂		0.12
	TiO ₂		0.14
	CaO		0.09
	MgO		0.03
	Fe ₂ O ₃		0.04
	Al ₂ O ₃		0.01
	Na ₂ O		0.01
Colour			white
Bulk Density		g/cm ³	1.4
Porosity		%	76
Operating Temperature**		°C	2,000
Peak Temperature		°C	2,200
Melting Point		°C	2,590
Flexural Strength, Normal to Fibre Plane		MPa	8.27
Compressive Strength, Normal to Fibre Plane, at 10 % compression		MPa	5.52
Outgassing in Vacuum			Nil
Dilatometric Softening Temperature		°C at 10 psi	1,400
Thermal Expansion Coefficient RT to 1,180 °C (⊥ to Thickness)		10 ⁻⁶ .K ⁻¹	10.7
Linear Shrinkage (⊥ to Thickness)	1 hr at 1,650 °C	%	0.0
	24 hrs at 1,650 °C		0.9
Thermal Conductivity (// to Thickness)	at 400 °C	W.m ⁻¹ .K ⁻¹	0.24
	at 800 °C		0.26
	at 1,100 °C		0.31
	at 1,400 °C		0.33
	at 1,650 °C		0.35

*1-2 % weight hafnia (HfO₂) occurs naturally with zirconia (ZrO₂) and does not affect performance.

**Maximum use temperature is dependent of variables such as chemical environment and stresses; both thermal and mechanical.