A Die Sets

B Precision Ground Plates and Flat Bars

C Lifting and Clamping Devices

D Guide Elements

Pillars, Bushes, Mounting Flanges,
Ball Cages, Oilless Guide Elements

E Ground Precision Components

F Springs

G Elastomer-Bars, -Sheets, -Sections

H FIBRO Chemical Tooling Aids

J Peripheral Equipment

K Slide Units

L Standard Parts for Mould Making

Guide Elements

Guide Elements

The great importance of exact alignment between punches and matrices in stamping dies has been recognized widely. The accuracy and maintenance of this alignment depends entirely on the quality and wear resistance of the guide elements.

As a consequence of recent rapid developments in stamping techniques it has also been accepted that conventional bush-pillar sets of casehardened steel can no longer stand up to the demands of the modern press shop with its more sophisticated dies, ever faster presses and the stresses in today's carbide tools.

The introduction of FIBRO Guide Elements made available an extensive range, principally based on superlative quality, and comprising some new, highly advanced bearing materials as well as novel assembly techniques of superior accuracy.

Recent additions have further broadened this range, especially in regard of demountable guiding components.

All FIBRO Guide Bushes for permanent fixing are laid out for epoxy-bonding. This highly reliable method ensures unparalleled accuracy together with the elimination of shrink allowances and rectification honing.

Ball Bearing Guides principally excel in undemanding maintenance and through the complete absence of bearing play. Their easy movement on the bench makes them very popular with die makers. Highest stroking speeds present no problems. But common to all ball bearings there remains the characteristic weakness to shock loads, the danger of ball impingement. To some extent this can be compensated for by oversized pillar diameters and the use of four-pillar die sets.

The group of Sliding-Type Guides affords much greater stability, partly due to the damping effect of the all-important, vital oil film . . . which in the past used to be threatened always by the vagaries of lubrication service and the propensity to rupture at high frequencies of travel reversal.

Extensive protection against these perils is offered by FIBRO Sintered Ferrite Bushes. Used in most of our sliding guide systems, their advanced technology comprises:

– porous structure, vacuum-filled with oil
– carbonitrided surface of extreme hardness
– outstanding friction properties
– exceptional wear-resistance
– thousands of oil-retaining porosity pockets.

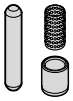
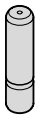
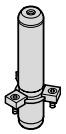
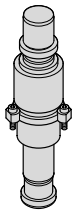
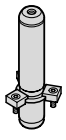
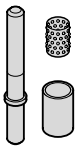
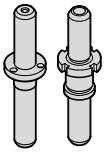
In combination with our mirror-finished pillars, ferrite guide bushes represent a guiding system of alltogether superior properties. A system that virtually precludes seizing under all but the most extreme running conditions.

Beyond such limitations there exist combinations of high velocities with very short strokes where even ferrite bushes cannot guarantee permanence of the oil film.
Here, the rigidity of the sliding guide has to be weighed up against the safety of ball bearings: die set guides are not entirely without problems yet! But at FIBRO we find ourselves very busy indeed with the remainder.

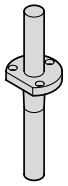
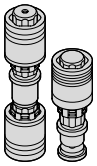
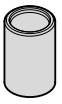
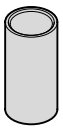
Technical progress may incur modifications without notice.

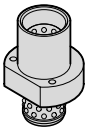
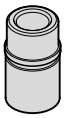
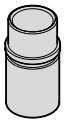
FIBRO GUIDE ELEMENTS – DESIGNED AND PRODUCED BY PEOPLE IN PURSUIT OF PERFECTION.

Contents

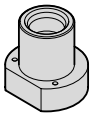
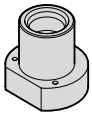
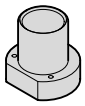
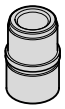
		Page
	Notes on Guide Elements	D9
	Sliding Guide Systems: Clearance and Pairing Recommendations	D10-D11
 202.19.	Guide Pillars, small dimensions	D12
206.51.	Ball Cages small dimensions	D13
206.54.	Guide Bushes, small dimensiones	
 202.19.	Guide Pillars DIN 9825/ISO 9182-2	D14
202.17.	Guide Pillars with Ball Cage Retainer	
202.22. 202.23. 202.24.	Guide Pillars ~DIN 9825/ ~ISO 9182 press-in type, with internal threads	D15
 202.21.	Guide Pillars – endwise bolt-on type ~DIN 9825/~ISO 9182-2	D17
202.55.	Guide Pillars – endwise bolt on type with Ball Cage Retainer	
 2021.50.	Demountable Pillars, conical, DIN 9825/ISO 9182-4 similar AFNOR*	D18
2021.58.	Demountable Pillars, conical, with Ball Cage Retainer	
 202.53.	Retaining disc with fillister head screw similar AFNOR	D19
 2021.53.	Retaining disc with countersunk head screw, DIN 9825/ISO 9182-4	
 2021.39.	Liner Bushes, DIN 9825/ISO 9182-4, for conical pillars 2021.50.	D20
 210.39.	Liner Bushes AFNOR, for conical pillars 2021.50.	D21
 2022.25.	Guide Pillars ~AFNOR with Retaining Ring Groove	D22
2022.12.	Guide Pillars to Daimler with Pilot Taper, for Large Tools and Snap Ring Groove	D23
2022.15.	Guide Pillars to VDI 3356, with Pilot Taper, for Large Tools	D24
2022.17.	Guide Pillars to VW, with Groove, for Large Tools	D25
2022.16.	Guide Pillars to Daimler, for Large Tools with Snap Ring Groove	D26
2022.19.	Guide Pillars for Large Tools	D27
2022.13.	Guide Pillars to VW, with 5° Pilot Taper	D28
2022.16.45.	Guide Pillars to CNOMO, with Groove	D29
 2022.29.	Guide Pillars to WDX with Collar, with Screw Clamps	D30
2021.46.	Demountable Pillars DIN 9825/ ~ISO 9182-5 with Collar and Screw Clamp Retention	D31
2021.44.	Demountable Pillars, with Ball Cage Retainers	
2021.43.	Retaining Disc with Screw	
 2025.94.	Ball guide units, complete to Daimler standard	D32
 2021.29.	Guide Pillars with collar, ECO LINE	D33
 206.41. 2062.44. 202.61. 2061.44.	Ball Guides for highest stroking speeds	D34
 2020.63. 2020.62. 202.60.	Stripper-Mounted Pillars	D35-D37
 2021.64.	Stripper-Mounted Retaining Bushes, conical pillar fit	D38

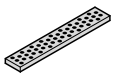
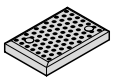
Contents

		Page
 2020.64.	Stripper-Mounted Guide Pillars, conical pillar fit	D39
 2024.94. 2024.96.	Guide units Million-Guide	D40- D43
 2031.70.	Rectangular Mounting Flanges Bronze with Non-Liquid Lubricant	D44
 2031.01. 2031.31. 2031.41.	Rectangular Mounting Flanges for Guide Pillars and Guide Bushes – without screw holes –	D45
 2031.02. 2031.34. 2031.42.	Rectangular Mounting Flanges for Guide Pillars and Guide Bushes – with screw holes –	D46
 2031.04. 2031.38. 2031.44.	Shallow Mounting Flanges, Rectangular, for Guide Pillars and Guide Bushes, – with screw holes –	D47
 2032.02. 2032.70.	Rectangular Mounting Flanges for Guide Pillars and Guide Bushes Bronze with Non-Liquid Lubricant	D48
 2051.32.	Sintered Ferrite Guide Bushes carbonitrided, for slip fit bonding DIN 9831/ISO 9448-2	D50
	Special Ball Bearing Cages – Brass	D51
	Tables: Safe Loads for FIBRO Ball Bearing Guides	D52- D53
 2061.44.	Guide Bushes for Ball Bearings, for slip fit bonding, DIN 9831/ISO 9448-3	D54
 206.49.	Guide Bushes for Ball Bearings, for slip fit bonding, similar AFNOR	D55

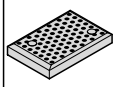
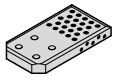
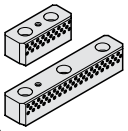
		Page
 206.71.	Ball Cages with securing ring groove	D56
206.72.	Circlips	
206.73.	Ball Cages with cage spacing	D57
206.75.	Ball Cages with Circlip DIN 472 and Fastning Ring Groove	D58
 2061.47.	Guide Bushes for Ball Bearings with stroke Limitation for slip fit bonding	D59
 2081.67.	Headed Guide Bushes for Ball Bearings, with ball cage retainer	D60
 2091.67.	Flanged Guide Bushes for Ball Bearings, with ball cage retainer	D61
 2061.82.	Roller Cages with circlip groove	D62
2061.84.	Roller Cages with mounting aid	
 2081.81. 2081.84. 2081.85.	Headed Guide Bushes, to ISO 9448, Steel, with bronze-coated internal bore	D63- D65
 2081.31. 2081.32. 2081.33. 2081.34. 2081.35.	Headed Guide Bushes, sintered ferrite, carbonitrided, long-term lubrication, DIN 9831/ISO 9448-6	D66- D70
 2081.91. 2081.94. 2081.95.	Headed Guide Bushes, bronze plated, ECO LINE	D71- D73
 2081.71. 2081.74. 2081.75.	Headed Guide Bushes, bronze with solid lubricant rings, ECO LINE	D74- D76
 2081.44. 2081.45. 2081.46. 2081.47. 2081.49.	Headed Guide Bushes for Ball Bearings , DIN 9831/ISO 9448-7	D77- D81

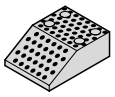
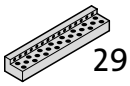
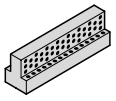
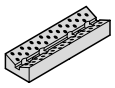
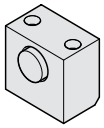
Contents

			Page
	2091.31. 2091.32. 2091.34.	Flanged Guide Bushes, sintered ferrite, carbonitrided, DIN 9831/ISO 9448-4	D82- D84
	2091.71. 2091.72. 2091.74.	Flanged Guide Bushes DIN 9831/ISO 9448-5 Bronze with solid lubrication rings, ECO-LINE	D85- D87
	2091.44. 2091.45. 2091.46.	Flanged Guide Bushes DIN 9831/ISO 9448-5 for Ball Bearings	D88- D90
	210.31. 210.34. 210.35.	Headed Guide Bushes, carbonitrided, long-term lubrication, similar AFNOR	D91- D93
	210.44. 210.46.	Headed Guide Bushes for Ball Bearings similar AFNOR	D94- D95
	210.45.	Guide Bushes with Collar for Ball Bearings similar AFNOR Slotted Nuts	D96
	210.85.	Guide Bushes with Collar, Bronze coated to AFNOR Slotted Nuts	D97

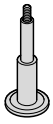
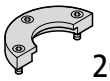
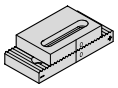
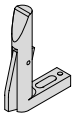
			Page
		Oilless Guide Elements	D99- D222
	2053.70.	Thrust Washers	D101
	2052.70.	Guide Bushes	D102- D113
	2085.70.	Guide Bushes with collar	
	2085.71.	Guide Bushes with collar	
	2086.70.	Guide Bushes with collar	
	2085.72.	Guide Bushes with collar	
	2087.73.	Guide Bushes with centre collar	
	2082.70.	Guide Bushes to DIN 9834/ ISO 9448	
	2072.45.	Screw clamps to DIN 9832	
	2082.71.	Guide Bushes to NAAMS	
	2072.46	Screw Clamps	
	2086.71.	Guide Bushes with collar to NAAMS	
	2072.47	Screws Clamps to NAAMS	
	2102.70.	Guide Bushes CNOMO	
	2102.71.	Guide Bushes CNOMO	
	2073.45.	Securing Flanges	
	2072.48.45.	Screw Clamps to CNOMO	
	2961.71. 2961.73. 2961.70.	Flat Guide Bars Cut-to-lenght with and without CSK-Holes	D115- D117
	2961.74.	Retaining Plates to VDI 3357 Bronze with Non-Liquid Lubricant	D118- D124
	2961.79.	Retaining Plates, Steel, VDI 3357	
	2961.81.	Retaining Plates, Steel with Non-Liquid Lubricant, VDI 3357	
	2961.82.	Retaining Plates, Steel with Non-Liquid Lubricant	
	2961.79.45.	Retaining Plates, Steel, to CNOMO	
	2961.81.45.	Retaining Plates, Bronze with Non-Liquid Lubricant, to CNOMO	
	2961.78.	Retaining Plates, Bronze with Non-Liquid Lubricant	
	2961.75. 2961.76. 2961.77.	Flat Guide Bars	D125- D127

Contents

		Page
	2960.72. Sliding Pads, small dimensions	D128-D153
	2960.71. Sliding Pads, Bronze, VDI 3357	
	2960.87. Sliding Pads, Steel, VDI 3357	
	2960.70. Sliding Pads, ISO 9183-1	
	2960.85. Sliding Pads	
	2960.86. Sliding Pads	
	2960.76. Sliding Pads	
	2962.78.45. Sliding Pads, Bronze with Non-Liquid Lubricant, to CNOMO	
	2962.78. Sliding Pads	
	2962.84.45. Sliding Pads, Steel, to CNOMO	
	2962.85. Sliding Pads Steel with Non Liquid Lubicant	
	2960.79. Sliding Pads to NAAMS, Bronze with Non-Liquid Lubricant	
	2960.80. Sliding Pads to NAAMS, Steel	
	2960.74. Sliding Pads AFNOR, Bronze with Non-Liquid Lubricant	
	2960.75. Sliding Pads AFNOR, Cast Iron with Non-Liquid Lubricant	
	2960.44.45. Sliding Pads to CNOMO, Steel with oil lubricating groove	
	2960.54.45. Sliding Pads to CNOMO, Steel with oil lubricating groove	
	2960.81. Sliding Pads, Bronze with Non-Liquid Lubricant, VDI 3357	
	2960.88. Sliding Pads, Steel, VDI 3357	
	2960.93. Sliding Pads, Bronze with Non-Liquid Lubricant, VDI 3357	
	2962.75. Guide Bars with two Sliding Surfaces, VDI 3357	D154-D161
	2962.75.45. Guide Bars with two Sliding Surfaces, CNOMO	
	2962.76. Guide Bars with three Sliding Surfaces	
	2962.77. Guide Bars with two Sliding Surfaces	
	2962.74. Guide Bars with four Sliding Surfaces	
	2962.79. Guide Bars with one Sliding Surface	
	2962.80. Guide Bars with three Sliding Surfaces	
	2960.73. Guide Brackets, Steel with Non-Liquid Lubricant, VDI 3387	D162
	2960.89. Guide Brackets, Bronze with Non-Liquid Lubricant, VDI 3387	D163
	2966.72. Slide centre guides, Bronze with Non-Liquid Lubricant	D164

		Page
	2960.90. Overrun Cams, Steel, to VDI 3357	D166
	2960.91.	
	2960.92. Overrun Cams, Bronze with Non-Liquid Lubricant, to VDI 3357	D167
	2962.70. Angled Guide Gibs, Bronze with Non-Liquid Lubricant	D168-D175
	2962.70.45.	
	2962.71.	
	2962.72.	
	2962.73.	
	2962.81.	
	2962.82.	
	2962.83.	
	2964.77. T-Guide Bars, Bronze with Non-Liquid Lubricant	D176
	2964.78.	
	2963.82. Sliding Blocks, Bronze with Non-Liquid Lubricant, NAAMS	D178-D189
	2963.83. Prismatic Guides, Steel	
	2963.84. Sliding Blocks, Bronze with Non-Liquid Lubricant, VDI 3357	
	2963.85. Prismatic Guides, Steel	
	2963.70. Prismatic Guides, Bronze with Non-Liquid Lubricant	
	2963.71. Sliding Blocks, Steel	
	2963.72. Prismatic Guides, Bronze with Non-Liquid Lubricant	
	2963.73. Sliding Blocks, Steel	
	2963.81. Prismatic Guides, Steel	
	2963.80. Sliding Blocks, Bronze with Non-Liquid Lubricant	
	2965.81. Single-sided Prismatic Guides, Bronze	
	2965.83. Single-sided Prismatic Sliding Blocks, Steel	
	2965.80.45. Single-sided Prismatic Guides, Bronze	
	2965.82.45. Single-sided Prismatic Sliding Blocks, Steel, to CNOMO	
	2965.80. Single-sided Prismatic Guides, Bronze	
	2965.82. Single-sided Prismatic Sliding Blocks, Steel	
	2451.6. Slide Stop	D190
	2451.6. .2 Stop buffer	
	Mounting Examples, Oilless Guide Elements	D192-D195

Contents

		Page
 2441.11.0.	Centering Units with Adjusting Washer	D196-D200
2441.11.	Centering Units without Adjusting Washer	
2441.11.3.	Adjusting Washers	
2441.13.45.	Centering units to CNOMO	
2441.13.3.45.	Adjusting Washers	
2441.13.	Centering Units to CNOMO	
2441.13.3.	Adjusting Washers	
 2445.10.	Centering pins to VW standard	D202
2445.11.	Centering pins to Daimler standard	D203
 206.91. 206.92.	Concertina Shrouds	D204-D205
 206.93.	Spacer Bushes	
 206.94.	Spacer Tubes	
 241.18.	Helical Springs for Ball Cage Retention	D206
 202.91. 202.92.1.	Cage Retainers	D207
 206.95. 2061.95.	Pillar Wipers	D208
 244.00.2.	Lifter Pins for Press Tool Strips	D209
 207.45 2072.45. 2072.46 2072.47 2071.45	Screw Clamps	D210-D211
 2073.45.	Securing Flanges	D212
2072.48.45.	Screw Clamps, to CNOMO	
 2444.12 2444.13	Spacer Plates, toothed	D213
 2443.10.	Guides	D214-D216
2443.12.	Guides with Part Position Control and Spring	
2443.13.	Guides with Part Position Control to VDI	
	Assembly Guidelines for Guide Elements, Tolerances for Fitment	D218-D222

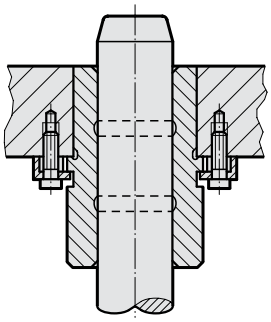
Notes on:
Guide Elements

FIBRO Precision Sliding Guides – Carbonitrided Sintered Ferrite Bushes

These guides employ bushes made from sintered ferrite of high purity with carbonitrided surface. Bearing surfaces are fine-ground.

The sintered ferrite has a porosity content of 18–20 % by volume, vacuum filled with special lubricant FIBROLIT LD. As additional long term lubrication it is recommended to fill up the grove in the bushing with FIBROLIT LD 280.34 – see page H 14. Even under arduous running conditions, this material can be relied upon for good protection against oil film rupture.

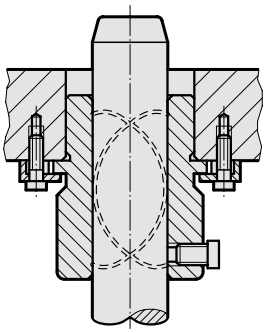
Under no circumstances must molybdenum disulfite be added to the lubricant.
For bearing clearance ranges – see page D 11.



FIBRO Precision Sliding Guide, bronze-coated

consists of a steel body with bronze-coated running surface with helical oil groove and a grease nipple for lubrication.

The steel body guarantees excellent resistance to breaking, even when subject to high loading at the edges.



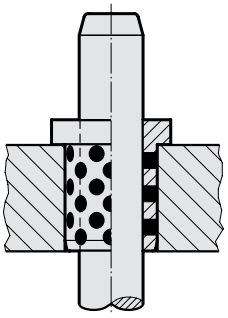
FIBRO Sliding Bearings with Non-Liquid Lubricant

The pockets containing the non-liquid lubricant occupy some 25 to 30 per cent of the bearing surface consisting of a bronze matrix.

After an initial oil lubrication on assembly, these elements are maintenance-free.

Wherever there is a demand for non-susceptibility against impact, contamination and heat, FIBRO Maintenance-Free Bearings find their ideal application.

We recommend to apply the tolerance classes H7/f6 to bush/pillar combinations using these elements.

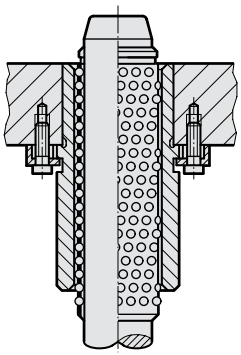


FIBRO Precision Ball Bearing Guides

Careful manufacture at narrowest tolerances, and exactly the right amount of preloading* result in a play-free guide element of exceptional performance potential. Our superfinished running surfaces further enhance the advantages of ball bearing guides. Toolmakers favour ball bearing buides because of their free movement on the bench. FIBRO ball bearing guides have brass ball cages – a material giving optimum results in stability and ball density.
Despite their unquestionable reliability at high speeds in particular, ball bearing guides with their point contact of the balls remain somewhat sensitive to shock and sustained radial loads. To some extent, generous dimensioning of pillar diameters helps to compensate for this inherent disadvantage.

* Average preloading:

4 µm	on pillars from	8	to 12 mm diameter
7– 9 µm	on pillars from	15	to 16 mm diameter
9–11 µm	on pillars from	18	to 42 mm diameter
11–13 µm	on pillars from	50	to 80 mm diameter



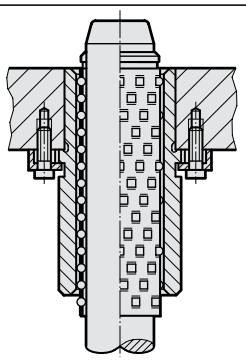
FIBRO Precision Roller Guides

In comparison to ball bearing guides, FIBRO Roller Guide Elements have considerably higher capacities for radial loads.
The much larger contact area of the rollers permits a significant reduction in preload values. This affords a longer service life of the units.

The following preload values apply to FIBRO Roller Guides:

For static loads/low velocities pillar diameters up to		or dynamic loads/high velocities pillar diameters up ton	
Ø 25	= 2,5 µm	Ø 25	= 1,5 µm
Ø 30/32	= 3 µm	Ø 30/32	= 2 µm
Ø 40–50	= 3,5 µm	Ø 40–50	= 2,5 µm
Ø 63	= 4 µm	Ø 63	= 3 µm

Use only pairing class
guide pillar red = .30
guide bush yellow = .10



Pairing Classification
Guide Pillars with sliding sintered
Guide Pillars with Ball Bearing Bushes

FIBRO

Cutting clearance	Sliding guide bearing clearance	Ball bearing preloading		
small	small	large	Piece parts with small tolerances, closely specified cut edge properties and contours – also parts from thin material	Pairing 1
medium	medium	medium	Piece parts from sheet thicker than 1 mm – also preferably for progression dies	Pairing 2
large	large	small	Where demands on edges and burrs are not stringent; note that large die clearances require smaller shearing forces	Pairing 3

Selection of punch-matrix clearance is largely determind by piece part charcteristics such as percentage of sheared land versus breakaway, but also by demands on burr formation.
Further criteria are: properties of piece part materials, conditions of the tool as well as the condition of the eccentric press.

Colour coding by paainted dots	Sliding guide				Ball bearing			
	Pillar Colour	Order No	Bush Colour	Order No	Pillar Colour	Order No	Bush Colour	Order No
Pairing 1	yellow	.10	yellow	.10	yellow	.10	red	.30
	green	.20	yellow	.10	yellow	.10	green	.20
					green	.20	red	.30
Pairing 2	green	.20	green	.20	yellow	.10	yellow	.10
	red	.30	yellow	.10	green	.20	green	.20
	yellow	.10	green	.20	red	.30	red	.30
Pairing 3	red	.30	red	.30	green	.20	yellow	.10
	green	.20	red	.30	red	.30	green	.20
	yellow	.10	red	.30	red	.30	yellow	.10

Selection Criteria:
die clearance – stock thickness – material

Note:

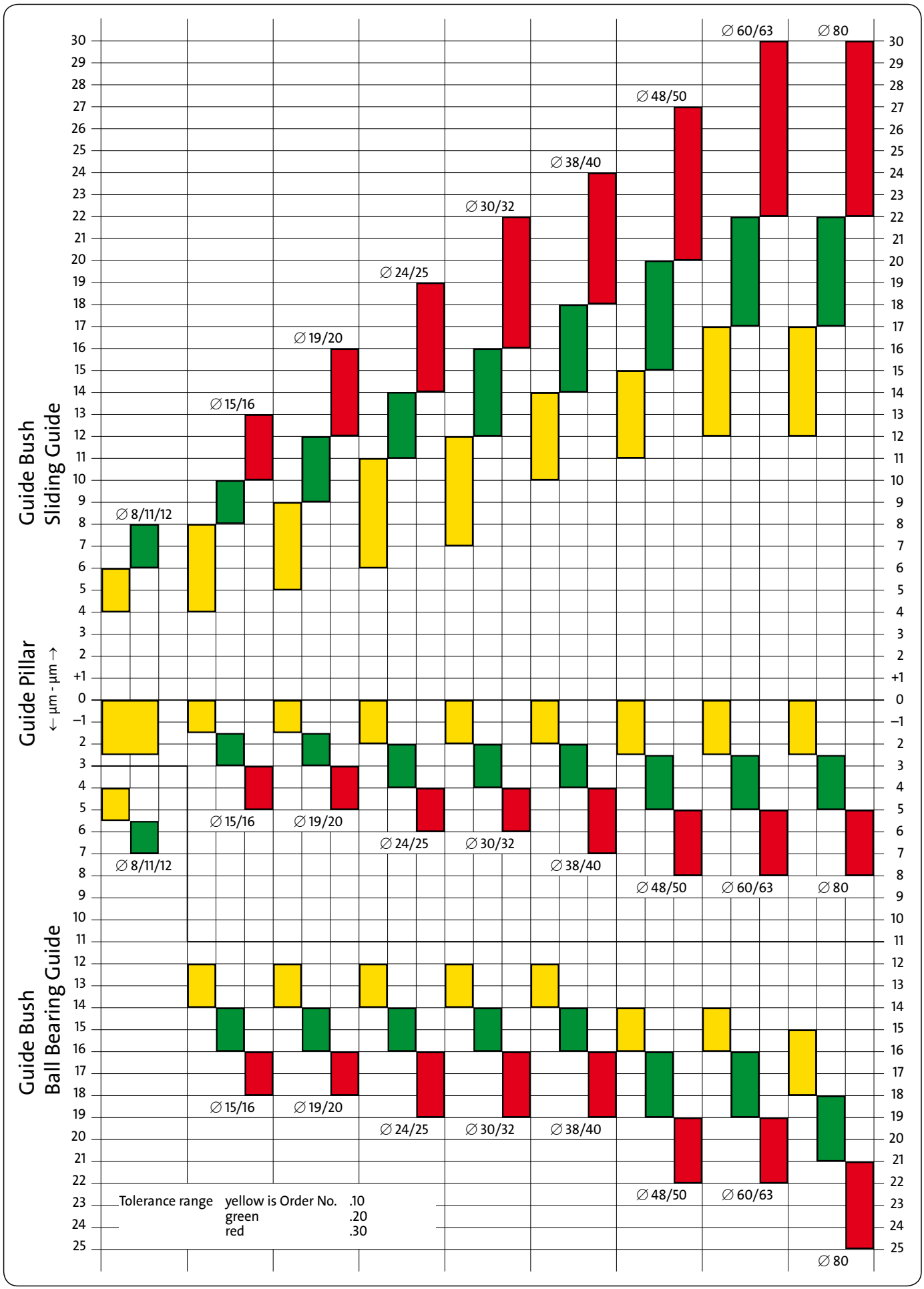
Please note that tight bearing clearances are normally unsuitable for 4-pillar die sets. In general, wherever retainer bore geometry is not absolutely perfect, pairings 2 and 3 must be chosen. The pairing classification does not signify differences in quality, rather a selection of the necessary bearing clearance in the case of guide pillars or preloading in the case of ball bearings (see also chart on page D 11).

Ordering Code (example):

Guide Pillar, tolerance range 1, yellow = 202.19.040.260.10 or green is then .20
Sliding guide, tolerance range 1, yellow = 2081.31.040.10

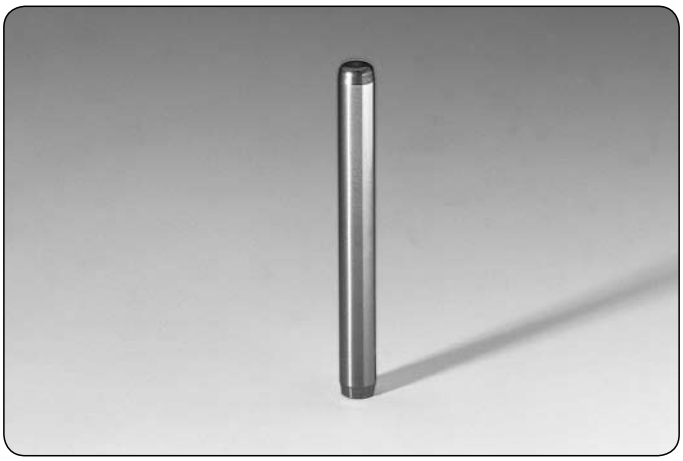
FIBRO

Pairing Classification
Guide Pillars with sliding sintered
Guide Pillars with Ball Bearing Bushes

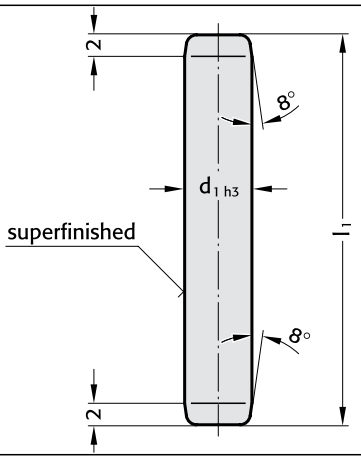


Guide Pillars, small dimensions

202.19.



202.19.



Material:

	alloy tool steel
Hardness:	hardened to 60 + 4 HRC
Remarks:	or from stainless steel on request
Hardness:	hardened to 56 + 2 HRC

Execution:

fine-ground and superfinished

Ordering Code (example):

Guide Pillar	=	202.19.
d_1 = 4 mm	=	004.
l_1 = 80 mm	=	080
Order No	=	202.19.004.080

202.19.

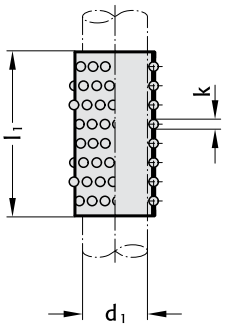
d_1	3	4	5	6	8
l_1					
30	●				
40		●	●	●	
50	●	●	●	●	●
60	●	●	●	●	●
80	●	●	●	●	●
100		●	●	●	●
125				●	●
140				●	●
160				●	●

FIBRO

206.51.
206.54

Ball Cages, small dimensions
Guide Bushes, small dimensions

206.51.



206.51.

d_1	3	4	5	6	8
k	1	1	1	1	1
l_1	total number of balls				
10	21	21	29	36	
15	35	35	49	61	61
20	49	49	69	69	69
25		64	89	89	89
30			109	109	109
40					149

Material:

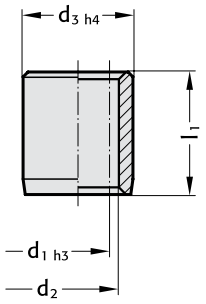
Cage: Brass

Balls: hardened steel (DIN 5401)

Ordering Code (example):

Ball cage	=	206.51.
d_1 = 3 mm	=	003.
l_1 = 15 mm	=	015
Order No	=	206.51.003.015

206.54.



206.54.

d_1	3	4	5	6	8
d_2	5	6	7	8	10
d_3	7	8	10	11	14
l_1					
10	●	●	●		
15	●	●	●	●	●
20	●	●	●	●	●
25		●	●	●	●
30			●	●	●
35				●	●
40					●

Material:

Roller bearing steel 100 Cr 6

Hardness: hardened to 60 + 4 HRC

Remarks: available in stainless steel on request

Execution:

Guide Bush bores d_2 fine-honed to IT3

Ordering Code (example):

Guide Bush	=	206.54.
d_1 = 3 mm	=	003.
l_1 = 20 mm	=	020
Order No	=	206.54.003.020

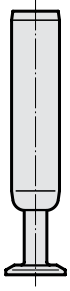
Guide Pillars
DIN 9825/ISO 9182-2

202.17.
202.19.

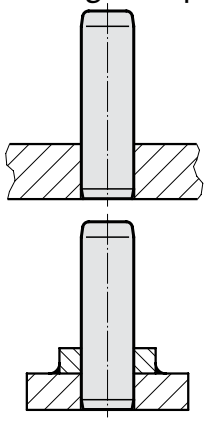
202.17.

Guide Pillars (∅ 38–63) with Ball Cage Retainer

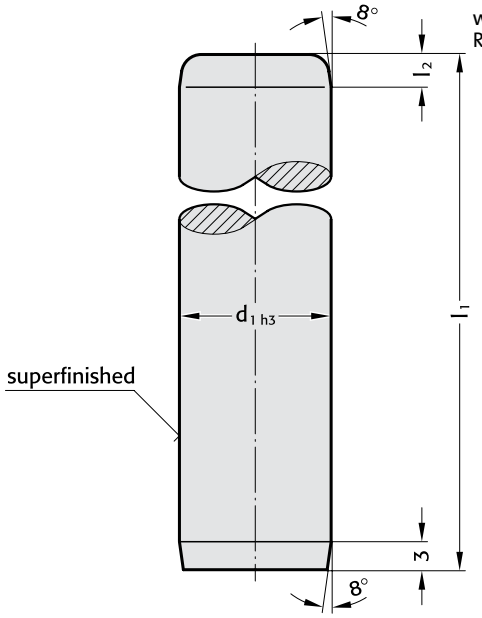
Dimensions of ball cage retainer: see page D 207.



Mounting Examples



202.19.



202.17. with Ball Cage Retainer

Material: Steel, surface hardened

Core strength: ≧ 900 N/mm²

Surface Hardness: 60 + 3 HRC (induction hardened)

Hardness Penetration: ≧ 1,8 mm (diameter up to 12 mm: troughhardened)

Execution: precision ground, superfinished

Remarks: method of manufacturing entails that centre holes are not concentric with O.D.

202.19.

d_1	10	11	12	15	16	19	20	24	25	30	32	38	40	48	50	60	63	80
l_2	3	3	3	4	4	4	4	6	6	6	6	6	6	8	8	8	8	8
l_1																		
80		●	●															
90	●	●	●	●	●													
100	●	●	●	●	●	●	●	●	●									
112	●	●	●	●	●	●	●	●	●									
125	●	●	●	●	●	●	●	●	●	●	●							
140	●	●	●	●	●	●	●	●	●	●	●							
160		●	●	●	●	●	●	●	●	●	●	●	●					
180				●	●	●	●	●	●	●	●	●	●	●	●			
200				●	●	●	●	●	●	●	●	●	●	●	●			
224				●	●	●	●	●	●	●	●	●	●	●	●			
250				●	●	●	●	●	●	●	●	●	●	●	●	●	●	
280				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
315				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
355				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
400						●	●	●	●	●	●	●	●	●	●	●	●	●
450								●	●	●	●	●	●	●	●	●	●	●
500								●	●	●	●	●	●	●	●	●	●	●
550												●	●	●	●	●	●	●
600												●	●	●	●	●	●	●
700												●	●	●	●	●	●	●
800												●	●	●	●	●	●	●

d_1 < 10 see page D 12

Diameter 10–12 only available in Tolerance range yellow = .10

Note:

Colour Code Combinations/Clearances – see pages D 10 and D 11.

Ordering Code (example):

Guide Pillar	= 202.19.	Tolerance range	yellow = .10
d_1 = 40 mm	= 040.		green = .20
l_1 = 200 mm	= 200.		red = .30
Tolerance range – yellow	= 10		
Order No	= 202.19.040.200.10		

Ordering Code (example):

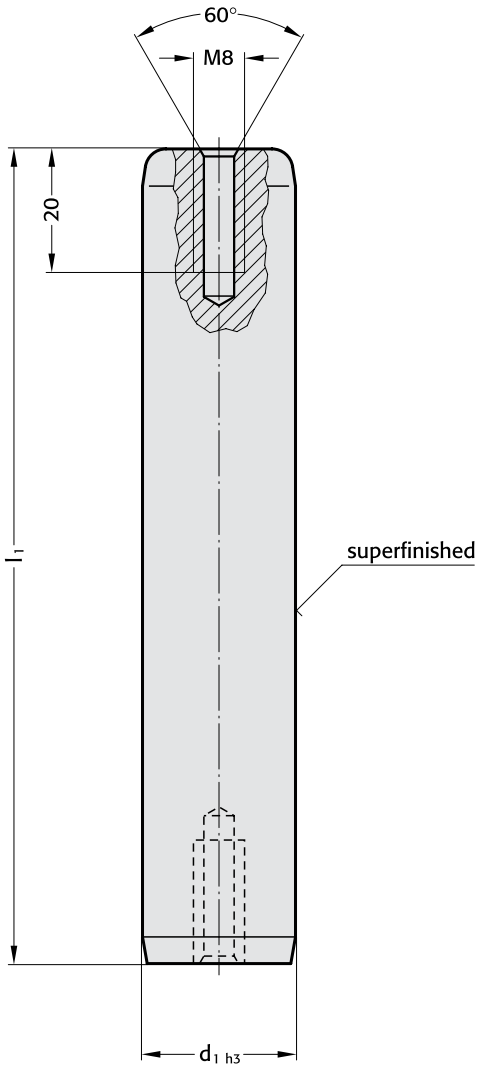
Guide Pillar with Cage retainer	= 202.17.
d_1 = 40 mm	= 040.
l_1 = 200 mm	= 200.
Cage holder size 3	= 3.
Tolerance range – yellow	= 10
Order No	= 202.17.040.200.3.10

FIBRO

202.22. 202.23. 202.24.

