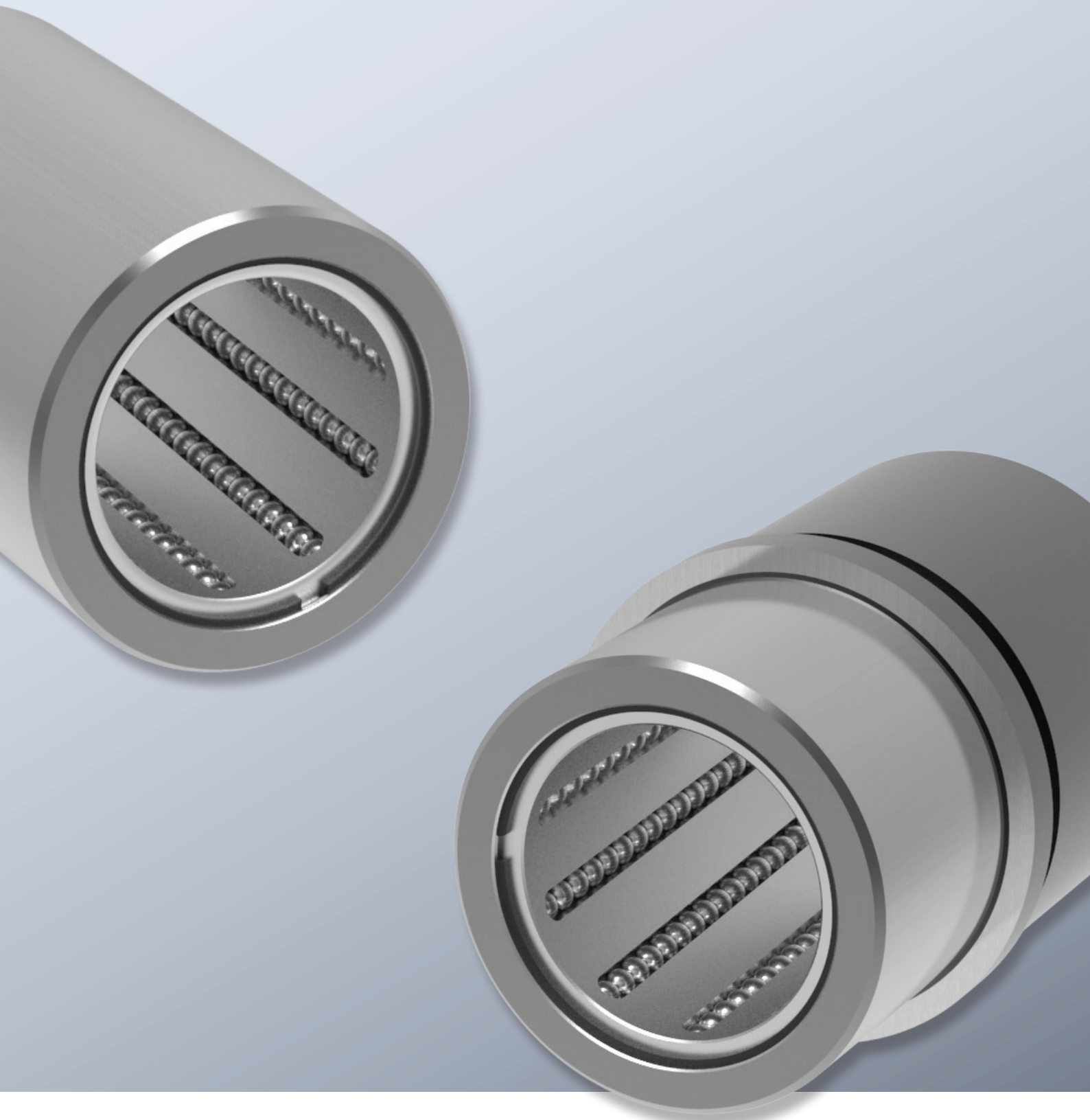


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NEW PRODUCT

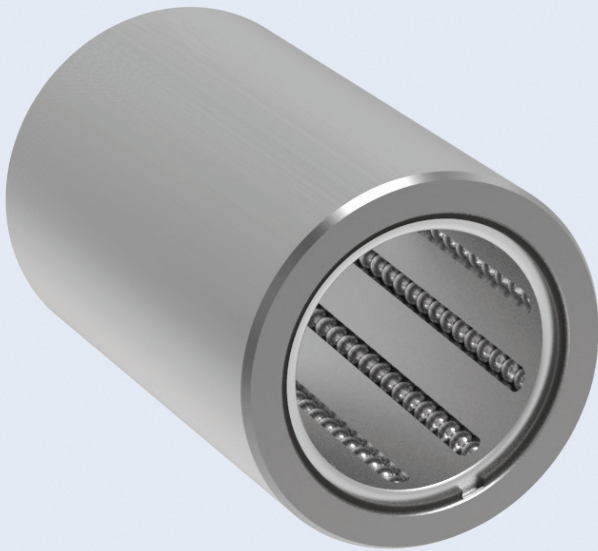
RECIRCULATING BALL BUSHES



MEMBER OF THE LÄPPLE GROUP



RECIRCULATING BALL BUSH ~ISO9448-3



The recirculating ball bush is used when very large paths (strokes) are travelled. This is only limited by the mounting situation.

In comparison to guides with ball cage, however, the lower dynamic load figures (C) should be observed. Despite the high number of ball tracks, fewer balls are in usage.

For optimum service life, a movement path (stroke) of three times the length of the recirculating ball bush is recommended ($3 \times l_1$).

MATERIAL:

- 1** Socket: Steel, hardened 62 ± 2 HRC
- 2** Ball carrier: Aluminium
- 3** Balls: Steel, hardened, conforming to DIN 5401

