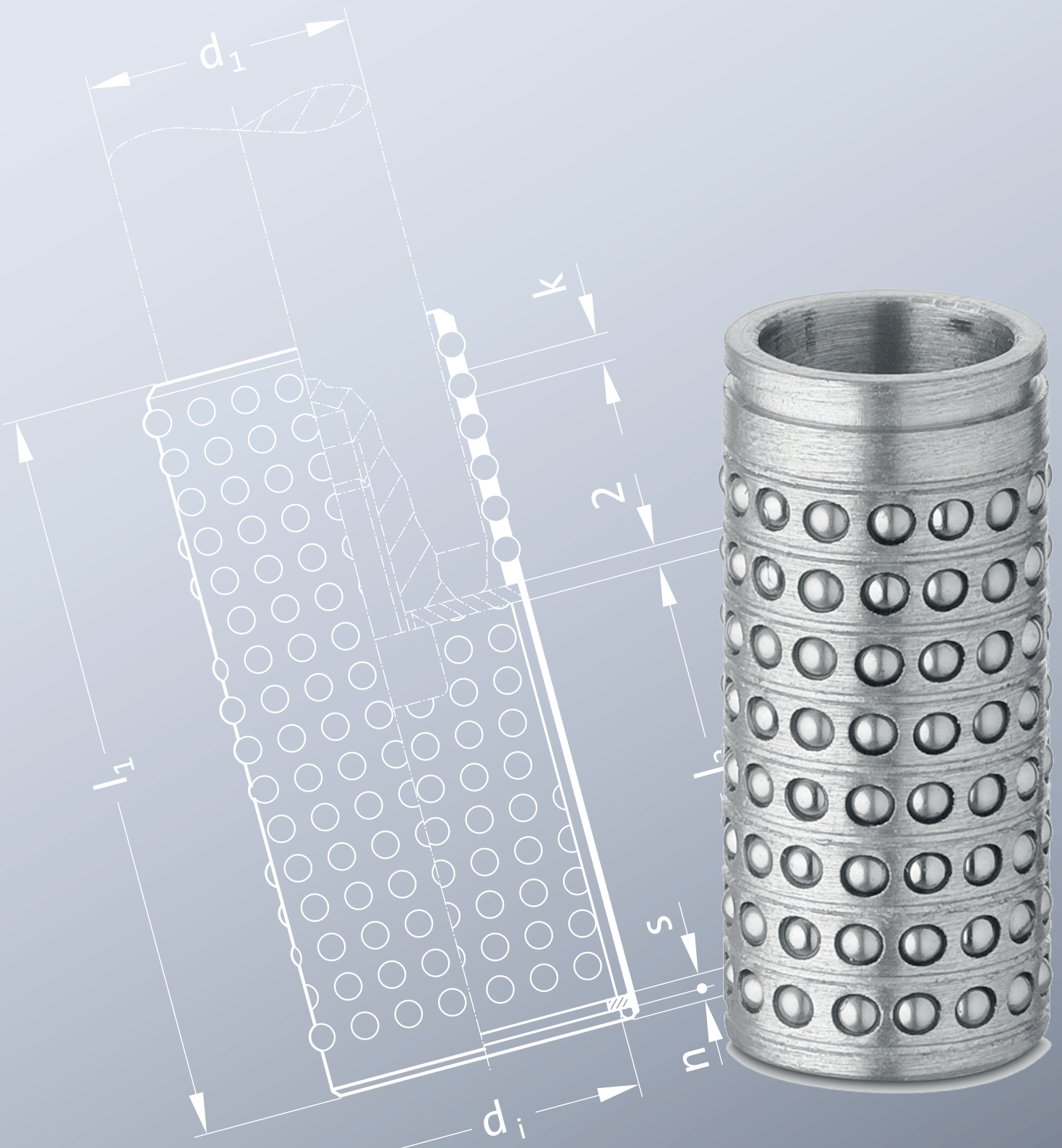


BALL CAGES
ALUMINIUM



BALL CAGE WITH CIRCLIP GROOVE ALUMINIUM

MATERIAL:

Cage: Aluminium

Balls: Steel hardened (DIN 5401)

NOTE:

Ball cages from $\varnothing 10$ have a groove for a circlip to DIN 471 (206.72.).