Guide Pillars ~DIN 9825/~ISO 9182-2 with internal threads

202.22./202.23./202.24.



202.22.

202.23.

202.24.

Material:	Steel, surface hardened
Core strength:	≧ 900 N/mm²
Surface Hardness:	60 + 3 HRC (induction hardened)
Hardness Penetration:	≧ 1,8 mm
Execution:	precision ground, superfinished
Note:	Dimensions of pillar sizes from d_1 = 15 mm see catalogue page D 14. Threads identical between the three pillar types. Colour Code Combinations/Clearances – see pages D10 and D11.

Tolerance range – yellow = .10
green = .20
red = .30

Ordering Code (example):

Pillar, threaded holes/both ends	=	202.22.
d_1 = 30 mm	=	030.
l_1 = 200 mm	=	200.
Tolerance range – green	=	20
Order No	=	202.22.030.200.20

FIBRO

202.21.
202.55.

Guide Pillars
Endwise Bolt-On Type ~DIN 9825/~ISO 9182-2
with ball cage retainer

202.21.

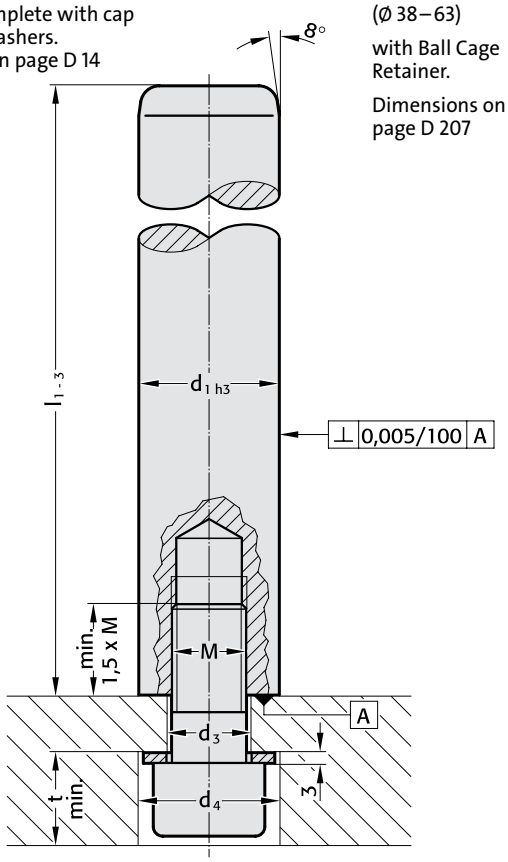
Guide Pillars for endwise screw retention, complete with cap screws and washers.
Dimensions on page D 14

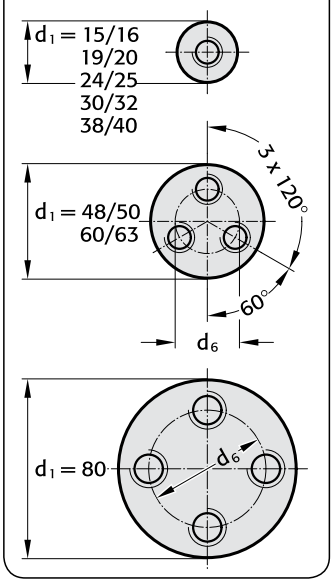
202.55.

Guide Pillars (Ø 38–63)

with Ball Cage Retainer.

Dimensions on page D 207





Material:

	Steel, surface hardened
Core strength:	≧900 N/mm²
Surface Hardness:	60+3 HRC (induction hardened)
Hardness Penetration:	≧1,8 mm

Execution:

fine precision ground
End face square within
0,005 mm in 100 mm

Remarks: Method of manufacturing entails that centre holes are not concentric with O. D.

202.21./202.55. Dimensions on page D14

d_1	15 16	19 20	24 25	30 32 38 40	48 50	60 63	80
d_3	9	11	14	18	14	18	18
d_4	17	20	22	28	22	28	28
d_6	–	–	–	–	28	34	54
t	12	14	16	20,5	16	20,5	20,5
M	8	10	12	16	12	16	16
cap screw	M8×35	M10×40	M12×40	M16×40	3×M12×50	3×M16×60	4×M16×60
Nm*	21	37	85	150	85	200	200

* tightening torque

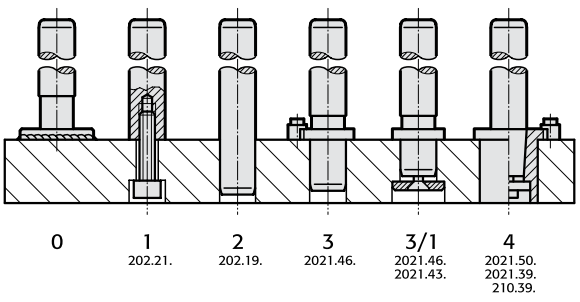
Note:
Colour Code Combinations/Clearances – see pages D10 and D11.

Tolerance range – yellow = .10
green = .20
red = .30

Ordering Code (example):

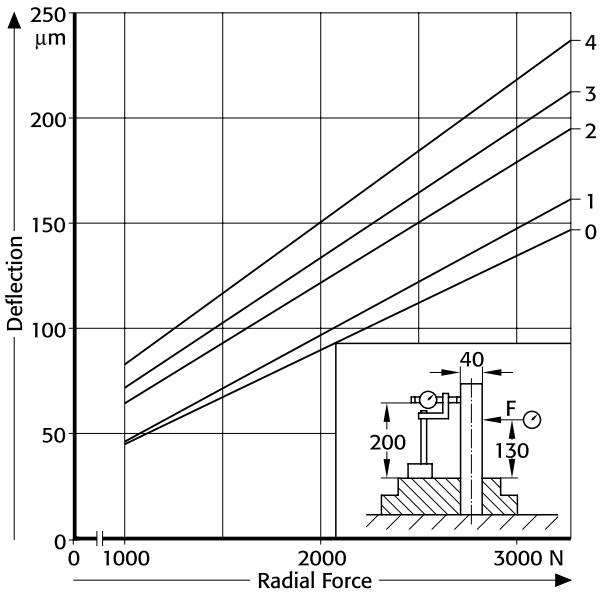
Guide Pillar similar DIN 9825	= 202.21.
d_1 = 40 mm	= 040.
l_1 = 200 mm	= 200.
Tolerance range – red	= 30
Order No	= 202.21.040.200.30

The practical application of these pillars demands a certain amount of re-thinking in regard of tool design. Deflection under radially imposed load is shown in the diagram to the right.
Further information: see under "Literature".



Mounting Instructions:

Coat head and threads of screws with molybdenum disulfite. Tighten and undo screw twice before final tightening with torque wrench. Tightening torque is shown above right.



Demountable Pillars, conical
DIN 9825/ISO 9182-4 AFNOR*
with ball cage retainer

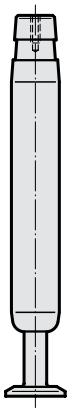
FIBRO

2021.50.
2021.58.

2021.58.

Demountable Pillar (Ø 38–63) with Ball Cage Retainer

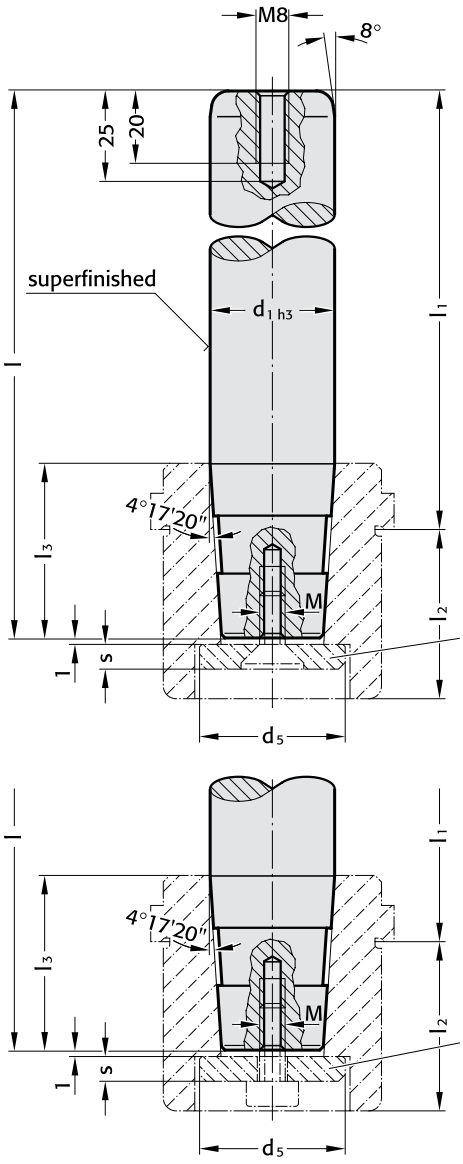
Dimensions of Ball Cage Retainer: see 202.91. on page D 207.



2021.50.

2021.58.

with Ball Cage Retainer



These pillars are recommended where die sharpening etc. demands frequent demounting and re-fitting.

Execution: precision ground, superfinished

Note: manufacturing methods entail that centre holes are not concentric with O. D.

Hardened liner Bushes with matching internal taper for Demountable Pillars 2051.50. with Retaining Disc and Head Cap Screw 202.53. – see page D 21.

Hardened liner Bushes with matching internal taper for Demountable Pillars 2021.50. with Retaining Disc and Countersunk Socket Head Screw 2021.53. – see page D 20.

Colour Code Combinations/Clearances – see pages D 10 and D 11.

Material: Steel, surface hardened

Core strength: ≧ 900 N/mm²

Surface Hardness: 60+3 HRC (induction hardened)

Penetration: ≧ 1,8 mm

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

2021.50. DIN 9825/ISO 9182-4 / AFNOR*

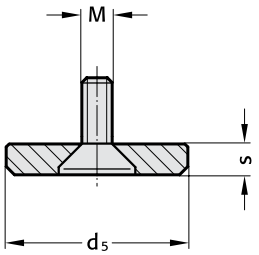
d_1	16*	19 20	20*	24 25	25*	30 32	32*	38 40	40*	48 50	50*	60 63	63*
M	M6×16*	M6×16	M6×16*	M8×20	M8×20*	M8×20	M8×20*	M8×20	M8×20*	M10×20	M10×25*	M12×30	M12×30*
l_2	30*	30 o. 37	38*	37 o. 47	38* o. 48*	37 o. 47	48* o. 61*	47 o. 60	48* o. 61*	47 o. 60	61* o. 78*	60 o. 77	78* o. 98*
l_3	28*	38	38*	35	35* o. 45*	48	48* o. 61*	48	48* o. 61*	58	58* o. 78*	69	77* o. 97*
l_1	l	l	l	l	l	l	l	l	l	l	l	l	l
82*	100*												
95*	113*												
100		126	126*	123	123*/ –*								
112	130*	138	138*	135	135*/ –*	145	145*/ –*						
125	143*	151	151*	148	148 /158*	158	158*/ –*	158	158*/ –*				
140		166	166*	163	163*/ –*	173	173*/186*	173	173*/ –*	180	180*/ –*		
160		186	186*	183	183 /193*	193	193*/206*	193	193*/206*	200	200*/ –*	211	
180		206	206*	203	203*/213*	213	213*/226*	213	213*/226*	220	220*/ –*	231	237*/ –*
200		226	226*	223	223*/233	233	233*/ –*	233	233*/ –*	240	240*/260*	251	257*/ –*
224				247	247*/ –*	257	257*/270*	257	257*/270*	264	264*/ –*	275	*/ –*
250				273	273*/ –*	283	283*/ –*	283	283*/296*	290	290*/310*	301	307*/327
280	Ordering Code (example):					313	313*	313	313*/ –*	320	320*/340*	331	337*/ –*
315	Demountable Pillar, conical		= 2021.50.					348	348*/ –*	355	355*/375*	366	372*/392*
355	d_1 = 32 mm		= 032.							395	395*/ –*	406	*/432*
400*	l_1 = 200 mm		= 200.										*/477*
	l_3 = 48 mm		= 048.										
	Tolerance range – yellow		= 10										
	Order No		= 2021.50.032.200.048.10										

FIBRO

2021.53.
202.53. Retaining Discs

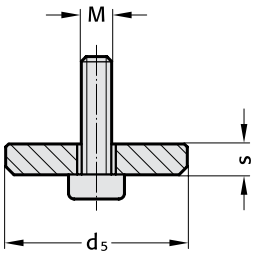
2021.53.

Retaining Disc with Countersunk
Socket Head Screw DIN 9825/ISO 9182-4



202.53.

Retaining disc with Head cap Screw AFNOR*



2021.53.

Retaining Disc with Countersunk
Socket Head Screw DIN 9825/ISO 9182-4

Pillar-∅						
d_1	19 20	24 25	30 32	38 40	48 50	60 63
d_5	22	25	32	40	50	63
s	3	3	3	5	5	6
M	M6×16	M8×20	M8×20	M8×20	M10×20	M12×30

Ordering Code (example):

Retaining Disc with Countersunk Socket Head Screw	
DIN 9825/ISO 9182-4	= 2021.53.
Pillar-Ø d_1 = 20 mm	= 020
Order No	= 2021.53.020

202.53.

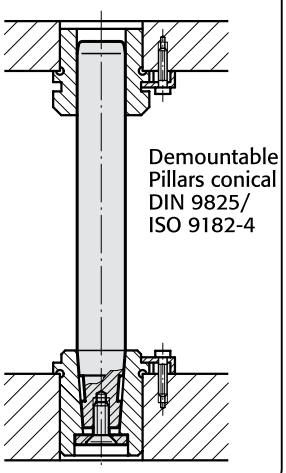
Retaining disc with Head cap Screw AFNOR*

Pillar-∅							
d_1	16	20	25	32	40	50	63
d_5	18	22	25	32	40	50	63
s	3	3	4	4	4	5	6
M	M6×16	M6×16	M8×20	M8×20	M8×20	M10×25	M12×30

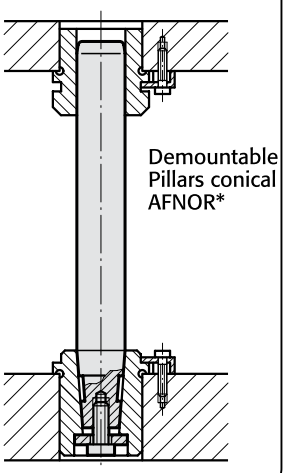
Ordering Code (example):

Retaining Disc with Head Cap Screw	
AFNOR	= 202.53.
Pillar-Ø d_1 = 16 mm	= 016
Order No	= 202.53.016

Mounting Example:



Mounting Example:



Note:

Not delivered with the demountable Pillar 2021.50., has to be ordered separately:

202.53. Retaining Disc with Head Cap Screw DIN 6912

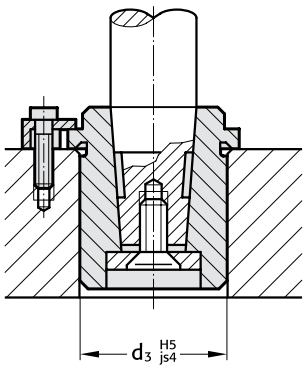
resp.

2021.53. Retaining Disc with Countersunk Socked Head Screw DIN 7991

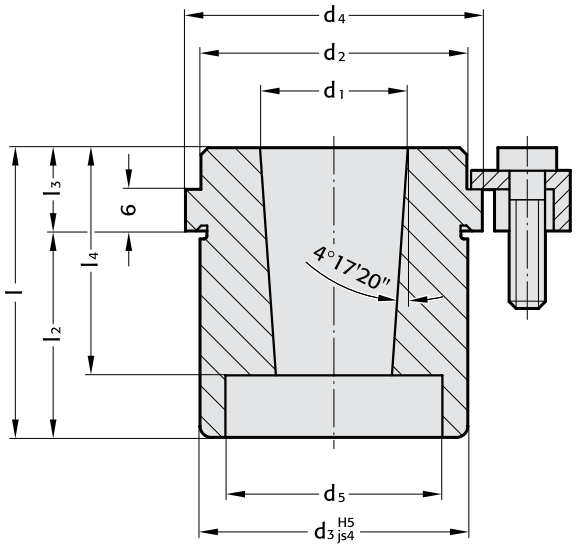
Liner Bushes DIN 9825/ISO 9182-4 for demountable Guide Pillars 2021.50.

2021.39.

Mounting Example:

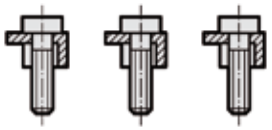


2021.39.



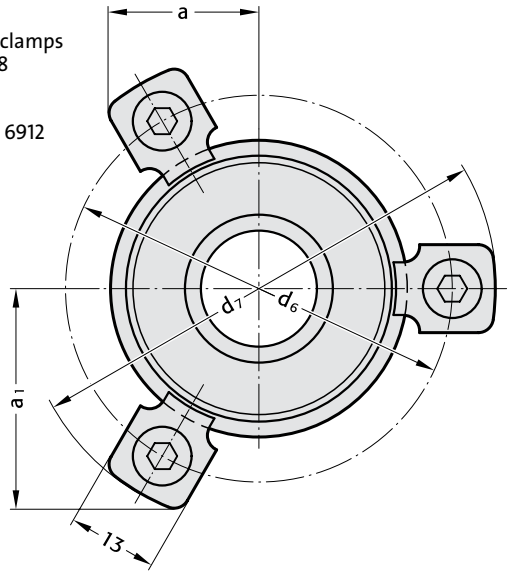
207.45

screw clamps
order No for
replacement parts



207.45

Four screw clamps
for ∅ d_1 = 38
and over
M6 × 20
similar DIN 6912
head ∅13



Material:

16 MnCr5
casehardened 58 ± 2 HRC
penetration: ≧ 0,8 – 1,0 mm

Execution:

Retaining bore, outside diameter and shoulder precision ground.
Supplied with screw clamps and cap screws similar DIN 6912, head Ø 13.

Note:

Outside diameter d_3 same as that of guide bushes 2081. and 2091.; see pages D 60-D 90.

2021.39.

d_1	19 20	24 25	30 32	38 40	48 50	60 63
d_2	32	40	48	58	70	85
d_3	32	40	48	58	70	85
d_4	40	48	56	66	80	95
d_5	23	26	33	41	51	64
d_6	53	60	67	77	91	106
d_7	65,7	72,7	79,7	89,7	103,7	118,7
a	20,9	22,65	24,4	35,3	40,2	45,5
a_1	30,3	33,4	36,4	35,3	40,2	45,5
l	42 o. 49	49 o. 59	52 o. 62	62 o. 75	65 o. 78	78 o. 95
l_2	30 o. 37	37 o. 47	37 o. 47	47 o. 60	47 o. 60	60 o. 77
l_3	12	12	15	15	18	18
l_4	39	36	49	49	59	70

Ordering Code (example):

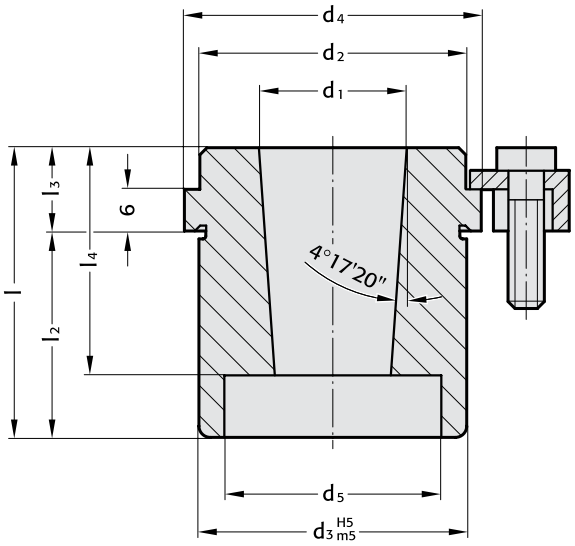
Liner Bush DIN 9825	=	2021.39.
d_1 = 40 mm	=	040.
l_2 = 47 mm	=	047
Order No	=	2021.39.040.047

FIBRO

similar AFNOR
210.39.

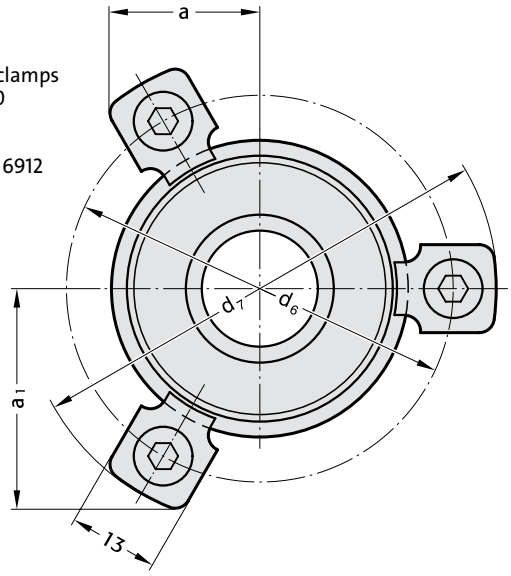
Liner Bushes
for Demountable Guide Pillars 2021.50

210.39.

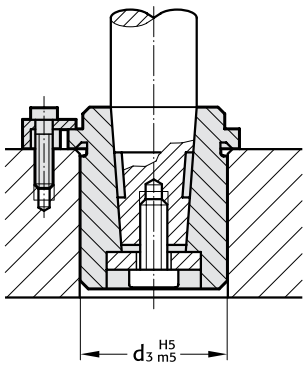


207.45

four screw clamps
ab ∅ d_1 = 40
M6 × 20
and over
similar DIN 6912
head ∅ 13

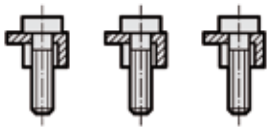


Mounting Example:



207.45

screw clamps
Order No for
replacement parts



210.39.

d_1	16	20	25	32	40	50	63
d_2	29	32	41	51	65	84	100
d_3	28	32	40	50	63	80	90
d_4	32	36	45	56	70	90	110
d_5	19	23	26	33	41	51	64
d_6	45	49	57	67	81	101	121
d_7	57,7	61,7	69,7	79,7	93,7	113,7	133,7
a	18,9	19,9	21,9	24,4	36	43	50,1
a_1	26,9	28,6	32,1	36,4	36	43	50,1
l	40	50	50/60	63/76	63/76	79/96	98/118
l_2	30	38	38/48	48/61	48/61	61/78	78/98
l_3	10	12	12	15	15	18	20
l_4	30	40	37/47	50/63	50/63	63/80	79/99

Ordering Code (example):

Liner Bush, similar AFNOR	=	210.39.
d_1 = 40 mm	=	040.
l_2 = 48 mm	=	048
Order No	=	210.39.040.048

Material:

16 MnCr5
casehardened 58 ± 2 HRC
penetration ≧ 0,8 – 1,0 mm

Execution:

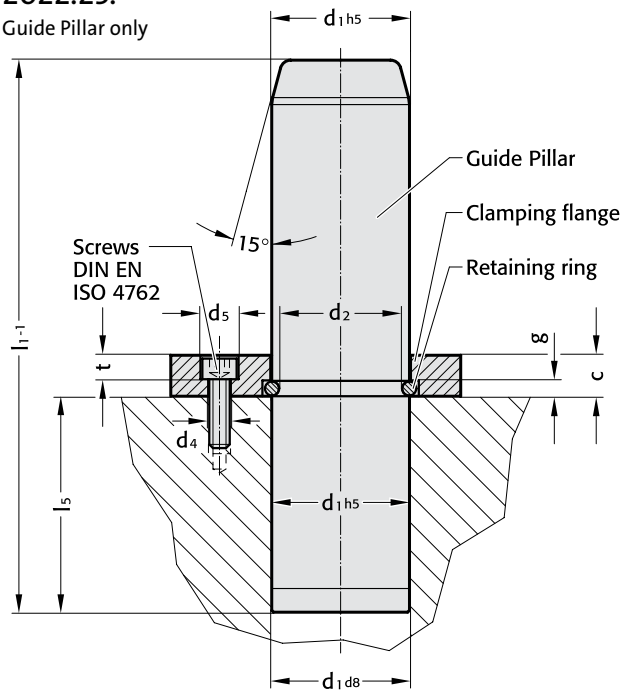
Retaining bore, outside diameter and shoulder precision ground.
Supplied with screw clamps and cap screws similar DIN 6912, head Ø 13.

Guide Pillars ~AFNOR with Retaining Ring Groove Clamping Flange and Retaining Ring

FIBRO
2022.25.
2073.46.

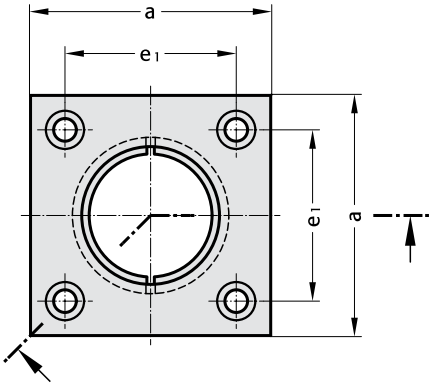
2022.25.

Guide Pillar only



2073.46.

Clamping flange with retaining ring



Material:

Steel, surface hardened

Surface hardness: 60 + 4 HRC

Hardness penetration depth: 1,5 + 1 mm

Execution:

Diameter precision ground.

Note:

Matching guide bushes

2102.70. AFNOR – see page D113.

Fit for receiving bore: M6.

Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

Fixing:

Clamping flange with retaining ring screws not included 2073.46. ☐☐☐

Retaining ring 2073.46. ☐☐☐.2

Ordering Code:

Guide Pillar AFNOR without Clamping Flange	= 2022.25.
d_1 = 40 mm	= 040.
l_1 = 250 mm	= 250
Order No	= 2022.25.040.250

2022.25.

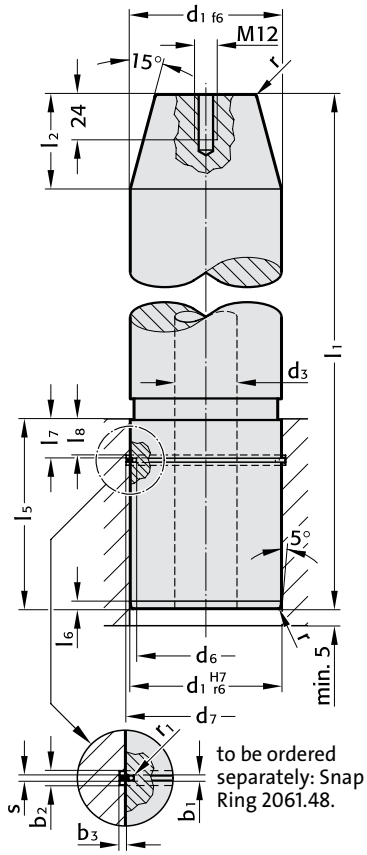
d_1	25	32	40	50	63	80	100
d_2	22,3	27,8	35,8	45,8	56,8	73,8	93,8
d_4	M6	M6	M6	M8	M10	M12	M12
d_5	11	11	11	15	18	20	20
a	45	56	70	80	100	110	140
c	10	10	12	14	18	20	20
g	2,7	4,2	4,2	4,2	6,2	6,2	6,2
e_1	31	36	50	55	70	80	100
t	7	7	7	9	11	13	13
l_5	25	32	63	80	100	125	160
l_1 100	●						
125	●	●					
140	●	●					
160	●	●					
180	●	●	●				
200	●	●	●	●			
220	●	●	●	●			
250		●	●	●	●		
280			●	●	●		
315			●	●	●	●	
355				●	●	●	●
400				●	●	●	●
450					●	●	●
500					●	●	●

FIBRO

2022.12.
2061.48.

Guide Pillars for Large Tools with Pilot Taper and Snap Ring Groove to Daimler Standard Snap Rings

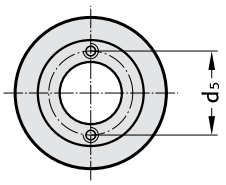
2022.12.



to be ordered separately: Snap Ring 2061.48.

1 x Lifting thread M12
centred only by Ø d1 = 80

2 x Lifting thread M8 from Ø d_1 = 100



2022.12.

d_1	80	100	125	160
d_3	–	50	65	95
d_5	–	62	82	119
d_6	71,4	89,9	114,9	148,9
d_7	83,2	103,8	128,8	164,3
r	3	3	4	4
r_1	1,05	1,3	1,3	1,3
l_2	50	50	50	50
l_5	100	125	140	180
l_6	4	4	5	5
l_7	21	31	31	31
l_8	20	30	30	30
b_1	2,1	2,6	2,6	2,6
b_2	4,2	5,2	5,2	5,2
b_3	2,8	3,4	3,4	4
s	2,0	2,5	2,5	2,5
Snap ring, outside ∅ loose	82,6	103,3	128,6	164,3
Snap ring 2061.48.	080	100	125	160
l_1				
280	●			
315	●	●		
355	●	●	●	
400	●	●	●	
450	●	●	●	●
500			●	●
560				●

Material:

Steel, surface hardened

Surface hardness: 60 + 4 HRC

Hardness penetration depth: 1,5 + 1 mm

Execution: precision ground

∅ 80	without central hole with 1 lifting thread M12 centred
from ∅100	with central hole (through) and with 2 lifting threads M8

Note:

Fit for receiving bore H7

Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

Matching guide bushes:
Page D 110, D 111 and D 113.

Ordering Code (example):

Guide Pillar with Groove	= 2022.12.
d_1 = 80 mm	= 080.
l_1 = 315 mm	= 315
Order No	= 2022.12.080.315

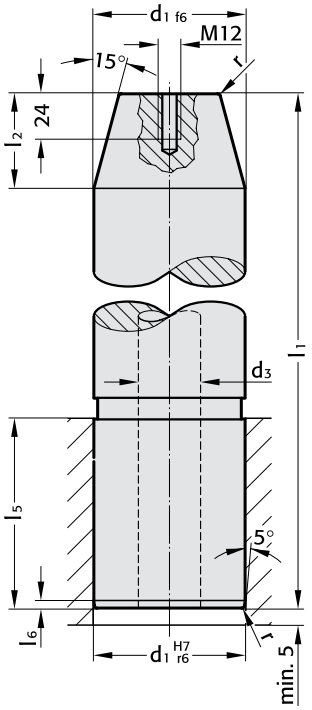
Ordering Code (example):

Snap Ring	= 2061.48.
d_1 = 80 mm	= 080
Order No	= 2061.48.080

Guide Pillars for Large Tools with Pilot Taper VDI 3356

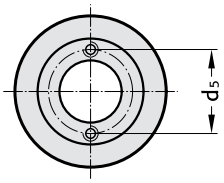
2022.15.

2022.15.



1 x Lifting thread M12
centred only by Ø d1 = 80

2 x Lifting thread M8 from Ø d_1 = 100



Material:

Steel, surface hardened

Surface hardness: 60 + 4 HRC

Hardness penetration depth: 1,5 + 1 mm

Execution: precision ground

Ø 80	without central hole
	with 1 lifting thread M12 centred
from Ø 100	with central hole (through) and with 2 lifting threads M8

Note:

Fit for receiving bore H7

Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

Matching guide bushes:
Page D110, D111 and D113

Ordering Code (example):

Guide Pillar	= 2022.15.
d_1 = 80 mm	= 080.
l_1 = 315 mm	= 315
Order No	= 2022.15.080.315

2022.15.

d_1	80	100	125	160
d_3	–	50	65	95
d_5	–	62	82	119
r	3	3	4	4
l_2	50	50	50	50
l_5	100	125	140	180
l_6	4	4	5	5
l_1				
280	●			
315	●	●		
355	●	●	●	
400	●	●	●	
450	●	●	●	●
500			●	●
560				●

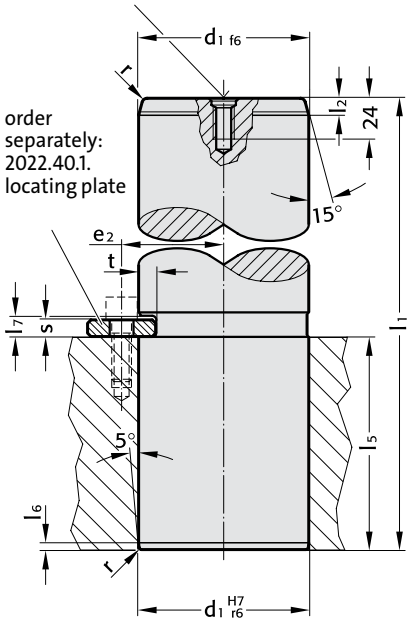
FIBRO

2022.17.
2022.40.1.

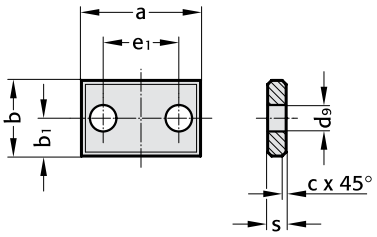
Guide Pillars for Large Tools with groove to VW Locating plates to VW

2022.17.

1 x Lifting thread M12
centred only by Ø d1 = 80



2022.40.1. Locating plate



Note:

Screws not included!

Fixing:

Use socket cap screws
DIN EN ISO 4762

M 8x20
M10x30
M12x30.

Ordering Code (example):

Locating plate	= 2022.40.1.
d_1 = 32 mm	= 02
Order No	= 2022.40.1.02

2022.17.

d_1	25	32	40	50	63	80
l_2	8	8	8	10	10	10
l_5	40	45	56	70	80	100
l_6	4	4	4	4	4	4
l_7	7	7	10	10	12	12
r	2	2	2	2,5	2,5	3
a	40	40	48	48	60	60
s	5	5	8	8	10	10
c	1	1	2	2	2	2
b	20	20	25	25	34	34
e_1	20	20	24	24	30	30
t	3	3	4	5	6,5	8
e_2	20,5	24	29,5	33,5	43	50
d_9	9	9	11	11	14	14
Order No 2022.40.1. for locating plate						
2022.40.1.	02	02	04	04	06	06
l_1						
125	●	●				
140	●	●	●			
160	●	●	●	●		
180	●	●	●	●	●	
200	●	●	●	●	●	
224	●	●	●	●	●	●
250		●	●	●	●	●
280			●	●	●	●
315				●	●	●
355				●	●	●
400					●	●
450						●
500						●

Material:

Steel, surface hardened

Surface hardness: 60 + 4 HRC

Hardness penetration depth: 1,5 + 1 mm

Execution: precision ground

by Ø d_1 = 80 with 1 lifting thread M12

Note:

Fit for receiving bore: H7.

Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

Matching guide bushes:
Page D 110, D 111 and D 113.

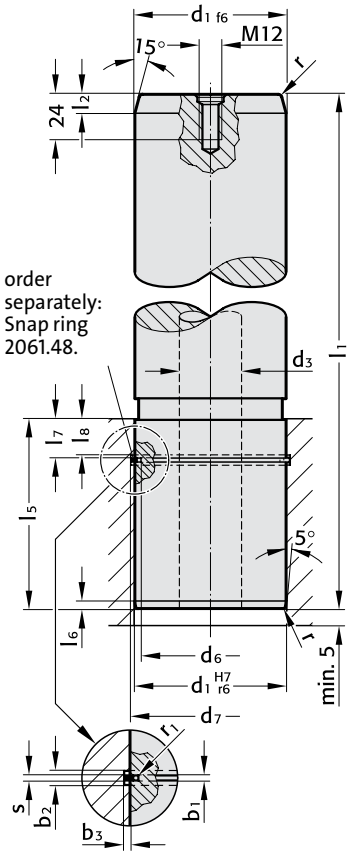
Ordering Code (example):

Guide Pillar	= 2022.17.
d_1 = 80 mm	= 080.
l_1 = 315	= 315
Order No	= 2022.17.080.315

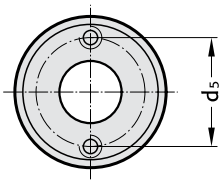
Guide Pillars for Large Tools with Snap Ring Groove to Daimler Snap Rings

FIBRO
2022.16.
2061.48.

2022.16.



1 x Lifting thread M12 centred only by Ø d1 = 80



Execution: precision ground

up to	Ø d1= 80	without central hole
by	Ø d1= 80	with 1 lifting thread M12
from	Ø d1= 100	with central hole (through) and with 2 lifting threads M12

Material:

Steel, surface hardened
Surface hardness: 60 + 4 HRC
Hardness penetration depth: 1,5 + 1 mm

Execution:

Fit for receiving bore: H7.
Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

Matching guide bushes:
Page D 110, D 111 and D 113.