EXECUTION:

Outside diameter precision ground.

SLIP-FIT BONDING:

The bush is accurately positioned by means of H5 slip-fit hole. The slip-fit adhesive (order no. 281.648) is used solely to secure the bond.

ADVANTAGES OF SLIP-FIT BONDING:

- High accuracy and stability
- Ease of interchangeability

We do not recommend press-fitting the bush since that causes unacceptable alteration to the shape of the bush.

Fastening within the locating hole using DIN 472 locking rings is possible.

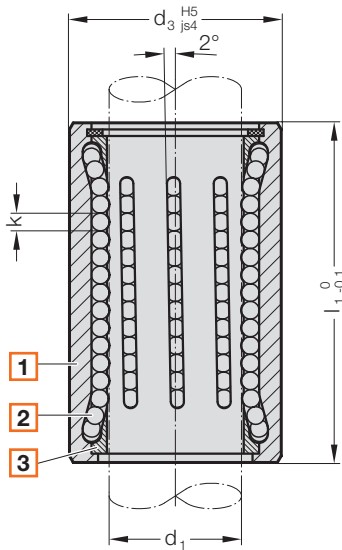
NOTE:

- 📄 For appropriate guide combinations, see selection matrix
- 📄 Lifetime calculation and dynamic load figures
- 📄 Installation guidelines / dimension tables

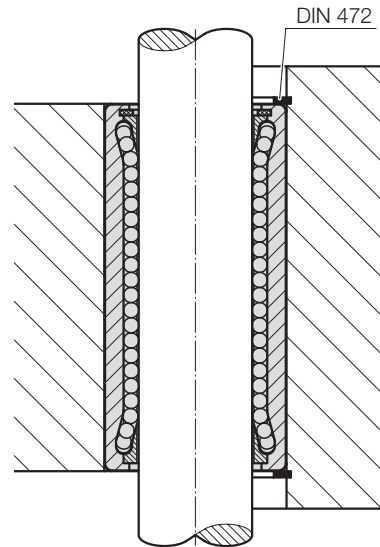
Recirculating ball bushes only with red guide pillar = .30 combinable.

