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VICO PARTS
INDUSTRIAL COMPONENTS

BUSSEN

Bagues

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PRODUCTS GENERAL INDEX

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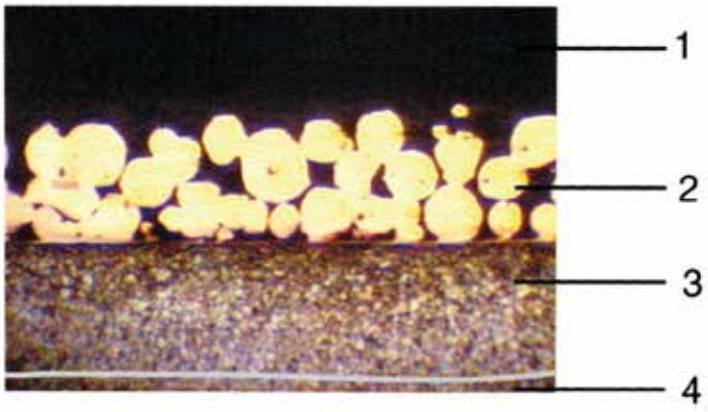
CHAPTER 1



1. SF-1 bushes characteristics

1.	*PTFE*	0,01 ~ 0,03 mm
2.	*Porous bronze*	0,2 ~ 0,30 mm
3.	*Steel backing*	0,70 ~ 2,30 mm
4.	*Tin plating*	~ 0,005 mm
	Copper-plating	~ 0,008 mm

1.1 Functionality and characteristics

The SF-1 bushes present multiple characteristics which can be summarized as follows:

- *exempt from lubrication*
- *elevated load capacities* - 140 N/mm^2 - *on large elasto-plastic surfaces*
- *elevated flow and low friction coefficients both static and dynamic (no stick-slip effect)*
- *the exercising temperature is from -195 °C to +280 °C.*
- *vibration, noise and pollution maximally reduced. The possibility to use coupling metals which have low hardness facilitating the work and reducing costs*
- *light weight materials, compact and with minimum encumbrance*
- *ease of mounting*
- *oil or water are not absorbed, presenting low expansion, high conductibility and excellent thermal stability*
- *elevated chemical resistance: easily covered with materials resistant to liquid, gas or solids which are chemically aggressive using a supplementary galvanic layer.*

1.2 Use

SF-1 bushes are widely used in hydraulic vehicles, automobiles, motorcycles, agricultural machines, textile machines, printing machines, gymnastic equipment and many other applications. SF-1 bushes generally have good initial adaptability with a wear of 0,01 ~ 0,02mm.
During the adjustment period a part of the surface in PTFE is deposited on the shaft or on the contact surface (fig. 1) forming a self-lubricating film capable of reducing friction and wear. After this initial phase and with progressive increases in the functioning hours, once 80% o the PTFE is consumed, the bush is considered depleted and therefore should be replaced.
The roughness of the surface must generally be inferior to 0,8 µ. The typical wear curve is shown in fig. 2.