Ordering Code (example):

Snap ring	= 2061.48.
d_1 = 80 mm	= 080
Order No	= 2061.48.080

Ordering Code (example):

Guide Pillar	= 2022.16.
d_1 = 40 mm	= 040.
l_1 = 200 mm	= 200
Order No	= 2022.16.040.200

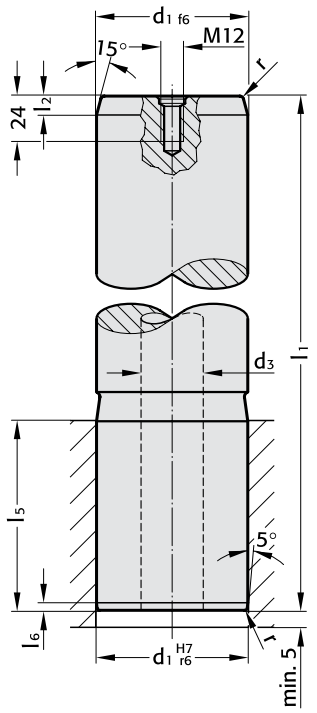
2022.16.

d_1	40	50	63	80	100	125	160
d_3	–	–	–	–	50	65	95
d_5	–	–	–	–	72	90	132
d_6	33	43	55,7	71,4	89,9	114,9	148,9
d_7	43	53	66	83,2	103,8	128,8	164,3
r	2	2,5	2,5	3	3	4	4
r_1	1	1	1	1,05	1,3	1,3	1,3
l_2	8	10	10	10	10	12	12
l_5	56	70	80	100	125	140	180
l_6	4	4	4	4	4	5	5
l_7	15	15	15	21	31	31	31
l_8	14	14	14	20	30	30	30
b_1	2	2	2	2,1	2,6	2,6	2,6
b_2	3,2	3,2	3,2	4,2	5,2	5,2	5,2
b_3	2,3	2,3	2,3	2,8	3,4	3,4	4
s	1,5	1,5	1,5	2,0	2,5	2,5	2,5
Snap ring, outside Ø, loose	41,8	51,8	65,3	82,6	103,3	128,6	164,3
Snap ring 2061.48.	040	050	063	080	100	125	160
l_1							
140	●						
160	●	●					
180	●	●	●				
200	●	●	●				
224	●	●	●	●			
250	●	●	●	●	●		
280	●	●	●	●	●		
315		●	●	●	●	●	
355		●	●	●	●	●	
400			●	●	●	●	●
450				●	●	●	●
500				●	●	●	●
560							●

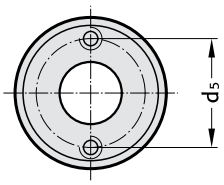
Guide Pillars for Large Tools
DIN 9833 / ISO 9182-3

2022.19.

2022.19.



1 x Lifting thread M12 centred only by Ø d1 = 80



Execution: precision ground

up to Ø d1= 80	without central hole
by Ø d1= 80	with 1 lifting thread M12
from Ø d1= 100	with central hole (through) and with 2 lifting threads M12

2022.19.

d_1	25	32	40	50	63	80	100	125	160
d_3	–	–	–	–	–	–	50	65	95
d_5	–	–	–	–	–	–	72	90	132
r	2	2	2	2,5	2,5	3	3	4	4
l_2	8	8	8	10	10	10	10	12	12
l_5	40	45	56	70	80	100	125	140	180
l_6	4	4	4	4	4	4	4	5	5
l_1									
125	●	●							
140	●	●	●						
160	●	●	●	●					
180	●	●	●	●	●				
200	●	●	●	●	●				
224	●	●	●	●	●	●			
250		●	●	●	●	●	●		
280			●	●	●	●	●		
315				●	●	●	●	●	
355				●	●	●	●	●	
400					●	●	●	●	●
450						●	●	●	●
500						●	●	●	●
560									●

Material:

Steel, surface hardened
Surface hardness: 60 + 4 HRC
Hardness penetration depth: 1,5 + 1 mm

Execution:

Fit for receiving bore: H7.
Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

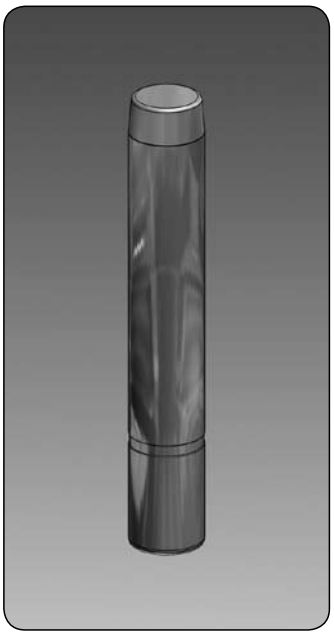
Matching guide bushes:
Page D 110, D 111 and D 113.

Ordering Code (example):

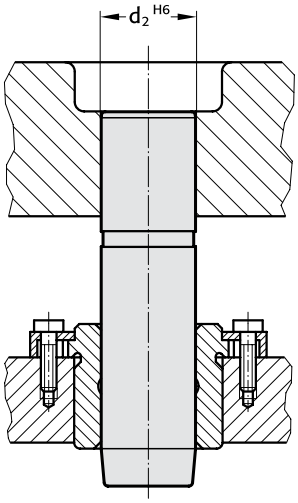
Guide Pillar	= 2022.19.
d_1 = 40 mm	= 040.
l_1 = 200 mm	= 200
Order No	= 2022.19.040.200

Guide Pillar
with 5° Pilot Taper to VW Standard

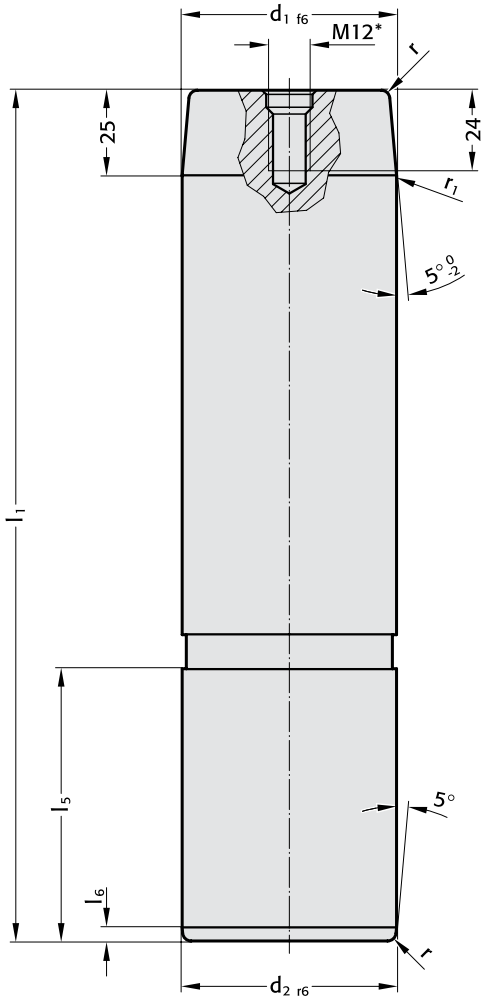
2022.13.



Mounting Example:



2022.13.



Material:

Steel, surface hardened

Surface hardness: 60 + 4 HRC

Hardness penetration depth: 1.5 + 1 mm

Execution:

precision ground

*by ∅ d_1 = 80 with 1 centered lifting thread M12

Note:

Fit for receiving bore H6

Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

Matching guide bushes:
Page D 110, D 111 and D 113.

Application:

floating support in upper half of trimming tools.

Ordering Code (example):

Guide Pillar	=	2022.13.
d_1 = 40 mm	=	040.
l_1 = 200 mm	=	200
Order No	=	2022.13.040.200

2022.13.

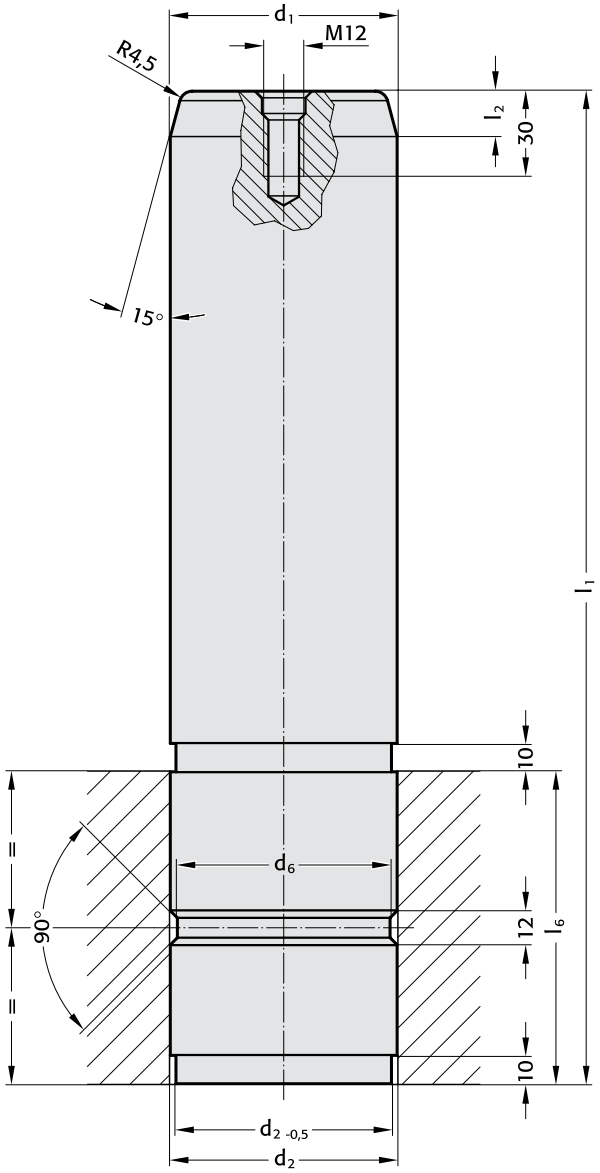
d_1	40	50	63	80
d_2	40	50	63	80
l_5	56	70	80	100
l_6	4	4	4	4
r	2	2,5	2,5	3
r_1	3	5	6	8
l_1				
140	●			
160	●	●		
180	●	●	●	
200	●	●	●	
224	●	●	●	●
250	●	●	●	●
280	●	●	●	●
315		●	●	●
355		●	●	●
400			●	●

FIBRO

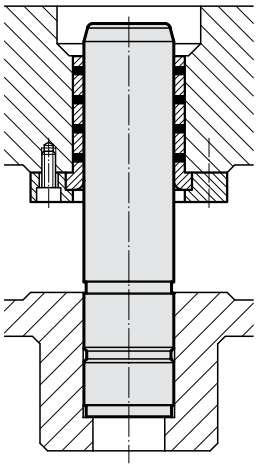
2022.16.45.

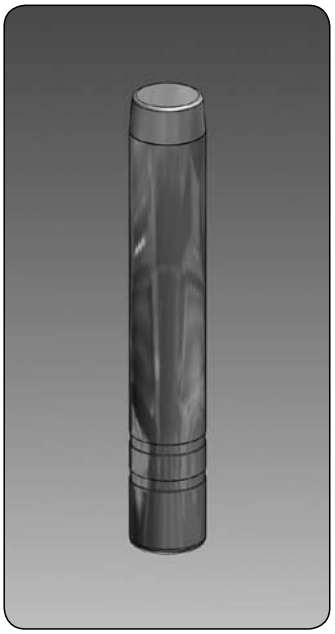
Guide Pillar with Groove to CNOMO

2022.16.45.



Mounting Example:





Material:

Steel, surface hardened

Surface hardness:	60 + 3 HRC
Hardness penetration depth:	2 + 1.6 mm

Execution:

precision ground

Note:

Fit for receiving bore H7

Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant.

Matching guide bushes:
Page D 110, D 111 and D 113 .

Ordering Code (example):

Guide Pillar	=	2022.16.45.
d_1 = 80 mm	=	080.
l_1 = 350 mm	=	350
Order No	=	2022.16.45.080.350

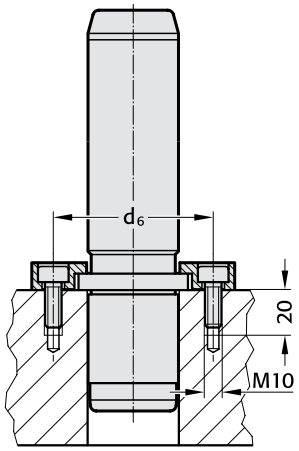
2022.16.45.

d_1		80	100
	tol.	-0,010	-0,010
		-0,025	-0,025
d_2		80	100
	tol.	+0,050	+0,055
		+0,040	+0,045
d_6		75	95
l_2		16	16
l_6		110	140
l_1			
350		●	
400		●	●
450			●

Guide Pillars with Collar to WDX Screw Clamps

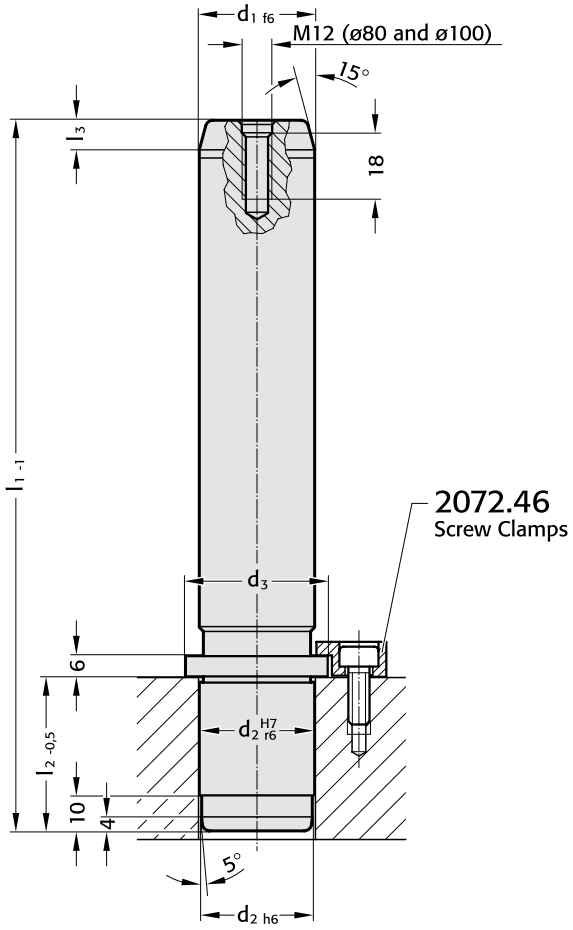
2022.29.
2072.46

Mounting Example



2022.29.

without Screw Clamps



Material:

Steel, surface hardened

Surface hardness: 60 + 4 HRC

Hardness penetration depth: 1,5 + 1 mm

Execution: precision ground

Remark: method of manufacture entails that centre holes are not concentric with O. D.

Guide pillar is recommended to be used only with Guide Elements with Non-Liquid Lubricant

Fit for receiving bore: H 7.

Fixing: (to be ordered separately)

Screw Clamps with Screws 2072.46 (M10 x 20 DIN EN ISO 4762), see page D 210

up to ∅ 50 2 screw clamps

from ∅ 63 3 screw clamps

Ordering Code (example):

Guide Pillar	=	2022.29.
d_1 = 32 mm	=	032.
l_1 = 140 mm	=	140
Order No	=	2022.29.032.140

2022.29.

d_1	25	32	40	50	63	80	100
d_2	25	32	40	50	63	80	100
d_3	32	40	50	60	80	90	110
d_6	68	75	83	93	106	123	143
l_2	40	42	56	70	80	100	125
l_3	6	8	8	10	10	10	10
l_1							
125	●						
140	●	●					
160	●	●	●	●			
180	●	●	●	●			
200	●	●	●	●	●		
224	●	●	●	●	●	●	
250		●	●	●	●	●	
280			●	●	●	●	●
315				●	●	●	●
355					●	●	●
400					●	●	●
500						●	●

FIBRO

2021.44. 2021.46. 2021.43.

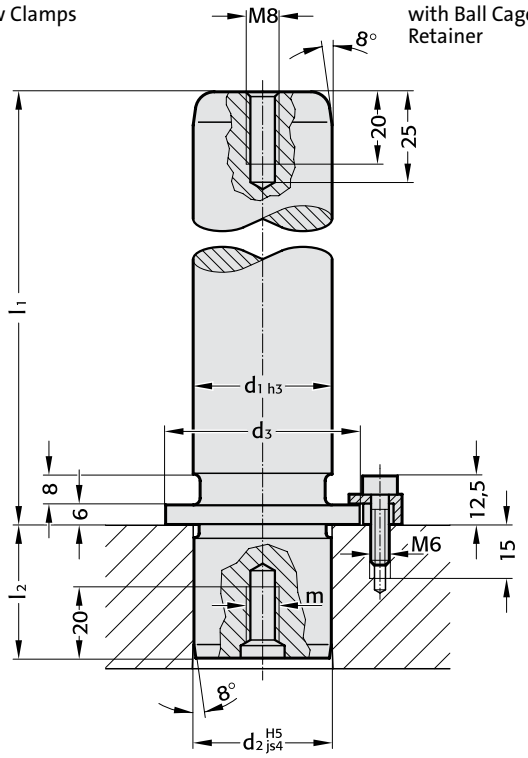
Demountable Pillars DIN 9825/~ISO 9182-5 with Collar and Screw Clamp Retention Disc with Screw for Central Retention

2021.46.

with Screw Clamps

2021.44.

with Ball Cage Retainer

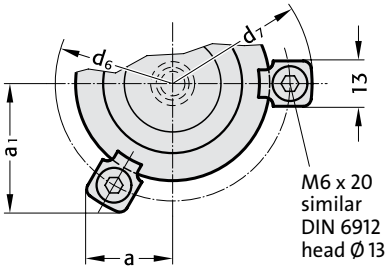


207.45

Screw Clamps, incl. Screws

Order-No for replacement parts

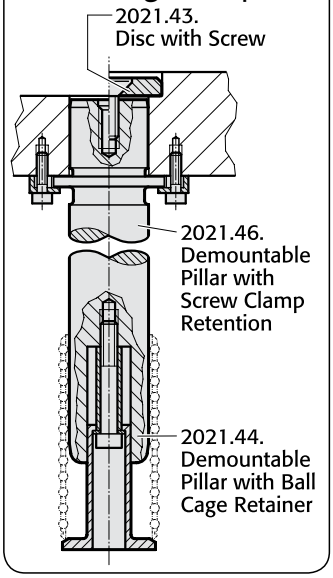
for Ø d_1 = 38 and over: 4 screw clamps



Ordering Code (example):

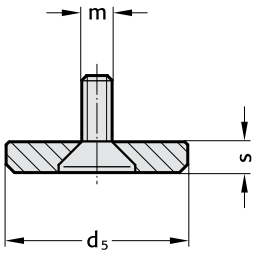
Demountable Pillar	= 2021.46.
d_1 = 32 mm	= 032.
l_1 = 180 mm	= 180
Tolerance range red	= .30
Order No	= 2021.46.032.180.30

Mounting Example



2021.43.

Disc with Screw

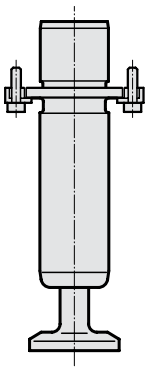


Ordering Code (example):

Disc with Screw	= 2021.43.
d_1 = 32 mm	= 032
Order No	= 2021.43.032

2021.44.

Demountable Pillar (∅38–63) with Ball Cage Retainer



Dimensions of ball cage retainer:
See 202.91., page D207.

2021.46./2021.44.

Material: Steel, surface hardened

Core strength: ≥ 900 N/mm²

Surface Hardness: 60 + 3 HRC (induction hardened)

Hardness Penetration: ≥ 1,8 mm

Execution: fine precision ground

Note: method of manufacture entails that centre holes are not concentric with O. D.

Demountable pillars with collar are suited to applications where die sharpening requires dismantling and re-fitting.

Tolerance range – yellow = .10
green = .20
red = .30

Note:
Colour Code Combinations/Clearances - see pages D10 and D11.

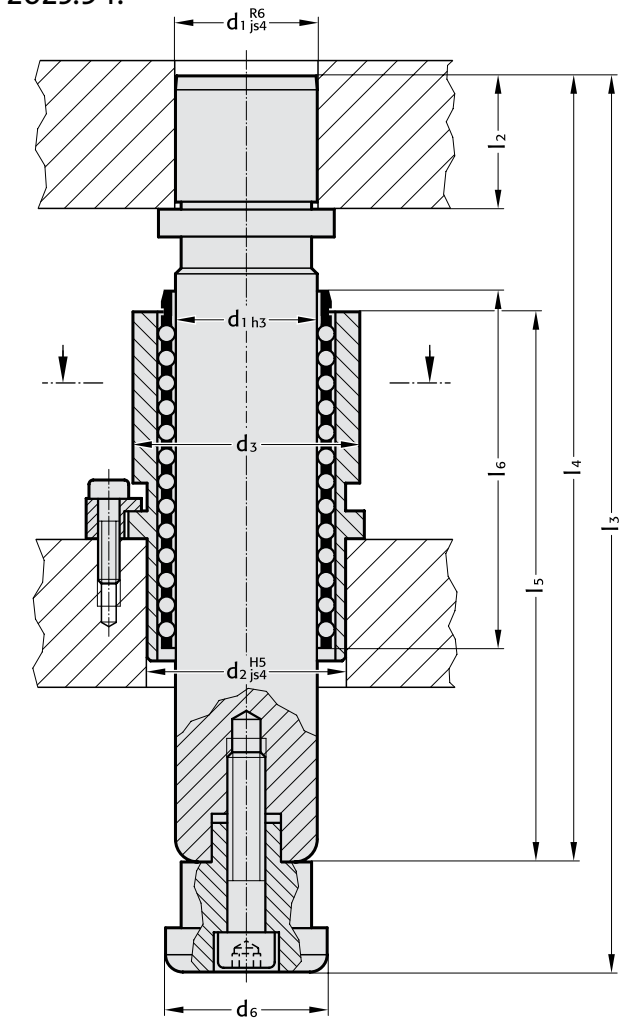
2021.46./2021.44./2021.43.

d_1	15 16	19 20	24 25	30 32	38 40	48 50	60 63	80
d_2	15 16	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	22	25	32	40	50	63	80	95
d_5	22	25	32	40	50	60	70	93
d_6	33	36	43	51	61	74	91	106
d_7	45,7	48,7	55,7	63,7	73,7	86,7	103,7	118,7
a	15,9	16,6	18,4	20,4	29,2	33,8	39,8	46,2
a_1	21,7	23	26	29,5	29,2	33,8	39,8	46,2
m	M8	M8	M8	M8	M8	M8	M8	M12
s	6	6	6	6	6	6	6	12
l_2	20	23	30	37	37	47	47	60
l_1 100	●	●	●					
112	●	●	●	●				
125	●	●	●	●	●			
140	●	●	●	●	●	●		
160	●	●	●	●	●	●	●	
180	●	●	●	●	●	●	●	
200	●	●	●	●	●	●	●	●
224			●	●	●	●	●	●
250			●	●	●	●	●	●
280				●	●	●	●	●
315				●	●	●	●	●
355					●	●	●	●
400						●	●	●

Ball Guide Units, complete to Daimler Standard

2025.94.

2025.94.



Pillar-∅d_1	50	80
d_2	70	105
d_3	80	118
d_6	57	91
d_8	97	135
l_2	47	75
l_3	316	450
l_4	271	400
l_5	194	280
l_6	128	160

Ordering example:

Ball guide unit, complete	= 2025.94.
Pillar ∅d_1 = 50 mm	= 050
Order No:	= 2025.94.050

Execution:

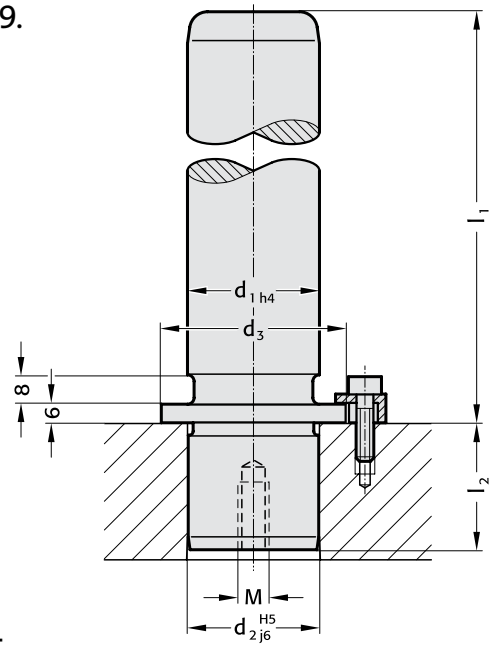
Ball guide unit 2025.94. consisting of:
Demountable guide pillar, guide bush, ball cage, cage retainer, clamps and socket head cap screws to DIN EN ISO 4762.

Materials:

Demountable guide pillar:	steel, surface hardened
Guide bush:	tooling steel
Cage retainer:	steel
Ball cage:	brass

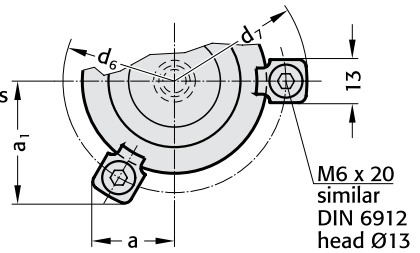
2021.29. Guide Pillars with Collar

2021.29.



207.45

Screw Clamps, incl. Screws
Order-No for replacement parts



2021.29.

Material:

Steel, surface hardened
Surface hardness: 60 + 4 HRC
Hardness penetration depth: 1,5 + 1 mm

Note:

Guide Pillar only recommended for use with sliding guides

Ordering Code (example):

Guide Pillar with Collar	= 2021.29.
d_1 = 32 mm	= 032.
l_1 = 180 mm	= 180
Order No	= 2021.29.032.180

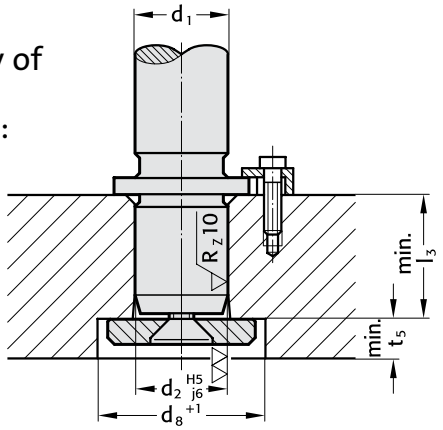
2021.29. / 2021.43.

d_1	15	16	19	20	24	25	30	32	38	40	48	50	60	63	80
d_2	15	16	19	20	24	25	30	32	38	40	48	50	60	63	80
d_3	22		25		32		40		50		63		80		95
d_5	22		25		32		40		50		60		70		93
d_6	33		36		43		51		61		74		91		106
d_7	45,7		48,7		55,7		63,7		73,7		86,7		103,7		118,7
d_8	24		27		34		42		52		62		72		95
a	15,9		16,6		18,4		20,4		29,2		33,8		39,8		46,2
a_1	21,7		23		26		29,5		29,2		33,8		39,8		46,2
M	M8		M8		M8		M8		M8		M8		M8		M12
s	6		6		6		6		6		6		6		12
l_3	20,5		23,5		30,5		37,5		37,5		47,5		47,5		60,5
t_5	6,5		6,5		6,5		6,5		6,5		6,5		6,5		12,5
l_2	20		23		30		37		37		47		47		60

l_1															
100	●		●		●										
112	●		●		●		●								
125	●		●		●		●		●						
140	●		●		●		●		●		●				
160	●		●		●		●		●		●		●		
180	●		●		●		●		●		●		●		
200	●		●		●		●		●		●		●		●
224					●		●		●		●		●		●
250					●		●		●		●		●		●
280							●		●		●		●		●
315							●		●		●		●		●
355									●		●		●		●
400											●		●		●

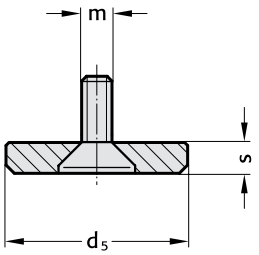
2021.29.

Assembly of Guide Elements:



2021.43.

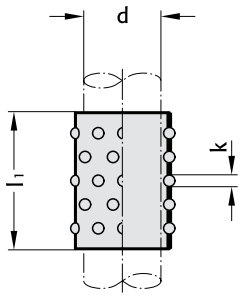
Retaining Disc with Countersunk Socket Head Screw



Ordering Code (example):

Disc with screw	= 2021.43.
d_1 = 32 mm	= 032
Order No	= 2021.43.032

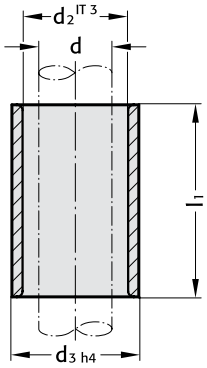
206.41.



206.41.

Order No	d	l1	k
206.41.012.020.021	12	21	2
206.41.012.020.042	12	42	2
206.41.012.025.021	12	21	2,5
206.41.012.025.042	12	42	2,5
206.41.015.030.045	15	45	3
206.41.015.030.056	15	56	3
206.41.015.030.063	15	63	3
206.41.015.030.071	15	71	3

2062.44.012.
2061.44.015.



2062.44.012.

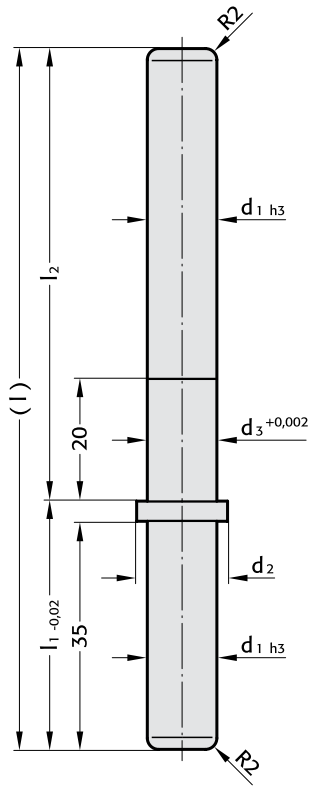
Order No	d	d2	d3	l1	for Ball Ø
2062.44.012.016.032	12	16	20	32	2
2062.44.012.017.032		17			2,5

2061.44.015.

Tolerance range xx
yellow = .10
green = .20

Order No	d	d_2	d_3	l_1	for Ball Ø
2061.44.015.023.xx	15	21	28	23	3
2061.44.015.030.xx				30	
2061.44.015.037.xx				37	
2061.44.015.047.xx				47	
2061.44.015.060.xx				60	

202.61.



202.61

Order No	d_1	d_2	d_3	l	l_1	l_2
202.61.012.041.074	12	15,9	12,02	115	41	74
202.61.015.044.080	15	23,5	15,02	124	44	80

Material:

Cage:	polyacetal tubing
Balls:	Rolling bearing steel 100 Cr6 Quality Class 1, DIN 5401
Guide bush:	tool steel, hardened to 62±2 HRC
Guide pillar:	Steel, surface hardened
hardness penetration	1±0,2 mm

Discription:

Owing to its much lower inertia, the plastic ball cage of particular advantage in die sets operating at stroking speed of 1000 SPM and more.

The phenomenon of ball-drag at the reversal point of cage travel, set up by the cage inertia, no longer occurs. The negative influence of this drag is eliminated – and so are the wear symptoms associated with it.

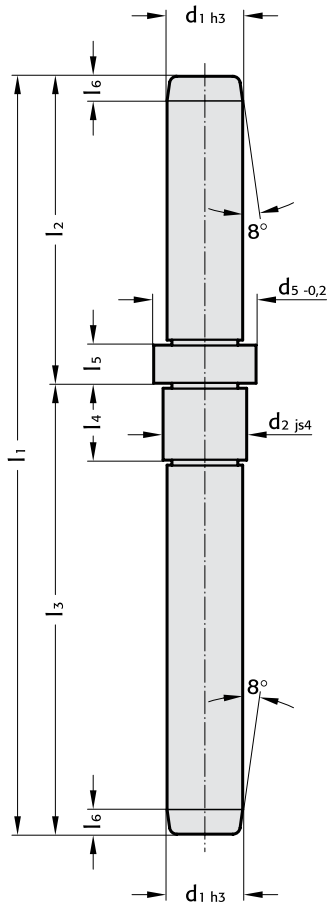
On small modular die sets the combination plastic ball cage/collared guide pillar 202.61. has indeed been successful for several years.

Cages with ball sizes 2 mm, 2,5 and 3 mm are supplied with matching guide bushes.

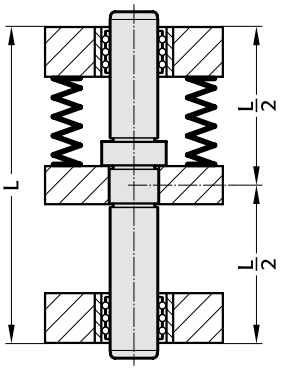
FIBRO

2020.63. Demountable Guide Pillars, with centre fixing

2020.63.



Mounting Example:



Description:

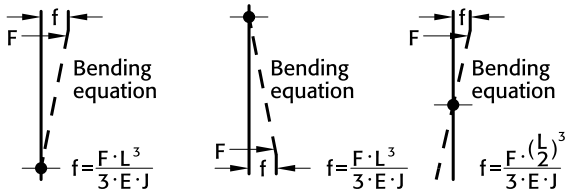
For press fit into register bore N5.

The transverse load resistance of tool guides is greatly influenced by the position of the guide pillar fixing.

For a tool with a spring-mounted die guide plate and pillar fixing at the top or bottom of the tool, the deflection and pillar bending values do not differ when the load is applied at the side since the distance (L) from the point of application of the force is the same.

Significantly better pillar bending values can be achieved by fixing the guide pillars in the die guide plate, i.e. in the centre of the pillar.

Since the distance $(\frac{L}{2})$ between the point of application of the force and the fixing surface is thus halved, the load-bearing capacity is increased by eight times.



2020.63.

d_1	12	16
d_2	13	18
d_5	15,9	21,9
l_1	116	158
l_2	42	64
l_3	74	94
l_4	12,5	16
l_5	5	8
l_6	3	5

Ordering Code (example):

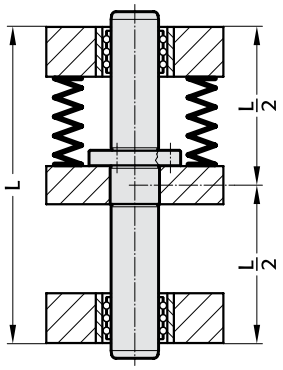
Demountable Guide Pillars	= 2020.63.	
d_1 = 12 mm	=	012.
l_2 = 42 mm	=	042.
l_3 = 74 mm	=	074
Order No	= 2020.63.012.042.074	

Material:

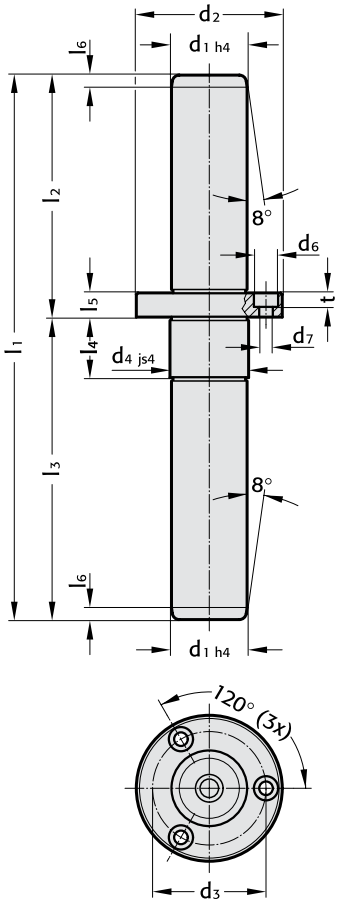
	Steel, surface hardened
surface hardness:	62+2 HRC case hardened
hardness penetration:	1 ± 0,2 mm

Stripper-Mounted Pillars 2020.62.

Mounting Example



2020.62.



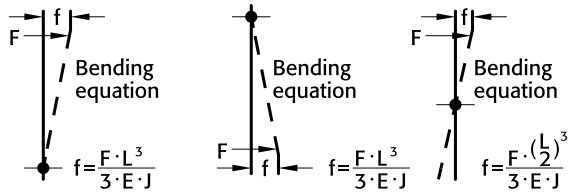
Description:

The transverse load resistance of tool guides is greatly influenced by the position of the guide pillar fixing.

For a tool with a spring-mounted die guide plate and pillar fixing at the top or bottom of the tool, the deflection and pillar bending values do not differ when the load is applied at the side since the distance (L) from the point of application of the force is the same.

Significantly better pillar bending values can be achieved by fixing the guide pillars in the die guide plate, i.e. in the centre of the pillar.

Since the distance ($\frac{L}{2}$) between the point of application of the force and the fixing surface is thus halved, the load-bearing capacity is increased by eight times.



Material:

Steel, heat treated
Core strength: ≧ 900 N/mm²
Surface Hardness: 60 + 3 HRC (induction hardened)
Hardness Penetration: ≧ 2,0 + 1,6 mm

Execution:

precision ground

Note:

Use hexagon socket head cap screws DIN EN ISO 4762 12.9

Colour Code Combinations/Clearances – see pages D 10 and D 11.

Diameter 12 only available in Tolerance range yellow = .10

Ordering Code (example):

Stripper-Mounted Pillar		Tolerance range
with centre fixing	= 2020.62.	yellow = .10
d_1 = 12 mm	= 012.	green = .20
l_2 = 50 mm	= 050.	red = .30
l_3 = 60 mm	= 060.	
Tolerance range – yellow	= 10	
Order No	= 2020.62.012.050.060.10	

2020.62.