2061.69. .1

Order number for recirculating ball bush ~ISO9448-3



MOUNTING EXAMPLE



2061.69. .1

RECIRCULATING BALL BUSH
~ISO9448-3

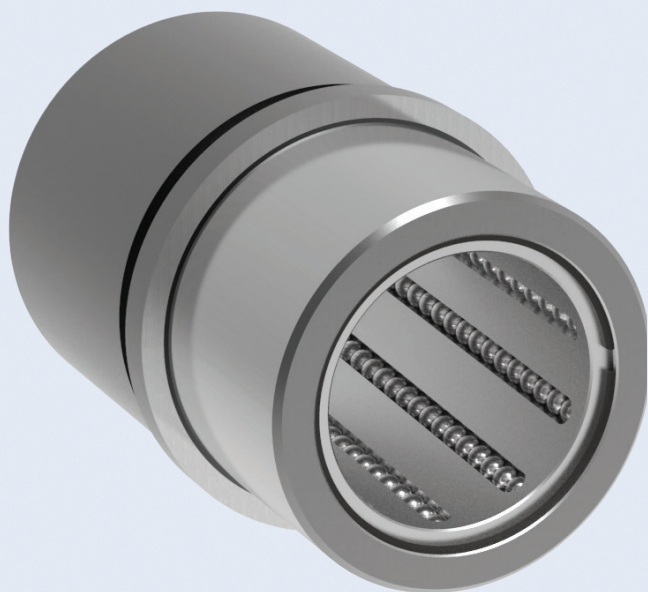
d ₁	20	25	32	40	50	63
d ₃	32	40	48	58	70	85
Ball tracks	8	8	8	10	10	12
k	3	3	4	4	4	4
l ₁						
47	●					
60		●				
77			●			
95				●	●	
120						●

2061.69. .1

ORDERING CODE (EXAMPLE):

Recirculating ball bush ~ISO9448-3		=	2061.69.		
Diameter of conduit d ₁	25 mm	=		025.	
Length l ₁	60 mm	=			060.
Standard design		=			1
Order No		=	2061.69.	025.	060. 1

RECIRCULATING BALL BUSH WITH COLLAR ~ISO9448-7



The recirculating ball bush is used when very large paths (strokes) are travelled. This is only limited by the mounting situation.

In comparison to guides with ball cage, however, the lower dynamic load figures (C) should be observed. Despite the high number of ball tracks, fewer balls are in usage.

For optimum service life, a movement path (stroke) of three times the length of the recirculating ball bush is recommended ($3 \times l_1$).

MATERIAL:


- 1** Socket: Steel, hardened 62 ± 2 HRC
- 2** Ball carrier: Aluminium
- 3** Balls: Steel, hardened, conforming to DIN 5401

EXECUTION:

Outside diameter precision ground.

NOTE:

The attachment is with 3 retaining elements, from $\varnothing d_1 = 38$ with 4 retaining elements, which are included in delivery (Order No: 207.45 - retaining element incl. socket head bolt DIN 6912, M6x20, head $\varnothing 13$).

 For appropriate guide combinations, see selection matrix

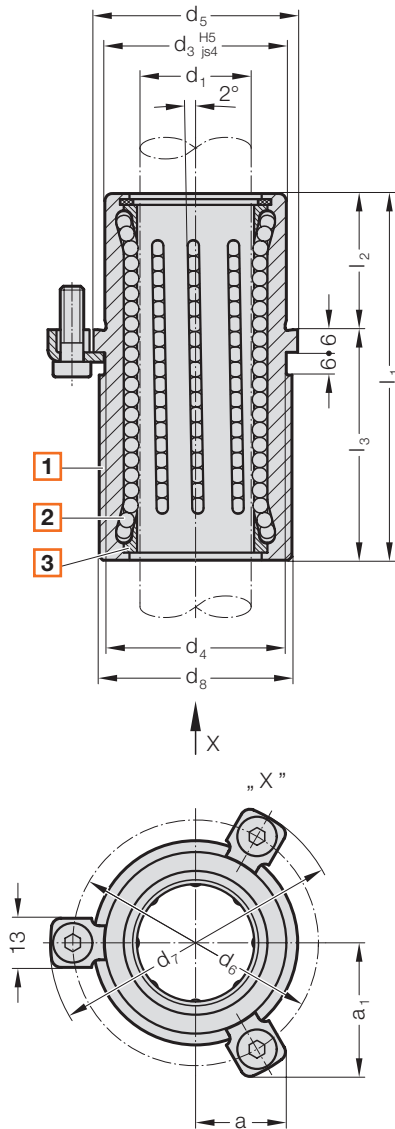
 Lifetime calculation and dynamic load figures

 Installation guidelines / dimension tables

Recirculating ball bushes only with red guide pillar = .30 combinable.