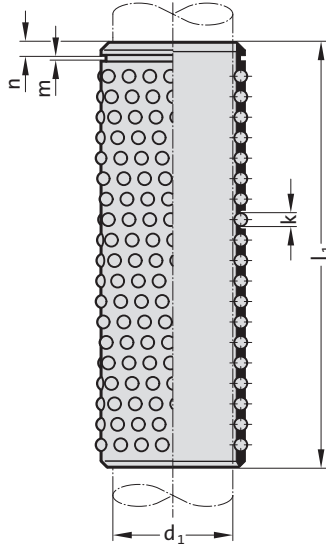
Notes on ball bearing type guides at the beginning of chapter D.

Bearing life and dynamic load indexes see at the end of chapter D.

l = Nominal ordering length

l_1 = Manufacturing length

2060.61.



2060.61. BALL CAGE WITH CIRCLIP GROOVE, ALUMINIUM

d_1	10	11 12	15	16	19	20	24 25	30 32	38 40	48 50	60 63	80	
k	2	2	3	3	3	3	3	4	4	4	4	6	
n	1.1	1.1	1.6	1.6	1.6	1.6	1.6	2.1	2.1	2.1	2.1	3	
m	1.1	1.1	1.3	1.3	1.3	1.3	1.6	1.85	1.85	2.15	2.65	3.15	
l	l_1	Total number of balls											
40	39	176	176										
56	57	272	272										
45	44			144	144	180	180	180					
56	56			192	192	240	240	240					
63	64			224	224								
71	72			256	256	320	320	320					
24	24				64	80							
28	28				80	100							
31	32					120	120	120					
80	80					360	360	360	280	336	392		
95	96					440	440	440					
40	40							160	120				
120	120							560	440	528	616	704	
45	45								140	168			
50	50								160	192	224		
56	55								180	216			
71	70								240				
95	95								340	408	476	544	
105	105								380	456	532	608	
140	140								520	624	728	832	648
160	160								600	720	840	960	
63	65									264	308		
180	180									816	952	1088	
200	200									912	1064	1216	
240	240									1104	1288	1472	
120	119											540	
160	161											756	
180	182											864	
200	203											972	
240	238											1152	

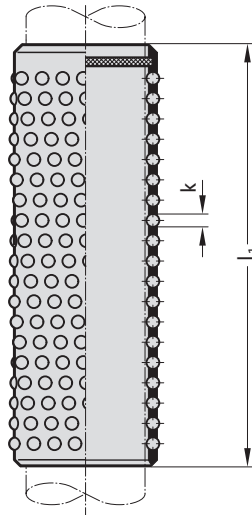
ORDERING CODE (EXAMPLE):

Ball cage with circlip groove, Aluminium = 2060.61.
 Guide diameter d_1 38 mm = 038.
 Nominal ordering length of ball cage l 50 mm = 050
 Order No = 2060.61.038.050

BALL CAGE WITH ASSEMBLY AID, ALUMINIUM



2060.63.



MATERIAL:

Cage: Aluminium

Balls: Steel hardened (DIN 5401)

NOTE:

No assistant is needed for their assembly. These cages are equipped with a suitably positioned brake ring insert. That ensures equal cage spacing especially on die sets with multiple pillars.

Notes on ball bearing type guides at the beginning of chapter D.

Bearing life and dynamic load indexes see at the end of chapter D.

l = Nominal ordering length

l_1 = Manufacturing length

2060.63. BALL CAGE WITH ASSEMBLY AID, ALUMINIUM

d_1	10	11 12	15	16	19	20	24 25	30 32	38 40	48 50	60 63	80
k	2	2	3	3	3	3	3	4	4	4	4	6
l	l_1	Total number of balls										
40	39	176	176									
56	57	272	272									
45	44		144	144	180	180	180					
56	56		192	192	240	240	240					
63	64		224	224								
71	72		256	256	320	320	320					
24	24			64		80						
28	28			80		100						
31	32				120	120	120					
80	80				360	360	360	280	336	392		
95	96				440	440	440					
40	40						160	120				
120	120						560	440	528	616	704	
45	45							140	168			
50	50							160	192	224		
56	55							180	216			
71	70							240				
95	95							340	408	476	544	
105	105							380	456	532	608	
140	140							520	624	728	832	648
160	160							600	720	840	960	
63	65								264	308		
180	180								816	952	1088	
200	200								912	1064	1216	
240	240								1104	1288	1472	
120	119											540
160	161											756
180	182											864
200	203											972
240	238											1152

ORDERING CODE (EXAMPLE):

