DATA SHEET

Rev. N° 0 - 30.03.2021

1AG.001
Ceramic Beads

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DIMENSIONS

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Overview

Final Advanced Materials supplies three varieties of ceramic beads. These beads are distinguished by their high degree of adaptability to challenging environments and their exceptional strength characteristics. These beads are highly rated in the watchmaking, medical and automobile sectors.

Manufacturing

Ceramic is produced from a chemical composition based upon several oxidized raw materials. The resulting powder is compacted, then moulded by dry pressing. The moulding is then sintered at high temperature to develop its polycrystalline ceramic structure.

Applications

- High-precision and high-speed ball bearings
- Hip replacements
- Valves or relief valves
- Measuring devices
- Reference spheres for three-dimensional measuring machines
- Probes for three-dimensional measuring machines

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Ceramic Beads

Benefits

- Exceptional hardness
- Strong resistance to friction and wear
- High elastic modulus
- High chemical, thermal and mechanical resistance
- Strong electrical insulating properties
- Low porosity

Comparative Table

Property	Unit	Alumina 99.7 %	Alumina 92 %	Zirconium
Hardness (Vickers, HV_5)		1,600	1,300	1,250 – 1,300
Density	g/cm^3	3.95 ±0.05	3.70 ±0.05	6.20 ±0.05
Max. Operating Temperature	°C	1,400	1,400	1,050

Products

99.7 % Alumina Oxide

The 99.7 % alumina oxide beads are very resistant to wear, heat and corrosive environments. They retain good dimensional stability up to 1,000 °C. Alumina resists oxidation and is tolerant to water, salt solutions and many chemicals and acids.

Technical Data:

Property		Unit	Pure Alumina Oxide Beads
Item N°			055-0100
Diameter		mm	from 0.40 to 3.30
Composition	Al_2O_3	Wt %	99.7
	MgO		0.15
	Others		0.15
Colour			off white
Surface Finish			silky, smooth, shiny
Density		g/cm^3	3.95 ±0.05
Bulk density		kg/l	2.35 ±0.05
Porosity			Nil
Water Absorption			Nil
Hardness on Mohs' scale			9+
Hardness on Vickers's scale (HV_5)			1,600

Property	Unit	Alumina Oxide Beads
Crushing Strength (Ø 2 mm)	N	980-1,078
Bead Sphericity 90 %		≥ 0.95
Max. Operating Temperature	°C	1,750
Thermal Expansion Coefficient from 20 to 1,000 °C	$10^{-6}K^{-1}$	8.4

92 % Alumina Oxide

The composition of these spheres differs slightly from that of previous spheres of pure alumina, with a reduced alumina content of 92 %. As a result, these spheres are more cost-effective. This product is also distinguished by increased abrasiveness and reduced thermal output.

Technical Data:

Property		Unit	92 % Alumina Oxide Beads
Item N°			055-0110
Diameter		mm	from 0.40 to 3.30
Composition	Al_2O_3	Wt. %	92.3
	SiO_2		2.55
	MgO		2.45
	CaO		2.10
	Others		0.60
Colour			white
Surface Finish			abrasive
Density		g/cm^3	3.70 ±0.05
Bulk density		kg/l	2.20 ±0.05
Porosity			Nil
Water Absorption			Nil
Hardness on Mohs' scale			9+
Hardness on Vickers's scale (HV_5)			1,300
Crushing Strength (Ø 2 mm)		N	882 - 980
Bead Sphericity 90 %			≥ 0.95
Max. Operating Temperature		°C	1,400
Thermal Expansion Coefficient from 20 to 1,000 °C		$10^{-6}K^{-1}$	7.6

Zirconium oxide stabilized with cerium

Zirconium oxide beads can be used 2 to 3 times longer than metal or carbide beads in highly abrasive and corrosive environment. They are also much heavier than alumina oxide beads.

Ceramic Beads

Technical Data:

Property		Unit	Zirconium oxide stabilized with cerium
Item N°			055-0120
Diameter		mm	from 0.40 to 3.30
Composition	ZrO_2	Wt. %	83
	CeO_2		17
Colour			golden brown
Surface Finish			satin, smooth, glossy
Density		g/cm^3	6.20 ±0.05
Bulk density		kg/l	3.85 ±0.05
Porosity			Nil
Water Absorption			Nil
Hardness on Mohs' scale			9
Hardness on Vickers's scale (HV_5)			1,250-1,300
Crushing Strength (Ø 2 mm)		N	2,107
Bead Sphericity 90 %			≥ 0.95
Max. Operating Temperature		°C	1,050
Cumulated Weight Loss / Hour (wear test conducted with water)	after 24 hrs	%	0.0015
	after 96 hrs		0.0010

Dimensions

Bulk Denisty according to Diameter

Diameter (mm)	Weight (kg/l)		
0.40-0.70	2.18 ±0.05	2.30 ±0.05	3.75 ±0.05
0.70-1.20	2.18 ±0.05	2.30 ±0.05	3.75 ±0.05
1.20-1.70	2.18 ±0.05	2.30 ±0.05	3.85 ±0.05
1.70-2.40	2.20 ±0.05	2.35 ±0.05	3.85 ±0.05
2.40-2.80	2.20 ±0.05	2.35 ±0.05	3.95 ±0.05
2.80-3.30	2.20 ±0.05	2.35 ±0.05	3.95 ±0.05

Ceramic Beads

Beads Available Dimensions

Product	Diameter (mm) with broad fraction size	Product	Diameter (mm) with narrow fraction size
055-0100 055-0110 055-0120	0.4-0.7	055-0120	0.2-0.4
	0.7-1.2		0.4-0.6
	1.2-1.7		0.6-0.8
	1.7-2.4		0.8-1.0
	2.4-2.8		1.0-1.2
	2.8-3.3		1.2-1.4
			1.4-1.7
			1.6-2.0
			1.7-2.0
			2.0-2.4

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