2081.69. .1

Order number for
Recirculating ball bush with collar ~ISO9448-7



2081.69. .1

RECIRCULATING BALL BUSH
WITH COLLAR ~ISO9448-7

d ₁	20	25	32	40	50	63
d ₆	39	46	53	63	77	92
d ₃	32	40	48	58	70	85
d ₄	32	40	48	58	70	85
d ₅	40	48	56	66	80	95
d ₆	52	60	67	77	91	106
d ₇	64,7	72,7	79,7	89,7	103,7	118,7
a	20,7	22,65	24,4	35,3	40,2	45,5
a ₁	30	33,4	36,4	35,3	40,2	45,5
Ball tracks	8	8	8	10	10	12
l ₁	47	60	77	95	95	120
l ₂	23	23	30	37	47	60
l ₃	24	37	47	58	48	60

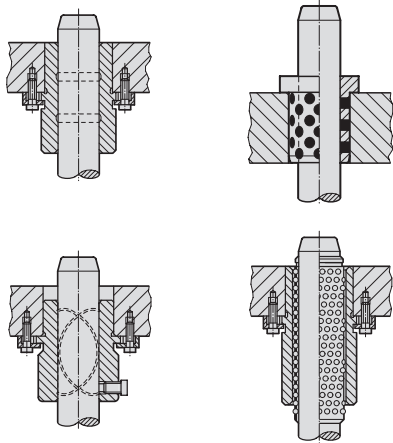
2081.69. .1 ORDERING CODE (EXAMPLE):

Recirculating ball bush with collar ~ISO9448-7		=	2081.69.		
Diameter of conduit d ₁	25 mm	=		025.	
Length l ₁	60 mm	=			060.
Standard design		=			1
Order No		=	2081.69.	025.	060. 1

SELECTION MATRIX

GUIDE PILLARS

GUIDE BUSHES

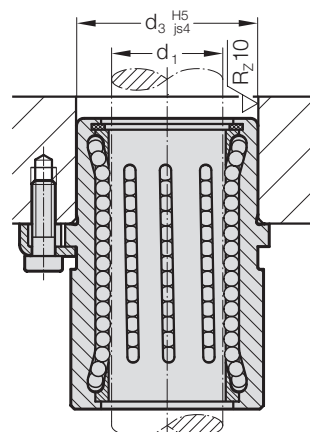
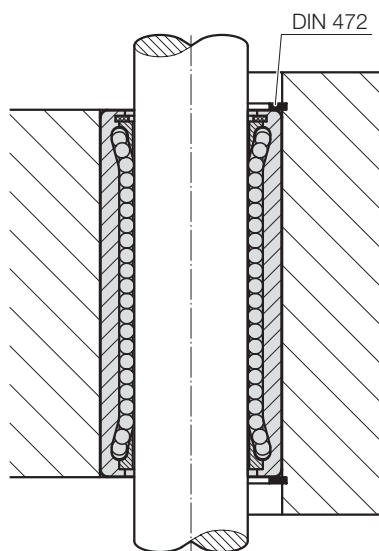


			GUIDE BUSHES			Recirculating ball bush			Sintered ferrite guide bushes Guide bearing, sintered guide			
			Ball guide bushes Guide bearing for ball bearing guide									
			206.49.	2081.46.		2061.69.	210.31.	2081.32.				
			210.44.	2081.47.		2081.69.	210.34.	2081.33.				
			210.45.	2081.49.			210.35.	2081.34.				
			210.46.	2081.67.			2031.31.	2081.35.				
			2031.41.	2081.68.			2031.34.	2091.31.				
			2031.42.	2091.44.			2031.38.	2091.32.				
			2031.44.	2091.45.			2051.32.	2091.34.				
			2061.44.	2091.46.			2081.31.					
			2061.47.	2091.67.								
			2081.44.	2091.68.								
			2081.45.									
GUIDE PILLARS			Tolerance range			.10	.20	.30	–	.10	.20	.30
Guide pillars conforming to DIN 9825 Guide pillars, bolt-on type Pallet die sets	202.17.	202.55.	.30	● ¹	● ¹	● ¹	●	● ¹	● ¹	● ¹	● ¹	
	202.19.	2021.44.										
	202.21.	2021.46.	.20	● ¹	● ¹	● ¹	×	● ¹	● ¹	● ¹	● ¹	
	202.22.	2021.50.										
Guide pillars with centre fixing	202.23.	2021.58.	.10	● ¹	● ¹	● ¹	×	● ¹	● ¹	● ¹	● ¹	
	202.24.											
Guide pillars with centre fixing	202.61.	2020.64.	h3	● ¹	● ¹	● ¹	×	×	×	×	×	
	2020.63.											
	202.60.	2020.62.	.30	● ¹	● ¹	● ¹	●	● ¹	● ¹	● ¹	● ¹	
Guide pillars to AFNOR	2022.25.		.20	● ¹	● ¹	● ¹	×	● ¹	● ¹	● ¹	● ¹	
			.10	● ¹	● ¹	● ¹	×	● ¹	● ¹	● ¹		
Guide pillars	2022.16.45.		-0.010	×	×	×	×	×	×	×	×	
	2022.16.48.		-0.025									
Guide pillars for large tools	2021.28.	2022.17.	f6	×	×	×	×	×	×	×	×	
	2022.12.	2022.19.										
	2022.13.	2022.29.										
	2022.15.	2022.16.										
Guide pillars ECO-LINE	202.29.	2021.29.	h4	● ¹	×	×	×	●	●	●	●	
Guide pillars with cage retainer bore	202.19.	.30.94	.30	●	●	●	×	×	×	×	×	
	2021.46.	.30.94										