Ball cage with assembly aid, Aluminium	= 2060.63.
Guide diameter d_1	38 mm = 038.
Nominal ordering length of ball cage l	50 mm = 050
Order No	= 2060.63.038.050

BALL CAGE WITH CIRCLIP AND FASTENING RING GROOVE, ALUMINIUM

MATERIAL:

Cage: Aluminium

Balls: Steel hardened (DIN 5401)

NOTE:

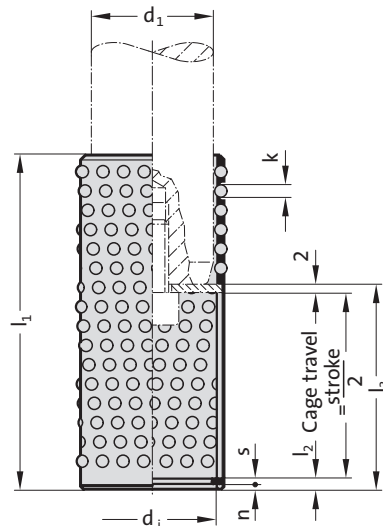
Notes on ball bearing type guides at the beginning of chapter D.

Bearing life and dynamic load indexes see at the end of chapter D.

l = Nominal ordering length

l_1 = Manufacturing length

2060.65.



2060.65. BALL CAGE WITH CIRCLIP AND FASTENING RING GROOVE, ALUMINIUM

d_i	19	20	24	25	30	32	38	40	48	50	60	63
$d_i \times s$	20 x 1	21 x 1	25 x 1.2	26 x 1.2	31 x 1.2	33 x 1.2	39 x 1.5	41 x 1.75	50 x 2	51 x 2	60 x 2	63 x 2
k	3	3	3	3	4	4	4	4	4	4	4	4
l_2	2.6	2.6	2.6	2.6	2.6	2.6	3.45	3.45	4.3	4.3	4.3	4.3
n	1.3	1.3	1.3	1.3	1.3	1.3	1.85	1.6	2.15	2.15	2.15	2.15
l	l_1	l_3										
56	56	31	31	31	31							
72	72	41	41	41	41							
80	80	51	51	51	51	51	51	51	51	51		
70	70					41	41					
95	95					61	61	61	61	61	61	61
105	105					61	61	61	61			
120	120						73	73	73	73	73	73
140	140										83	83

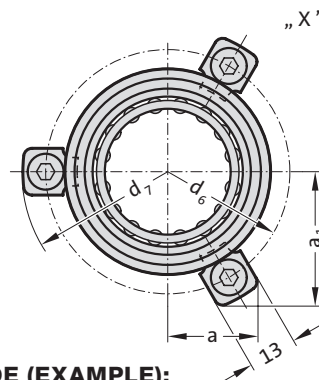
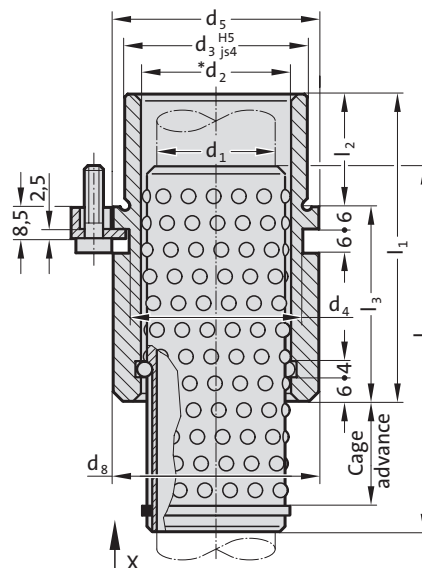
ORDERING CODE (EXAMPLE):

Ball cage with circlip and fastening ring groove, Aluminium	=	2060.65.
Guide diameter d_i	38 mm =	038.
Nominal ordering length of ball cage l	80 mm =	080.
Groove length l_3	51 mm =	051
Order No	=	2060.65.038.080.051

HEADED GUIDE BUSH WITH BALL CAGE RETAINER



2081.68.



MATERIAL:

Bush: Tool steel

Hardness: 62 ± 2 HRC

Cage: Brass

Balls: Steel hardened (DIN 5401)

NOTE:

Ball cage position - please specify the required cage advance with order. FIBRO Ball Cage Retainers ensure optimum starting position of ball cages on inverted die sets - even if pillars retract from guide bushes. The application determines the cage advance. Note that cage travel is half the stroke length. In this context it is of importance to note the minimum constructional length. The cage advance should be chosen so that during normal operation of the tool, optimum position is achieved. The attachment is with 3 screw clamps, from Ø d₁ = 38 with 4 screw clamps, which are included in delivery (Order No: 207.45 - screw clamp incl. socket cap screw DIN 6912, Head Ø 13).

