

T-162

Tabular Alumina Balls

BASF T-162 Tabular Alumina Balls® are sintered alpha alumina with very high-purity. The alumina is form of pure aluminum oxide which has been fired at such high temperatures (well over 1900°C) that practically all porosity and shrinkage is removed. It is essentially 100 percent alpha alumina (corundum).

When the internal crystalline structure of tabular alumina is examined, large plate-like or tablet-like crystals are apparent. The shape of these crystals gives “tabular” alumina its name.

Product Background

In 1950, tabular alumina balls were introduced to the chemical and petrochemical industries. The balls were first produced for use as the heat exchange medium for pebble heaters. In this application, the balls constitute a moving bed which transfers heat from a furnace to the gas or liquid process stream. After this stage, the balls return to the furnace to be reheated.

The applications of tabular alumina balls have since expanded to other areas where the balls' inertness, high chemical purity, and thermal and mechanical shock resistance are important. These uses include thermal reservoirs and supporting beds in catalytic and other petroleum refining and petrochemical plant applications, and over-burden to prevent gas or liquid streams from carrying away desiccant or other bedded material.

Applications

The properties of BASF T-162 tabular alumina balls make them ideal in applications as inert catalyst bed supports. BASF T-162 tabular alumina balls have a relatively smooth surface and are suitable as catalyst reactor and desiccant bed supports, or for ballast under exposure to high temperature or severe corrosive conditions. The high chemical purity and inertness of the balls minimizes the

possibility of catalyst contamination and adverse side reactions. The balls offer good resistance to heat shock, mechanical shock and abrasion. However, BASF T-162 Tabular Alumina Balls are not suitable for grinding media. All sizes are carefully screened before packaging; however, some chips and chipped balls may be present in all sizes.

Product Benefits

- Long lasting because they are inert and can withstand exposure to most environments.
- A smooth ball alumina; the smoothness provides low pressure drop characteristics, eliminating the need for additional compressor horsepower to maintain operating pressure.
- Good thermal shock properties and very good resistance to the mechanical and abrasive actions found in catalyst support systems.
- High chemical purity, with over 99.7 percent Al_2O_3 content and minute traces of SiO_2 .
- Do not produce fines and dust to contaminate the product stream.
- Unaffected by either oxidizing or reducing atmospheres at temperatures well below the softening point. The balls are also practically insoluble in almost all aqueous acid and alkaline solutions.



We create chemistry

Product Data Sheet

Available Sizes

BASF T-162 tabular alumina balls are available in seven sizes:

- 1/8" (3.0 mm)
- 3/16" (4.8 mm)
- 1/4" (6.4 mm)
- 5/16" (8.0 mm)
- 3/8" (11.0 mm)
- 1/2" (13 mm)
- 3/4" (19 mm)
- 1" (25 mm)
- 2" (50 mm)

Available Packaging

- 25 kg paper bags
- 1000 kg super sacks
- 200 kg steel drums

Reasons for use

In chemical and petroleum processes which involve reactors, a chemically inert material is used to support the catalyst bed. Generally, the support material is in the form of balls, since that form gives the lowest pressure drop. High density balls also may be placed at the top of the bed to help ensure a uniform distribution of the gas or liquid flow across a down flow reactor tower or to prevent lifting of the bed in a reactor tower designed for up flow.

Tabular alumina balls are used as either catalyst support or cover media in numerous hydrocarbon and catalytic processes such as dehydrogenation, desulfurization, catalytic reforming, selective hydrogenation, catalytic isomerization, etc. Tabular Aluminas Balls®, when used as support or cover media, have an application in practically every solid desiccant dehydration unit. Specifically, Tabular alumina balls are used as bed support media when dehydrating natural gas, air inert gases, and hydrocarbon liquids and gases.

Selected Properties 3/4" T-162

Thermal Conductivity		Specific Heat C _p		CET ⁽¹⁾	
Mean °F	BTU In/ft ² /hr/°F	°F	BTU/lb/°F	°F	CET
200	3.0	32	0.186	77	5.5x10 ⁻⁶
600	5.8	420	0.245	1472	7.3x10 ⁻⁶
1000	8.7	1340	0.294	2372	10.0x10 ⁻⁶
1600	11.6	1880	0.302		

(1) Coefficient of thermal expansion. All data represents typical product properties and are based upon BASF standard test methods. All test methods are available upon request. Information presented herein is believed to be accurate and reliable but does not imply any guarantee or warranty by BASF.