Guide bushes ECO-LINE bronze with solid lubrica- tion rings	Guide bushes, bronze coated	Guide bushes ECO-LINE bron- ze plated	Guide bushes with solid lubrication Guide bea- ring with solid lubricant	Guide bushes with solid lubrication	Guide bushes with solid lubrication	Guide bushes with solid lubrication	Guide bushes with solid lubrication
2051.72. 2091.71. 2081.71. 2091.72. 2081.74. 2091.74. 2081.75.	210.85. 2081.85. 2081.81. 2081.84.	2051.92. 2091.91. 2081.91. 2091.92. 2081.94. 2091.94. 2081.95.	2031.70. 2087.70. 2082.70. 2087.71. 2082.71. 2087.72. 2085.70. 2087.73. 2085.72.	2085.71.	2032.70. 2086.70. 2052.70.	2102.70. 2102.71.	2086.71.
H6	IT5	H5	H7	E7	F7	G7	C9
●	●	●	●	●	●	●	●
○	●	○	×	●	●	●	●
×	○	×	×	●	×	×	●
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×
×	×	×	●	●	●	●	●
×	×	×	●	●	●	●	●
×	×	×	●	●	●	●	●
●	●	●	●	●	●	●	●
×	×	×	×	×	×	×	×

ASSEMBLY OF GUIDE ELEMENTS

DIMENSIONAL REQUIREMENTS AND TOLERANCES



2061.69. .1 RECIRCULATING BALL BUSH
SLIP-FIT BONDING*

Pillar-ø d ₁	Retaining bore d ₃ ^{H5}
20	32 ^{+0,011}
25	40 ^{+0,011}
32	48 ^{+0,011}
40	58 ^{+0,013}
50	70 ^{+0,013}
63	85 ^{+0,015}

2081.69. .1 RECIRCULATING BALL BUSH WITH
COLLAR
TRANSITION FIT

Pillar-ø d ₁	Retaining bore d ₃ ^{H5}
20	32 ^{+0,011}
25	40 ^{+0,011}
32	48 ^{+0,011}
40	58 ^{+0,013}
50	70 ^{+0,013}
63	85 ^{+0,015}

***SLIP-FIT BONDING:**

The adhesive gap must not be less than 0.005 mm (in ø min. 0.01 mm).

In the case of a smaller adhesive gap, the adhesive is stripped off during joining, and the adhesive connection is inadequate. The existing fit tolerances do not always result in the minimum adhesive gap.

This must be taken into account when manufacturing the receiving bore.