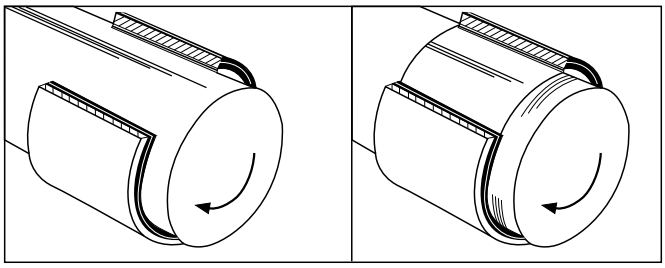


Fig. 1

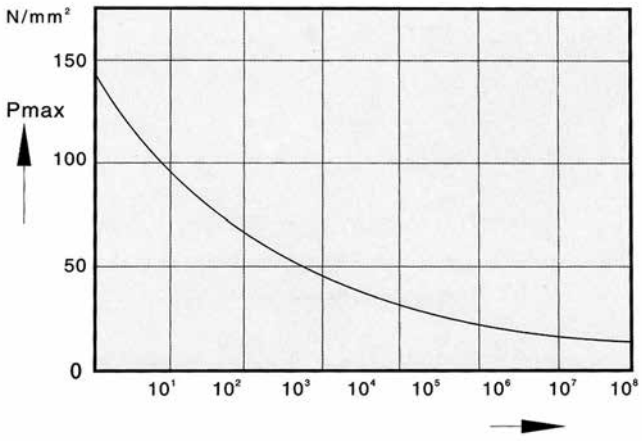


Fig. 2

1.3 Load capacity

*The load capacity of the bush is expressed using the load factor Pv (N/mm² • m/s) where P represents the specific load and v the velocity. The specific maximum load applicable in constant conditions can reach a value of (140 N/mm²), while in dynamic conditions, therefore with rotary and oscillating movement, the specific load limit can decrease to 56 N/mm². The limit of the load can be influenced by the temperature: it is important to maintain constant temperature in order to obtain the best performances and therefore to increase the duration of the bush. If we consider **F** as total load, **d** the internal diameter and **b** the length, the load limit will be equal to:*

$$p = \frac{F}{d \cdot b}$$

The lubrication can influence the load factor too: in fact the maximum specific load p depends on the conditions of the greasing, as shown in fig. 3.

Pv factor with dry and lubricating condition

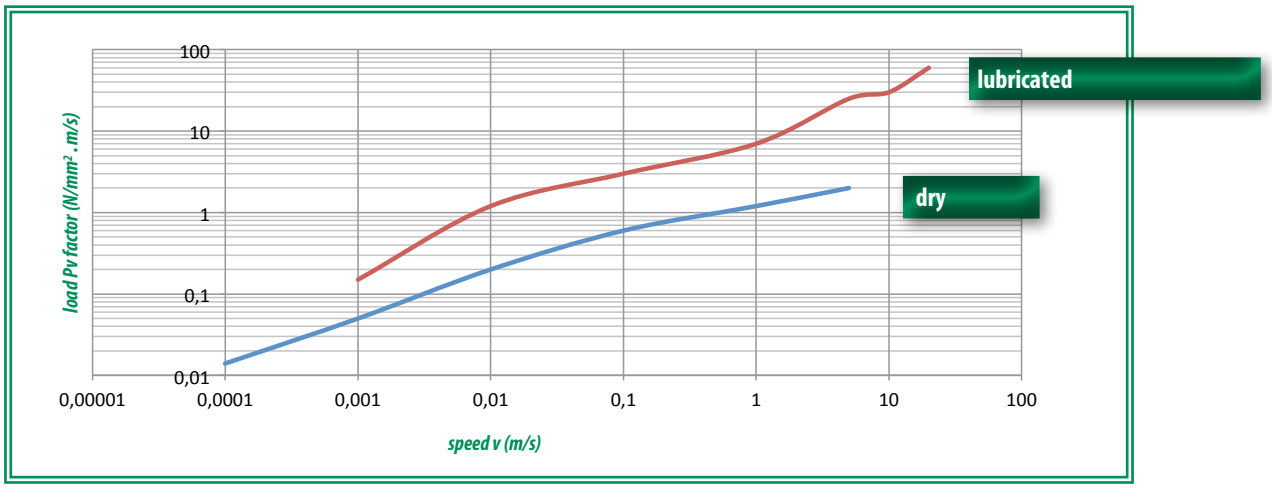


Fig. 3

1.4 Lubricants fluids

Despite the material used for the construction of the SF-1 is of good quality and usable when dry, when used in the presence of fluids, liquids and or lubricants the limits Pv increase sensibly; in fact, the presence of fluids allous the dispersion of the friction heat possible and the contact between the surfaces, increasing the useful duration of the bush. The presence of lubricating fluids creates the adapt conditions for the hydrodynamic functioning, incrementing noticeably the sliding velocity bling the specific load the seme. It is worthwhile to always verify the compatibility of the bush with the fluid present because an undesirable effect could be experienced in the use of one fluid rather than another. It is advisable to try to immerge hall of the bush in the fluid for approximately 2 weeks to verify that the bush remains unchanged in every part.

1.5 Temperature

In case the temperature remains between 0 °C and 100 °C, the impact of the friction coefficient is rather limited; once this limit is surpassed, the friction coefficient increases rapidly by approximately 50%. With an estimated temperature of over 200 °C and with costant load factor, the duration of the bush would be reduced by 80% with respect to that registered at 20 °C (table 1).