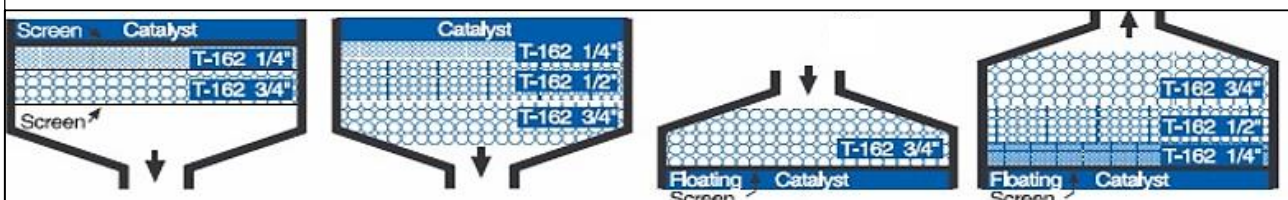
Heat Absorption

Tabular alumina balls have been found to be one of the most suitable materials for use as the heat absorbing component of a catalytic mass. The following table compares Tabular Alumina with other materials that could be considered for this use.

Material	Tabular Alumina	Mullite	Magnesite Brick	Chrome Brick	Iron Metal	Aluminum Metal	Silica Brick	Fireclay Brick
True Density, lb/ft ³ (g/mL)	248.9 (4.0)	202.8 (3.2)	218.4 (3.5)	246.5 (3.9)	480 (7.7)	168.5 (2.7)	146.6 (2.3)	162.2 (2.6)
Specific Heat, BTU/lb ^o F (joule/g ^o C)	0.31 (1.3)	0.27 (1.1)	0.31 (1.3)	0.29 (1.2)	0.17 (0.7)	0.26 (1.1)	0.32 (1.3)	0.26 (1.1)
Heat Capacity, BTU/ft ³ ^o F (joule/m ³ ^o C)	78.0 (5.23E6)	54.9 (3.68E6)	67.7 (4.54E6)	71.1 (4.77E6)	81.7 (5.48E6)	43.7 (2.93E6)	47.7 (3.20E6)	42.2 (2.83E6)

Representative Applications

The amount of BASF T-162 Tabular Alumina Balls® specified in the examples are given as typical. The bed depth utilized can be varied from process to process, depending on the size of the reactors, operating conditions of the unit, etc. As a rule, it requires 1,350 pounds of 3/4-inch tabular alumina balls to fill a volume of 10 cubic feet. The tabular alumina balls of other sizes have essentially the same bulk density. The percentage of voids remains practically constant when comparisons are made of different sphere sizes in a given size vessel.



Fine mesh containment screens have long been used to separate the actual catalyst from the bed support. Because of weld failures during regenerative heating and cooling cycles, these screens can separate and become a troublesome source of high pressure drop. This same cyclic heat can cause lower quality bed support balls to crack and spill. This can plug or blind fine mesh screens, causing channeling through the bed and a decrease in catalyst efficiency. The extra quality of BASF T-162 Tabular Alumina Balls can be good insurance when there is a concern about pressure drop and screen bindings.

Some newer designs are omitting the screen separation at the reactor bottom. Tabular balls are loaded in graduated sizes directly on the vessel floor. A final layer of BASF T-162 Tabular Alumina Balls, 1/4 inch, is in direct contact with the actual catalyst with no screen separation. The lighter weight catalyst has little chance of settling or diffusing into the much higher density bed support. Typical ratio of diameters between support balls directly below catalyst and the catalyst itself, is 2 to 1.

High velocity gases entering the top of a reactor vessel need proper distribution and redirection to prevent disruptive channeling. The catalyst itself needs protection from the turbulence of these entry gases. A 6 to 12-inch layer of T-162, 3/4 (19 millimeters) Tabular Balls is an excellent choice to break this destructive speed. The high density of BASF T-162 Tabular Alumina Balls® can withstand the impact of the gas without movement. Lighter balls can vibrate to the point of attrition and subsequent dusting. Ball sizes above 1 inch are not needed because of the BASF T-162 density. Larger sizes would result in packing voids which can accentuate channeling. The 3/4 -inch BASF T-162 Tabular Alumina Ball® is an effective size to evenly distribute the gas flow to the catalyst bed.

For reactor vessels being fed from the bottom, BASF T-162 Tabular Alumina Balls can be especially beneficial. The extra density of T-162 can provide the weight and ballast to hold the catalyst bed in place. Movement or lifting of the bed can be very destructive and cause breaking and dusting of the catalyst.

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