

BALL GUIDANCE



BALL GUIDE BUSH

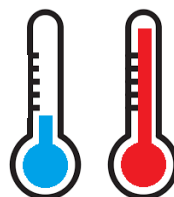
BOLEXP ball guidance bushes are made up of an outer casing of steel for rolling, hardened and ground, which holds fixed inside a high-resistance bronze cage for guiding the balls running along the cage. The translation system consists of several rows of precision balls circulating endlessly.

The great novelty of **BOLEXP** ball guidance bushes is that balls do not run aligned, with the translation motion, but at a slight angle, thus enlarging the contact area with the shaft and enabling greater load capacity. This patented system represents an utter innovation in the linear guidance market. An all-metal structure makes bushes extremely resistant to high temperatures.

Inclined Technology



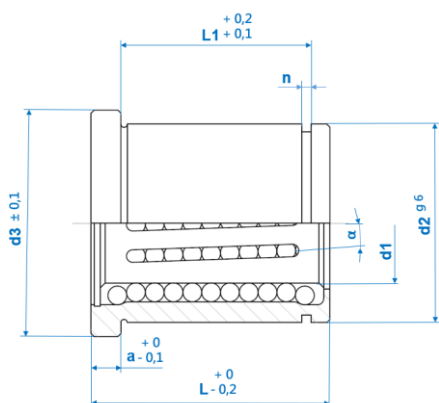
-5°C



200°C

BOLEXP bushes are supplied in a variety of three outer forms, all of them equipped with the same inside structure.

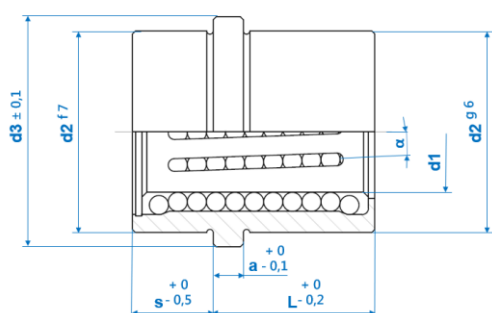
Type 1



Bush with an outer cylindrical body and a flange at the end for fixing it.



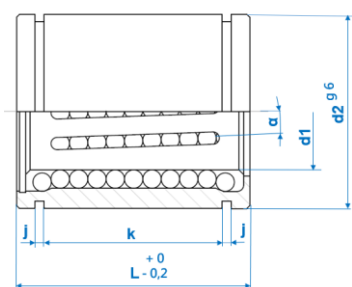
Type 2



Bush with two outer cylindrical bodies and a center flange for fixing it between two plates.



Type 3



Bush with an all-cylindrical outer body and two ferrules at the ends for fixing it with security spring rings.



GUIDE PILLAR

BOLEXP guide column is made of steel 1.7131 with surface hardening, obtaining a hardness of 62-64 HRC, and a depth from 1.00 to 1.20 mm., leaving the shaft core soft so that it can absorb the bending it might be required to. In guide manufacturing, some features are considered to be essential, including the quality of steel, surface hardness and precision and quality of the finish.

FEATURES

Determining the adequate ball bush size is based on the requirements of the tool to be constructed and the load capacity needed, as well as bush lifetime and operating security.

Use the maximum recommended loads listed in Table I below for calculations.

TABLE MODEL BOLEXP / LOAD

MODEL	Maximum Recommended Load (N)	MODEL	Maximum Recommended Load (N)	MODEL	Maximum Recommended Load (N)
B8011230	882	B8031230	882	B844302736	2.690
B8011630	882	B8031630	882	B8452417	1.280
B8011635	1.250	B8031635	1.250	B8452422	1.720
B8012035	1.250	B8032035	1.250	B8453622	1.470
B8012045	1.912	B8032045	1.912	B8453627	1.840
B8012535	1.250	B8032535	1.250	B8454827	2.820
B8012545	1.985	B8032545	1.985	B8454836	3,620
B8012555	2.721	B8032555	2.721	B8521222	600
B8013245	1.691	B8033245	1.691	B8521622	600
B8013263	3.015	B8033263	3.015	B8522026	880
B8014045	1.691	B8034045	1.691	B8522526	880
B8014063	3.015	B8034063	3.015	BGEB0750	1.250
B8020812	290	B8035063	3.770	BGEB0875	1.950
B8021012	520	B8035080	5.200	BGEB1000	1.990
B8021222	882	B8036080	6.235	BGEB1250	2.290
B8021622	882	B80360100	7.795	BGEB1500	2.850
B8021626	1.250	B8121226	765	B737121217	1.020
B8022026	1.250	B8121835	1.250	B737181722	1.670
B8022035	1.915	B8122445	1.985	B737242227	2.590
B8022526	1.250	B8123055	2.353	B737302232	3100
B8022535	1.985	B844100912	520	B737302736	3,620
B8022545	2.721	B844100917	630	B737402736	4.040
B8022555	3.456	B844120917	760	B737402746	4.680
B8023245	2.574	B844121217	850	B737403646	5.260
B8023263	3.897	B844181222	1.210	CL522012	590
B8024045	2.574	B844181722	1.390	CL522018	900
B8024063	3.897	B844241727	1.940	CL522024	1.350
B8025055	5.200	B844242227	2.160	CL522030	1.500
B8026055	6.235	B844302232	2.310		

Made in accordance with report by L.G.A.I. (Generalitat de Catalunya).

Use the following formula to calculate nominal life for ball bushes :

L_h = Nominal lifetime in operating hours.

$$L_h = \frac{833}{H \times N_{osc}} \times \left(\frac{C}{P} \right)^3$$

H = Nominal lifetime in operating hours.
 N_{osc} = Come-and-go motion frequency in 1/min.

C = Load capacity in N.
 P = Equivalent rolling load in N.

Motion factors.
Load factors.

SERVICE LIFE CALCULATION (L_h):

An injection mould expulsion is guided by four bushes reference B8022535 (C=1.985).

MODEL	Maximum Recommended Load (N)
B8022535	1,985

The load on each bush is of $P=200N$.

The column travel is of $H=0.25\text{ m}$.

The come-and-go motion frequency is of $N_{osc}=10\text{ cycles/min}$.

1. Motion factors :

$$L_h = \frac{833}{H \times N_{osc}} = \frac{833}{0,25 \times 10} = \underline{\underline{333,2}}$$

2. Load factors :

$$\left(\frac{C}{P} \right)^3 = \left(\frac{1985}{200} \right)^3 = (9,925)^3 = \underline{\underline{977,7}}$$

3. Total Service Life :

$$333,2 \times 977,7 = \underline{\underline{325.770\text{ hours}}}$$

TRAVEL ACCURACY

Travel accuracy with a guidance system using shafts with **BOLEXP** ball linear rolling depends on several factors, such as the positioning precision of bushes or shafts, quality of shafts, free length between shaft supports and length of the bush in relation to the area to be slid. These influences depend basically on the type of application and the load to be supported.

On the whole, the required travel accuracy must be ensured by the features and design of the assembly, as well as by the precise manufacture of adjacent pieces.

Fixing the shaft at its two ends is recommended, particularly in the case of high loads, whenever the project allows it.