# HiDur™ inert ceramic balls
# Technical data and properties

## HiDur™ inert ceramic balls

HiDur™ Inert Ceramic Balls are designed for a wide range of applications acting as carrier layers or cover layers of catalyst packings, absorbents, molecular sieves and silica gel. Due to excellent crush strength and high resistance to thermal shock HiDur™ inert ceramic balls are suitable for a wide variety of industrial processes like claus reactors, reformers, hydrocrackers, hydrotreaters, dryers, desulphurization plants, and others. HiDur™ inert ceramic balls have performed failure-free in operation in industrial plants for decades due to superior physical properties.

### HiDur™ inert ceramic balls

| Nominal size inch | Nominal size mm | Bulk density kg / m³ | Bulk density lbs / ft³ | Specific surface area m² / m³ | Specific surface area ft² / ft³ | Minimum crush strengh N(min) |
|---|---|---|---|---|---|---|
| 1/8" | 3.2 | 1,350 | 84.3 | 720 | 219.5 | 300 |
| 1/4" | 6.4 | 1,350 | 84.3 | 520 | 158.5 | 600 |
| 3/8" | 9.5 | 1,350 | 84.3 | 360 | 109.7 | 1,200 |
| 1/2" | 12.7 | 1,350 | 84.3 | 275 | 83.8 | 2,300 |
| 3/4" | 19.1 | 1,350 | 84.3 | 190 | 57.9 | 4,300 |
| 1" | 25.4 | 1,350 | 84.3 | 144 | 43.9 | 7,950 |
| 1 1/2" | 38.1 | 1,350 | 84.3 | 100 | 30.5 | 9,100 |
| 2" | 50.8 | 1,350 | 84.3 | 72 | 21.9 | 9,100 |

Typical chemical composition

| | | | |
|---|---|---|---|
| $SiO_2$ | < 80 % | MgO | 0.6 - 1.2 % |
| $SiO_2$+$Al_2O_3$ | > 90 % | CaO | 0.6 - 0.9 % |
| $TiO_2$ | 0.5-0.8 % | $K_2O$ | 2.3 - 3.0 % |
| $Fe_2O_3$ | 0.4-0.8 % | $Na_2O$ | 0.5 - 0.8 % |
| Leachable iron | < 0.1 % | | |
| Water absorption | < 2.0 % | | |

Typical physical properties

| | | |
|---|---|---|
| Density | g / cm³ | 2.3 - 2.4 |
| | lbs / ft³ | 143.6 - 149.8 |
| Sphericity | $d_{max}/d_{min}$ | < 1.15 |
| E-Modulus | GPa | 60 |
| Mohs hardness | - | 7 – 8 |
| Heat capacity | J / kgK | 840 |
| 30°C to 100°C / 86°F to 212°F | BTU / lb °F | 0.20 |
| Thermal conductivity | W/mK | 1-1.5 |
| 30°C to 100°C / 86°F to 212°F | BTU / inch ft² hr °F | 7-10.5 |
| Heat expansion | (20°C-600°C) $10^{-6}$ $K^{-1}$ | 4.7 |
| Thermal resistance | up to °C | 1,000 |
| | up to °F | 1,800 |

# HiDur™ alumina oxide balls
# Technical data and properties

## HiDur™ alumina oxide balls

HiDur™ alumina oxide balls consist of > 99% wt of alpha-alumina oxide with a maximum content of 0.2% wt of silica dioxide. This composition is ideal for applications requiring extremely high crush strength and thermal resistance. These balls are typically used in high temperature environments such as steam shift operations. The extremely low $SiO_2$ and $Fe_2O_3$ content prevent the poisoning of catalysts or fouling of downstream processes. Typical applications are in ammonia plants, ethylene crackers and polymerization units within the petrochemical industry.

### HiDur™ alumina oxide balls

| Nominal size inch | mm | Bulk density kg / m³ | lbs / ft³ | Specific surface area m² / m³ | ft² / ft³ | Minimum crush strengh N(min) |
|---|---|---|---|---|---|---|
| 1/8" | 3.2 | 2,000-2,200 | 124.6-137.1 | 720 | 219.5 | 500 |
| 1/4" | 6.4 | 2,000-2,200 | 124.6-137.1 | 520 | 158.5 | 2,500 |
| 3/8" | 9.5 | 2,000-2,200 | 124.6-137.1 | 360 | 109.7 | 4,000 |
| 1/2" | 12.7 | 2,000-2,200 | 124.6-137.1 | 275 | 83.8 | 6,000 |
| 3/4" | 19.1 | 2,000-2,200 | 124.6-137.1 | 190 | 57.9 | 10,000 |
| 1" | 25.4 | 2,000-2,200 | 124.6-137.1 | 144 | 43.9 | 14,000 |
| 1 1/2" | 38.1 | 2,000-2,200 | 124.6-137.1 | 100 | 30.5 | 18,000 |
| 2" | 50.8 | 2,000-2,200 | 124.6-137.1 | 72 | 21.9 | 25,000 |

Typical chemical composition

| | |
|---|---|
| $Al_2O_3$ | > 99 % |
| $SiO_2$ | ≤ 0.2 % |
| $TiO_2$ | ≤ 0.1 % |
| $Fe_2O_3$ | ≤ 0.12 % |
| MgO + CaO | ≤ 0.2 % |
| $Na_2O + K_2O$ | ≤ 0.4 % |
| Leachable iron: | ≤ 0.01 % |

Typical physical properties

| | | |
|---|---|---|
| Density | g / cm³ | 3.0 - 3.6 |
| | lbs / ft³ | 206 - 224.7 |
| Sphericity | $d_{max}/d_{min}$ | < 1.15 |
| E-Modulus | GPa | 300 |
| Mohs hardness | - | 9 |
| Heat capacity | J/kgK | 850 - 1,050 |
| 30°C to 100°C / 86°F to 212°F | BTU / lb °F | 0.203 - 0.251 |
| Thermal conductivity | W/mK | 19 - 30 |
| 30°C to 100°C / 86°F to 212°F | BTU / inch ft² hr °F | 131.7 - 208 |
| Heat expansion | (20°C-600°C) $10^{-6}$ $K^{-1}$ | 7 - 9 |
| Thermal resistance | up to °C | 1,500 |
| | up to °F | 2,730 |