Tipton's Product Quality Exceeds Global Standards

Compare Tipton's product quality to the global standards for inert balls established by UOP.

1 Use of new products

UOP All inert balls shall be new products. No recycled products or repaired products shall be used.

Tipton All inert balls we supply are new products.

2 Stable Material (Inertness)

UOP All inert balls are inert. Materials shall not influence the environment in any way.

Tipton All of the materials of the inert balls we supply are inert and stable.

3 Chemical compositions of the Main Component

UOP

	Standard Value
$Al_2O_3+SiO_2$	90wt%
SiO_2	80wt%

The total percent of alumina and silica content in the product is over 90% and silica content is 80% or less.

Tipton

	Representative Value
$Al_2O_3+SiO_2$	95wt%
SiO_2	76wt%

Measurement Method
·JIS R-2216
(A.S.T.M. C573 rejected in 1995)

* Representative value is an actual average rate measured by Tipton products.

4 Eluted Iron (Fe_2O_3) (Leachability)

UOP

	Standard Value
Eluted Iron (Fe_2O_3)	0.1wt%

The maximum content of eluted iron (Fe_2O_3) is 0.1% per 1/8" (3mm). Eluted iron is measured after boiling a 0.1 pound (50 gram) inert ball in a 10% hydrochloric acid solution for 64 hours.

Tipton

	Representative Value
Eluted Iron (Fe_2O_3)	0.000012wt%

* Representative value is an actual average rate measured by Tipton products.

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5 Upper Temperature Limit

UOP

	Standard Value
Operating temperature	980°C Max

All materials must support an operating temperature of up to 980 degrees.

Tipton

	Standard Value	Representative Value
Operating temperature	1,350°C Max	1,480°C

All materials must support an operating temperature of up to 1,350 degrees.
* Representative value is an actual average rate measured by Tipton products.

6 Circularity (Roundness)

UOP

	Standard Value
Ratio of the maximum diameter to the minimum diameter	1.20Max

All inert balls are basically spheres. The ratio of maximum to minimum diameter of any inert ball shall not exceed 1.20.

Tipton

	Representative Value
Ratio of the maximum diameter to the minimum diameter	1.16

* Representative value is an actual average rate measured by Tipton products.

7 Size tolerances and Crush strength

UOP

Nominal size (Nominal Diameter)	Size tolerance (minimum size~maximum size)	Crush strength (min.)
1/16" (1.6mm)	1 mm ~ 2 mm (0.04"~0.08")	9kg(20lb)
1/8" (3mm)	2 mm ~ 4 mm (0.08"~0.17")	23kg(50lb)
1/4" (6mm)	5 mm ~ 8 mm (0.20"~0.30")	55kg(120lb)
1/2" (13mm)	12 mm ~ 14 mm (0.45"~0.57")	170kg(370lb)
3/4" (19mm)	17 mm ~ 21 mm (0.65"~0.85")	430kg(950lb)
1" (25mm)	23 mm ~ 27 mm (0.94"~1.06")	635kg(1,400lb)
1-1/2" (38mm)	35 mm ~ 40 mm (1.38"~1.58")	910kg(2,000lb)
2" (51mm)	48 mm ~ 56 mm (1.90"~2.20")	910kg(2,000lb)

The size tolerances for each size of inert ball are listed above. The crush strength for each size must be at least that value. The crush strength is an actual measured value obtained by pressing an inert ball between two steel plates.

Tipton

Nominal size (Nominal Diameter)	Size tolerance		Crush strength	
	Standard Value	Representative Value	Standard Value	Representative Value
1/16" (1.6mm)	0.6 mm ~ 2.6 mm (0.02"~0.10")	1.69 mm (0.07")	10kg (20lb)	15kg (30lb)
1/8" (3mm)	2.2 mm ~ 4.2 mm (0.09"~0.17")	3.64 mm (0.14")	30kg (70lb)	58kg (130lb)
1/4" (6mm)	5.4 mm ~ 7.4 mm (0.21"~0.29")	6.48 mm (0.26")	85kg (190lb)	144kg (320lb)
3/8" (9.3mm)	7.8 mm ~ 10.8 mm (0.31"~0.43")	9.33 mm (0.37")	160kg (350lb)	275kg (610lb)
1/2" (13mm)	11.2 mm ~ 14.2 mm (0.44"~0.56")	12.77 mm (0.50")	200kg (440lb)	426kg (940lb)
3/4" (19mm)	17.6 mm ~ 20.6 mm (0.69"~0.81")	19.36 mm (0.76")	450kg (990lb)	834kg (1,840lb)
1" (25mm)	23.9 mm ~ 25.63 mm (0.94"~1.01")	25.13 mm (0.99")	600kg (1,320lb)	1,218kg (2,690lb)
1-1/2" (38mm)	35.0 mm ~ 41.0 mm (1.38"~1.61")	38.01 mm (1.50")	1,000kg (2,210lb)	1,455kg (3,210lb)
2" (51mm)	47.0 mm ~ 53.0 mm (1.85"~2.09")	49.98 mm (1.97")	1,400kg (3,090lb)	3,305kg (7,290lb)

Each size of inert ball meets the size tolerance/ crush strength requirements (our inert balls have been used in many different projects.

* Standard value is numeric value guaranteed by Tipton.

* Representative value is an actual average rate measured by Tipton products.

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8 Bulk density (volume density)

UOP: The minimum bulk density is 85 lb/ft³(1,360kg/m³). Material density must be at least 135 lb/ft³(2,160kg/m³).

Tipton: Please refer to the Products Specifications.

9 Size variation

UOP: Before filling, small or large inert balls must be screened for in each size in order to remove them.

Tipton: We only provide standard inert balls that have been screened during the separation process.

10 Handling

UOP: The Inert Ceramic Balls hall not “dust” I.e., produce small fines, spall, or fracture due to abrasion between Inert Ceramic Ball s or with the container when handled or vibrated.

Tipton: Inert balls are sintered, so they do not break down or “stir up dust.”

* Caution: Particulate may be created by handling or friction caused by vibration.