

Product Data Sheet

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Product	SiLibeads Glass beads Type P
Material	Precision Glass beads made of Borosilicate glass with polished or (fine-)matt surface Specific weight: 2,23 kg/dm ³ Hydrolytic resistance on Glass beads: HGB 1 (based on DIN ISO 719) Acidic resistance on Glass beads: S1 (according to DIN 12116) Alcaline resistance on Glass beads: A3 (according to DIN ISO 695)
Application	Glass beads are used as high precision beads for ball bearings in aggressive and corrosive media (solutions). Mixing bead in insulin cartridges, Valves of dosage pumps and dispensers in the cosmetic- and food industry, and many other special applications in the optical, space and medical technique.
Technical Data	
Roundness	≥ 0.99 (ratio width/length (x_{min}/x_{max}))
Compressive strength	mean value 1,10 kg/dm ³ (belonging to diameter)
Refractive index	1,4642
Size (Diameter)	see table Standard Sizes
Transformation temperature	586 °C
Softening point (Littleton point)	787 °C
Melting point	1.663 °C
Specific thermal Conductivity	1,268 W/km
Coefficient of expansion	3,35 10 ⁶ (1/K) [20-400 °C]
Specific thermal capactcity	1,447 kJ/kg K [>600 °C]
Youngs-Module	64 GPa
Hardness according to Mohs	7
Linear thermal expansion, ∞ (20-300 °C)	3,25 x 10 ⁻⁶ K ⁻¹

all datas are reference values

Assessment acc. to Food Legislation

The Glass beads are a consumer good in the sense of §2 clause 6 no. 1 German Code for Food Stuff (LFGB), Commodities and Feeding Stuff. Therefore they have to comply with the legal requirements.

The Glass beads comply with the requirements of§ 31 LFGB and article 3 of the regulation (EC) No 1935/2004.



Conformity to Pharmacopoeia

The Glass beads fullfil the requirements of Pharmacopoeia Ph. Eur. 5.1, USP 30 and JP XIV.

The heavy metal content of the Glass beads keeps the permitted limits of RoHS.

Chemical Analysis; Glass beads made of Borosilicate glass; CAS-No. 65997-17-3 / EINECS 266-046-0

Name	Methode	Reference in Weight-%	CAS-No.	EINECS
		approx.		
Silicon dioxide SiO ₂	DIN 51001	81 %	7631-86-9	231-545-4
Boric oxide B ₂ O ₃	DIN 51086-1	13 %	1303-86-2	215-125-8
Sodium oxide Na ₂ O +	DIN 51001	} 4 %	1313-59-3	215-208-9
Potassium oxide K ₂ O	DIN 51001		12136-45-7	235-227-6
Aluminium oxide Al ₂ O ₃	DIN 51001	2 %	1344-28-1	215-691-6

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Standard Sizes (special diameters by request)