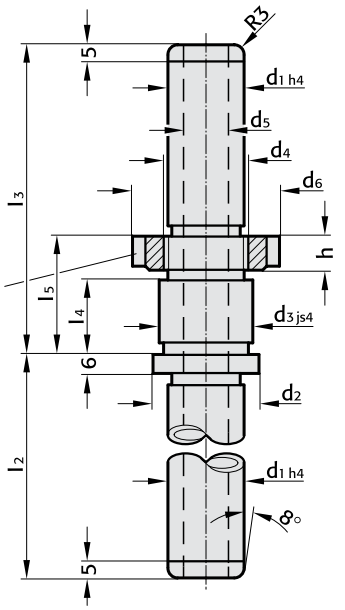
d_1	d_2	d_3	d_4	d_6	d_7	t	l_1	l_2	l_3	l_4	l_5	l_6
12	28	20	13	6	3,4	3,4	90	40	50	12	6	3
							100	40	60			
							110	50	60			
							120	50	70			
							130	60	70			
							140	70	70			
16	38	28	18	8	4,5	4,6	140	60	80	16	8	4
							150	60	90			
							160	70	90			
							170	70	100			
							180	80	100			
							190	90	100			
19	42	32	22	8	4,5	4,6	160	70	90	20	8	4
							170	70	100			
							180	80	100			
							190	80	110			
							200	90	110			
							210	100	110			
25	48	38	26	8	4,5	4,6	180	80	100	22	8	6
							190	80	110			
							200	90	110			
							210	90	120			
							220	100	120			
							230	110	120			
32	60	48	34	10	5,5	5,7	180	80	100	25	10	7
							190	80	110			
							200	90	110			
							210	90	120			
							220	100	120			
							230	100	130			
							240	110	130			
							250	110	140			
40	70	56	42	11	6,6	6,8	200	90	110	27	12	7
							210	90	120			
							220	100	120			
							230	100	130			
							240	110	130			
							250	110	140			
							260	120	140			

202.60. Stripper-Mounted Pillars

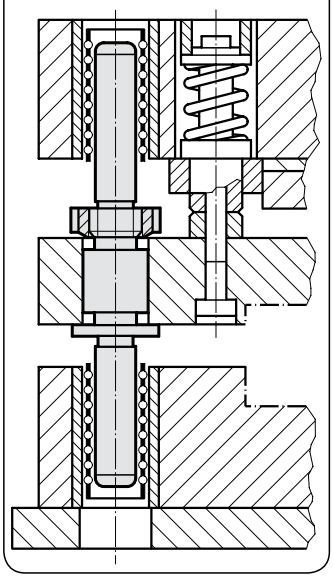
202.60.

Stripper-Mounted Pillars with ring nut

Always use shouldered face as bearing surface!



Mounting Examle



Description:

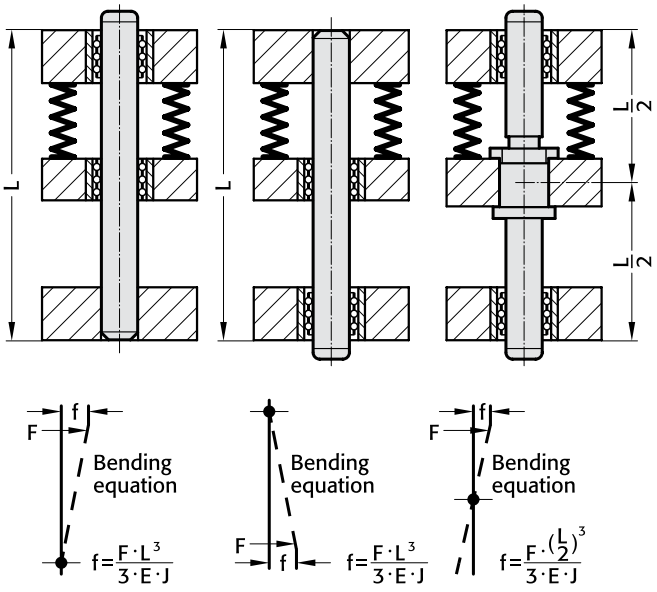
The transverse load resistance of tool guides is greatly influenced by the position of the guide pillar fixing.

For a tool with a spring-mounted die guide plate and pillar fixing at the top or bottom of the tool, the deflection and pillar bending values do not differ when the load is applied at the side since the distance (L) from the point of application of the force is the same.

Significantly better pillar bending values can be achieved by fixing the guide pillars in the die guide plate, i.e. in the centre of the pillar.

Since the distance ($\frac{L}{2}$) between the point of application of the force and the fixing surface is thus halved, the load-bearing capacity is increased by eight times.

In order to keep moving mass to a minimum and thereby minimize detrimental forces of inertia, FIBRO Stripper-Mounted Pillars are made with a hollow core. Rigidity of the die set – of paramount importance – remains unaffected by the hollow design.



202.60.

d_1	19	25	32	40
d_2	32	38	46	56
d_3	25	30	36	46
d_4	M22 × 1,5	M28 × 1,5	M35 × 1,5	M45 × 1,5
d_5	8	12	20	28
d_6	40	50	55	68
h	9	10	11	12
l_2	80	80	100	100
l_3	120	120	140	140
l_4	29	29	34	34
l_5	45	45	50	50

Shorter lengths l_2 and l_3 available on request

Ordering Code (example):

Stripper-Mounted Pillar with Collar and ring nut retention	= 202.60.	
d_1 = 25 mm	=	025.
l_2 = 80 mm	=	080.
l_3 = 120 mm	=	120.
Tolerance range – green	=	20
Order No	= 202.60.025.080.120.20	

Material:

Steel, surface hardened

Core strength: ≧ 900 N/mm²

Surface Hardness: 60+3 HRC (induction hardened)

Hardness Penetration: ≧ 1,8 mm

Execution:

precision ground

Note:

Colour Code Combinations/Clearances – see pages D10 and D11.

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

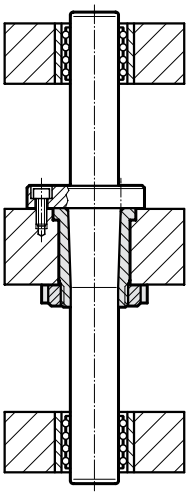
Ordering Code (example):

ring nut only
to DIN 1804-h = 202.60.025
(d_1)

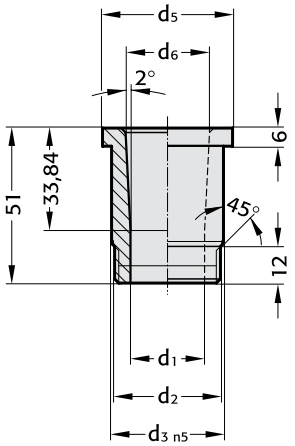
Stripper-Mounted Retaining Bushes, conical pillar fit

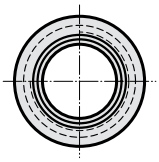
2021.64.

Mounting Example:



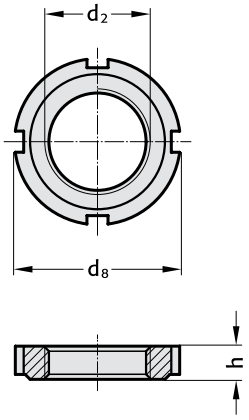
2021.64.





2073.48.

DIN 1804



Ordering Code (example):

Ring Nut	=	2073.48.
d_2 = M40×1,5	=	040.15
Order No	=	2073.48.040.15

Material:

Retaining bushes 16 MnCr5

Surface hardness: Case hardened 60 ±2 HRC

Hardness Penetration: ≧ 0,8 –1 mm

Execution:

Thread not hardened

Note:

Guide pillar 2020.64.

2021.64.

d_1	25,5	32,5
d_2	M35 × 1,5	M40 × 1,5
d_3	37	44
d_5	43	50
d_6	27,86	34,86
d_8	55	62
h	11	12

Available upon request!

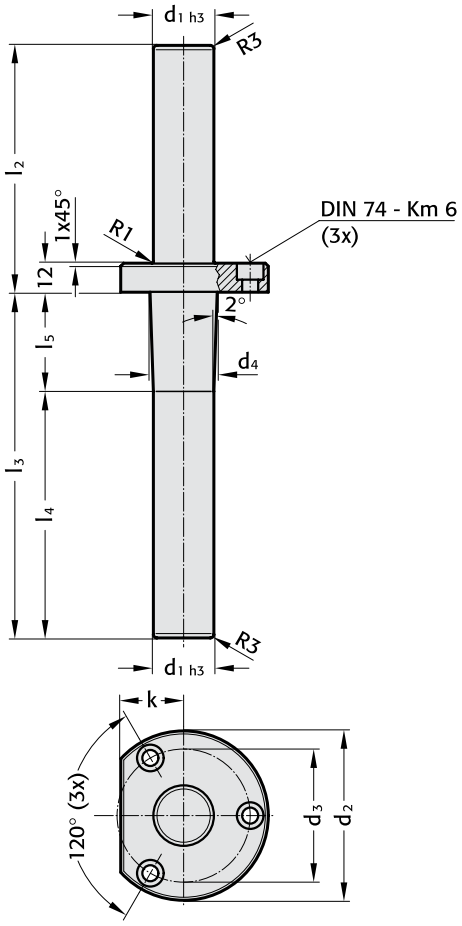
Ordering Code (example):

Retaining Bush, conical	=	2021.64.
d_1 = 32 mm	=	032
Order No	=	2021.64.032

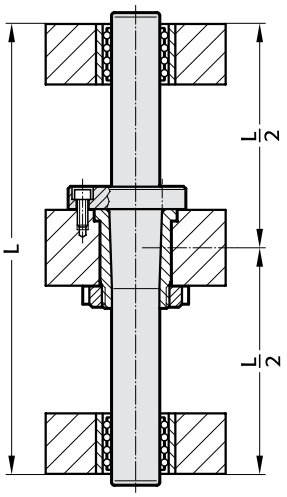
FIBRO

2020.64. Stripper Mounted Guide Pillars conical, with centre fixing

2020.64.



Mounting Example:



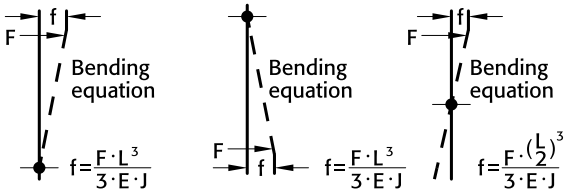
Description:

The transverse load resistance of tool guides is greatly influenced by the position of the guide pillar fixing.

For a tool with a spring-mounted die guide plate and pillar fixing at the top or bottom of the tool, the deflection and pillar bending values do not differ when the load is applied at the side since the distance (L) from the point of application of the force is the same.

Significantly better pillar bending values can be achieved by fixing the guide pillars in the die guide plate, i.e. in the centre of the pillar.

Since the distance ($\frac{L}{2}$) between the point of application of the force and the fixing surface is thus halved, the load-bearing capacity is increased by eight times.



2020.64.

d_1	d_2	d_3	d_4	k	l_2	l_3	l_4	l_5
25	70	55	27,86	26	102	143	102	41
					122	143	102	41
32	76	62	34,86	30	102	143	102	41
					122	143	102	41
					122	153	112	41
					137	153	112	41
					142	153	112	41
					162	153	112	41

Available upon request!

Ordering Code (example):

Guide Pillar, conical with centre fixing	=	2020.64.
d_1 = 25 mm	=	025.
l_2 = 102 mm	=	102.
l_3 = 143 mm	=	143.
Tolerance range – yellow	=	10
Order No	=	2020.64.025.102.143.10

Material:

Steel
hardened to 62 ± 2 HRC

Execution:

Precision ground

Note:

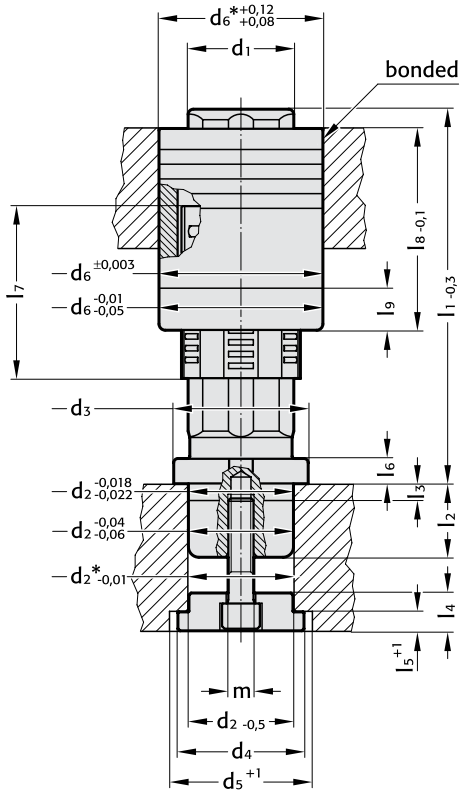
Retaining Bush 2021.64.

Use screws conforming to DIN EN ISO 4762 12.9

Tolerance range	yellow	= .10
	green	= .20

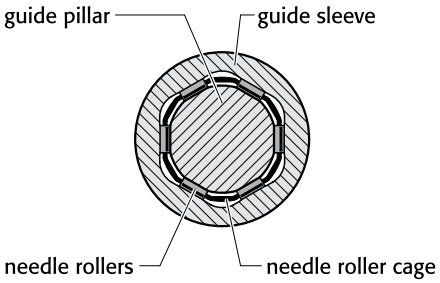
2024.94.

2024.94.



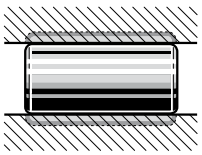
*mounting bore

Cross section of guide unit



∅16	4 Running surfaces
∅12, ∅20 - ∅60	6 Running surfaces
∅80	8 Running surfaces

The secret of the high rigidity, robustness and guide accuracy of FIBRO Million Guide guide units is the large surface area of the needle rollers.



FIBRO

2024.94. Million Guide - Guide Units

Description:

FIBRO Million Guide guide units are used wherever rigidity, robustness and a precision guide function is required. For stroke speeds up to 50 m/min and temperatures up to 80 °C.

Version:

Guide unit 2024.94 consisting of paired guide pillar and guide sleeve, needle roller cage and disk for fixing the guide column. The fixing screw is ordered separately (see c 42, c 43) as the screw required depends on the thickness of the base plate.

Materials:

Needle roller cage:	plastic
Needle rollers:	steel, hardened
Guide sleeve:	tool steel alloy, hardened, 60±2 HRC
Guide pillar:	tool steel alloy, hardened, 60±2 HRC
Disk:	Steel

Note:

Guide units must be installed in accordance with the Instructions.

2024.94.

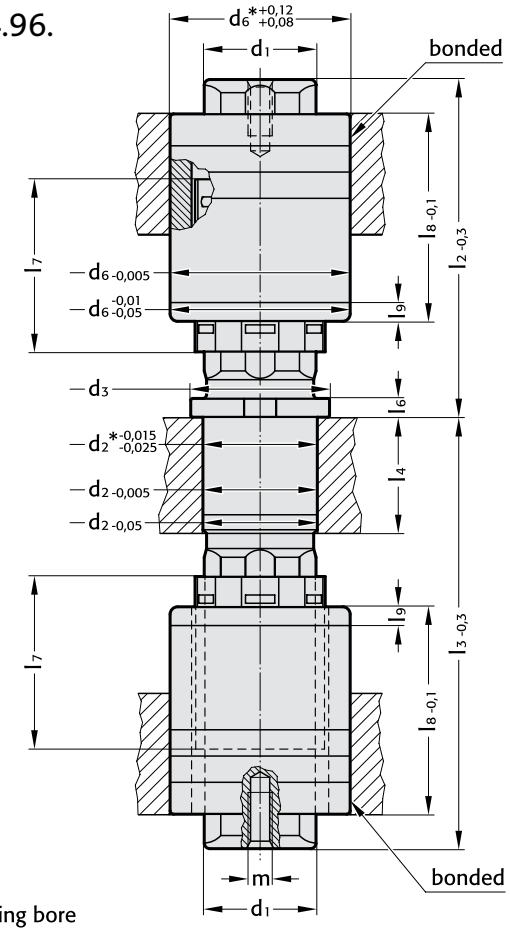
d_1	12	16	20	25	30	32	40	50	60	80
d_2	12	16	20	25	30	32	40	50	60	80
d_3	18	24	29	35	40	42	54	64	74	98
d_4	16	22	26	32	38	40	50	60	72	105
d_5	18	24	28	34	38	40	50	60	72	105
d_6	23	30	37	44	50	54	68	78	95	120
m	M5x8	M6x10	M8x20	M8x20	M10x25	M10x25	M12x30	M12x30	M14x30	M16x30
l_2	12	16	20	25	30	30	35	35	42	45
l_3	6	6	8	8	8	8	8	8	15	15
l_4	7	10	13	13	16	16	18	18	20	26
l_5	3	4	5	5	7	7	9	9	12	13
l_6	5	6	8	8	9	9	10	12	15	15
l_7	29,8	30	52	62	68	68	78	82	116	132
l_8	40	40	60	70	78	78	92	96	120	145
l_9	–	–	20	20	20	20	20	20	20	25
l_1 50	●									
60	●									
70	●									
80	●	●	●							
90	●	●	●							
100	●	●	●	●	●	●				
110	●	●	●	●	●	●				
120	●	●	●	●	●	●	●			
130		●	●	●	●	●	●			
140				●	●	●	●			
150				●	●	●	●	●	●	
160				●	●	●	●	●	●	
170					●	●	●	●	●	
180					●	●	●	●	●	●
190					●	●	●	●	●	●
200					●	●	●	●	●	●
210							●	●	●	●
220							●	●	●	●
230								●	●	●
240								●	●	●
250								●	●	●
260										●
270										●
280										●

Ordering Code (example):

Guide unit	
Million Guide	= 2024.94.
d_1 = 20 mm	= 020.
l_1 = 120 mm	= 120
Order No	= 2024.94.020.120

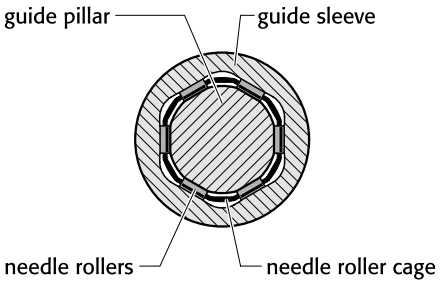
2024.96.

2024.96.



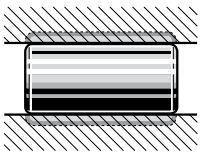
*mounting bore

Cross section of guide unit



∅16	4 Running surfaces
∅12, ∅20 - ∅60	6 Running surfaces
∅80	8 Running surfaces

The secret of the high rigidity, robustness and guide accuracy of FIBRO Million Guide guide units is the large surface area of the needle rollers.



FIBRO

2024.96. Million Guide - Guide Units

Description:

FIBRO Million Guide guide units are used wherever rigidity, robustness and a precision guide function is required. For stroke speeds up to 50 m/min and temperatures up to 80 °C.

Version:

Guide unit consisting of a paired guide pillar & guide sleeves and needle roller cages.

Materials:

Needle roller cage:	plastic
Needle rollers:	steel, hardened
Guide sleeve:	tool steel alloy, hardened, 60±2 HRC
Guide pillar:	tool steel alloy, hardened, 60±2 HRC
Disk:	Steel

Note:

Guide units must be installed in accordance with the Instructions.

2024.96.

d_1	12	16	20	25	30
d_2	12,5	16,5	20,5	25,5	30,5
d_3	19	23	27	32	37
d_6	22	28	34	40	48
m	M5x8	M6x10	M8x20	M8x20	M8x20
l_4	12	16	20	25	30
l_6	4	5	5	5	5
l_7	29,8	30	46	56	68
l_8	30	40	50	60	70
l_9	–	–	20	20	20
	l_2	l_2	l_2	l_2	l_2
l_3 50	40/50/60				
60	40/50/60				
70	40/50/60	40/50/60			
80		40/50/60/70	50/60/70		
90		50/60/70/80	50/60/70/80	60/70/80	70/80/90
100			60/70/80/90	60/70/80/90	70/80/90
110				70/80/90	70/80/90

Ordering Code (example):

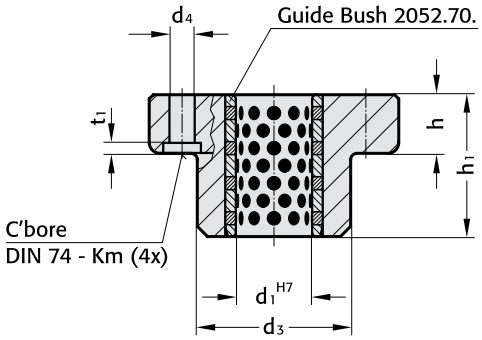
Million Guide – guide unit
with centre fixing = 2024.96.

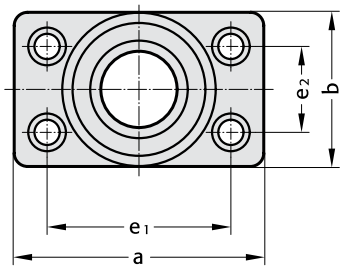
d_1 = 20 mm	=	020.
l_3 = 80 mm	=	080.
l_2 = 70 mm	=	070
Order No	= 2024.96.020.080.070	

Rectangular Mounting Flanges
Bronze with Non-Liquid Lubricant

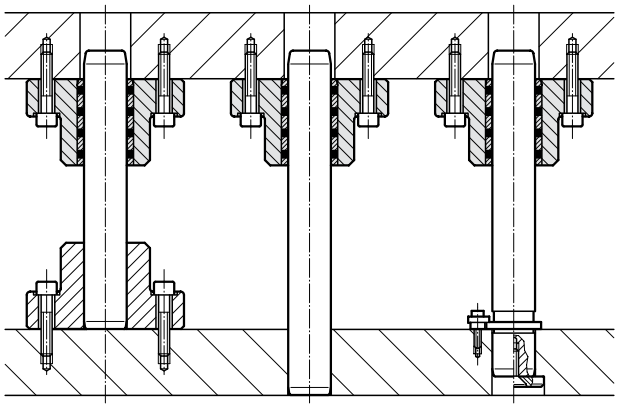
2031.70.

2031.70.





Mounting examples:



	*202.19.
Guide pillars	*2022.19. *2021.46.
* 202.19.	*2022.25. 2021.43.

* Guide pillars, to order separately, see pages D 14, D 22, D 27, and D 31.

Material:

Mounting flange – special cast iron
Guide bush 2052.70.
Bronze, with non-liquid lubricant.

Execution:

Face and top machined.

2031.70.

d_1	19	20	24	25	30	32	38	40	50	63	80
d_3	45	45	50	50	65	65	80	80	96	110	130
d_4	9	9	9	9	11	11	14	14	18	18	22
a	85	85	90	90	115	115	130	130	160	180	215
b	45	45	50	50	65	65	80	80	96	110	130
e_1	64	64	68	68	83	83	95	95	118	132	160
e_2	24	24	28	28	34	34	45	45	55	62	75
h	18	18	22	22	25	25	30	30	35	35	40
h_1	37	37	47	47	60	60	77	77	95	120	120
t_1	3	3	3	3	3	3	3	3	4	4	10

Ordering Code (example):

Mounting Flange, Guide Bush with Non-Liquid Lubricant 2052.70.	=	2031.70.
d_1 = 40 mm	=	040
Order No	=	2031.70.040

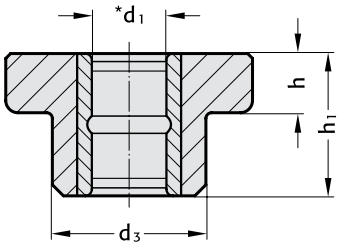
FIBRO

2031.01./.31./.41. 206.71.

Rectangular Mounting Flanges – without screw holes – Ball Cages

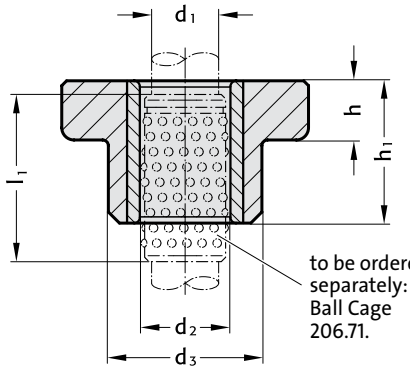
2031.31.

Mounting Flange with Sintered Ferrite Guide Bush, carbonitrided



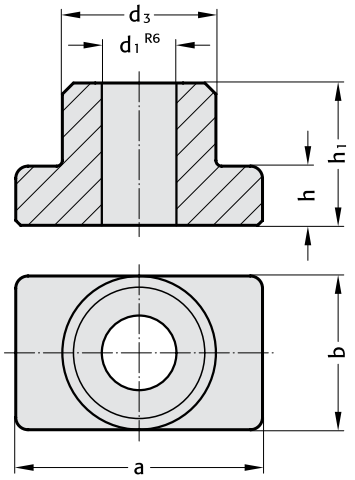
2031.41.

Mounting Flange with Ball Bearing Guide Bush



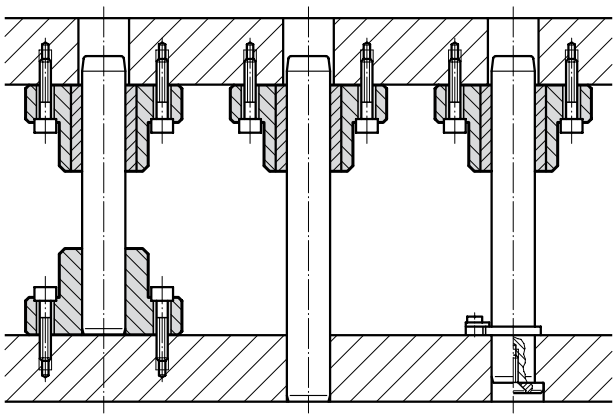
2031.01.

Mounting Flange for Guide Pillars



*Colour Code Combinations/Clearances – see pages D 10 and D 11.

Mounting Examples:



Guide Pillars *202.19. | *202.19. | *2021.46. 2021.43.

*Guide Pillars, to order separate, see pages D 14 and D 31.

2031.01./2031.31./2031.41.

d_1	15 16	19 20	24 25	30 32	38 40	48 50	60 63	80
d_2	21 22	25 26	30 31	38 40	46 48	56 58	68 71	–
d_3	35	45	50	65	80	96	110	130
a	70	85	90	115	130	160	180	215
b	35	45	50	65	80	96	110	130
h	18	18	22	25	30	35	35	40
h_1	30	37	47	60	77	95	120	120
l*	45	45	56	71	95	120	140	–
l_1*	44	44	56	70	95	120	140	–

Tolerance range – yellow = .10
l* = Nominal ordering length — green = .20
l_1* = Manufacturing length = Preferred lengths of Ball Cages — red = .30

Ordering Code (example):

Mounting Flange with sintered ferrite guide bush	= 2031.31.	Ball Cage	= 206.71.	Mounting flange for Guide Pillars	= 2031.01.
d_1 = 32 mm	= 032.	d_1 = 32 mm	= 032.	d_1 = 40 mm	= 040
Tolerance range – red	= 30	l = 71 mm	= 071		
Order No	= 2031.31.032.30	Order No	= 206.71.032.071	Order No	= 2031.01.040

Material:

Special cast iron

Execution:

Mounting Flanges for Guide Bushes:
Face and top machined.
Bores honed.

Mounting Flanges for Guide Pillars:
Face and top machined.
Hole fine bored to d_1 R6 fit.

Note:

Check squareness of pillars after press-fitting.

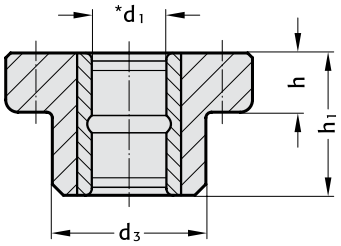
Notes on Sliding-/Ball Bearing Guides – see page D 9.

Rectangular Mounting Flanges Ball Cages

2031.02./.34./.42.
206.71.

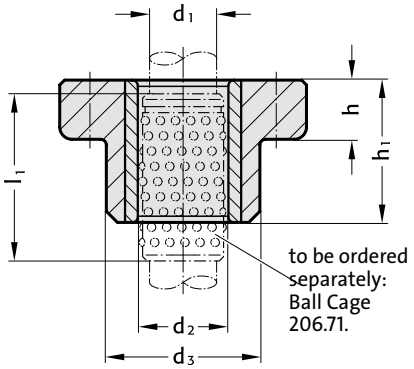
2031.34.

Mounting Flange with Sintered Ferrite Guide Bush, carbonitrided



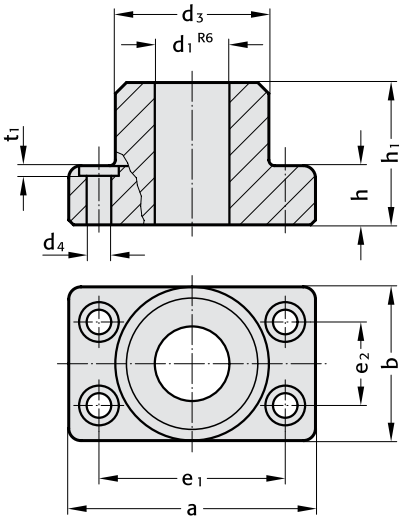
2031.42.

Mounting Flange for Ball Bearing Guide



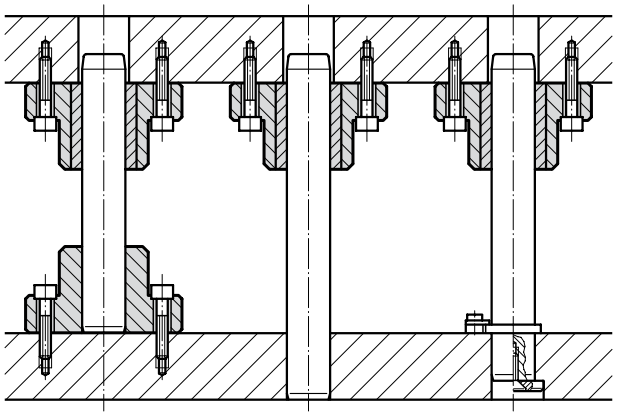
2031.02.

Mounting Flange for Guide Pillars



*Colour Code Combinations/Clearances – see pages D10 and D11.

Mounting Examples:



Guide Pillars *202.19. | *202.19. | *2021.46. 2021.43.

*Guide Pillars, to order separate, see pages D 14 and D 31.

Material:

Special cast iron

Execution:

Mounting Flanges for Guide Bushes:
Face and top machined.
Bores honed.

Mounting Flanges for Guide Pillars:
Face and top machined.
Hole fine bored to d_1^{R6} – fit.

Note:

Check squareness of pillars after press-fitting.

Notes on Sliding-/Ball Bearing Guides – see page D 9.

2031.02./2031.34./2031.42.

d_1	15 16	19 20	24 25	30 32	38 40	48 50	60 63	80
d_2	21 22	25 26	30 31	38 40	46 48	56 58	68 71	–
d_3	35	45	50	65	80	96	110	130
d_4	6,6	9	9	11	14	18	18	22
t_1	3	3	3	3	3	4	4	10
a	70	85	90	115	130	160	180	215
b	35	45	50	65	80	96	110	130
e_1	53	64	68	83	95	118	132	160
e_2	19	24	28	34	45	55	62	75
h	18	18	22	25	30	35	35	40
h_1	30	37	47	60	77	95	120	120
l*	45	45	56	71	95	120	140	–
l_1*	44	44	56	70	95	120	140	–

Tolerance range – yellow = .10 green = .20 red = .30

l* = Nominal ordering length
l_1* = Manufacturing length = Preferred lengths of Ball Cages

Ordering code (example):

Mounting Flange for Ball Bearing Guide	= 2031.42.	Ball Cage	= 206.71.	Mounting flange for Guide Pillars	= 2031.02.
d_1 = 40 mm	= 040.	d_1 = 40 mm	= 040.	d_1 = 40 mm	= 040
Tolerance range – green	= 20	l = 95 mm	= 095		
Order No	= 2031.42.040.20	Order No	= 206.71.040.095	Order No	= 2031.02.040

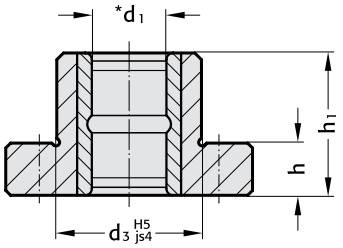
FIBRO

2031.04./.38./.44.
206.71.

Shallow Mounting Flanges – Rectangular – Ball Cages

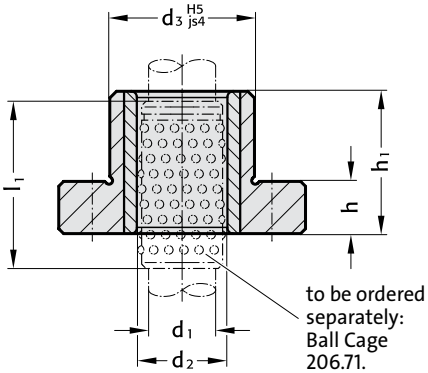
2031.38.

Mounting Flange with Sintered Ferrite Guide Bush, carbonitrided



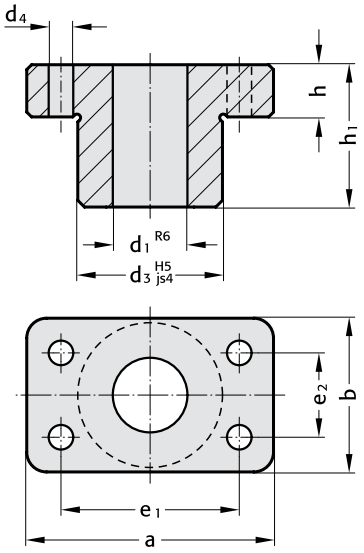
2031.44.

Mounting Flange for Ball Bearing Guide



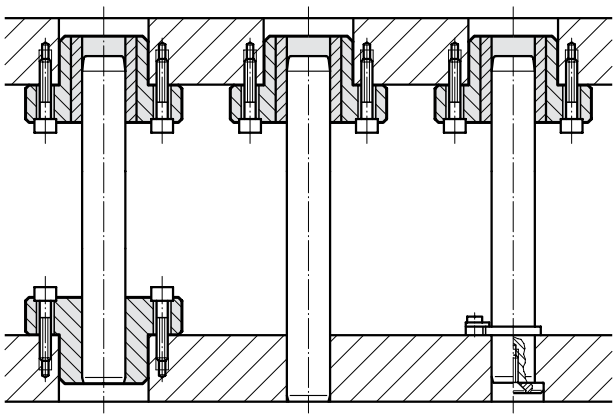
2031.04.

Mounting Flange for Guide Pillars



*Colour Code Combinations/Clearances – see pages D 10 and D 11.

Mounting Examples:



Guide Pillars *202.19. | *202.19. | *2021.46. 2021.43.

*Guide Pillars, to order separate, see pages D 14 and D 31.

2031.04./2031.38./2031.44.

d_1	15 16	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	–	–
d_3	32	42	47	62	77	93	107	127
d_4	7	9	9	11	14	18	18	22
a	70	85	90	115	130	160	180	215
b	35	45	50	65	80	96	110	130
e_1	53	64	68	83	95	118	132	160
e_2	19	24	28	34	45	55	62	75
h	16	16	20	23	28	33	33	38
h_1	30	37	47	60	77	95	120	120
l*	–	45	56	71	95	120	–	–
l_1*	–	44	56	70	95	120	–	–

Tolerance range – yellow = .10
green = .20
red = .30

l* = Nominal ordering length

l_1* = Manufacturing length = Preferred lengths of Ball Cages

Ordering Code (example):

Mounting Flange for Ball Bearing Guide	= 2031.44.	Ball Cage	= 206.71.	Mounting flange for Guide Pillars	= 2031.04.
d_1 = 40 mm	= 040.	d_1 = 40 mm	= 040.	d_1 = 40 mm	= 040
Tolerance range – yellow	= 10	l = 95 mm	= 095	Order No	= 2031.04.040
Order No	= 2031.44.040.10	Order No	= 206.71.040.095		

Material:

Special cast iron

Execution:

Both faces machined to dims. h; O. D. d_3 turned.

Mounting Flange for Guide Bushes: Bores honed.

Mounting Flanges for Guide Pillars: Hole fine bored to d_1^{R6} – fit.

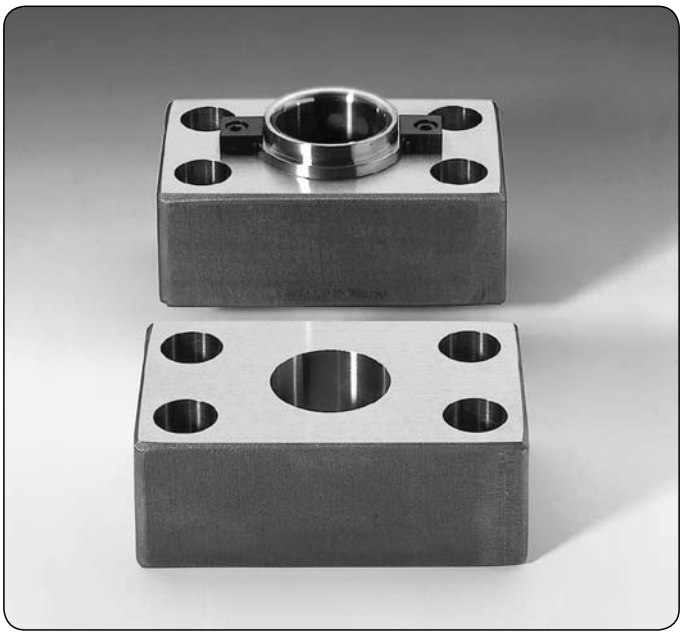
Note:

Check squareness of pillars after press-fitting.

Notes on Sliding-/Ball Bearing Guides – see page D 9.

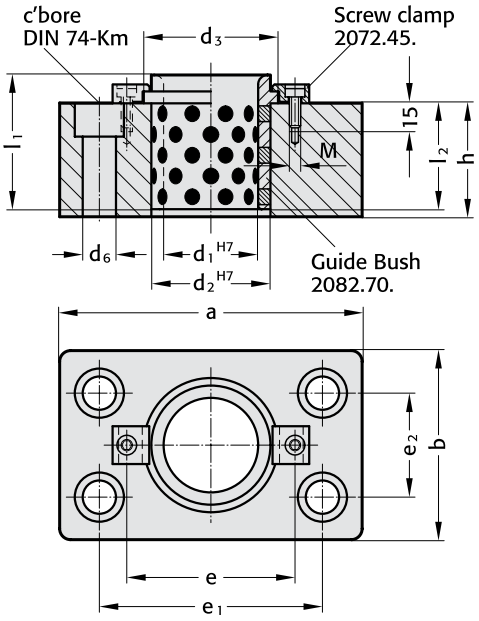
Rectangular Mounting Flanges
Bronze with Non-Liquid Lubricant

2032.70.
2032.02.



