



## 5MS.012 ZYFB Zirconium Oxide Fibre Composite

### Applications

- High temperature insulation
- Zone separator in directional solidification furnaces

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### Overview

Zirconium oxide boards types ZYFB-3 & ZYFB-6 are rigid refractory structures composed of ZYBF bulk fibres which are nearly 100 % zirconia phase stabilized with yttria. These ceramics have high insulating properties that excel at extremely high temperatures and in severe environments such as corrosive, oxidizing and reducing atmospheres.

Fibres used to manufacture these ZYBF-3 and ZYBF-6 products undergo multiple processing and heat treatments. They have a good dimensional stability up to 1,650 °C and can be used as insulation in fused quartz processing, heat shield and setter for loads up to twice its weight at temperature up to 1,400 °C.

ZYBF boards and cylinders are available at two different densities:

- **ZYFB-3** is our lowest density product at 0.48 g/cm<sup>3</sup> and benefits of an extremely low thermal conductivity.

**Usual Applications:** hot face insulation in fused quartz processing, zone separator in directional solidification furnaces used to manufacture jet turbine blades.

- **ZYFB-6** is medium density product at 0.96 g/cm<sup>3</sup> and has a better mechanical strength than ZYFB-3 products.

**Usual Applications:** IR source insulation in FTIR spectrometer, insulation in nuclear meltdown experiments.

### Available Products

ZYBF-3 & ZYBF-6	Dimensions
Square Board	from 152.4 x 152.4 x 6.4 mm to 152.4 x 152.4 x 38.1 mm
	from 304.8 x 304.8 x 6.4 mm to 304.8 x 304.8 x 38.1 mm
<b>The dimensions depend on the article number. Customized designs are available on request.</b>	

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# 5MS.012

## ZYFB Zirconium Oxide Fibre Composite

### Technical Data

Property		Unit	ZYFB-3	ZYFB-6
Composition	ZrO <sub>2</sub> *	Wt. %	90	90
	Y <sub>2</sub> O <sub>3</sub>		10	10
Typical Impurities	HfO <sub>2</sub>	Wt. %	1 to 2	1 to 2
	SiO <sub>2</sub>		0.12	0.12
	TiO <sub>2</sub>		0.14	0.14
	CaO		0.09	0.09
	MgO		0.03	0.03
	Fe <sub>2</sub> O <sub>3</sub>		0.04	0.04
	Al <sub>2</sub> O <sub>3</sub>		0.01	0.01
	Na <sub>2</sub> O		0.01	0.01
Colour			white	white
Bulk Density		g/cm <sup>3</sup>	0.48	0.96
Porosity		%	92	84
Operating Temperature**		°C	1,800	1,800
Peak Temperature		°C	2,200	2,200
Melting Point		°C	2,590	2,590
Flexural Strength (// to Fibre Plane)		MPa	0.60	2.10
Compressive Strength at 10 % compression (// to Fibre Plane)		MPa	0.29	1.59
Outgassing in Vacuum			None	None
Dilatometric Softening Temperature at 10 psi		°C	1,180	1,240
Thermal Expansion Coefficient RT to 1,180 °C (⊥ to Thickness)		10 <sup>-6</sup> .K <sup>-1</sup>	10.7	10.7
Linear Shrinkage	1 h at 1,650 °C	%	1.2	1.0
	24 hrs at 1,650 °C		2.8	1.7
Thermal Conductivity (// to Thickness)	at 400 °C	W.m <sup>-1</sup> .K <sup>-1</sup>	0.08	0.6
	at 800 °C		0.11	0.19
	at 1,100 °C		0.14	0.22
	at 1,400 °C		0.19	0.25
	at 1,650 °C		0.24	0.27

\*1-2 % weight hafnia (HfO<sub>2</sub>) occurs naturally with zirconia (ZrO<sub>2</sub>) and does not affect performance.

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