*Preloading see pairing classification at the beginning of chapter D.

Matching guide combinations, see selection matrix at the beginning of chapter D.

Tolerance range: yellow = .10; green = .20; red = .30

ORDERING CODE (EXAMPLE):

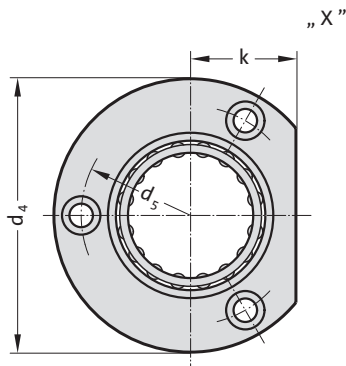
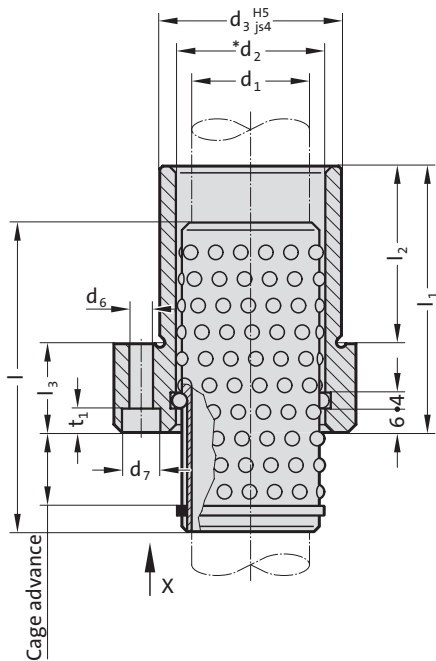
Headed guide bush with ball cage retainer	=	2081.68.
Guide diameter d ₁	38 mm	= 038.
Cage advance VL	5 mm	= 005.
Classification TOL	yellow mm	= 10
Order No		= 2081.68.038.005.10

2081.68. HEADED GUIDE BUSH WITH BALL CAGE RETAINER

d ₁	19 20	24 25	30 32	38 40	48 50	60 63
d ₂	25 26	30 31	38 40	46 48	56 58	68 71
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
d ₈	38.9	46	53	63	77	92
l ₁	59	79	93	108	127	150
l ₂	23	23	30	37	47	60
l ₃	36	56	63	71	80	90
l	71	95	120	140	140	160

FLANGED GUIDE BUSH WITH BALL CAGE RETAINER

2091.68.



ORDERING CODE (EXAMPLE):

Flanged guide bush with ball cage retainer		= 2091.68.
Guide diameter d_1	38 mm	= 038.
Cage advance VL	5 mm	= 005.
Classification TOL	yellow mm	= 10
Order No		= 2091.68.038.005.10

2091.68. FLANGED GUIDE BUSH WITH BALL CAGE RETAINER

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
d_2	25 26	30 31	38 40	46 48	56 58	68 71	92
d_3	32	40	48	58	70	85	105
d_4	50	63	72	85	104	120	148
d_5	40	50	58	70	86	100	125
d_6	4.5	5.5	5.5	6.6	9	9	11
d_7	8	10	10	11	15	15	18
t_1	4.6	5.7	5.7	6.8	9	9	11
k	18	23	28	33	38	46	56
l_1	52	62	72	77	102	102	125
l_2	37	37	47	47	60	60	75
l_3	15	25	25	30	42	42	50
l	71	71	80	95	105	120	140



MATERIAL:

Bush: Tool steel

Hardness: 62 ± 2 HRC

Cage: Aluminium

Balls: Steel hardened (DIN 5401)

NOTE:

Ball cage position - please specify the required cage advance with order. FIBRO Ball Cage Retainers ensure optimum starting position of ball cages on inverted die sets – even if pillars retract from guide bushes. The application determines the cage advance. Note that cage travel is half the stroke length. In this context it is of importance to note the minimum constructional length.

The cage advance should be chosen so that during normal operation of the tool, optimum position is achieved.

*Preloading see pairing classification at the beginning of chapter D.

Matching guide combinations, see selection matrix at the beginning of chapter D.

Tolerance range: yellow = .10; green = .20; red = .30

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