-



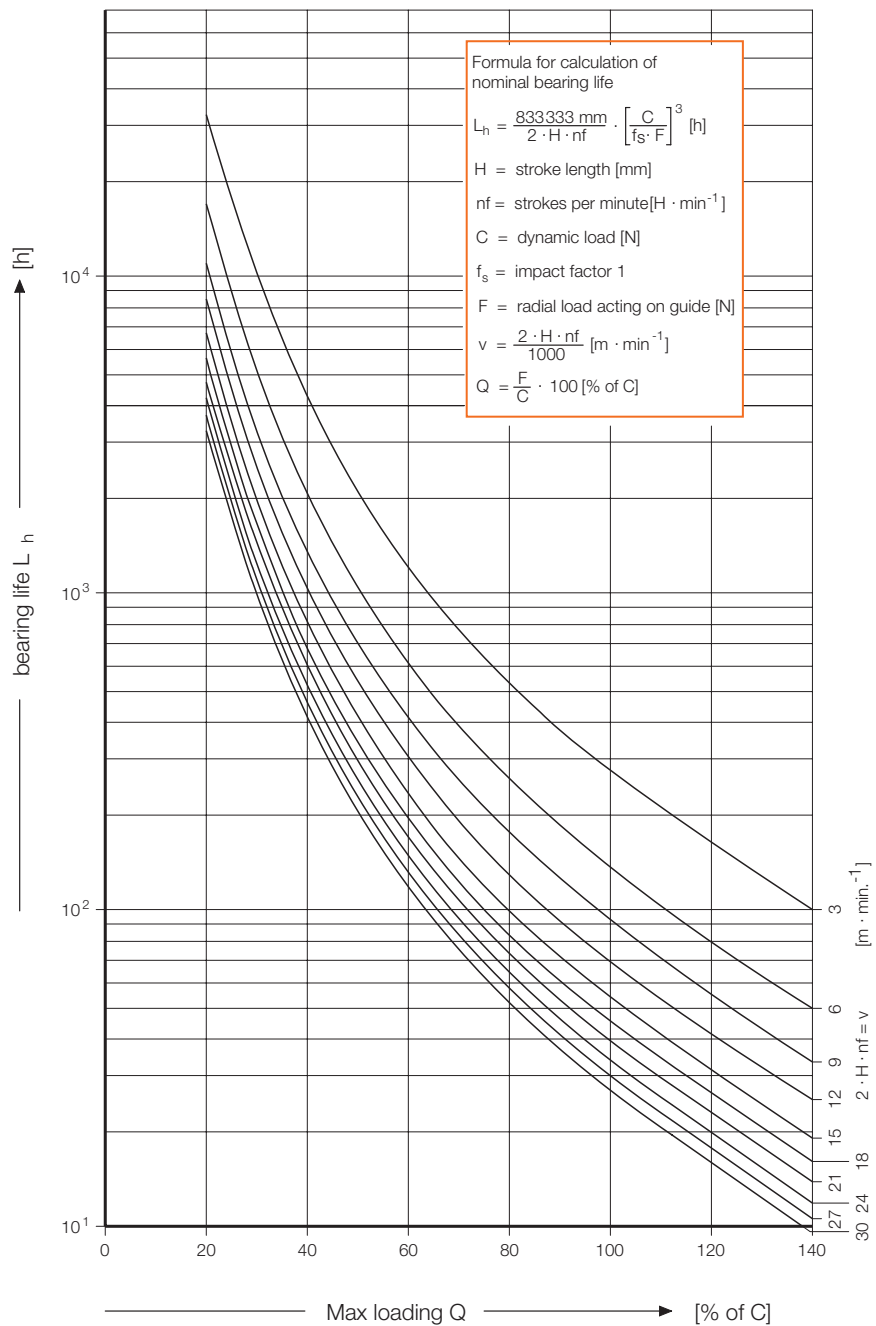
BALL GUIDES

LOAD DIAGRAM

BEARING LIFE VERSUS LOADING

Values shown are based on the Impact Factor of $f_s = 1$:

Application to normal conditions in respect of press and die set, with a maximum bearing temperature of 100 °C.



BALL GUIDES - CALCULATION TABLE

DYNAMIC LOAD FIGURES FOR RECIRCULATING BALL BUSH

DEFINITION:

The dynamic load index C in N constitutes a load with constant size and direction, at which 90 % of a sufficiently large quantity of equal bearings achieve a minimum of the service life of $+10^5$ m. This applies for solely longitudinal movement.

PILLAR-Ø d ₁	CAGE LENGTH L ₁	DYNAMIC LOAD INDEX C FOR WHOLE
		CAGE (N)
20	47	2080
25	60	2960
32	77	5450
40	95	7600
50	95	8800
63	120	11800

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