Diameter *)	Tolerance **)	Roundness**)	Surface	Weight per 1000 pieces	Amount (pieces per kg)
2,000 mm	+/- 0,02 mm	≤ 0,02 mm	polished	9,34 gr.	107.055
2,381 mm 3/32"	+/- 0,02 mm	≤ 0,02 mm	polished	15,76 gr.	63.448
2,500 mm	+/- 0,02 mm	≤ 0,02 mm	polished	18,24 gr.	54.812
2,700 mm	+/- 0,02 mm	≤ 0,02 mm	polished	22,98 gr.	43.512
2,780 mm	+/- 0,02 mm	≤ 0,02 mm	polished	25,09 gr.	39.862
3,000 mm	+/- 0,02 mm	≤ 0,02 mm	polished	31,53 gr.	31.720
3,175 mm 1/8"	+/- 0,02 mm	≤ 0,02 mm	polished	37,37 gr.	26.759
3,400 mm	+/- 0,02 mm	≤ 0,02 mm	polished	45,89 gr.	21.790
3,500 mm	+/- 0,02 mm	≤ 0,02 mm	polished	50,06 gr.	19.975
3,969 mm 5/32"	+/- 0,02 mm	≤ 0,02 mm	polished	73,00 gr.	13.698
4,000 mm	+/- 0,02 mm	≤ 0,02 mm	polished	74,73 gr.	13.382
4,500 mm	+/- 0,02 mm	≤ 0,02 mm	polished	106,40 gr.	9.398
4,762 mm 3/16"	+/- 0,02 mm	≤ 0,02 mm	polished	126,09 gr.	7.931
5,000 mm	+/- 0,02 mm	≤ 0,02 mm	polished	145,95 gr.	6.851
5,500 mm	+/- 0,02 mm	≤ 0,02 mm	polished	194,26 gr.	5.148
5,556 mm 7/32"	+/- 0,02 mm	≤ 0,02 mm	polished	200,26 gr.	4.994
5,800 mm	+/- 0,02 mm	≤ 0,02 mm	polished	227,82 gr.	4.389
6,000 mm	+/- 0,02 mm	≤ 0,02 mm	polished	252,21 gr.	3.965
6,350 mm 1/4"	+/- 0,02 mm	≤ 0,02 mm	polished	298,97 gr.	3.345
6,500 mm	+/- 0,02 mm	≤ 0,02 mm	polished	320,66 gr.	3.119
6,747 mm 17/64"	+/- 0,02 mm	≤ 0,02 mm	polished	358,62 gr.	2.788
7,000 mm	+/- 0,02 mm	≤ 0,02 mm	polished	400,50 gr.	2.497
7,144 mm 9/32"	+/- 0,02 mm	≤ 0,02 mm	polished	425,72 gr.	2.349
7,500 mm	+/- 0,02 mm	≤ 0,02 mm	polished	492,59 gr.	2.030
7,938 mm 5/16"	+/- 0,02 mm	≤ 0,02 mm	polished	584,03 gr.	1.712
8,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	597,83 gr.	1.673
8,500 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	717,07 gr.	1.395
8,731 mm 11/32"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	777,14 gr.	1.287
9,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	851,20 gr.	1.175
9,525 mm 3/8"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	1.009,02 gr.	991
10,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	1.167,63 gr.	856
10,319 mm 13/32"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	1.282,97 gr.	779
10,500 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	1.351,68 gr.	740
11,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	1.554,11 gr.	643
11,112 mm 14/32"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	1.602,07 gr.	624
11,906 mm 15/32"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	1.970,62 gr.	507
12,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	2.017,66 gr.	496
12,303 mm 31/64"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	2.174,39 gr.	460
12,500 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	2.280,52 gr.	438
12,700 mm 1/2"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	2.391,75 gr.	418
13,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	2.565,28 gr.	390
13,494 mm 17/32"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	2.868,97 gr.	349
14,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	3.203,97 gr.	312
15,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	3.940,74 gr.	254
15,081 mm 19/32"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	4.004,93 gr.	250
15,875 mm 5/8"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	4.671,39 gr.	214

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Diameter *)	Tolerance **)	Roundness**)	Surface	Weight per 1000 pieces	Amount (pieces per kg)
16,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	4.782,60 gr.	209
17,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	5.736,56 gr.	174
18,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	6.809,61 gr.	147
19,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	8.008,76 gr.	125
19,050 mm 3/4"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	8.072,15 gr.	124
20,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	9.341,02 gr.	107
22,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	12.432,90 gr.	80
24,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	16.141,29 gr.	62
25,000 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	18.244,19 gr.	55
25,400 mm 1"	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	19.133,99 gr.	52
31,750 mm 1 1/4 "	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	37.371,08 gr.	27
38,100 mm	+/- 0,02 mm	≤ 0,02 mm	(fine-)matt	64.577,23 gr.	15

*) special diameters by request

**) for special request tolerance +/- 0,01 mm and roundness ≤ 0,01 mm possible

Grades and Tolerances acc. to DIN 5401 - 11.1993 (ANSI/AFBMA - 10.1989)

Grade	Deviation from spheric form in micron	Maximum surface roughness in micron
200	5,0	0,200
100	2,5	0,125

Chemical resistance of Glass beads Type P (Borosilicate) 2,5 mm Ø, in further media:

Medium	Concentration	Temperature	Time	Corrosion rate
Hydrochlorid Acid (HCl)	20,4 %	102 °C	6 h	0,001 gr. / m ² / h
Nitric Acid (HNO ₃)	30,0 %	102 °C	6 h	0,010 gr. / m ² / h
Oxalic Acid (H ₂ C ₂ O ₄)	30,0 %	102 °C	6 h	0,005 gr. / m ² / h
Formic Acid (H ₂ CO ₂)	30,0 %	102 °C	6 h	0,000 gr. / m ² / h
Sodium Hydroxide (NaOH)	30,0 %	102 °C	6 h	1,200 gr. / m ² / h
Deionized Water (H ₂ O)	100,0 %	102 °C	6 h	0,002 gr. / m ² / h

Additional Information

Storage indication	Store in a dry manner in closed (original) container by room temperature. We recommend storage life of maximum 3 years.
Disposal	There is no type of waste that occurs due to the product that requires special supervision according to the German "Closed Substance Waste Management Act" or the 91/689/EWG and 2006/12/EG guidelines.
Safety advice	High risk of slipping due to spillage of product
Product information	Sample card ... glass beads for technical applications, Safety Data Sheet SiLibeads Type P+M (Borosilicate); Test Reports
Manufacturer/Supplier	Sigmund Lindner GmbH; Oberwarmensteinacher Straße 38; D-95485 Warmensteinach Phone: 09277-9940 Fax: 09277-99499 Web: www.sili.eu E-Mail: sili@sigmund-lindner.com