Limit Pv at various temperature				
		Pv Limit (N/mm² • m/s)		
Speed (m/s)	Load (N/mm²)	20 °C	100 °C	200 °C
0,0001	140	0,014	0,014	0,014
0,001	50	0,5	0,3	0,1
0,01	6	0,6	0,35	0,12
1,0	1,2	1,2	0,72	0,24
5,0	0,4	2,0	1,0	0,40

SF-1 and SF-1F Bushes tolerances

SF-1 - SF-1F

Outer diameter D	Outer diameter tolerances D	Thickness tolerances S_B			Chamfer dimensions S_B	f_1	f_2
≤ 10	+ 0,055 + 0,025	0,75		0 - 0,020	0,75	0,5 ± 0,3	- 0,05 - 0,30
10 < ≤ 18	+ 0,065 + 0,030	1		+ 0,005 - 0,020	1	0,6 ± 0,4	- 0,1 - 0,4
18 < ≤ 30	+ 0,075 + 0,035	1,5		+ 0,005 - 0,025	1,5	0,6 ± 0,4	- 0,1 - 0,6
30 < ≤ 50	+ 0,085 + 0,045	2		+ 0,005 - 0,030	2	1,2 ± 0,4	- 0,1 - 0,7
50 < ≤ 80	+ 0,100 + 0,055	2,5	D ≤ 80	+ 0,005 - 0,040	2,5	1,8 ± 0,6	- 0,2 - 1,0
80 < ≤ 120	+ 0,120 + 0,070	2,5	80 < D ≤ 120	- 0,010 - 0,060	2,5	1,8 ± 0,6	- 0,2 - 1,0
120 < ≤ 180	+ 0,170 + 0,100	2,5	D > 120	- 0,035 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0
180 < ≤ 305	+ 0,255 + 0,125	2,5	D > 120	- 0,035 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0

Recommended mounting tolerances:

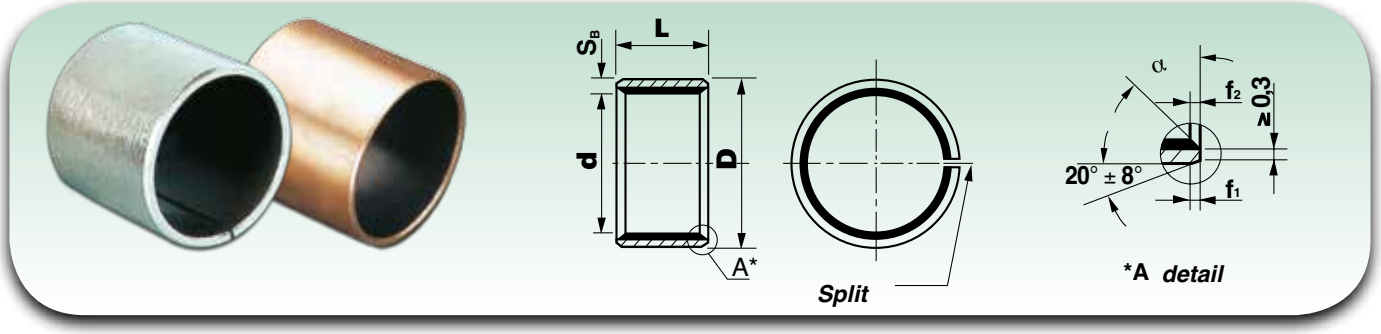
Shaft:	*Bore:*
≤ 4 = h 6	*≤ 4 = H 6*
from 5 to 75 = f7	*> 4 = H 7*
≥ 80 = h 8	

Recommended mounting tolerances SF-1F:

Shaft:	*Bore:*
f7	*≤ 4 = H 6*
	> 4 = H 7

Tolerance values of metric bushings SF-1 and SF-1F comply with standard ISO 3547-1:2006