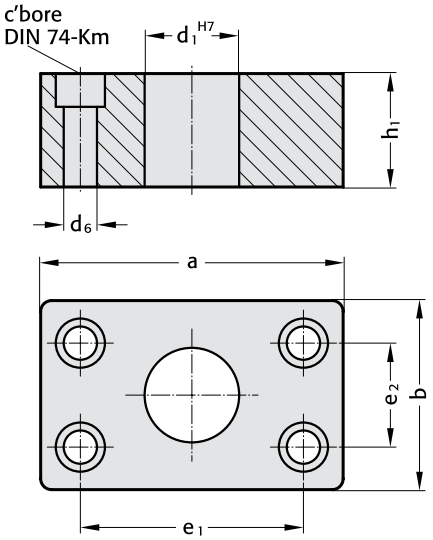
2032.70.

Mounting Flange Bronze with Non-Liquid Lubricant

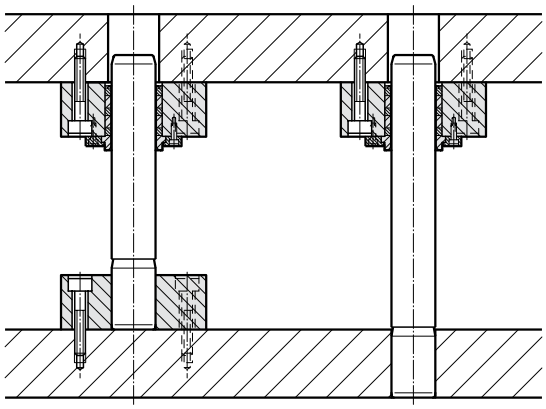


2032.02.

Mounting Flange for Guide Pillars



Mounting Examples:



*Guide Pillars, to order separate, see page D27.

2032.02./2032.70

d_1	50	63	80	100	125	160
d_2	63	80	100	125	160	200
d_3	71	90	112	140	180	220
d_6	17,5	17,5	21,5	21,5	25,5	25,5
a	160	180	215	230	270	315
b	100	125	145	170	205	250
e	89	123	143	168	203	243
e_1	118	132	160	168	203	243
e_2	55	62	75	110	142	170
h	60	70	90	110	140	180
h_1	70	80	100	125	140	180
l_1	71	80	100	125	160	200
l_2	56	63	80	106	132	170
M	M6 x 16	M10 x 16	M10 x 16	M10 x 16	M10 x 16	M10 x 16

Ordering Code (example):

Mounting Flange, Bronze with Non-Liquid Lubricant	=	2032.70.
d_1 = 50 mm	=	050
Order No	=	2032.70.050

Material:

St 37.

Execution:

Mounting Flange Bronze with Non-Liquid Lubricant:
Face and top machined.
Guide Bush 2082.70. Bronze with Non-Liquid Lubricant, oilless lubricating.

Mounting Flange for Guide Pillars:
Face and top machined.
Hole fine bored to d_1 H7 – fit.

Note:

Check squareness of pillars after press-fitting.

FIBRO

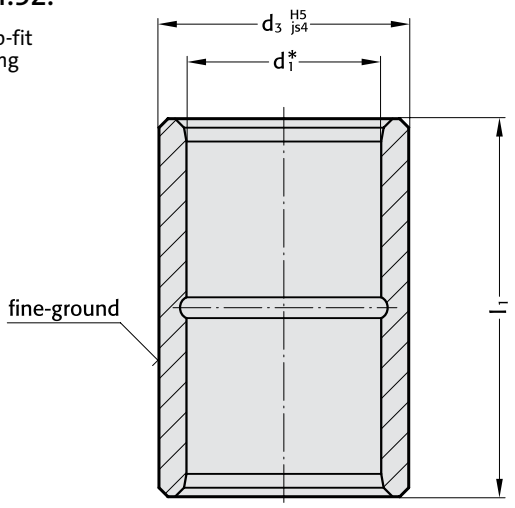
Guide Bushes DIN 9831/ISO 9448-2
Sintered Ferrite, carbonitrided, long-term lubrication

FIBRO

2051.32.

2051.32.

for slip-fit bonding



* Colour Code Combinations/Clearances – see pages D10 and D11.

Material:

Sintered ferrite of high purity, carbonitrided

Execution:

Bearing surfaces and outside diameter fine-ground.

Slip-Fit Bonding:

The position of the bearing is given by push fit holes tolerance H5. The adhesive (order no. 281.648) provides optimum push retention whilst offering the following advantages:

– high accuracy and stiffness
– no problems to find position when changing bushings

We do not recommend to press fit for the same reasons mentioned above.

Note:

Notes on Sliding- and Ball Bearings Guides: see page D9.

Pillars see pages D12, D14, D15, D17, D18 and D31.

Tolerance range – yellow = .10
green = .20
red = .30

Ordering Code (example):

Guide Bush DIN 9831/ISO 9448-2	=	2051.32.
d_1 = 40 mm	=	040.
l_1 = 60 mm	=	060.
Tolerance range – red	=	30
Order No	=	2051.32.040.060.30

2051.32.

d_1	8	11 12	15 16	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	13,7	22	28	32	40	48	58	70	85	95,7
l_1 15	●									
23		●	●	●	●					
30		●	●	●	●	●	●			
37		●	●	●	●	●	●	●		
47			●	●	●	●	●	●		
60	∅8–∅12 not available in Tolerance range red = .30		●	●	●	●	●	●	●	●
77				●	●	●	●	●	●	
95						●	●	●	●	
110										●
120							●	●	●	●

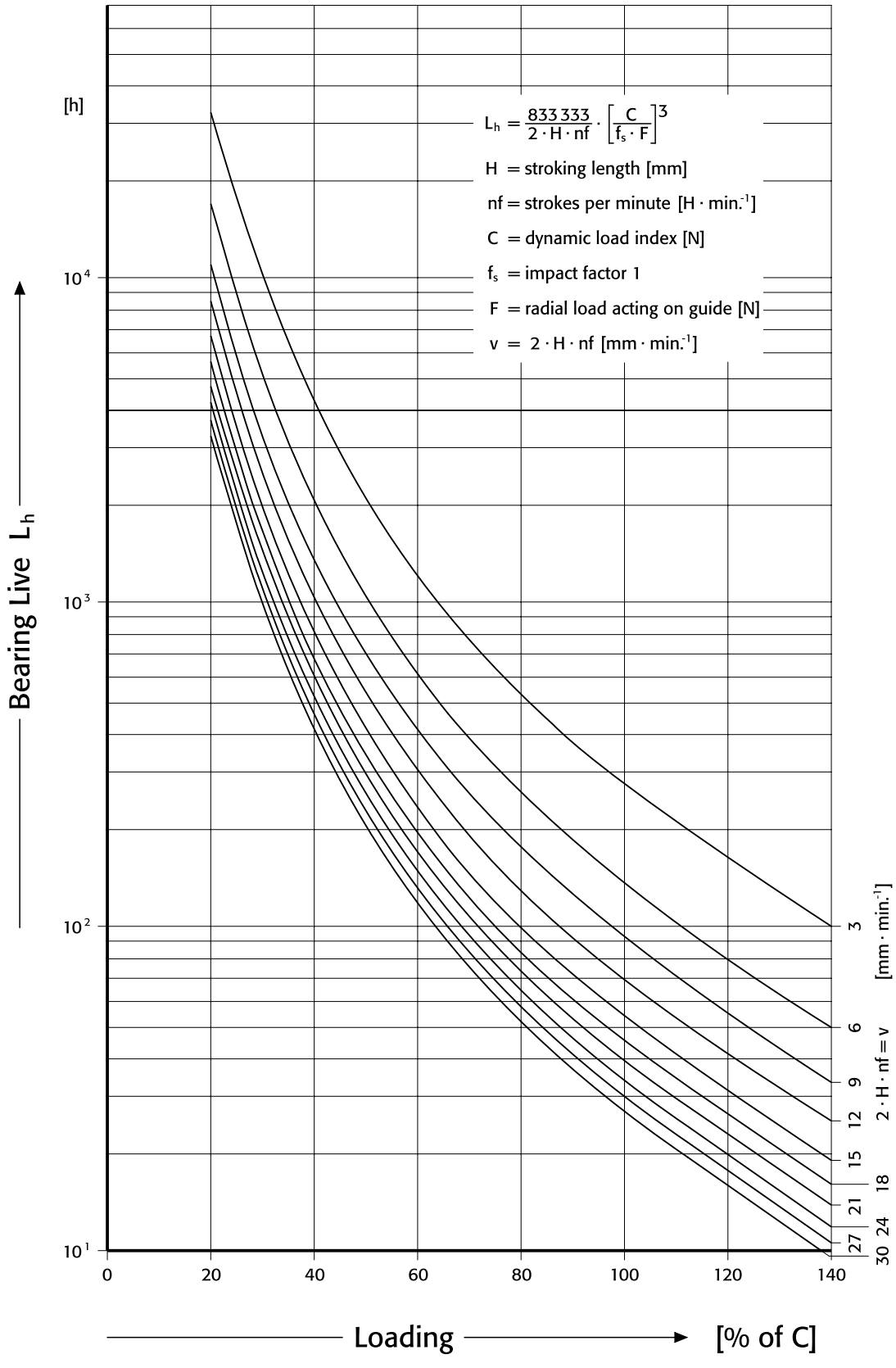
Special Ball Bearing Cages – Brass
Made to Customers' Specifications

For use in special machine tools, general purpose machines, jigs and fixtures etc. brass ball cages are made to customers' specifications
– without limitations to lenght and ball pattern.

Loading Diagram for Ball Bearing Guides

Bearing Life versus Loading:

Values shown are based on the Impact Factor of $f_s = 1$
which is applicable to normal conditions in respect of die set and press,
with a maximum bearing temperature of 100 °C.



Safe Loads for FIBRO Ball Bearing Guides

Tables of Dynamic Load Indexes

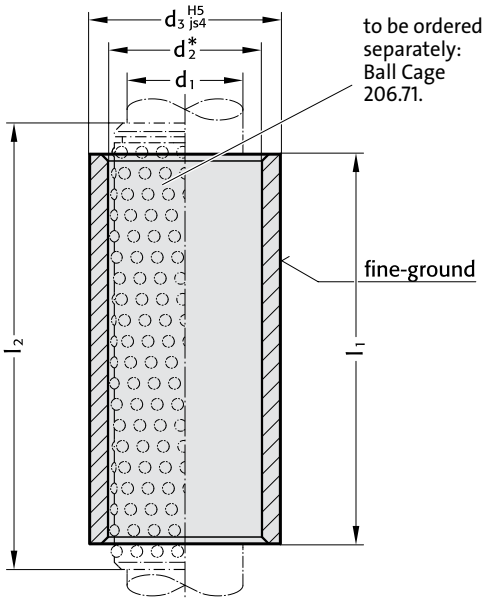
Definition:
The dynamic load index C constitutes a constant loading that will allow the respective sizes of ball bearing guides to reach + 10^5 m without any discernible bearing damage. The load index is shown in N and results from tests executed with batches of sufficient size, subjected to linear travel oscillations and radially imposed loads of constant magnitude and unchanging direction.

Pillar ∅ d_1	Cage length l_1	Dynamic Load Index C for whole cage (N)
8	40	450
10	40	1630
	56	2210
11	40	1660
	56	2250
12	40	1680
	56	2280
15	45	3300
	56	4050
	63	4550
	71	4950
16	24	1910
	28	2230
	45	3350
	56	4100
	63	4600
	71	5000
19	31	3050
	45	4050
	56	4950
	71	6100
	80	6600
	95	7600
20	24	2320
	28	2700
	31	3100
	45	4100
	56	5000
	71	6100
	80	6600
	95	7600
24	31	3150
	40	3850
	45	4200
	56	5100
	71	6300
	80	6800
	95	7800
	120	9300
25	31	3200
	40	3900
	45	4200
	56	5200
	71	6300
	80	6900
	95	7900
	120	9300
30	40	5700
	45	6400
	50	7000
	56	7600
	71	9300
	75	9800
	80	10400
	95	11900
	105	12800
	120	14200
	140	16000
	160	17700
32	40	5800
	45	6400
	50	7100
	56	7700
	71	9400
	75	9900
	80	10500
	95	12000
	105	12900
	120	14300
	140	16100
	160	17800
38	45	7500
	50	8200
	56	8900
	63	10300
	80	12100
	95	13900
	105	15000
	120	16700
	140	18700
	160	20700
	180	22600
	200	24400
	240	28000
40	45	7500
	50	8200
	56	9000
	63	10300
	80	12200
	95	14000
	105	15100
	120	16700
	140	18800
	160	20800
	180	22700
	200	24600
	240	28000
48	50	9400
	63	11700
	80	13800
	95	15900
	105	17100
	120	19000
	140	21400
	160	23600
	180	26000
	200	28000
	240	32000
50	50	9400
	63	11700
	80	13900
	95	15900
	105	17200
	120	19100
	140	21400
	160	23700
	180	26000
	200	28000
	240	32000
60	95	17700
	105	19200
	120	21300
	140	23900
	160	26500
	180	29000
	200	31000
	240	35500
63	95	17800
	105	19300
	120	21300
	140	24000
	160	26500
	180	29000
	200	31500
	240	35500
80	120	41000
	140	46500
	160	52000
	180	57000
	200	62000
	240	70000

Ball Bearing Guide Bushes
DIN 9831/ISO 9448-3
Ball Cages

FIBRO
2061.44.
206.71.

2061.44.



* Preloading see Colour Code Combinations – pages D10 and D11.

* Ball cages Ø8 supplied without fastening ring groove and assembly aid!

Note: cage travel = one half of stroke length

l* = Nominal ordering length

l_2* = Manufacturing length = Preferred lengths of Ball Cages

Material:

Bush: tool steel, Hardness: 62 ± 2HRC
Cage: brass
Balls: hardened steel (DIN 5401)

Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Slip-Fit Bonding:

The position of the bearing is given by push fit holes tolerance H5. The adhesive (order no. 281.648) provides optimum push retention whilst offering the following advantages:

– high accuracy and stiffness

– no problems to find position when changing bushings

We do not recommend to press fit for the same reasons mentioned above.

Note:

Notes on sliding- and rolling type guides see page D 9.

Pillars see pages D 12, D 14, D15, D 17, D 18 and D 31.

Ordering Code (example):

Ball Cage	= 206.71.
d_1 = 30 mm	= 030.
l_2 = 120 mm	= 120
Order No	= 206.71.030.120

Tolerance range – yellow = .10
green = .20
red = .30

Ordering Code (example):

Guide Bush	= 2061.44.
d_1 = 30 mm	= 030.
l_1 = 95 mm	= 095.
Tolerance range – yellow	= 10
Order No	= 2061.44.030.095.10

2061.44.

d_1			8*	10	11	12	15	16	19	20	24	25	30	32	38	40	48	50	60	63	80
d_2			11	14	15	16	21	22	25	26	30	31	38	40	46	48	56	58	68	71	92
d_3			18	22	22	22	28	28	32	32	40	40	48	48	58	58	70	70	85	85	105
l_1	l*	l_2*																			
23	40	39		●	●	●															
23	45	44					●	●	●	●	●	●									
30	40	39	●	●	●	●															
30	45	44					●	●	●	●	●	●									
30	45	45											●	●	●	●					
37	40	39		●	●	●															
37	45	44					●	●	●	●	●	●									
37	50	50											●	●	●	●	●	●			
47	56	55											●	●							
47	56	56					●	●	●	●	●	●									
47	63	55													●	●	●	●			
60	71	70											●	●							
60	71	72					●	●	●	●	●	●									
60	80	80													●	●	●	●			
60	95	95																	●	●	
77	95	95											●	●	●	●	●	●	●	●	
77	95	96							●	●	●	●									
95	120	120											●	●	●	●	●	●	●	●	
120	140	140													●	●	●	●	●	●	●

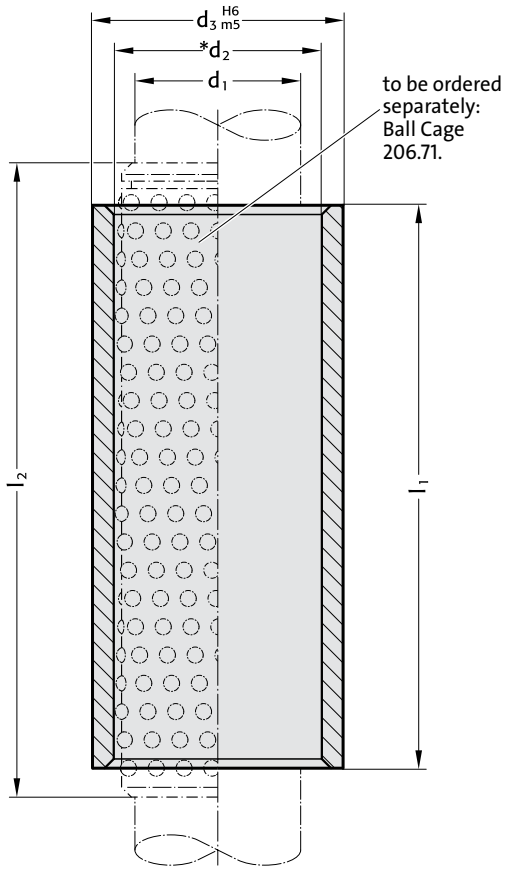
Diameter 8–12 not available in Tolerance range red = .30

FIBRO

206.49.
206.71.

Ball Bearing Guide Bushes similar to AFNOR Ball Cages

206.49.



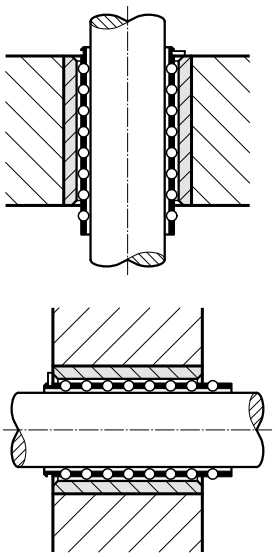
* Preloading see Colour Code Combinations – pages D 10 and D 11.

Tolerance range – yellow = .10
green = .20
red = .30

Ordering Code (example):

Guide Bush	= 206.49.
d_1 = 32 mm	= 032.
l_1 = 90 mm	= 090.
Tolerance range green	= 20
Order No	= 206.49.032.090.20

Mounting Examples



Material:

Bush: tool steel, Hardness: 62 ± 2 HRC
Cage: brass
Balls: hardened steel (DIN 5401)

Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Notes on sliding- and rolling type guides see page D 9.

Pillars see pages D 14, D15, D 17, D 18 and D 31.

Slip-Fit Bonding:

The position of the bearing is given by push fit holes tolerance H5. The adhesive (order no. 281.648) provides optimum push retention whilst offering the following advantages:

– high accuracy and stiffness
– no problems to find position when changing bushings

We do not recommend to press fit for the same reasons mentioned above.

206.49./206.71.

d_1			16	20	25	32	40	50
d_2			22	26	31	40	48	58
d_{3m5}			28	32	40	50	63	80
l_1	l*	l_2*						
35	45	44	●	●				
40	45	44	●	●	●			
45	56	55				●		
50	56	56	●	●	●			
55	63	65					●	
60	71	70				●		
60	71	72	●	●	●			
70	80	80		●	●	●	●	●
80	95	95				●	●	●
80	95	96		●	●			
90	95	96			●			
90	105	105				●	●	●
100	120	120				●	●	●
120	140	140					●	●

Note: cage travel = one half of stroke length
l* = Nominal ordering length
l_2* = Manufacturing length = Preferred lengths of Ball Cages

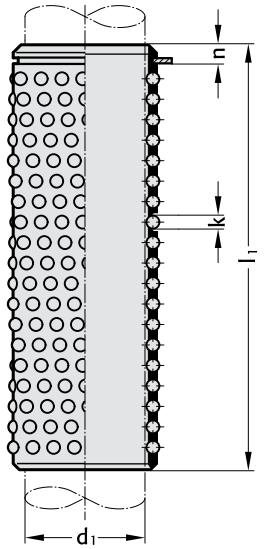
Ordering Code (example):

Ball Cage	= 206.71.
d1 = 32 mm	= 032.
l2 = 105 mm	= 105
Order No	= 206.71.032.105

Ball Cages with Circlip Groove
Circlips

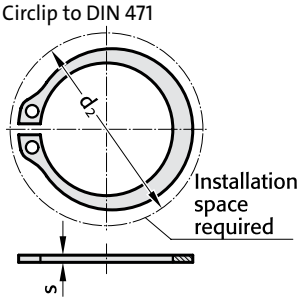
206.71.
206.72.

206.71.

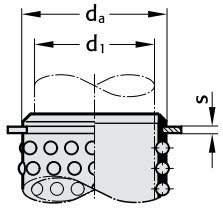


206.72.

Circlip to DIN 471



Mounting Example:



Material:

Cage: Brass

Balls: hardened steel (DIN 5401)

Execution:

FIBRO Ball Cages are made from brass. They are distinguished by their stability and dense ball pattern. This makes them the preferred choice in tools and machines of high precision demands and elevated stroking speeds. Ball guides operate free from play because of their accurate preloading.

Each ball cage has a groove for circlip to DIN 471.

206.72.

Order No 206.72.	010	011	012	015	016	018	019	020	024	025	030	032	038	040	042	048	050	052	060	063	080
d_1	10	11	12	15	16	18	19	20	24	25	30	32	38	40	42	48	50	52	60	63	80
$d_a \times s$	13×1	14×1	15×1	20×1,2	21×1,2	23×1,2	24×1,2	25×1,2	29×1,5	30×1,5	37×1,75	39×1,75	45×1,75	47×1,75	48×1,75	55×2	57×2	58×2	67×2,5	70×2,5	90×3
d_2	20,2	21,4	22,6	28,4	29,6	32	33,2	34,2	39,1	40,5	49	51,4	59,1	60,8	62,5	70,2	72,6	73,6	83,1	87	108,5

206.71.

d_1		8*	10	11	12	15	16	19	20	24 25	30 32	38 40	48 50	60 63	80
k		1,5	2	2	2	3	3	3	3	3	4	4	4	4	6
n		–	2,2	2,2	2,2	2,9	2,9	2,9	2,9	3,2	3,95	3,95	4,25	4,75	6,15
l*	l_1*	total number of balls													
24	24						64		80						
28	28						80		100						
31	32							120	120	120					
40	39	80	176	176	176										
40	40									160	120				
45	44					144	144	180	180	180					
45	45										140	168			
50	50										160	192	224		
56	55										180	216			
56	56					192	192	240	240	240					
56	57		272	272	272										
63	64					224	224								
63	65											264	308		
71	70										240				
71	72					256	256	320	320	320					
80	80							360	360	360	280	336	392		
95	95										340	408	476	544	
95	96							440	440	440					
105	105										380	456	532	608	
120	119														540
120	120									560	440	528	616	704	
140	140										520	624	728	832	648
160	160										600	720	840	960	
160	161														756
180	180											816	952	1088	
180	182														864
200	200											912	1064	1216	
200	203														972
240	238														1152
240	240											1104	1288	1472	

Ordering Code(example):

Ball Cage with Circlip Groove	= 206.71.	
d_1 = 32 mm	=	032.
l_1 = 80 mm	=	080
Order No	= 206.71.032.080	

Note: cage travel = one half of stroke length

* Ball cages Ø8 supplied without circlip groove !

l* = Nominal ordering length

l_1* = Manufacturing length

FIBRO

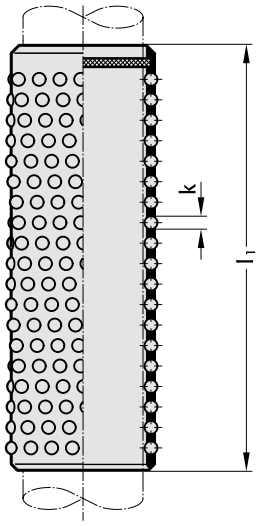
206.73. Ball Cages with Assembly Aid

Material:

Cage: Brass

Balls: hardened steel (DIN 5401)

206.73.



Execution:

FIBRO Ball Cages are made from brass. They are distinguished by their stability and dense ball pattern. This makes them the preferred choice in tools and machines of high precision demands and elevated stroking speeds. Ball guides operate free from play because of their accurate preloading.

Note:

Ball cages 206.73. with cage spacing.

These cages are held at the correct height for engaging the top die. These cages are equipped with a suitably positioned brake ring insert – ensuring equal cage spacing especially on die sets with multiple pillars. No assistant is needed for their assembly.

206.73.

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

Ordering Code (example):

Ball Cage with Assembly Aid	= 206.73.	
d_1 = 32 mm	=	032.
l_1 = 80 mm	=	080
Order No	= 206.73.032.080	

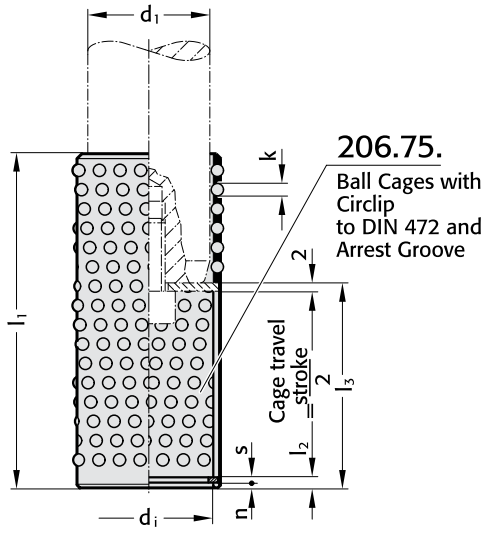
Note: cage travel = one half of stroke length

l* = Nominal ordering length l_1* = Manufacturing length

Ball Cages with Circlip and Fastening Ring Groove Circlips

206.75.

206.75.



Material:

Cage: Brass

Balls: hardened steel (DIN 5401)

Execution:

FIBRO Ball Cages are made from brass. They are distinguished by their stability and dense ball pattern. This makes them the preferred choice in tools and machines of high precision demands and elevated stroking speeds. Ball guides operate free from play because of their accurate preloading.

Each ball cage has a groove for circlip to DIN 472.

206.75.

d_1	19			20			24			25			30			32			38			40			48			50			60			63		
$d_i \times s$	20×1			21×1			25×1,2			26×1,2			31×1,2			33×1,2			39×1,5			41×1,75			50×2			51×2			60×2			63×2		
Order No.																																				
206.75.	019			020			024			025			030			032			038			040			048			050			060			063		
k	3			3			3			3			4			4			4			4			4			4			4			4		
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_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3	l_1	l_2	l_3
	56	2,6	31	56	2,6	31	70	2,6	41	80	3,45	51	80	4,30	51	95	4,30	61																		
	72		41	72		41	80		51	95		61	95		61	120		73																		
	80		51	80		51	95		61	105		61	120		73	140		83																		
							105		61	120		73																										

Ordering Code (example):

Ball Cages with Circlip	
DIN 472 and Fastening Ring Groove	= 206.75.
d_1 = 32 mm	= 032.
l_1 = 80 mm	= 080.
l_3 = 51 mm	= 051
Order No	= 206.75.032.080.051

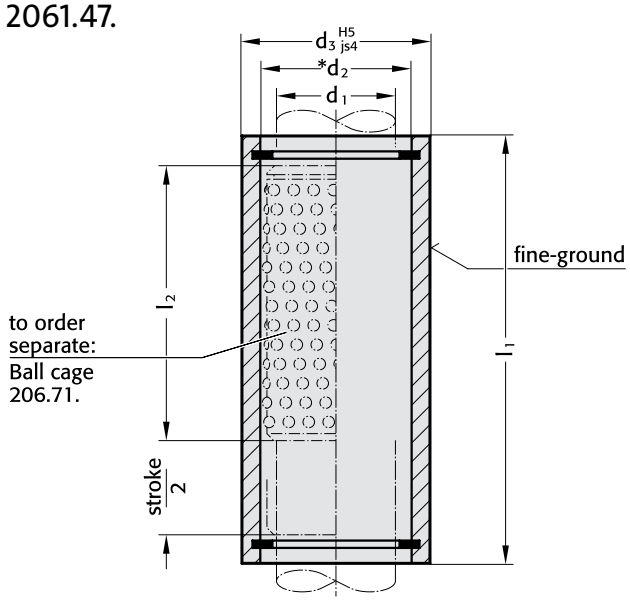
2-9291-20013 ◦

FIBRO

2061.47.
206.71.

Ball Bearing Guide Bushes with stroke Limitation Ball Cages

2061.47.



* Preloading see Colour Code Combinations – pages D10 and D11.

Material:

Bush: tool steel, Hardness: 62±2HRC
Cage: Brass
Balls: hardened steel (DIN 5401)

Slip-Fit Bonding:

The position of the bearing is given by push fit holes tolerance H5. The adhesive oder no. 281.648 provides optimum push retention whilst offering the following advantages:

– high accuracy and stiffness

– no problems to find position when changing bushings

We do not recommend to press fir for the same reasons mentioned above.

Note:

Notes on sliding- and rolling type guides see page D 9.

Pillars see pages D 14, D 15, D 17, D 18 and D 31.

Ordering Code (example):

Ball cage	= 206.71.
d_1 = 40 mm	= 040.
l = 63 mm	= 063
Order No	= 206.71.040.063

Tolerance range – yellow = .10
green = .20
red = .30

Ordering Code (example):

Guide Bush	= 2061.47.
d_1 = 40 mm	= 040.
l_1 = 120 mm	= 120.
Tolerance range – red	= 30
Order No	= 2061.47.040.120.30

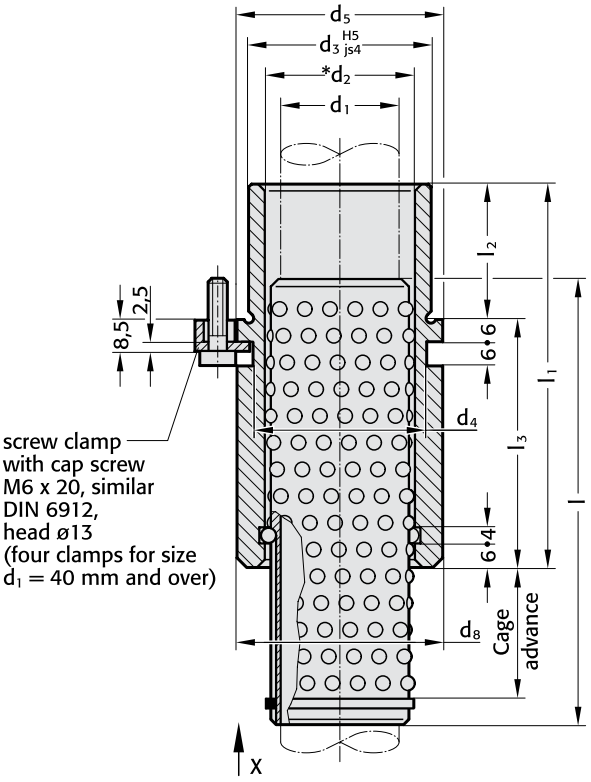
2061.47.

			d_1	15	16	19	20	24	25	30	32	38	40	48	50	60	63
			d_2	21	22	25	26	30	31	38	40	46	48	56	58	68	71
			d_3	28	28	32	32	40	40	48	48	58	58	70	70	85	85
l_2*	l*	Hub max.	l_1														
44	45	18	60	●	●												
44	45	52	77			●	●										
44	45	49						●	●								
56	56	27						●	●								
50	50	74	95							●	●						
70	71	32								●	●						
65	63	98	120									●	●				
80	80	64										●	●				
105	105	14										●	●				
80	80	62												●	●		
95	95	32														●	●

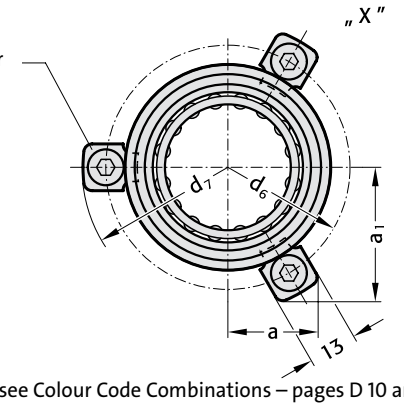
Note: cage travel = one half of stroke length
l* = Nominal ordering length
l_2* = Manufacturing length = Preferred lengths of Ball Cages

Headed Guide Bushes for Ball Bearings 2081.67.

2081.67.



207.45.



* Preloading see Colour Code Combinations – pages D 10 and D 11.

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.

Material:

Bush:	tool steel	Cage:	Brass
Hardness:	62 ± 2 HRC	Balls:	hardened steel (DIN 5401)

2081.67.

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	39	46	53	63	77	92
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
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	72	96	120	140	140	160

Price and delivery on request!

Ordering Code (example):

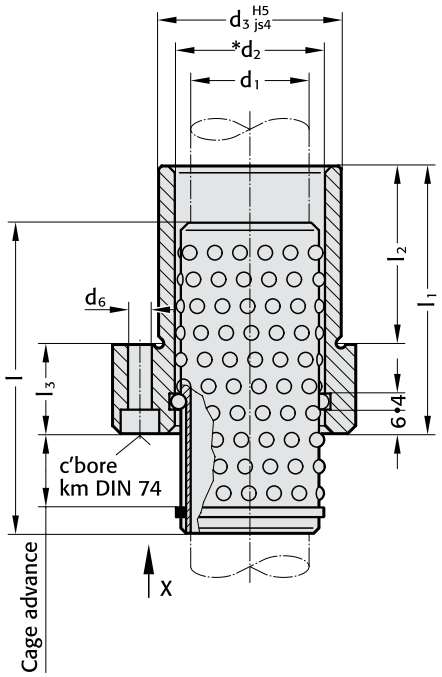
Headed Guide Bush	= 2081.67.		
d_1 = 50 mm	= 050.	Tolerance range –	yellow = .10
cage advance 50 mm	= 050.		green = .20
Tolerance range – green	= 20		red = .30
Order No	= 2081.67.050.050.20		

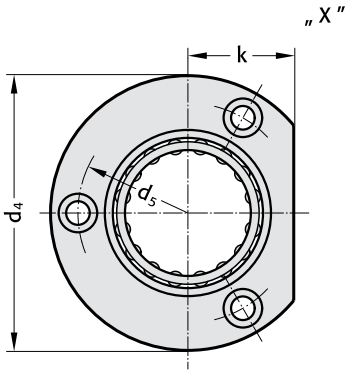
2-9480-8-4 °

FIBRO

2091.67. Flanged Guide Bushes for Ball Bearings with Ball Cage Retainer

2091.67.





* Preloading see Colour Code Combinations – pages D 10 and D 11.

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.

Material:

Bush: tool steel, Hardness: 62±2HRC
Cage: Brass
Balls: hardened steel (DIN 5401)

2091.67.

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
Senkung	Km 4	Km 5	Km 5	Km 6	Km 8	Km 8	Km 10
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	72	72	80	95	105	120	140

Price and delivery on request!

Ordering Code (example):

Flanged Guide Bush with Ball Cage Retainer	= 2091.67.		
d_1 = 50 mm	= 050.	Tolerance range – yellow	= .10
cage advance 50 mm	= 050.	green	= .20
Tolerance range – green	= 20	red	= .30
Order No	= 2091.67.050.050.20		

2.9480.8.4 ©

Roller cages with Circlip Groove
Circlips
Roller Cages with Mounting Aid

FIBRO

2061.82. 206.72.
2061.84.

Description:

Roller cages make linear contact with the guide bush and the guide pillar.

This results in a load carrying capacity for each individual roller which is many times that of a ball of the same diameter.

Roller bearings feature a FIBRO specific seal, similar to the ball bearings.

The profile rollers are arranged in a spiral layout axially, so that every roller has its own path.

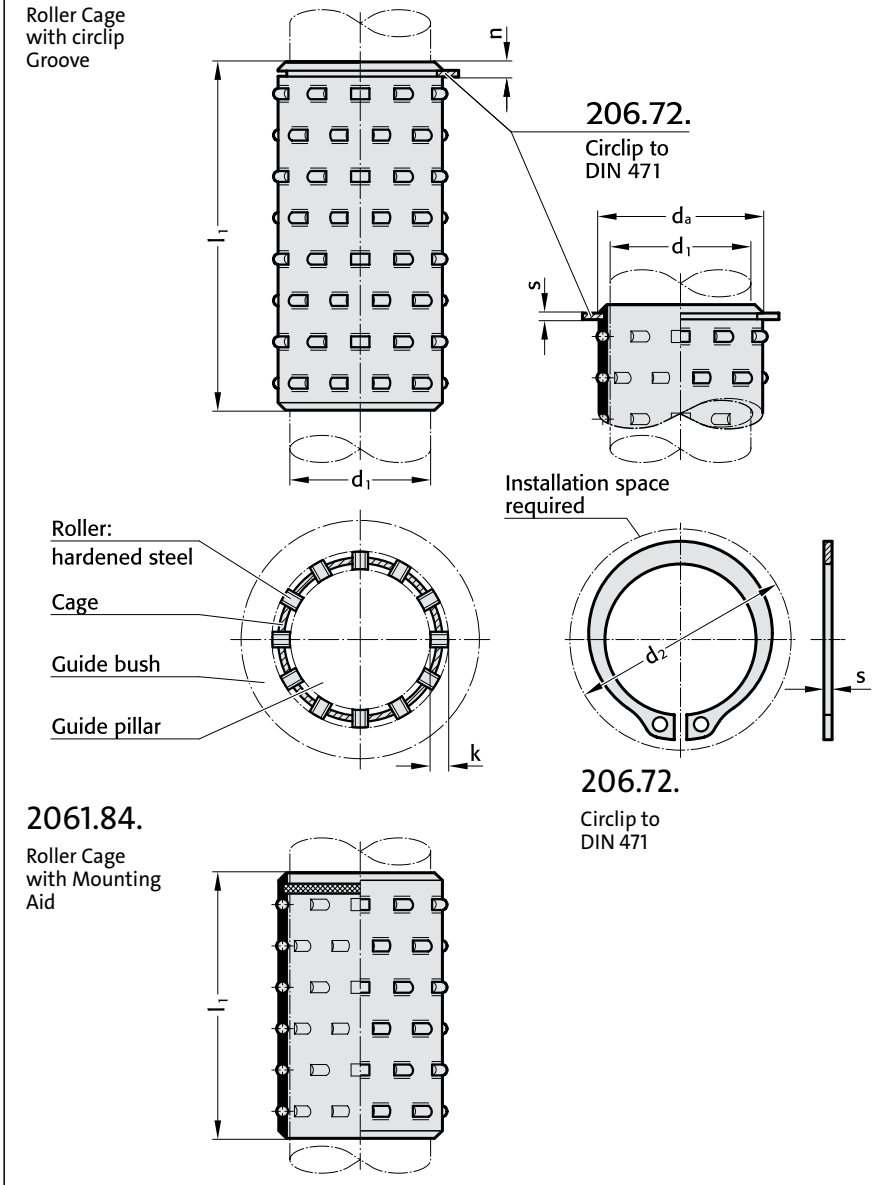
The cages are grooved to accept a DIN 471 circlip.

