Standard for Inert Ceramic Balls

Chemical Industry Standard of the People's Republic of China HG/T 3683.1-2014 "Industrial Ceramic Balls - Inert Ceramic Balls"

Introduction to Inert Ceramic Balls

Inert ceramic balls possess high strength, excellent chemical stability and thermal stability. They can withstand high temperatures, high pressures, and corrosion from acids, alkalis, salts, and various organic solvents. Inert ceramic balls are widely used in industries such as petroleum, chemical engineering, fertilizers, natural gas, and environmental protection. As a support and covering material for catalysts in reactors, inert ceramic balls can buffer the impact of liquids and gases entering the reactor on the catalyst, protect the catalyst, and improve the distribution of liquids and gases within the reactor.

Technical Data

Item		Type 1	Type 2	Type 3	Type 4
Equal to		Denstone 2000	Denstone 57		Denstone 99
AL2O3		17-19%	23-26%	90%	>99%
Acid resistance		>=90%			
Alkali resistance		>85%	>85%	>85%	>85%
Thermal shock reistance		>=300	>=400	>=700	>=800
Operation temperature (℃)		982	1100	1350	1500
Bulk density(kg.m3)		1300-1400	1400-1500	1600-1800	>=1800
Crushing Strength (N/pellet)	1/8''(3mm)	>350	>350	>510	>510
	1/4''(6mm)	>600	>600	>1500	>1500
	3/8''(10mm)	>850	>850	>6000	>6000
	1/2''(13mm)	>1850	>1850	>8000	>8000
	5/8"(16mm)	>3600	>3600	>9000	>9000
	3/4''(19mm)	>4870	>4870	>11000	>11000
	1''(25mm)	>8500	>8500	>20000	>20000
	1.5"(38mm)	>12000	>12000	>33000	>33000
	2''(50mm)	>56000	>56000	>150000	>150000
	3"(76mm)	>56000	>56000	>150000	>150000

Chemical Analysis

Al2O3	SiO2	MgO	K2O+Na2O	CaO	TiO2	Leachable Fe2O3
23-26%	62-72%	<1.0%	<4%	<1.5 %	<1.0%	<0.1%

Chemical Composition

Al2O3	SiO2	Fe2O3	CaO+MgO	TiO2	K2O+Na2O
≥99%	≤0.25%	≤0.1%	≤0.2%	≤0.1%	≤0.4%

Size tolerance

Diameter Φ	3	6	8	10	13	16	20	25	30	38	50	75
Size tolerance	±1.0				±1.5				±2.0			±3.0

Testing methods

Compressive strength: A testing machine with sufficient pressure and a force measurement accuracy of grade one is selected. Five ceramic balls are taken as samples. Each sample is placed in the center of the testing machine's pressure plate. Absorbent paper of 1-2mm thickness is placed between the sample and the upper and lower pressure plates. The load is applied steadily and uniformly at a speed of 5-20mm/min or 0.5-3.5KN/min. The pressure value at which the sample breaks is recorded, and the arithmetic mean of these values is calculated as the final test result.

Alumina content: Alumina balls are classified into different materials based on their alumina content, such as feldspar type, feldspar-mullite type, mullite type, mullite-spinel type, and spinel type. The proportioning is adjusted according to the different design requirements of customers. Generally, high-alumina ones use industrial alumina, while low-alumina ones are usually made from chemical kaolin. The determination of the alumina content in alumina balls is in accordance with GB/T4734-1996, "Chemical Analysis Methods for Ceramic Materials and Products".