Note:

FIBRO-Roller Cage 2061.84. with Mounting Aid. This roller cage version can be inserted to the correct position without extra assistance. The cage has a braking ring insert in the holder. It is particularly advantageous in the case of die sets with multiple pillars.

2061.82.

Roller Cage with circlip Groove



2061.84.

Roller Cage with Mounting Aid

Material:

Roller Cage: brass

Rollers: hardened steel, 100 Cr6, DIN 5402

Note:

Notes on sliding and rolling type guides see page D9.

Important:

For roller cages use only pairing class
guide pillar red = .30
Guide sleeve yellow = .10

Ordering Code (example):

Roller Cage with Circlip Groove	=	2061.82.
d_1 = 25 mm	=	025.
l_1 = 85 mm	=	085
Order No	=	2061.82.025.085

2061.82./2061.84.

d_1	19 20	24 25	30 32	38 40	48 50	63
k	3	3	4	4	4	4
Number of rollers/peripheral row	8	10	12	14	18	22
n	2,9	3,2	3,95	3,95	4,25	4,75
l_1	total number of rollers					
45	32	40	48	–	–	–
55	40	50	60	70	–	–
65	48	60	72	84	108	–
75	56	70	84	98	126	154
85	64	80	96	112	144	176
95	72	90	108	126	162	198
105	80	100	120	140	180	220
115	–	110	132	154	198	242
125	–	120	144	168	216	264
135	–	–	156	182	234	286
145	–	–	168	196	252	308
155	–	–	180	210	270	330
165	–	–	192	224	288	352
175	–	–	–	238	306	374
185	–	–	–	252	324	396
205	–	–	–	280	360	440

206.72.

d_1	19	20	24	25	30	32	38	40	48	50	63
$d_a \times s$	24×1,2	25×1,2	29×1,5	30×1,5	37×1,75	39×1,75	45×1,75	47×1,75	55×2	57×2	70×2,5
Order No 206.72.	019	020	024	025	030	032	038	040	048	050	063
d_2	33,2	34,2	39,1	40,5	49	51,4	59,1	60,8	70,2	72,6	87

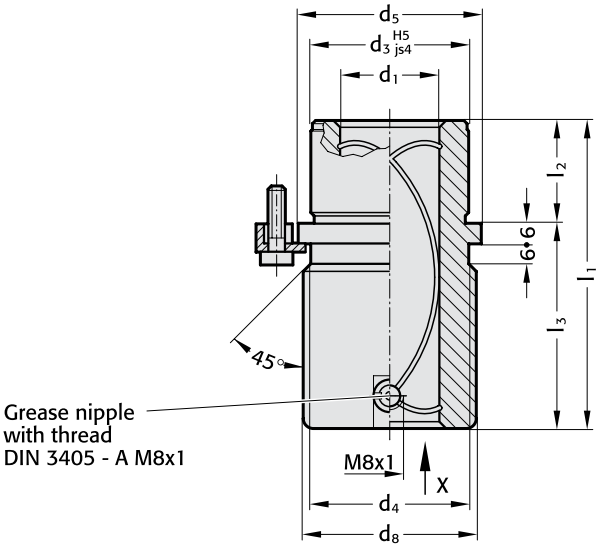
2-9852.20015 ▪

FIBRO

2081.81.

Headed Guide Bushes to ISO 9448, Steel, with bronze coated internal bore

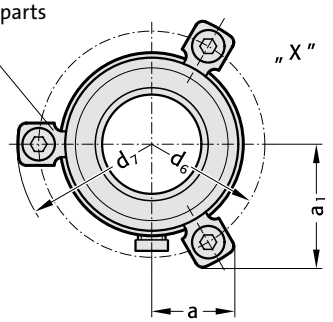
2081.81.



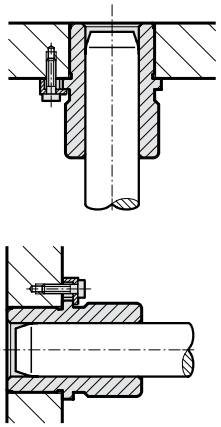
207.45

Order No. for replacement parts

Screw clamp with cap screws M6 x 20 similar DIN 6912, head ø13, (four clamps for size ød_1 = 38 mm and over)



Mounting Examples



Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

Guide pairing:

We recommend the use of guide pillars from pairing class .20/.30

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material: 1.0503
Ø d_3 and d_8 induction hardened to 500+100 HV 10.

Execution: Bronze coated internal bore.
Diameter d_3 and collar face precision ground.

2081.81.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
tol.	+0,012	+0,012	+0,015	+0,015	+0,015	+0,018	+0,018
	+0,003	+0,003	+0,004	+0,004	+0,004	+0,005	+0,005
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	59	79	93	108	127	150	150
l_2	23	23	30	37	47	60	60
l_3	36	56	63	71	80	90	90

Ordering code (example):

Headed guide bush	= 2081.81.
d_1 = 40 mm	= 040
Order No	= 2081.81.040

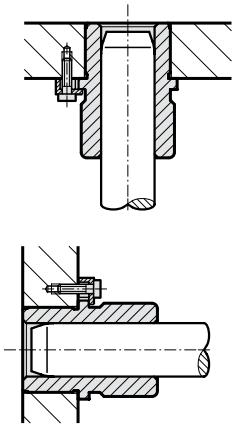
2-10000-7-1 °

Headed Guide Bushes to ISO 9448, Steel, with bronze coated internal bore

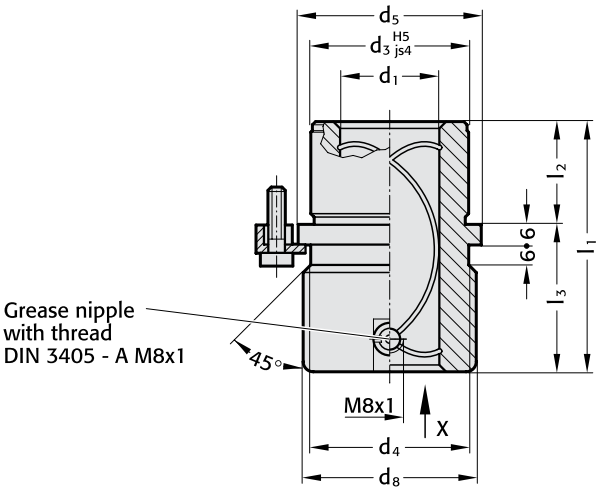
FIBRO

2081.84.

Mounting Examples



2081.84.



Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

Guide pairing:

We recommend the use of guide pillars from pairing class .20/.30

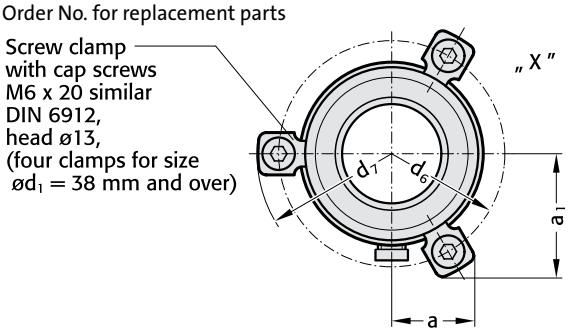
These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material: 1.0503
Ø d_3 and d_8 induction hardened to 500+100 HV 10.

Execution: Bronze coated internal bore.
Diameter d_3 and collar face precision ground.

207.45

Order No. for replacement parts



2081.84.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
tol.	+0,012	+0,012	+0,015	+0,015	+0,015	+0,018	+0,018
	+0,003	+0,003	+0,004	+0,004	+0,004	+0,005	+0,005
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	43	59	75	82	97	116	120
l_2	23	23	30	37	47	60	60
l_3	20	36	45	45	50	56	60

Ordering code (example):

Headed guide bush	= 2081.84.
d_1 = 40 mm	= 040
Order No	= 2081.84.040

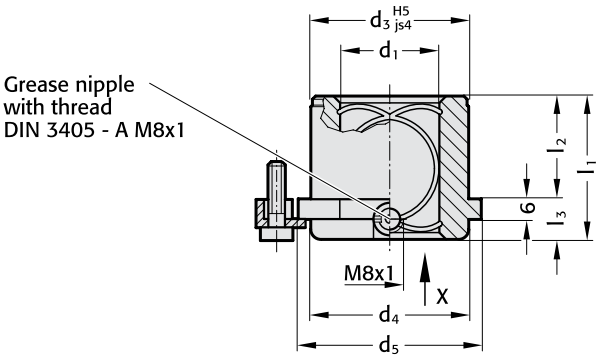
2-10000-7-1 ®

FIBRO

Headed Guide Bushes to ISO 9448, Steel, with bronze coated internal bore

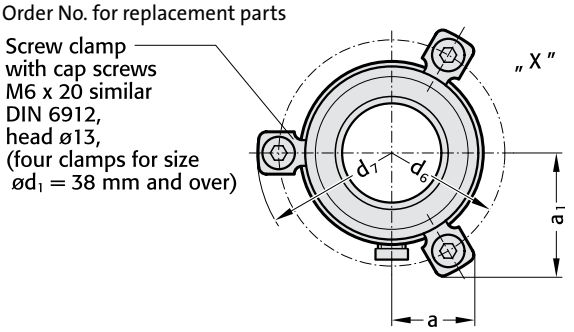
2081.85.

2081.85.

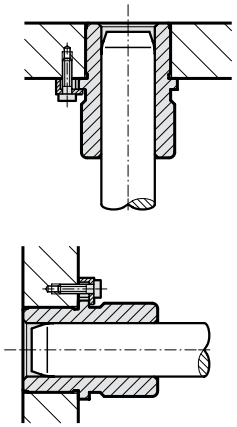


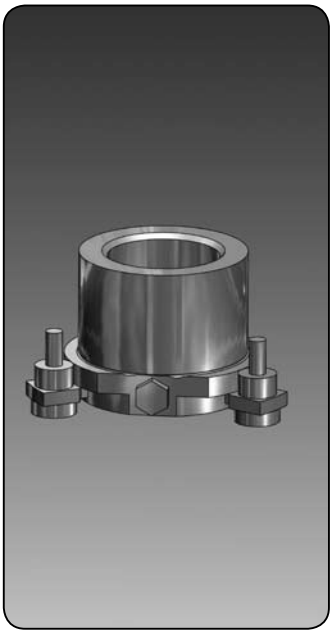
207.45

Order No. for replacement parts



Mounting Examples





Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

Guide pairing:

We recommend the use of guide pillars from pairing class .20/.30

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material: 1.0503
Ø d_3 and d_8 induction hardened to 500+100 HV 10.

Execution: Bronze coated internal bore.
Diameter d_3 and collar face precision ground.

2081.85.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
tol.	+0,012	+0,012	+0,015	+0,015	+0,015	+0,018	+0,018
	+0,003	+0,003	+0,004	+0,004	+0,004	+0,005	+0,005
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	35	35	42	52	65	80	80
l_2	23	23	30	37	47	60	60
l_3	12	12	12	15	18	20	20

Ordering code (example):

Headed guide bush	= 2081.85.
d_1 = 40 mm	= 040
Order No	= 2081.85.040

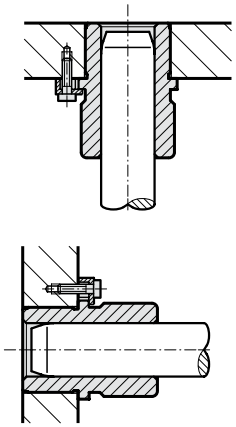
2.10000-7-1 •

Headed Guide Bushes to DIN 9831/ISO 9448-6, sintered ferrite, carbonitrided, long-term lubrication

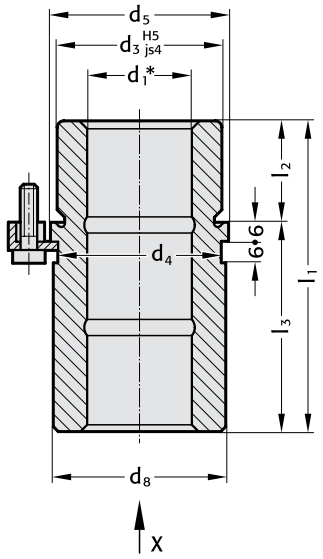
FIBRO

2081.31.

Mounting examples

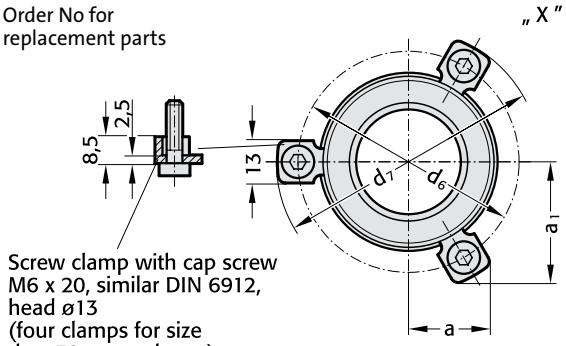


2081.31.



207.45

Order No for replacement parts



* Colour Code Combinations/Clearances – see pages D10 and D 11.

Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO headed ball bearing guide bushes.

Notes on Sliding- and Ball Bearing Guides: page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material:

Sintered ferrite of high purity, carbonitrided

Execution:

Bore, diameter d_3 and collar face precision ground.

2081.31.

d_1	19 20	24 25	30 32	38 40	48 50	60 63
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	39	46	53	63	77	92
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
l_1	59	79	93	108	127	150
l_2	23	23	30	37	47	60
l_3	36	56	63	71	80	90

Ordering Code (example):

Headed Guide Bush	= 2081.31.	Tolerance range – yellow	= .10
d_1 = 40 mm	= 040.	green	= .20
Tolerance range – yellow	= 10	red	= .30
Order No	= 2081.31.040.10		

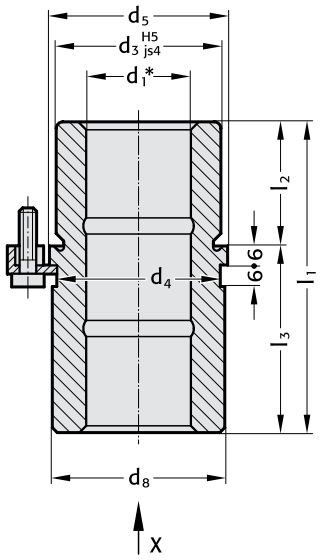
2-10000-7-1 ●

FIBRO

Headed Guide Bushes to DIN 9831/ISO 9448-6, sintered ferrite, carbonitrided, long-term lubrication

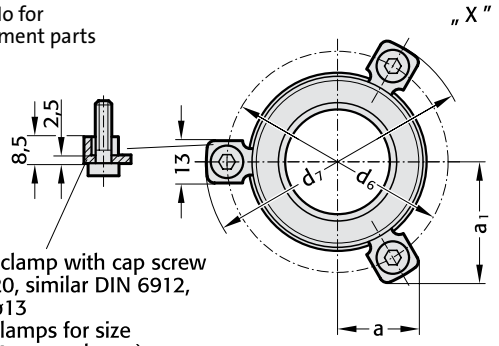
2081.32.

2081.32.



207.45

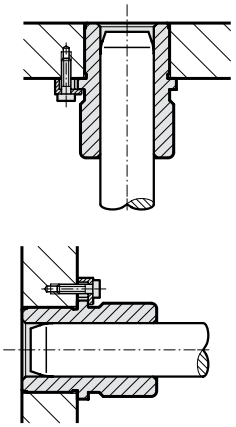
Order No for replacement parts



Screw clamp with cap screw M6 x 20, similar DIN 6912, head ø13 (four clamps for size d_1 = 38mm and over)

* Colour Code Combinations/Clearances – see pages D 10 and D 11.

Mounting examples



Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO headed ball bearing guide bushes.

Notes on Sliding- and Ball Bearing Guides: page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material:

Sintered ferrite of high purity, carbonitrided

Execution:

Bore, diameter d_3 and collar face precision ground.

2081.32.

d_1	24 25	30 32	38 40	48 50
d_3	40	48	58	70
d_4	40	48	58	70
d_5	48	56	66	80
d_6	60	67	77	91
d_7	72,7	79,7	89,7	103,7
d_8	46	53	63	77
a	22,65	24,4	35,3	40,2
a_1	33,4	36,4	35,3	40,2
l_1	80	93	110	131
l_2	30	37	47	60
l_3	50	56	63	71

Ordering Code (example):

Headed Guide Bush	= 2081.32.	Tolerance range – yellow	= .10
d_1 = 30 mm	= 030.	green	= .20
Tolerance range – green	= 20	red	= .30
Order No	= 2081.32.030.20		

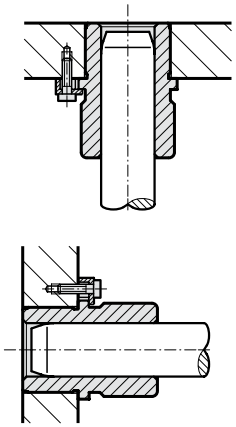
2-10000-7-1 °

Headed Guide Bushes to DIN 9831/ISO 9448-6, sintered ferrite, carbonitrided, long-term lubrication

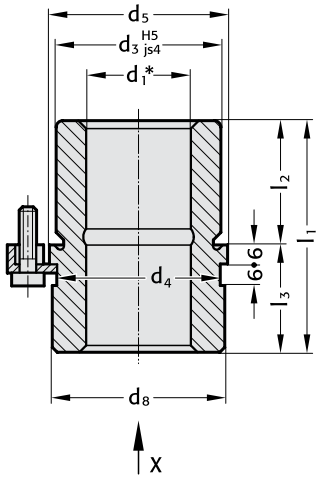
FIBRO

2081.33.

Mounting examples



2081.33.



Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO headed ball bearing guide bushes.

Notes on Sliding- and Ball Bearing Guides: page D 9.

Guide Pillars: see pages D 14, D 15, D 17, D 18 and D 31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material:

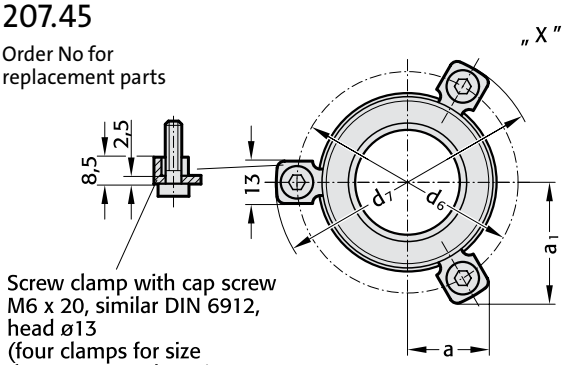
Sintered ferrite of high purity, carbonitrided

Execution:

Bore, diameter d3 and collar face precision ground.

207.45

Order No for replacement parts



Screw clamp with cap screw M6 x 20, similar DIN 6912, head ø13 (four clamps for size d_1 = 38mm and over)

* Colour Code Combinations/Clearances – see pages D10 and D 11.

2081.33.

d_1	24 25	30 32	38 40	48 50
d_3	40	48	58	70
d_4	40	48	58	70
d_5	48	56	66	80
d_6	60	67	77	91
d_7	72,7	79,7	89,7	103,7
d_8	46	53	63	77
a	22,65	24,4	35,3	40,2
a_1	33,4	36,4	35,3	40,2
l_1	55	69	79	96
l_2	30	37	47	60
l_3	25	32	32	36

Ordering Code (example):

Headed Guide Bush	= 2081.33.	Tolerance range – yellow	= .10
d1 = 40 mm	= 040.	green	= .20
Tolerance range – yellow	= 10	red	= .30
Order No	= 2081.33.040.10		

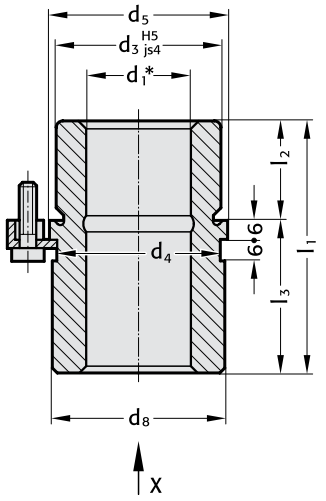
2-10000-7-1 °

FIBRO

2081.34.

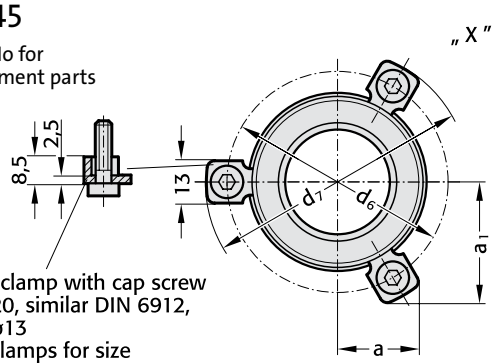
Headed Guide Bushes to DIN 9831/ISO 9448-6, sintered ferrite carbonitrided, long-term lubrication

2081.34.



207.45

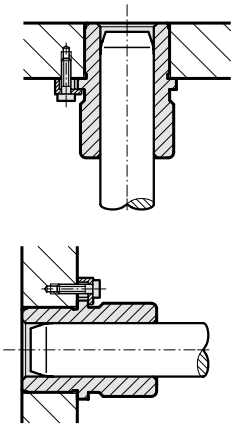
Order No for replacement parts



Screw clamp with cap screw M6 x 20, similar DIN 6912, head ø13 (four clamps for size d_1 = 38mm and over)

* Colour Code Combinations/Clearances – see pages D10 and D 11.

Mounting examples



Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO headed ball bearing guide bushes.

Notes on Sliding- and Ball Bearing Guides: page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material:

Sintered ferrite of high purity, carbonitrided

Execution:

Bore, diameter d_3 and collar face precision ground.

2081.34.

d_1	19 20	24 25	30 32	38 40	48 50	60 63
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	39	46	53	63	77	92
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
l_1	43	59	75	82	97	116
l_2	23	23	30	37	47	60
l_3	20	36	45	45	50	56

Ordering Code (example):

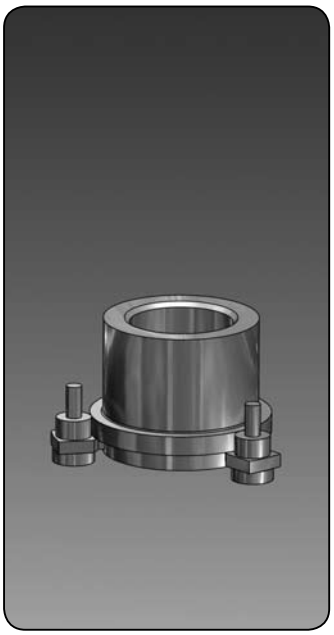
Headed Guide Bush	= 2081.34.	Tolerance range – yellow	= .10
d_1 = 30 mm	= 030.	green	= .20
Tolerance range –green	= 20	red	= .30
Order No	= 2081.34.030.20		

2-10000-7-1 °

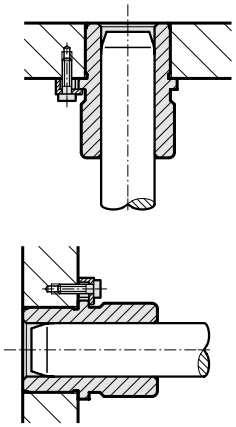
Headed Guide Bushes to DIN 9831/ISO 9448-6, sintered ferrite, carbonitrided, long-term lubrication

FIBRO

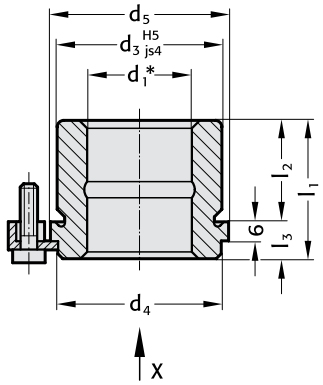
2081.35.



Mounting examples



2081.35.



Note:

Headed Guide Bushes are to be held in H5-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO headed ball bearing guide bushes.

Notes on Sliding- and Ball Bearing Guides: page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material:

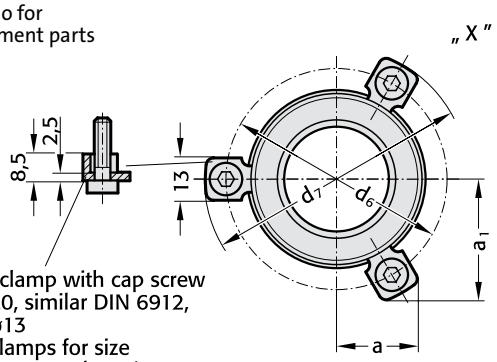
Sintered ferrite of high purity, carbonitrided

Execution:

Bore, diameter d_3 and collar face precision ground.

207.45

Order No for replacement parts



* Colour Code Combinations/Clearances – see pages D10 and D 11.

2081.35.

d_1	19 20	24 25	30 32	38 40	48 50	60 63
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
l_1	35	35	42	52	65	80
l_2	23	23	30	37	47	60
l_3	12	12	12	15	18	20

Ordering Code (example):

Headed Guide Bush	= 2081.33.	Tolerance range –	yellow	= .10
d_1 = 40 mm	= 040.		green	= .20
Tolerance range – yellow	= 10		red	= .30
Order No	= 2081.33.040.10			

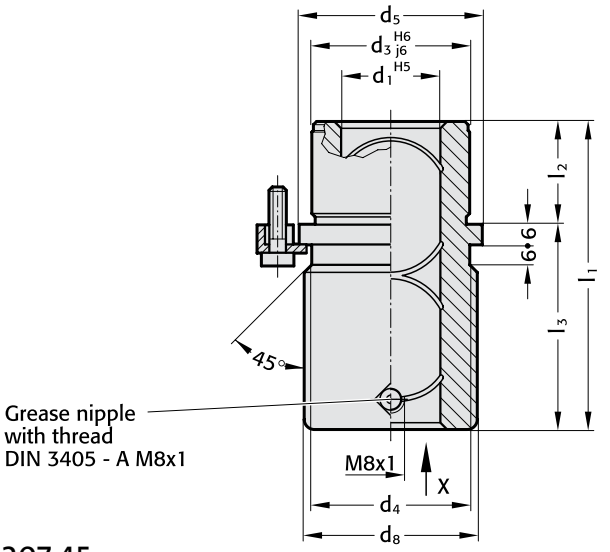
2-10000-7-1 e

FIBRO

2081.91.

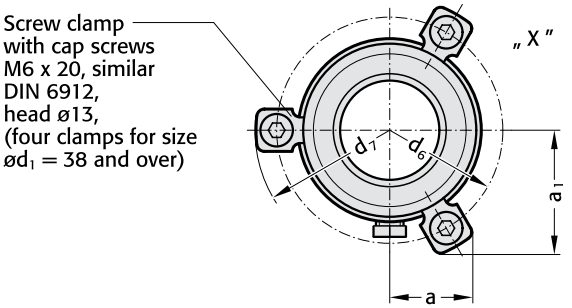
ECO-Line
Headed Guide Bushes, bronzeplated

2081.91.

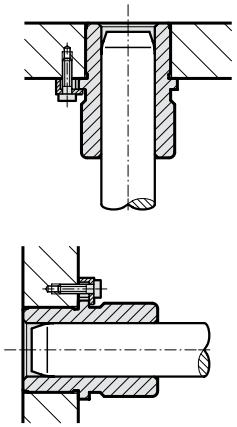


207.45

Order No for replacement parts



Mounting examples



Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material: Steel
Ø d_3 induction hardened

Execution: Bronze plated internal bore.
Diameter d_3 and collar face precision ground.

2081.91.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	59	79	93	108	127	150	150
l_2	23	23	30	37	47	60	60
l_3	36	56	63	71	80	90	90

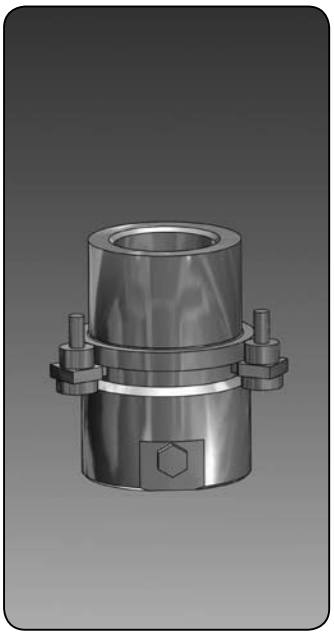
Ordering code (example):

Headed Guide Bushes, bronzeplated	= 2081.91.
d_1 = 40 mm	= 040
Order No	= 2081.91.040

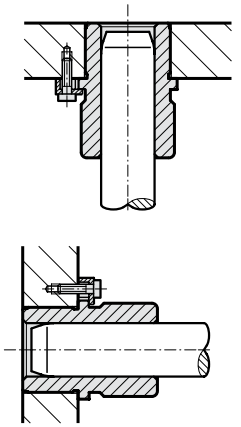
2.20680.2006-1 o

Headed Guide Bushes, bronzeplated

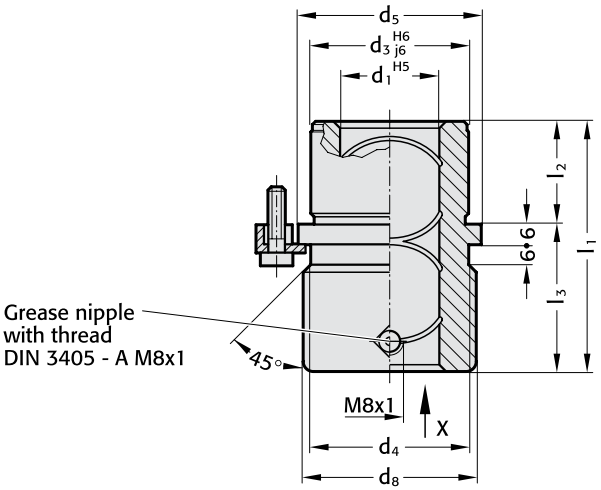
2081.94.



Mounting example



2081.94.



Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

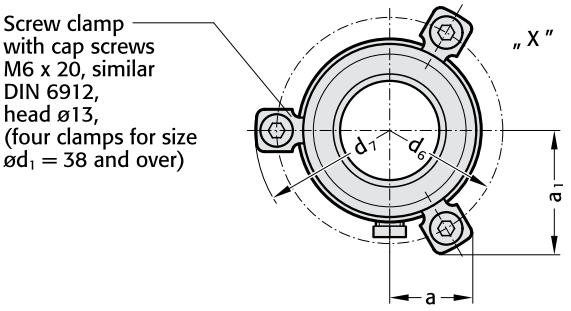
These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material: Steel
Ø d_3 induction hardened

Execution: Bronze plated internal bore.
Diameter d_3 and collar face precision ground.

207.45

Order No for replacement parts



2081.94.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	43	59	75	82	97	116	120
l_2	23	23	30	37	47	60	60
l_3	20	36	45	45	50	56	60

Ordering Code (example):

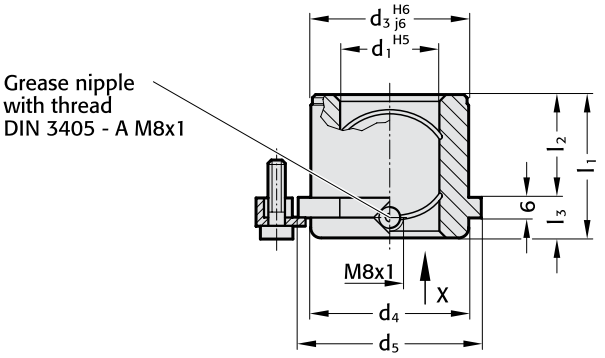
Headed Guide Bushes, bronzeplated	= 2081.94.
d_1 = 63 mm	= 063
Order No	= 2081.94.063

FIBRO

2081.95.

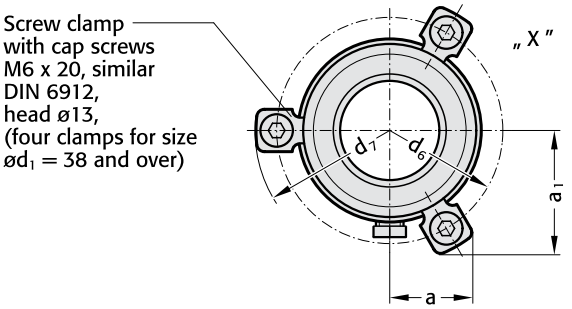
ECO-Line
Headed Guide Bushes, bronzeplated

2081.95.

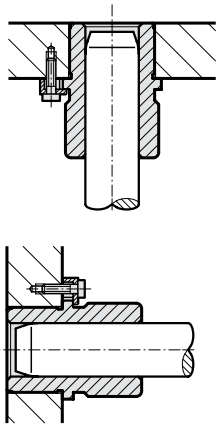


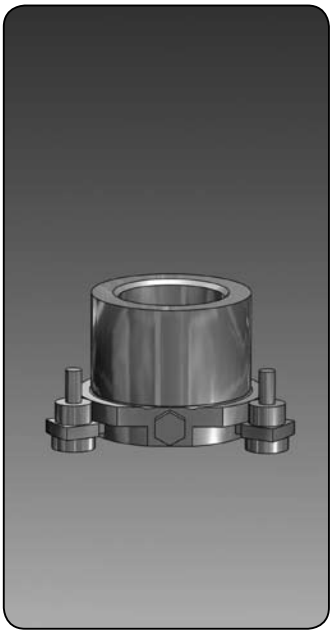
207.45

Order No for replacement parts



Mounting example





Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material: Steel
Ø d_3 induction hardened

Execution: Bronze plated internal bore.
Diameter d_3 and collar face precision ground.

2081.95.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	35	35	42	52	65	80	80
l_2	23	23	30	37	47	60	60
l_3	12	12	12	15	18	20	20

Ordering Code (example):

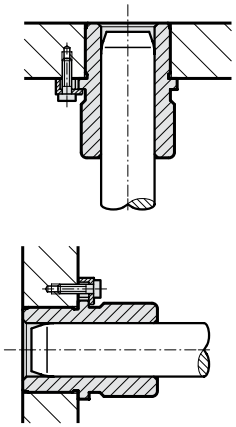
Headed Guide Bushes, bronzeplated	= 2081.95.
d_1 = 63 mm	= 063
Order No	= 2081.95.063

2.20680.2006-1 o

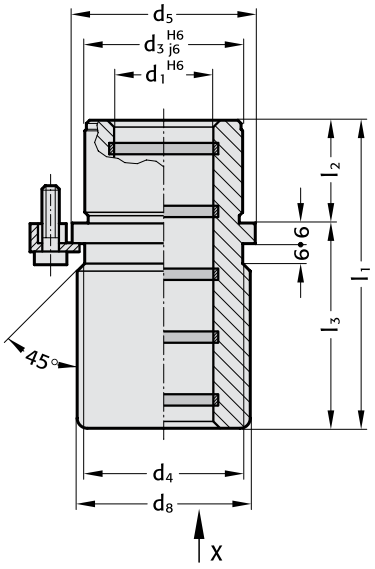
Headed Guide Bushes, Bronze with solid lubrication rings

2081.71.

Mounting Example



2081.71.



Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

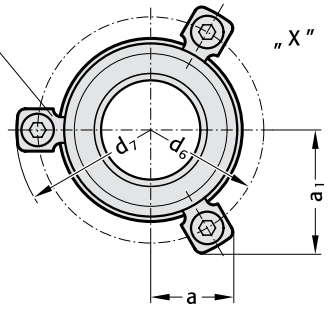
Material: Bronze

Execution: Contact surfaces with solid lubricant rings. Diameter d_3 and collar face precision ground.

207.45

Order No for replacement parts

Screw clamp with cap screws M6 x 20, similar DIN 6912, head ø13, (four clamps for size ød_1 = 38 and over)



2081.71.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	59	79	93	108	127	150	150
l_2	23	23	30	37	47	60	60
l_3	36	56	63	71	80	90	90

Ordering Code (example):

Headed Guide Bushes, Bronze	=	2081.71.
d_1 = 40 mm	=	040
Order No	=	2081.71.040

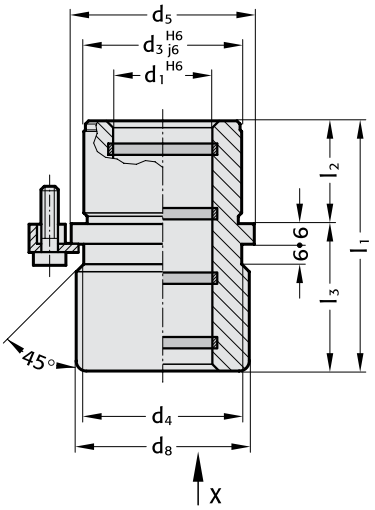
2-20680-2006-1 °

FIBRO

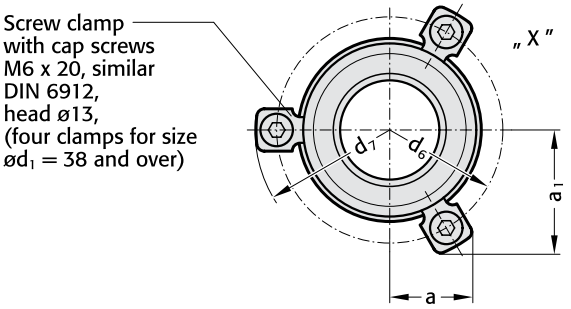
2081.74.

ECO-Line
Headed Guide Bushes, Bronze with solid lubrication rings

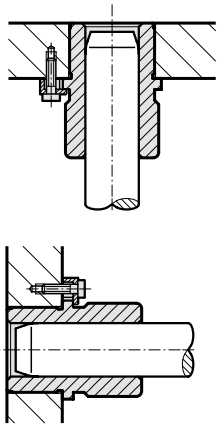
2081.74.



207.45
Order No for replacement parts



Mounting Example



Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

Material: Bronze

Execution: Contact surfaces with solid lubricant rings. Diameter d_3 and collar face precision ground.

2081.74.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	43	59	75	82	97	116	120
l_2	23	23	30	37	47	60	60
l_3	20	36	45	45	50	56	60

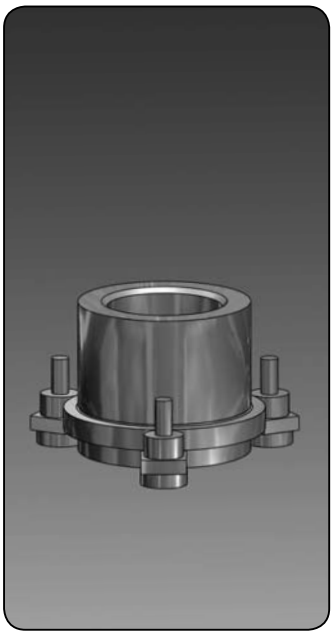
Ordering Code (example):

Headed Guide Bushes, Bronze	=	2081.74.
d_1 = 25 mm	=	025
Order No	=	2081.74.025

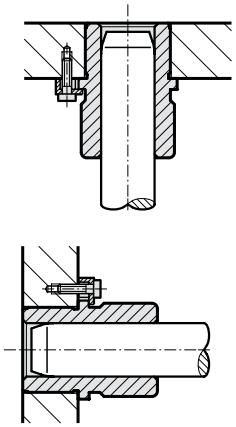
2.20680.2006-1 °

Headed Guide Bushes, Bronze with solid lubrication rings

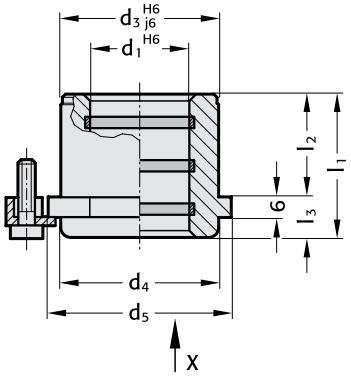
2081.75.



Mounting Example



2081.75.



Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 38 mm and over have four.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø 13.

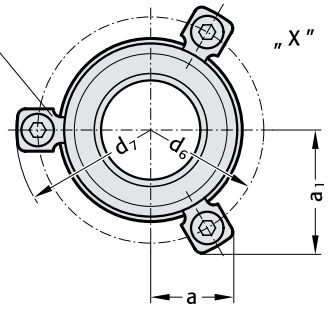
Material: Bronze

Execution: Contact surfaces with solid lubricant rings. Diameter d_3 and collar face precision ground.

207.45

Order No for replacement parts

Screw clamp with cap screws M6 x 20, similar DIN 6912, head ø13, (four clamps for size ød_1 = 38 and over)



2081.75.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
d_3	32	40	48	58	70	85	105
d_4	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	35	35	42	52	65	80	80
l_2	23	23	30	37	47	60	60
l_3	12	12	12	15	18	20	20

Ordering Code (example):

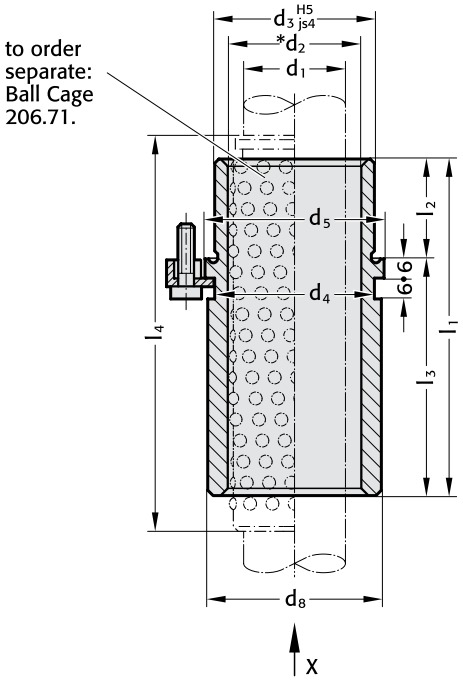
Headed Guide Bushes, Bronze	=	2081.75.
d_1 = 63 mm	=	063
Order No	=	2081.75.063

2-20680-2006-1 °

FIBRO

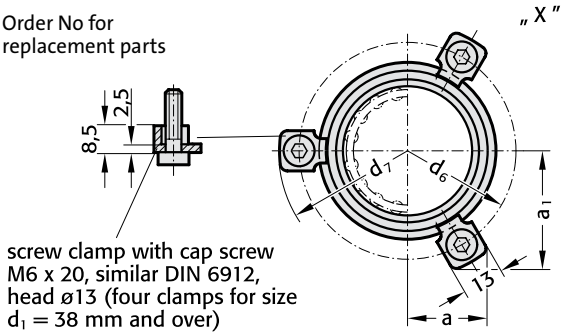
2081.44. 206.71. Headed Guide Bushes for Ball Bearings DIN 9831/ISO 9448-7 Ball Cages

2081.44.



207.45

Order No for replacement parts



* Preloading see Colour Code Combinations – pages D10 and D11.

Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H5-retainer bores.

Three screw clamps are provided for fixing; sizes Ø d1 = 38 mm and over have four.

FIBRO headed guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO headed guide bushes of sintered ferrite.

Notes on Sliding and Ball Bearing Guides see page D 9.

Guide Pillars see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

Material:

Bush: tool steel, Hardness: 62 ± 2HRC

Ball Cage: brass

Balls: hardened steel DIN 5401

2081.44.

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	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	59	79	93	108	127	150	150
l_2	23	23	30	37	47	60	60
l_3	36	56	63	71	80	90	90

206.71. (preferred length)

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80	
l	71	95	120	120	140	160	160	l = Nominal ordering length
l_4	72	96	120	120	140	160	161	l_4 = Manufacturing length

Ordering Code (example):

Headed Guide Bush	= 2081.44.		Ball Cages	= 206.71.		Tolerance range – yellow	= .10
d_1 = 40 mm	= 040.		d_1 = 40 mm	= 040.		green	= .20
Tolerance range – red	= 30		l = 120 mm	= 120		red	= .30
Order No	= 2081.44.040.30		Order No	= 206.71.040.120			

Headed Guide Bushes for Ball Bearings
DIN 9831/ISO 9448-7
Ball Cages

FIBRO
2081.45.
206.71.

Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H5-retainer bores.

Three screw clamps are provided for fixing; sizes Ø d_1 = 38 mm and over have four.

FIBRO headed guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO headed guide bushes of sintered ferrite.

Notes on Sliding and Ball Bearing Guides see page D 9.

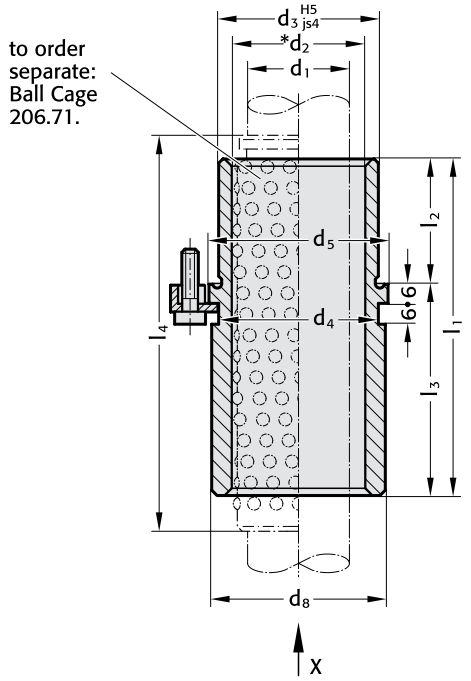
Guide Pillars see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

Material:

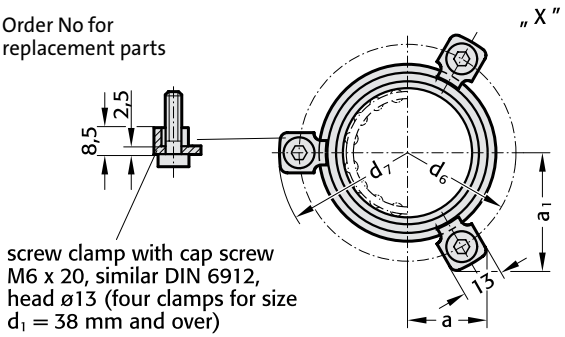
Bush: tool steel, Hardness: 62 ± 2HRC
Ball Cage: brass
Balls: hardened steel DIN 5401

2081.45.



207.45

Order No for replacement parts



* Preloading see Colour Code Combinations – pages D10 and D11.

2081.45.

d_1	24 25	30 32	38 40	48 50
d_2	30 31	38 40	46 48	56 58
d_3	40	48	58	70
d_4	40	48	58	70
d_5	48	56	66	80
d_6	60	67	77	91
d_7	72,7	79,7	89,7	103,7
d_8	46	53	63	77
a	22,65	24,4	35,3	40,2
a_1	33,4	36,4	35,3	40,2
l_1	80	93	110	131
l_2	30	37	47	60
l_3	50	56	63	71

206.71. (preferred length)

d_1	24 25	30 32	38 40	48 50	
l	95	120	140	160	l = Nominal ordering length
l_4	96	120	140	160	l_4 = Manufacturing length

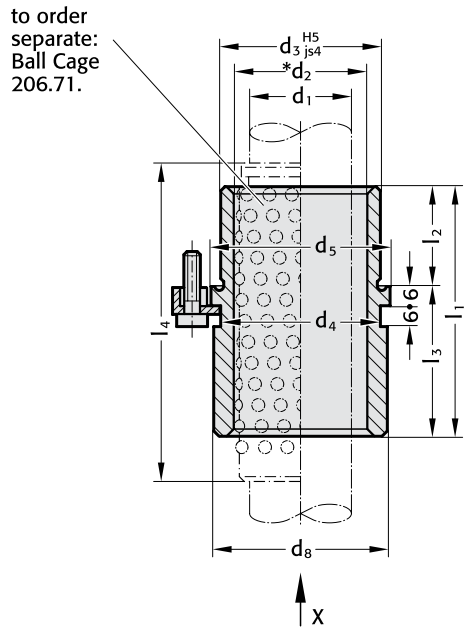
Ordering Code (example):

Headed Guide Bush	= 2081.45.		Ball Cages	= 206.71.	Tolerance	yellow	= .10
d_1 = 40 mm	= 040.		d_1 = 40 mm	= 040.	range –	green	= .20
Tolerance range- red	= 30		l = 120 mm	= 120		red	= .30
Order No	= 2081.45.040.30		Order No	= 206.71.040.120			

FIBRO

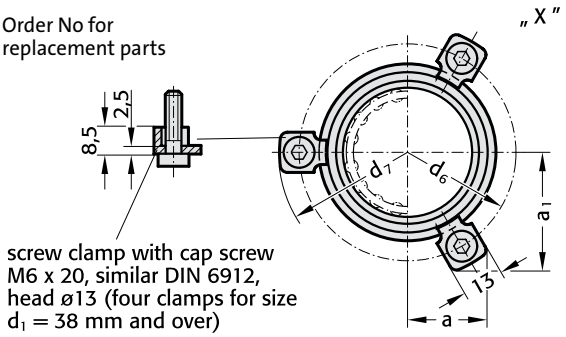
Headed Guide Bushes for Ball Bearings
2081.46. DIN 9831/ISO 9448-7
206.71. Ball Cages

2081.46.



207.45

Order No for replacement parts



* Preloading see Colour Code Combinations – pages D10 and D11.

Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H5-retainer bores.

Three screw clamps are provided for fixing; sizes Ø d1 = 38 mm and over have four.

FIBRO headed guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO headed guide bushes of sintered ferrite.

Notes on Sliding and Ball Bearing Guides see page D 9.

Guide Pillars see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

Material:

Bush: tool steel, Hardness: 62 ± 2HRC
Ball Cage: brass
Balls: hardened steel DIN 5401

2081.46.

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	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	43	59	75	82	97	116	120
l_2	23	23	30	37	47	60	60
l_3	20	36	45	45	50	56	60

206.71. (preferred length)

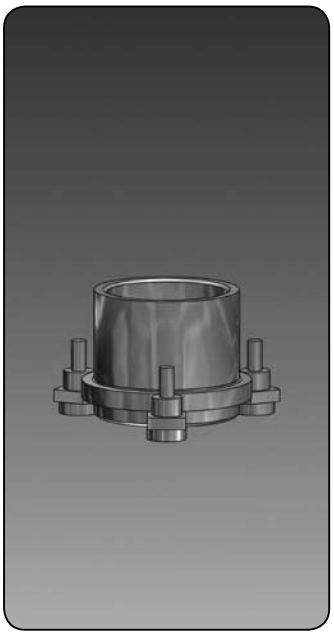
d_1	19 20	24 25	30 32	38 40	48 50	60 63	80	
l	56	71	95	105	120	140	140	l = Nominal ordering length
l_4	56	72	95	105	120	140	140	l_4 = Manufacturing length

Ordering Code (example):

Headed Guide Bush	= 2081.46.		Ball Cages	= 206.71.		Tolerance	yellow = .10
d_1 = 40 mm	= 040.		d_1 = 40 mm	= 040.		range –	green = .20
Tolerance range-red	= 30		l = 120 mm	= 120			red = .30
Order No	= 2081.46.040.30		Order No	= 206.71.040.120			

Headed Guide Bushes for Ball Bearings
DIN 9831/ISO 9448-7
Ball Cages

FIBRO
2081.47.
206.71.



Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H5-retainer bores.

Three screw clamps are provided for fixing; sizes Ø d1 = 38 mm and over have four.

FIBRO headed guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO headed guide bushes of sintered ferrite.

Notes on Sliding and Ball Bearing Guides see page D 9.

Guide Pillars see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

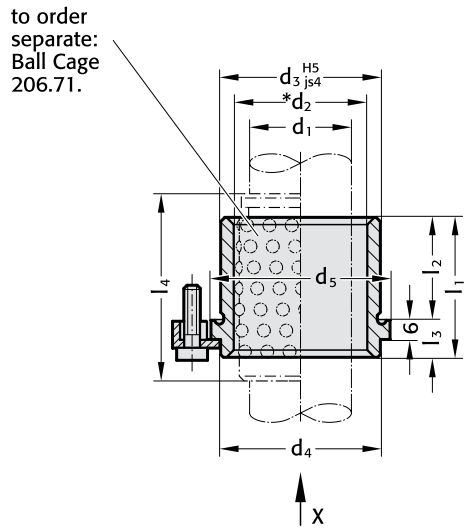
Material:

Bush: tool steel
Hardness: 62 ± 2HRC

Ball Cage: brass

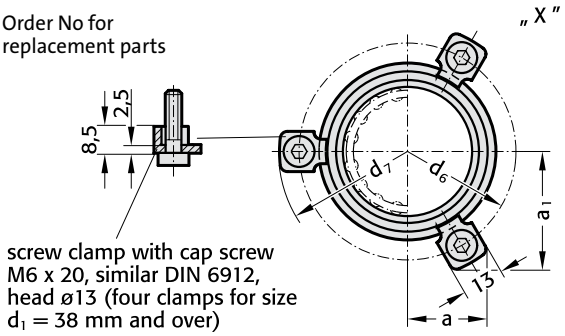
Balls: hardened steel DIN 5401

2081.47.



207.45

Order No for replacement parts



* Preloading see Colour Code Combinations – pages D10 and D11. .

2081.47.

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	32	40	48	58	70	85	105
d_5	40	48	56	66	80	95	118
d_6	52	60	67	77	91	106	129
d_7	64,7	72,7	79,7	89,7	103,7	118,7	141,7
d_8	39	46	53	63	77	92	115
a	20,7	22,65	24,4	35,3	40,2	45,5	54,5
a_1	30	33,4	36,4	35,3	40,2	45,5	54,5
l_1	35	35	42	52	65	80	80
l_2	23	23	30	37	47	60	60
l_3	12	12	12	15	18	20	20

206.71. (preferred length)

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80	
l	45	45	56	63	80	95	120	l = Nominal ordering length
l_4	44	44	55	65	80	95	119	l_4 = Manufacturing length

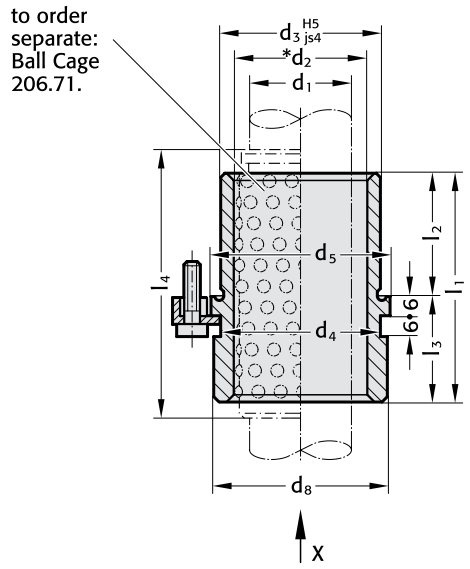
Ordering Code (example):

Headed Guide Bush	= 2081.47.		Ball Cages	= 206.71.		Tolerance	yellow = .10
d_1 = 40 mm	= 040.		d_1 = 40 mm	= 040.		range –	green = .20
Tolerance range- red	= 30		l = 120 mm	= 120			red = .30
Order No	= 2081.47.040.30		Order No	= 206.71.040.120			

FIBRO

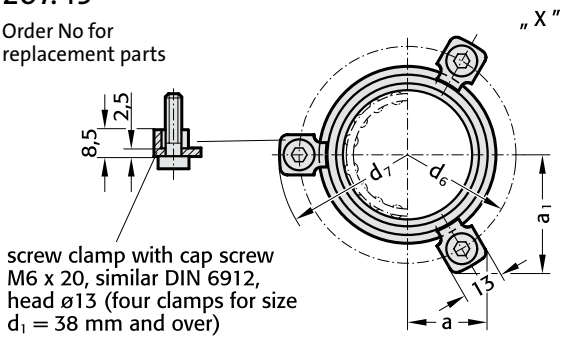
Headed Guide Bushes for Ball Bearings
2081.49. DIN 9831/ISO 9448-7
206.71. Ball Cages

2081.49.

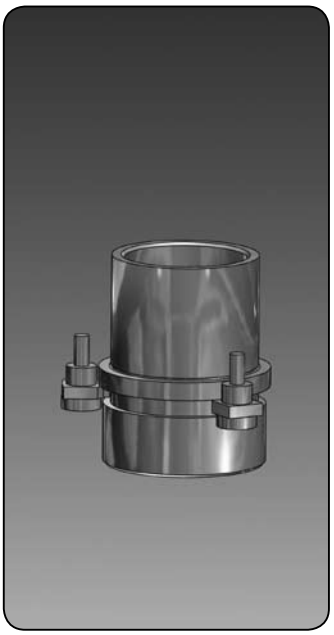


207.45

Order No for replacement parts



* Preloading see Colour Code Combinations – pages D10 and D11.



Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H5-retainer bores.

Three screw clamps are provided for fixing; sizes Ø d1 = 38 mm and over have four.

FIBRO headed guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO headed guide bushes of sintered ferrite.

Notes on Sliding and Ball Bearing Guides see page D 9.

Guide Pillars see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

Material:

Bush: tool steel
Hardness: 62 ± 2HRC

Ball Cage: brass

Balls: hardened steel DIN 5401

2081.49.

d_1	24 25	30 32	38 40	48 50
d_2	30 31	38 40	46 48	56 58
d_3	40	48	58	70
d_4	40	48	58	70
d_5	48	56	66	80
d_6	60	67	77	91
d_7	72,7	79,7	89,7	103,7
d_8	46	53	63	77
a	22,65	24,4	35,3	40,2
a_1	33,4	36,4	35,3	40,2
l_1	55	69	79	96
l_2	30	37	47	60
l_3	25	32	32	36

206.71. (preferred length)

d_1	24 25	30 32	38 40	48 50	
l	71	80	95	120	l = Nominal ordering length
l_4	72	80	95	120	l_4 = Manufacturing length

Ordering Code(example):

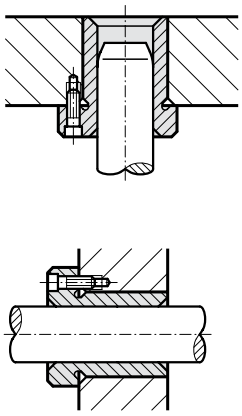
Headed Guide Bush	= 2081.49.		Ball Cages	= 206.71.		Tolerance	yellow = .10
d_1 = 40 mm	= 040.		d_1 = 40 mm	= 040.		range –	green = .20
Tolerance range- red	= 30		l = 120 mm	= 120			red = .30
Order No	= 2081.49.040.30		Order No	= 206.71.040.120			

Flanged Guide Bushes, sintered ferrite, DIN 9831/ISO9448-4, carbonitrided long-term lubrication

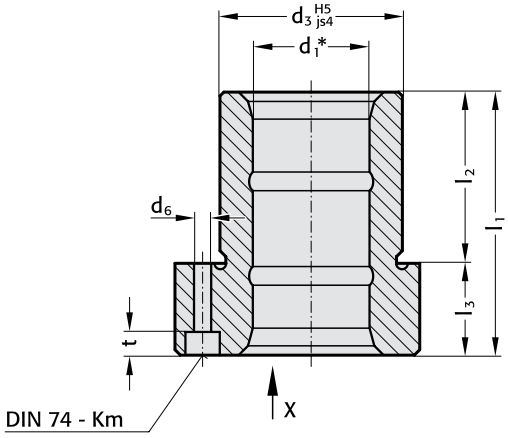
FIBRO

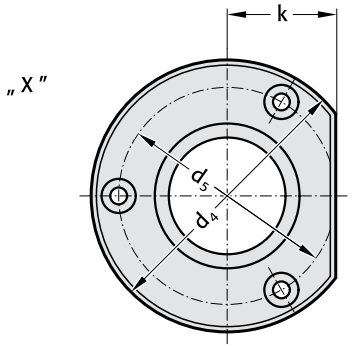
2091.31.

Mounting Examples



2091.31.





Material:

Sintered ferrite of high purity, carbonitrided.

Execution:

Bearing surfaces and outside diameter fine-ground.

Note:

Register bore H5.
The guide bush is fixed by means of 3 screws to DIN EN ISO 4762. The screws are not contained in the scope of delivery.

FIBRO flanged guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO flanged guide bushes for ball bearings.

Notes on Sliding- and Ball Bearing Guides: see page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

* Colour Code Combinations/Clearances – see pages D10 and D11.

2091.31.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
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
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
t	4,6	5,7	5,7	6,8	9	9	11

Ordering Code (example):

Flanged Guide Bush	= 2091.31.		
d_1 = 40 mm	= 040.	Tolerance	yellow = .10
Tolerance range – red	= 30	range –	green = .20
Order No	= 2091.31.040.30		red = .30

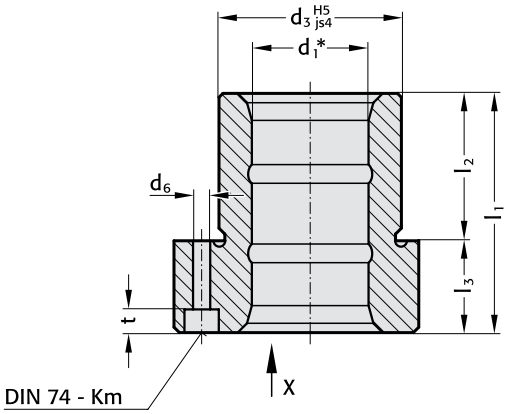
2-10000-7-1 e

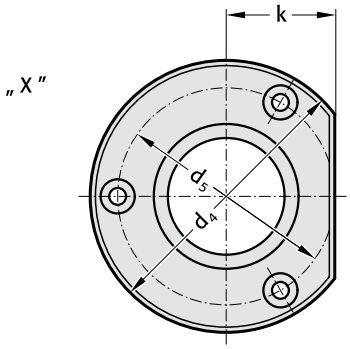
FIBRO

2091.32.

Flanged Guide Bushes, sintered ferrite, DIN 9831/ISO 9448-4, carbonitrided, long-term lubrication

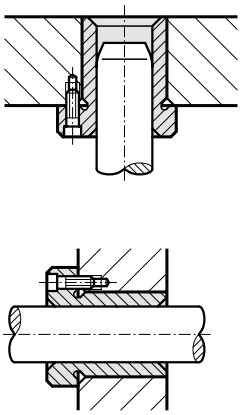
2091.32.





* Colour Code Combinations/Clearances – see pages D10 and D11.

Mounting Examples



Material:

Sintered ferrite of high purity, carbonitrided

Execution:

Bearing surfaces and outside diameter fine-ground.

Note:

Register bore H5. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762, except for dias. 15 + 16, which require screws to DIN 6912. The screws are not contained in the scope of delivery.

FIBRO flanged guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO flanged guide bushes for ball bearings.

Notes on Sliding- and Ball Bearing Guides: see page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

2091.32.

d_1	15* 16*	19 20	24 25	30 32	38 40	48 50	60 63
d_3	28	32	40	48	58	70	85
d_4	45	50	63	72	85	104	120
d_5*	35	40	50	58	70	86	100
d_6	4,5	4,5	5,5	5,5	6,6	9	9
k	15	18	23	28	33	38	46
l_1	36	45	55	62	67	89	89
l_2	30	30	30	37	37	47	47
l_3	6	15	25	25	30	42	42
t	3,4	4,6	5,7	5,7	6,8	9	9

* use Shallow Head Cap Screws DIN 6912!

Ordering Code (example):

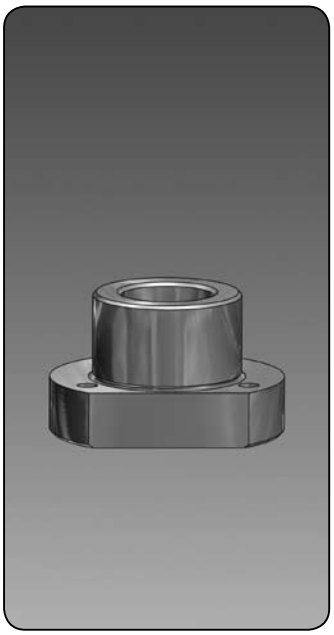
Flanged Guide Bush	= 2091.32.	Tolerance range –	yellow = .10
d_1 = 38 mm	= 038.		green = .20
Tolerance range – red	= 30		red = .30
Order No	= 2091.32.038.30		

2-10000-7-1 °

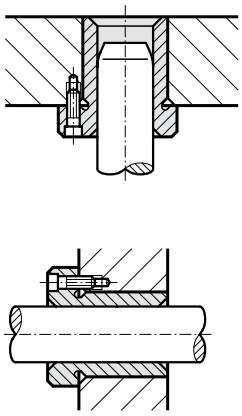
Flanged Guide Bushes, sintered ferrite, DIN 9831/ISO 9448-4, carbonitrided, long-term lubrication

FIBRO

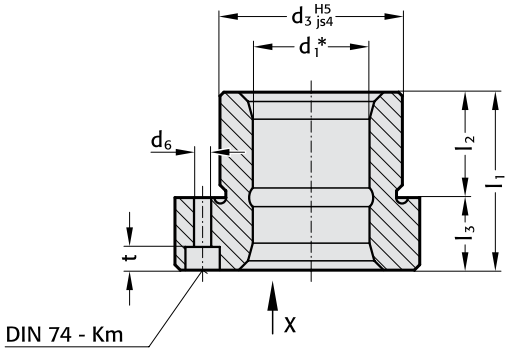
2091.34.

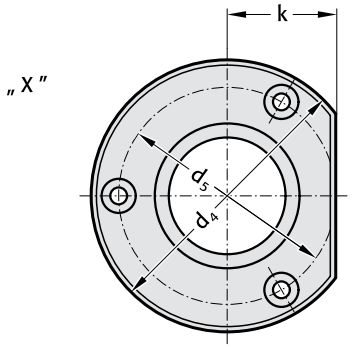


Mounting Examples



2091.34.





Material:

Sintered ferrite of high purity, carbonitrided.

Execution:

Bearing surfaces and outside diameter fine-ground.

Note:

Register bore H5. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762, except for dias. 15 + 16, which require screws to DIN 6912. The screws are not contained in the scope of delivery.

FIBRO flanged guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO flanged guide bushes for ball bearings.

Notes on Sliding- and Ball Bearing Guides: see page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

* Colour Code Combinations/Clearances – see pages D10 and D11.

2091.34.

d_1	15* 16*	19 20	24 25	30 32	38 40	48 50
d_3	28	32	40	48	58	70
d_4	45	50	63	72	85	104
d_5*	35	40	50	58	70	86
d_6	4,5	4,5	5,5	5,5	6,6	9
k	15	18	23	28	33	38
l1	29	38	38	45	55	62
l2	23	23	23	30	30	37
l3	6	15	15	15	25	25
t	3,4	4,6	5,7	5,7	6,8	9

* use Shallow Head Cap Screws DIN 6912!

Ordering Code (example):

Flanged Guide Bush	= 2091.34.			
d_1 = 40 mm	= 040.	Tolerance	yellow	= .10
Tolerance range – red	= 30	range –	green	= .20
Order No	= 2091.34.040.30		red	= .30

2-10000-7-1 e

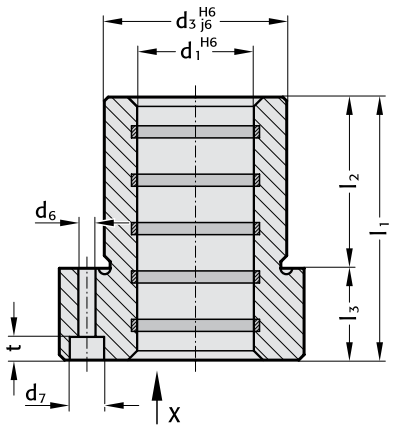
subject to alterations

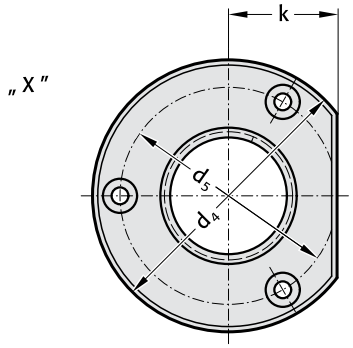
FIBRO

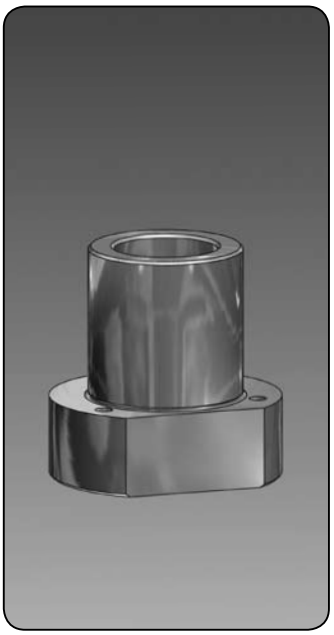
ECO-Line Flanged Guide Bushes DIN 9831/ISO 9448 Bronze with Solid Lubrication Rings

2091.71.

2091.71.







Note:

Register bore H6. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762.
The screws are not contained in the scope of delivery.

Material:

Bronze

Execution:

Contact surfaces with solid lubricant rings.
Diameter d_3 and collar face precision ground.

2091.71.

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80
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
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
t	4,6	5,7	5,7	6,8	9	9	11

Ordering Code (example):

Flanged Guide Bush	=	2091.71.
d_1 = 40 mm	=	040
Order No	=	2091.71.040

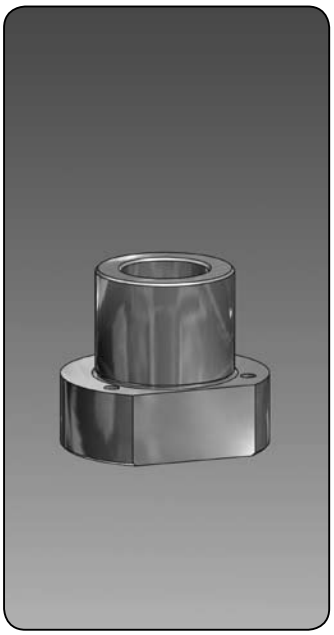
2-10000-7-1 °

Flanged Guide Bushes
DIN 9831/ISO 9448-4
Bronze with Solid Lubrication Rings

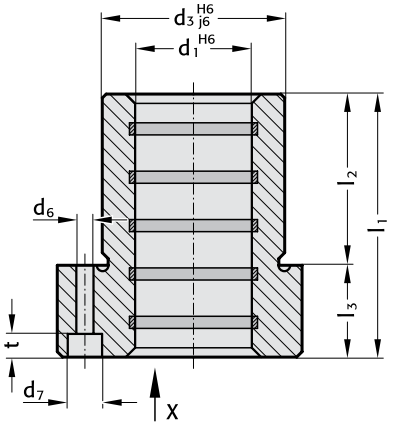
ECO-Line

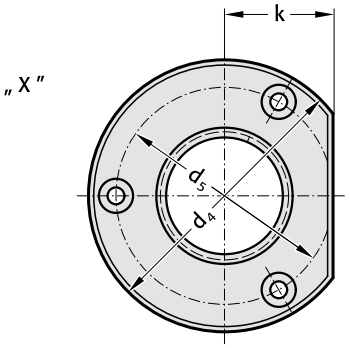
FIBRO

2091.72.



2091.72.





Note:

Register bore H6. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762, except for dias. 15 + 16, which require screws to DIN 6912. The screws are not contained in the scope of delivery.

Material:

Bronze.

Execution:

BContact surfaces with solid lubricant rings.
Diameter d_3 and collar face precision ground.

2091.72.

d_1	15* 16*	19 20	24 25	30 32	38 40	48 50	60 63
d_3	28	32	40	48	58	70	85
d_4	45	50	63	72	85	104	120
d_5	35	40	50	58	70	86	100
d_6	4,5	4,5	5,5	5,5	6,6	9	9
d_7	6	8	10	10	11	15	15
k	15	18	23	28	33	38	46
l_1	36	45	55	62	67	89	89
l_2	30	30	30	37	37	47	47
l_3	6	15	25	25	30	42	42
t	3,4	4,6	5,7	5,7	6,8	9	9

* use Shallow Head Cap Screws DIN 6912!

Ordering Code (example):

Flanged Guide Bush	=	2091.72.
d_1 = 40 mm	=	040
Order No	=	2091.72.040

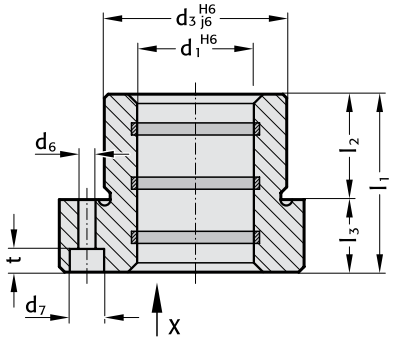
2-10000-7-1 °

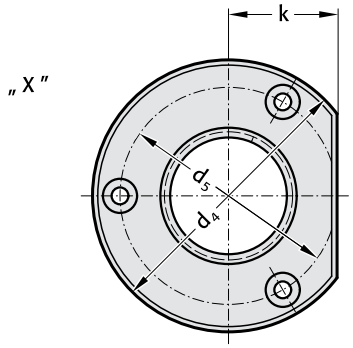
FIBRO

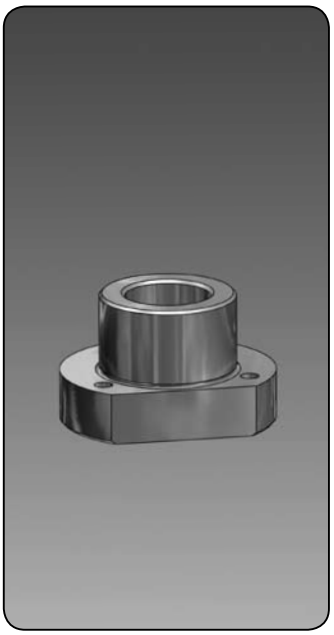
2091.74.

ECO-Line Flanged Guide Bushes DIN 9831/ISO 9448-4 Bronze with Solid Lubrication Rings

2091.74.







Note:

Register bore H6. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762, except for dias. 15 + 16, which require screws to DIN 6912. The screws are not contained in the scope of delivery.

Material:

Bronze.

Execution:

Contact surfaces with solid lubricant rings.
Diameter d_3 and collar face precision ground.

2091.74.

d_1	15*	16*	19	20	24	25	30	32	38	40	48	50
d_3	28		32		40		48		58		70	
d_4	45		50		63		72		85		104	
d_5	35		40		50		58		70		86	
d_6	4,5		4,5		5,5		5,5		6,6		9	
d_7	6		8		10		10		11		15	
k	15		18		23		28		33		38	
l_1	29		38		38		45		55		62	
l_2	23		23		23		30		30		37	
l_3	6		15		15		15		25		25	
t	3,4		4,6		5,7		5,7		6,8		9	

* use Shallow Head Cap Screws DIN 6912!

Ordering Code (example):

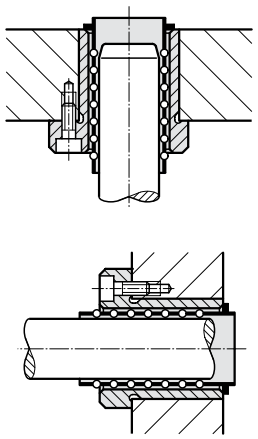
Flanged Guide Bush	=	2091.74.
d_1 = 40 mm	=	040
Order No	=	2091.74.040

2-10000-7-1 °

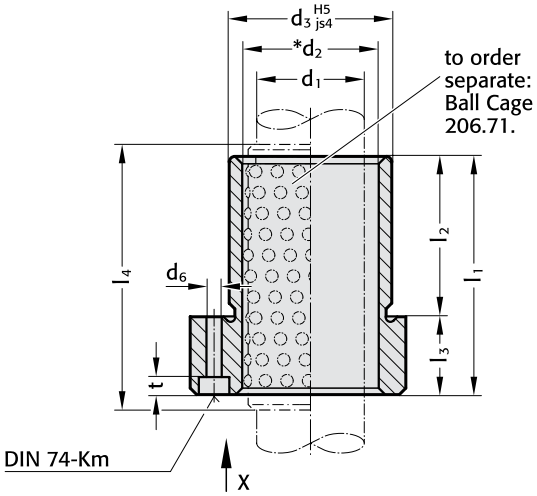
Flanged Guide Bushes for Ball Bearings
DIN 9831/ISO 9448-5
Ball Cages

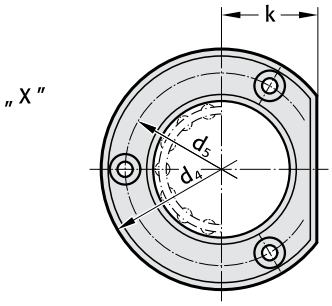
FIBRO
2091.44.
206.71.

Mounting Examples



2091.44.





* Preloading see Colour Code Combinations – pages D10 and D11.

Material:

Bush:	tool steel
Hardness:	62 ± 2 HRC
Ball Cage:	brass
Balls:	hardened steel DIN 5401

Execution:

Bearing surfaces honed. Outside diameter fine-ground.

Note:

Register bore H5. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762. The screws are not contained in the scope of delivery.

FIBRO flanged guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO flanged guide bushes of sintered ferrite.

Notes on Sliding- and Ball Bearing Guides: page D 9.

Guide Pillars: see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

2091.44.

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
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
t	4,6	5,7	5,7	6,8	9	9	11

206.71. (preferred lenght)

d_1	19 20	24 25	30 32	38 40	48 50	60 63	80	
l	71	71	80	95	120	120	140	l = Nominal ordering length
l_4	72	72	80	95	120	120	140	l_4 = Manufacturing length

Ordering Code (example):

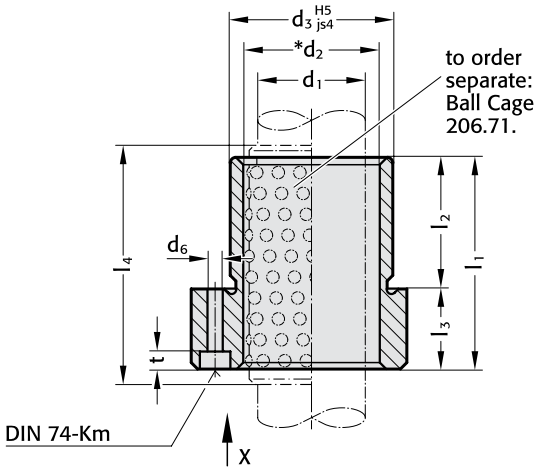
Flangered Guide Bush	= 2091.44.	Ball Cage	= 206.71.	Tolerance	yellow	= .10
d_1 = 40 mm	= 040.	d_1 = 40 mm	= 040.	range –	green	= .20
Tolerance range – green	= 20	l = 80 mm	= 080		red	= .30
Order No	= 2091.44.040.20	Order No	= 206.71.040.080			

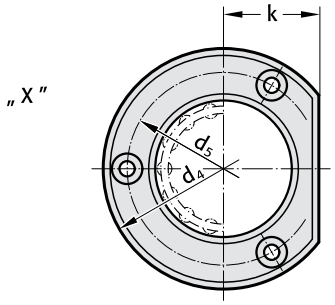
FIBRO

Flanged Guide Bushes for Ball Bearings DIN 9831/ISO 9448-5 Ball Cages

2091.45.
206.71.

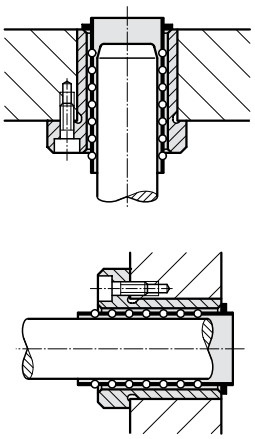
2091.45.





* Preloading see Colour Code Combinations – pages D10 and D11.

Mounting Examples



Material:

Bush:	tool steel
Hardness:	62 ± 2 HRC
Ball Cage:	brass
Balls:	hardened steel DIN 5401

Execution:

Bearing surfaces honed. Outside diameter fine-ground.

Note:

Register bore H5. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762, except for dias. 15 + 16, which require screws to DIN 6912. The screws are not contained in the scope of delivery.

FIBRO flanged guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO flanged guide bushes of sintered ferrite.

Notes on Sliding- and Ball Bearing Guides: page D 9.

Guide Pillars: see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

2091.45.

d_1	15* 16*	19 20	24 25	30 32	38 40	48 50	60 63
d_2	21 22	25 26	30 31	38 40	46 48	56 58	68 71
d_3	28	32	40	48	58	70	85
d_4	45	50	63	72	85	104	120
d_5	35	40	50	58	70	86	100
d_6	4,5	4,5	5,5	5,5	6,6	9	9
k	15	18	23	28	33	38	46
l_1	36	45	55	62	67	89	89
l_2	30	30	30	37	37	47	47
l_3	6	15	25	25	30	42	42
t	3,4	4,6	5,7	5,7	6,8	9	9

206.71. (preferred lenght)

d_1	15* 16*	19 20	24 25	30 32	38 40	48 50	60 63	* use Shallow Head Cap Screws DIN 6912!
l	45	56	71	71	80	95	95	l = Nominal ordering length
l_4	44	56	72	70	80	95	95	l_4 = Manufacturing length

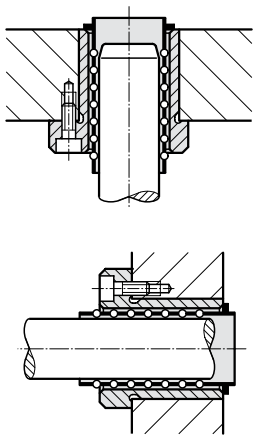
Ordering Code (example):

Flangered				Tolerance	yellow = .10
Guide Bush	= 2091.45.	Ball Cage	= 206.71.	range –	green = .20
d_1 = 40 mm	= 040.	d_1 = 40 mm	= 040.		red = .30
Tolerance range – red	= 30	l = 120 mm	= 120		
Order No	= 2091.45.040.30	Order No	= 206.71.040.120		

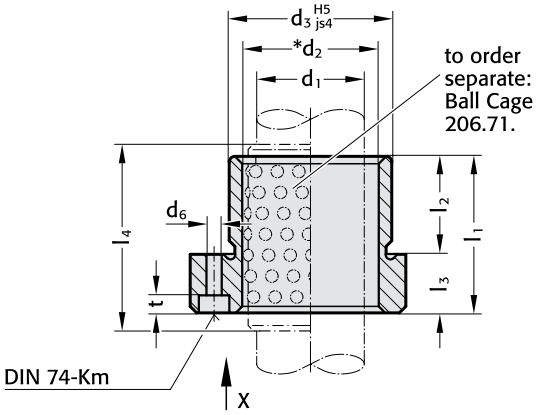
Flanged Guide Bushes for Ball Bearings
DIN 9831/ISO 9448-5
Ball Cages

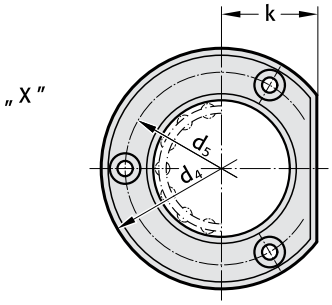
FIBRO
2091.46.
206.71.

Mounting Examples



2091.46.





* Preloading see Colour Code Combinations – pages D10 and D11.

Material:

Bush:	tool steel
Hardness:	62 ± 2 HRC
Ball Cage:	brass
Balls:	hardened steel DIN 5401

Execution:

Bearing surfaces honed. Outside diameter fine-ground.

Note:

Register bore H5. The guide bush is fixed by means of 3 screws to DIN EN ISO 4762, except for dias. 15 + 16, which require screws to DIN 6912. The screws are not contained in the scope of delivery.

FIBRO flanged guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO flanged guide bushes of sintered ferrite.

Notes on Sliding- and Ball Bearing Guides: page D 9.

Guide Pillars: see pages D 14, D 15, D 17, D 18 and D 31.

Ball guide capacity calculations see pages D 52 and D 53.

2091.46.

d_1	12	15* 16*	19 20	24 25	30 32	38 40	48 50
d_2	16	21 22	25 26	30 31	38 40	46 48	56 58
d_3	26	28	32	40	48	58	70
d_4	43	45	50	63	72	85	104
d_5	33	35	40	50	58	70	86
d_6	4,5	4,5	4,5	5,5	5,5	6,6	9
k	13	15	18	23	28	33	38
l_1	25	29	38	38	45	55	62
l_2	16	23	23	23	30	30	37
l_3	9	6	15	15	15	25	25
t	4,6	3,4	4,6	5,7	5,7	6,8	9

206.71. (preferred lenght)

d_1	12	15* 16*	19 20	24 25	30 32	38 40	48 50	* use Shallow Head Cap Screws DIN 6912!
l	40	45	45	45	56	63	80	l = Nominal ordering length
l_4	39	44	44	44	55	65	80	l_4 = Manufacturing length

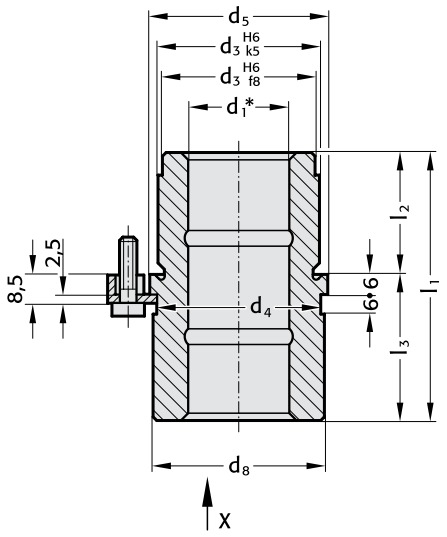
Ordering Code (example):

Flangered Guide Bush	= 2091.46.	Ball Cage	= 206.71.	Tolerance	yellow = .10
d_1 = 40 mm	= 040.	d_1 = 40 mm	= 040.	range –	green = .20
Tolerance range – green	= 20	l = 120 mm	= 120		red = .30
Order No	= 2091.46.040.20	Order No	= 206.71.040.120		

FIBRO

210.31. Headed Guide Bushes, sintered ferrite, similar AFNOR carbonitrided long-term lubrication

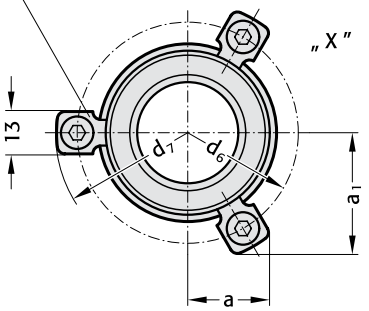
210.31.



207.45

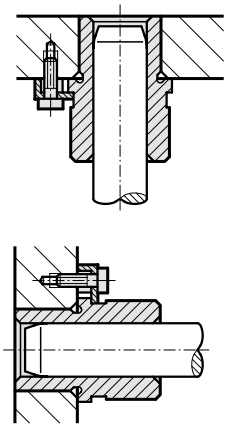
Order No for repeat-order.

Screw clamp with cap screw M6 x 20, similar DIN 6912, head ø13, (four clamps for size d_1 = 40 mm and over)



* Colour Code Combinations/Clearances – see pages D 10 and D 11.

Mounting Examples



Material:

Sintered ferrite of high purity, carbonitrided.

Execution:

Bearing surfaces and outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 40 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO guide bushes for ball bearings.

Notes on Sliding- and Ball Bearing Guides: page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø13.

210.31.

d_1	19 20	25	32	40	50
d_3	32	40	50	63	80
d_4	32	40	50	63	80
d_5	36	45	56	70	90
d_6	49	57	67	81	101
d_7	61,7	69,7	79,7	93,7	113,7
d_8	35	43,5	53	67	87
a	19,9	21,9	24,4	36	43
a_1	28,6	32,1	36,4	36	43
l_1	66	70	83	98	120
l_2	30	30	38	48	61
l_3	36	40	45	50	59

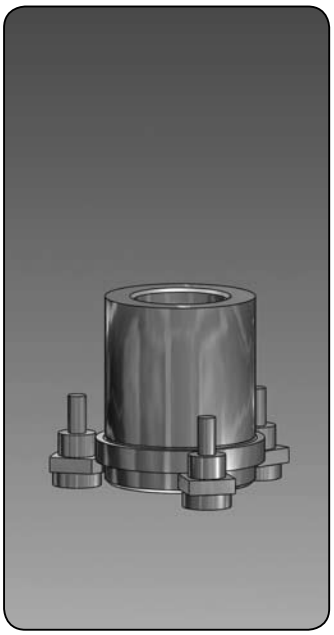
Ordering Code (example):

Headed Guide Bush = 210.31.			Tolerance	yellow = .10
d_1 = 40 mm	=	040.	range –	green = .20
Toerance range-green	=	20		red = .30
Order No	=	210.31.040.20		

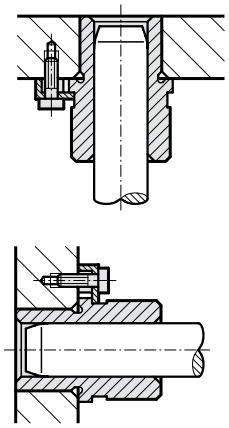
Headed Guide Bushes, sintered ferrite, similar AFNOR carbonitrided long-term lubrication

FIBRO

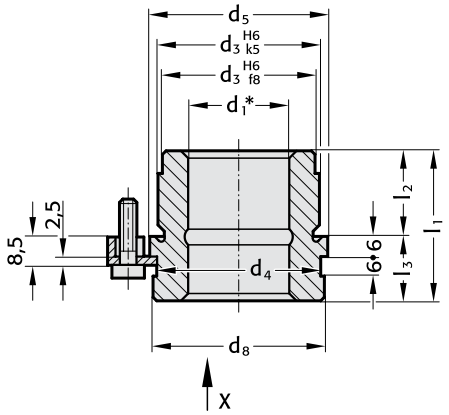
210.34.



Mounting Examples



210.34.



Material:

Sintered ferrite of high purity, carbonitrided.

Execution:

Bearing surfaces and outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 40 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO guide bushes for ball bearings.

Notes on Sliding- and Ball Bearing Guides: page D9.

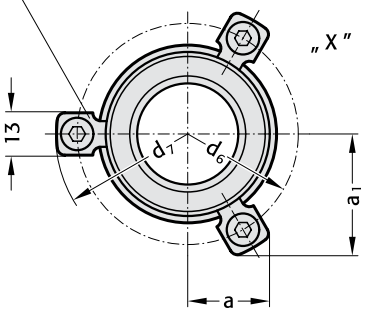
Guide Pillars: see pages D14, D15, D17, D18 and D31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø13.

207.45

Order No for repeat-order.

Screw clamp with cap screw M6 x 20, similar DIN 6912, head ø13, (four clamps for size d_1 = 40 mm and over)



* Colour Code Combinations/Clearances – see pages D 10 and D 11.

210.34.

d_1	19 20	25	32	40	50
d_3	32	40	50	63	80
d_4	32	40	50	63	80
d_5	36	45	56	70	90
d_6	49	57	67	81	101
d_7	61,7	69,7	79,7	93,7	113,7
d_8	35	43,5	53	67	87
a	19,9	21,9	24,4	36	43
a_1	28,6	32,1	36,4	36	43
l_1	42	50	63	76	96
l_2	30	38	48	61	78
l_3	12	12	15	15	18

Ordering Code (example):

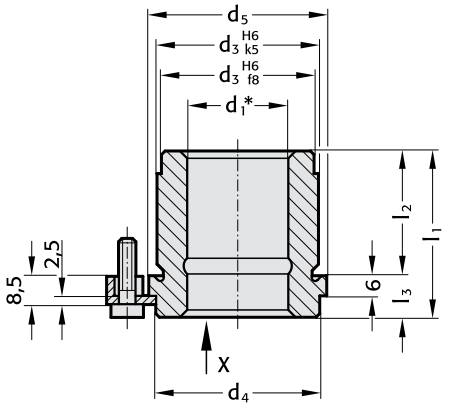
Headed Guide Bush = 210.34.		Tolerance	yellow = .10
d_1 = 40 mm	= 040.	range –	green = .20
Tolerance range – red	= 30		red = .30
Order No	= 210.34.040.30		

FIBRO

Headed Guide Bushes, sintered ferrite, similar AFNOR carbonitrided long-term lubrication

210.35.

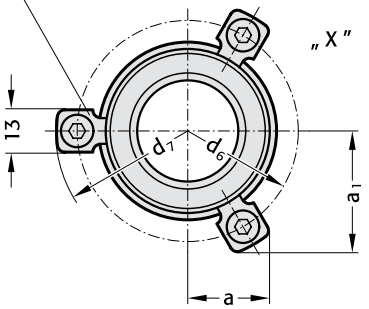
210.35.



207.45

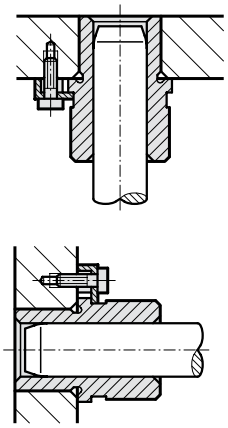
Order No for repeat-order.

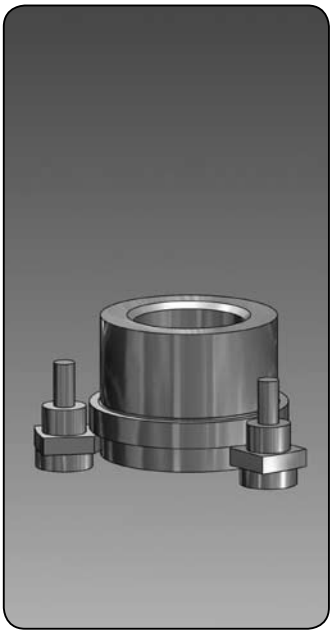
Screw clamp with cap screw M6 x 20, similar DIN 6912, head ø13, (four clamps for size d_1 = 40 mm and over)



* Colour Code Combinations/Clearances – see pages D 10 and D 11.

Mounting Examples





Material:

Sintered ferrite of high purity, carbonitrided.

Execution:

Bearing surfaces and outside diameter fine-ground.

Note:

Headed Guide Bushes are to be held in H6-retainer bores. Three screw clamps are provided for fixing; sizes d_1 = 40 mm and over have four.

FIBRO headed guide bushes of sintered ferrite carbonitrided are fully interchangeable with the corresponding sizes of the FIBRO guide bushes for ball bearings.

Notes on Sliding- and Ball Bearing Guides: page D9.

Guide Pillars: see pages D14, D15, D17, D18 and D31.

These guide bushes are supplied complete with clamps and low-head socket cap screws similar DIN 6912, head Ø13.

210.35.

d_1	19 20	25	32	40	50
d_3	32	40	50	63	80
d_4	32	40	50	63	80
d_5	36	45	56	70	90
d_6	49	57	67	81	101
d_7	61,7	69,7	79,7	93,7	113,7
a	19,9	21,9	24,4	36	43
a_1	28,6	32,1	36,4	36	43
l_1	28	32	37	44	44
l_2	16	20	25	32	32
l_3	12	12	12	12	12

Ordering Code (example):

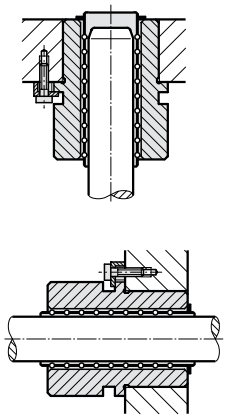
Headed Guide Bush = 210.35.			Tolerance	yellow	= .10
d_1 = 40 mm	= 040.		range –	green	= .20
Tolerance range – red	= 30			red	= .30
Order No	= 210.35.040.30				

2.9269.9.4 e

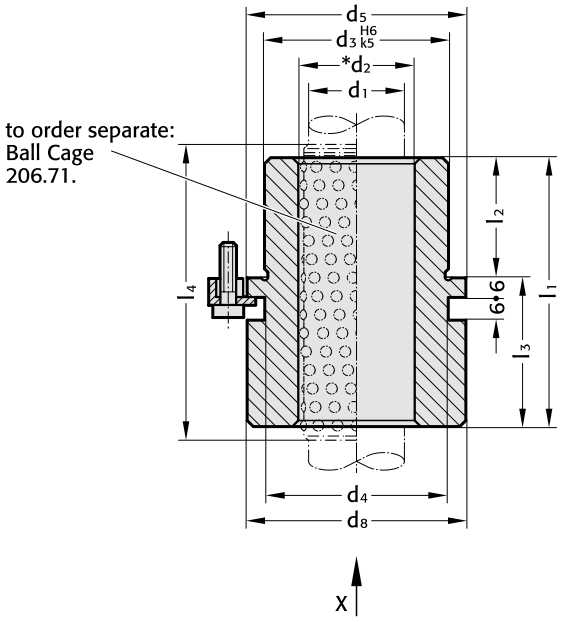
Headed Guide Bushes for Ball Bearings similar AFNOR Ball Cages

FIBRO
210.44.
206.71.

Mounting Examples

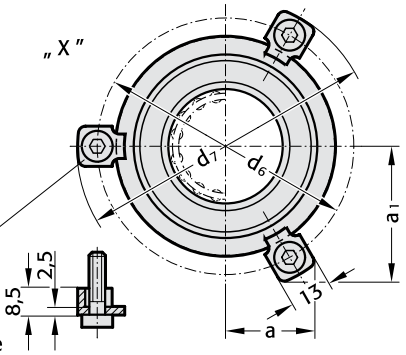


210.44.



207.45

Order No
for repeat-order.



* Preloading see Colour Code Combinations – pages D10 and D11.

Material:

Guide Bush: tool steel
Hardness: 62 ± 2 HRC

Ball Cage: brass

Balls: hardened steel to DIN 5401

Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Receiving bores: H6 tolerance.
Guide bushes are retained by three screw clamps – sizes from Ø d_1 = 40 mm and over are supplied with four clamps.
FIBRO guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO guide bushes of sintered ferrite.

Notes on sliding- and rolling type guides see page D 9.
For guide pillars see pages D 14, D15, D 17, D 18 and D 31.

210.44.

d_1	16	20	25	32	40	50	63
l_3	32	36	40	45	50	63	63
l_2	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$
23	55/63/64		63*/71/72	68*/80/80			
30	62/71/72	66/71/72	70/80/80	75*/80/80	80*/95/95		
38	70*/71/72	74/80/80	78/95/96	83/95/95	88*/95/95	101*/120/120	
48			88/95/96	93/105/105	98/105/105	111*/120/120	
61			101*/120/120	106/120/120	111/120/120	124/140/140	
78				123*/120/140	128/140/140	141/160/160	
98					148*/160/160	161*/180/180	161/180/180
123							186*/200/200

* not available ex-stock – supply on request!
l = Nominal ordering length
l_4 = Manufacturing length

210.44./207.45

d_1	16	20	25	32	40	50	63
d_2	22	26	31	40	48	58	71
d_3	28	32	40	50	63	80	90
d_4	29	32	40	50	63	80	90
d_5	32	36	45	56	70	90	110
d_6	45	49	57	67	81	101	121
d_7	57,7	61,7	69,7	79,7	93,7	13,7	131,7
d_8	31	35	43,5	53,5	67	87	107
a	18,9	19,9	21,9	24,4	36	43	50,1
a_1	26,9	28,6	32,1	36,4	36	43	50,1

Ordering Code (example):

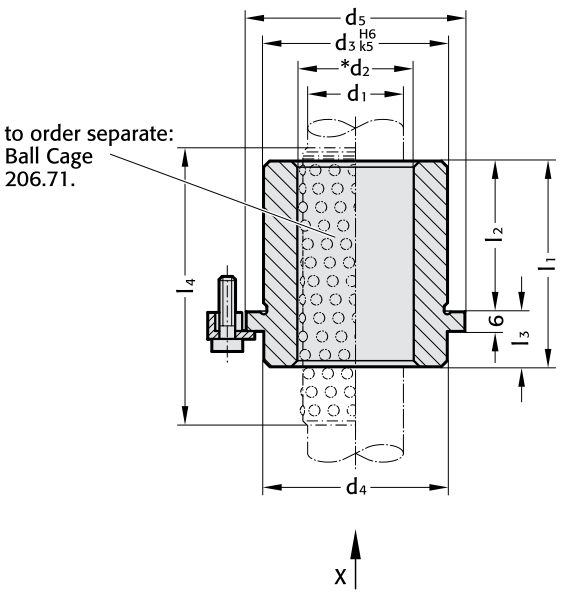
Headed guide bush	= 210.44.						
d_1 = 40 mm	= 040.	Ball Cage	= 206.71.	Tolerance	yellow	= .10
l2 = 30 mm	= 030.	d_1 = 40 mm	= 040.	range –	green	= .20
Tolerance range – red	= 30	l = 120 mm	= 120		red	= .30
Order No	= 210.44.040.030.30	Order No	= 206.71.040.120			

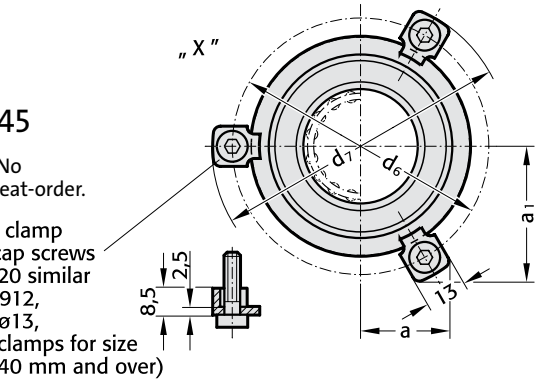
FIBRO

210.46.
206.71.

Headed Guide Bushes for Ball Bearings similar AFNOR Ball Cages

210.46.





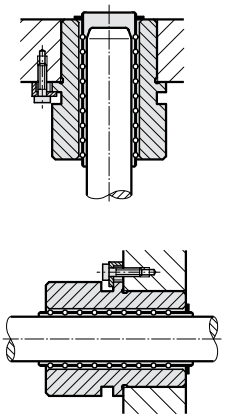
207.45

Order No
for repeat-order.

screw clamp
with cap screws
M6 x 20 similar
DIN 6912,
head ø13,
(four clamps for size
d_1 = 40 mm and over)

* Preloading see Colour Code Combinations – pages D10 and D11.

Mounting Examples



Material:

Guide Bush: tool steel
Hardness: 62 ± 2 HRC

Ball Cage: brass

Balls: hardened steel to DIN 5401

Execution:

Bearing surfaces honed.
Outside diameter fine-ground.

Note:

Receiving bores: H6 tolerance.
Guide bushes are retained by three screw clamps – sizes from Ø d_1 = 40 mm and over are supplied with four clamps.
FIBRO guide bushes for ball bearings are fully interchangeable with the corresponding sizes of the FIBRO guide bushes of sintered ferrite.

Notes on sliding- and rolling type guides see page D 9.
For guide pillars see pages D 14, D15, D 17, D 18 and D 31.

210.46.

d_1	16	20	25	32	40	50	63
l_3	10	12	12	15	15	18	20
l_2	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$	$l_1/l/l_4$
23	33/45/44						
30	40/45/44	42/45/44	42/45/44	45*/56/55			
38	48*/56/56	50/56/56	50/56/56	53*/71/70			
48	58*/63/64	60/71/72	60/71/72	63/71/70	63/80/80		
61			73*/80/80	76/80/80	76/95/95	79/95/95	
78			90*/105/105	93*/105/105	93*/105/105	96/105/105	
98				113*/120/120	113*/120/120	116*/140/140	118*/120/120
123							143*/160/160

* not available ex-stock – supply on request!
l = Nominal ordering length
l_4 = Manufacturing length

210.46./207.45

d_1	16	20	25	32	40	50	63
d_2	22	26	31	40	48	58	71
d_3	28	32	40	50	63	80	90
d_4	29	32	40	50	63	80	90
d_5	32	36	45	56	70	90	110
d_6	45	49	57	67	81	101	121
d_7	57,7	61,7	69,7	79,7	93,7	113,7	131,7
d_8	31	35	43,5	53,5	67	87	107
a	18,9	9,9	21,9	24,4	36	43	50,1
a_1	26,9	28,6	32,1	36,4	36	43	50,1

Ordering Code (example):

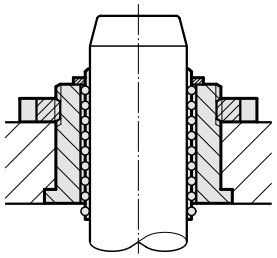
Headed guide bush	= 210.46.						
d_1 = 40 mm	= 040.	Ball Cage	= 206.71.			Tolerance	yellow = .10
l_2 = 30 mm	= 030.	d_1 = 40 mm	= 040.			range –	green = .20
Tolerance range – red	= 30	l = 120 mm	= 120				red = .30
Order No	= 210.46.040.030.30	Order No	= 206.71.040.120				

Guide Bushes with Collar for Ball Bearings similar AFNOR
Ball Cages
Slotted Nuts

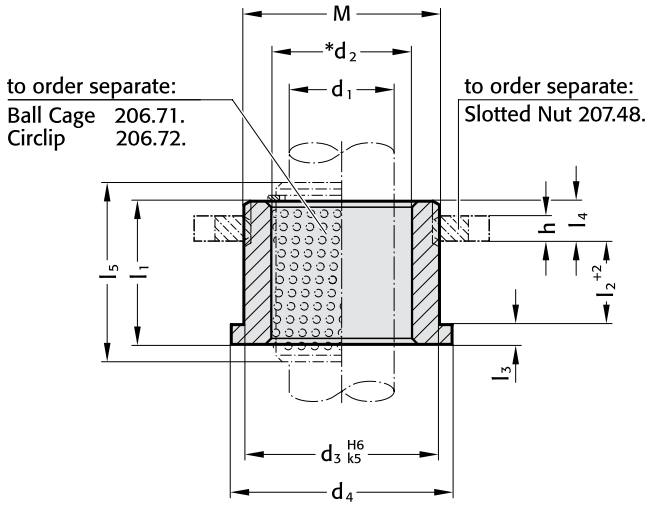
FIBRO

210.45. 206.71.
207.48.

Mounting Example



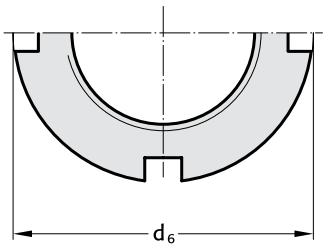
210.45.



* Preloading see Colour Code Combinations – pages D10 and D11.

207.48.

Slotted Nut



Material:

Guide Bush:	tool steel
Hardness:	62±2 HRC
Ball Cage:	brass
Balls:	hardened steel to DIN 5401

Execution:

Bearing surfaces fine-ground and honed.
Outside diameter fine-ground.

Note:

Receiving bore tolerance: H6.

The guide bushes are retained by slotted nuts.

210.45.

d_1	16	20	25	32	40	50
d_2	22	26	31	40	48	58
d_3	28	32	40	50	63	80
d_4	32	36	45	56	70	90
d_6	40	44	55	65	81	100
M	M 27×1	M 30×1	M 39×1	M 48×1	M 60×1	M 76×1
h	3	4	4	5	6	8
l	24	24	31	40	50	50
l_5	24	24	32	40	50	50
l_1	16	17	22	26	32	41
l_2	8	8	12	15	20	26
l	28	28	40	40	50	63
l_5	28	28	40	40	50	65
l_1	20	21	26	31	39	49
l_2	12	12	16	20	27	34
l	–	31	40	50	56	–
l_5	–	32	40	50	55	–
l_1	–	25	31	38	47	–
l_2	–	16	21	27	35	–
l_3	3	3	3	4	4	5
l_4	5	6	7	7	8	10

l = Nominal ordering length
l_5 = Manufacturing length
l_2 = assembly dimension

Ordering Code (example):

Guide Bushes	= 210.45.	Tolerance	yellow = .10
d_1 = 25 mm	= 025.	range –	green = .20
l_1 = 22 mm	= 022.		red = .30
Tolerance range – red	= 30		
Order No	= 210.45.025.022.30		

207.48.

Ordering Code (example):

Slotted Nut	= 207.48.
d_1 = 40 mm	= 040
Order No	= 207.48.040

206.71. (Preferred length)

Ordering Code (example):

Ball Cage	= 206.71.
d_1 = 40 mm	= 040
l = 56 mm	= 056
Order No	= 206.71.040.056

206.72.

Ordering Code (example):

Circlip	= 206.72.
d_1 = 40 mm	= 040
Order No	= 206.72.040

FIBRO

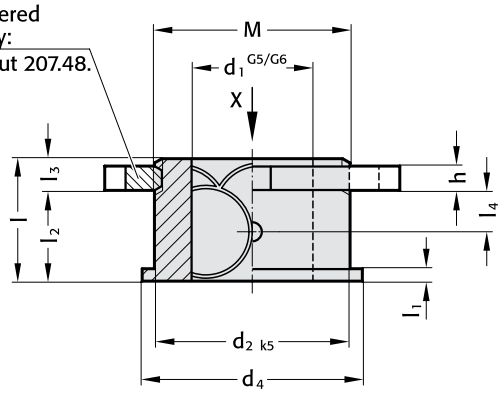
210.85.
207.48.

Guide Bushes with Collar, Bronze-coated to AFNOR Slotted Nuts

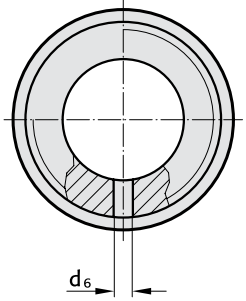
210.85.

Guide Bush with Collar

to be ordered separately:
Slotted Nut 207.48.

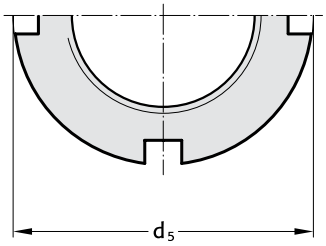


View X
without Slotted Nut

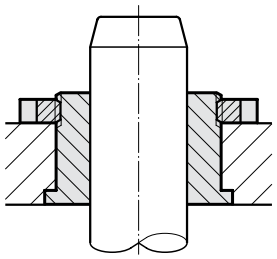


207.48.

Slotted Nut



Mounting example:



Note:

Recieving bore tolerance: H6

Guide pairing:

We recommend the use of guide pillars from pairing class .20/.30.

Material: 1.0503 (C45)

Ø d_2 induction hardened 500+100 HV 10

Execution: Bronze coated internal bore
outside diameter fine ground.

Ø d_1 up to d_1 = 25 tolerance G6
from d_1 = 32 tolerance G5

210.85.

d_1	16	20	25	32	40	50
tol.	+0,017 +0,006	+0,020 +0,007	+0,020 +0,007	+0,020 +0,009	+0,020 +0,009	+0,020 +0,009
d_2	28	32	40	50	63	80
d_4	32	36	45	56	70	90
d_5	40	44	55	65	81	100
d_6	3	4	4	4	7	7
h	3	4	4	5	6	8
M	M27×1	M30×1	M39×1	M48×1	M60×1	M76×1
l_1	3	3	3	4	4	5
l_2	11 15	15 19	19 24	24 31	31 39	31 39
l_3	5	6	7	7	8	10
l_4	5,5 7,5	7,5 9,5	9,5 12	12 15,5	15,5 19,5	15,5 19,5
l	16 20	21 25	26 31	31 38	39 47	41 49

Ordering Code (example):

Guide Bush	= 210.85.
d_1 = 40 mm	= 040.
l = 47 mm	= 047
Order No	= 210.85.040.047

Ordering Code (example):

Slotted Nut	= 207.48.
d_1 = 40 mm	= 040
Order No	= 207.48.040

Headed Guide Bushes to DIN 9831/ ISO 9448-6, Steel, with bronze coated internal bore