SF-1 Bushes - Metric sizes

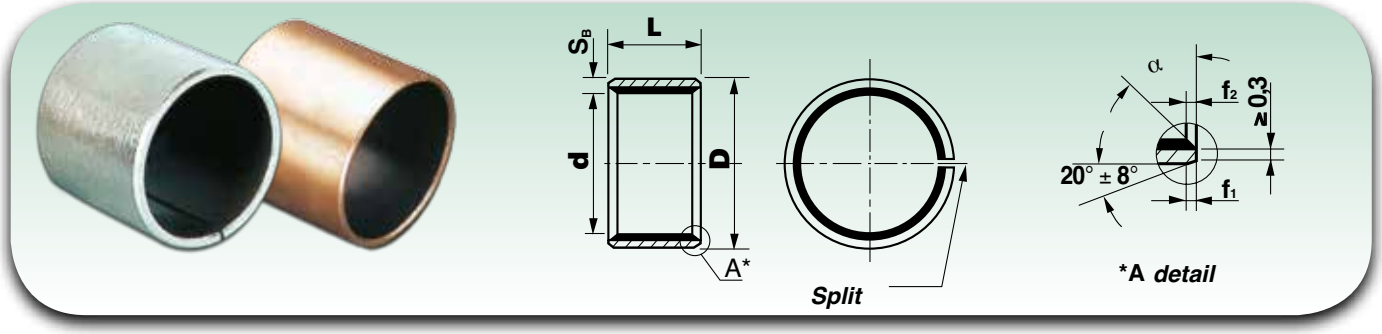


Dimensions (mm)		
d	D	$L^{\pm 0,25}$
2	3,5	3
		5
3	4,5	3
		4
		5
		6
4	5,5	3
		4
		5
		6
		7
		8
		9
		10
5	7	4
		5
		6
		7
		8
		10
6	8	4
		5
		6
		7
		8
		10
7	9	10
8	10	5
		6
		7
		8
		10
		12
		15
		20
10	12	5
		6
		7
		8
		10
		12
		13,5
		15
		20
12	14	6
		8
		10
		12
		15
		20
		25
13	15	8

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
13	15	10
		15
		20
14	16	5
		10
		12
		14
		15
		20
		25
15	17	8
		10
		12
		15
		20
		25
16	18	5
		8
		10
		12
		15
		16
		20
		25
17	19	10
		12
		15
		17
		20
18	20	8
		10
		12
		15
		18
		20
		25
20	22	10
		15
		20
		25
		30
20	23	5
		10
		12
		15
		20
		25
		30
22	25	10
		12
		15

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
22	25	20
		25
		30
24	27	15
		20
		25
		30
24	28	15
		20
		24
		25
		30
25	28	5
		10
		12
		15
		20
		25
		30
		40
		50
25	29	12
28	32	10
		12
		15
		20
		25
		28
		30
		40
		43
30	34	10
		12
		15
		20
		25
		30
		32
		40
32	36	8
		20
		25
		30
		40
35	39	12
		15
		20
		25
		30
		35
		40
		50

SF-1 Bushes - Metric sizes

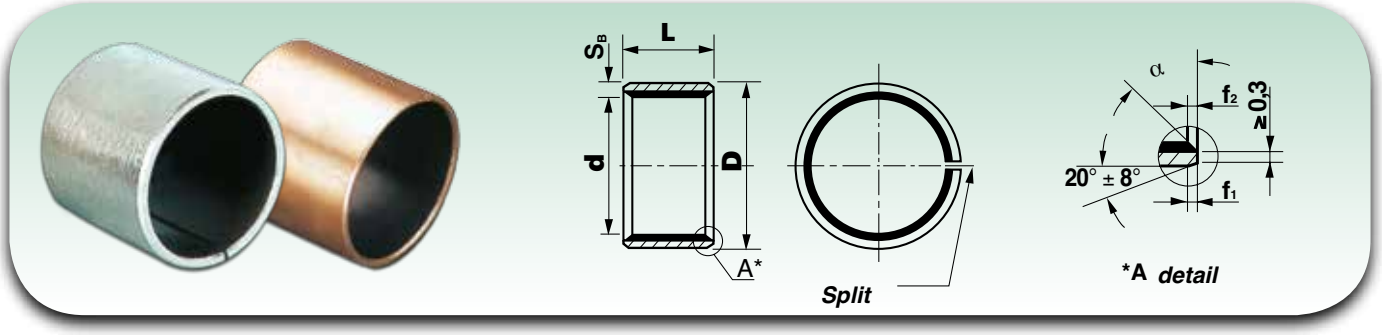


Dimensions (mm)		
d	D	$L^{\pm 0,25}$
37	41	20
38	42	15
		20
		25
		30
		38
		40
40	44	12
		15
		20
		25
		30
		35
		40
		45
		50
45	50	20
		25
		30
		40
		45
		50
50	55	20
		25
		30
		40
		50
		60
55	60	10
		20
		25
		30
		35
		40
		50
		55
		60
60	65	20
		25
		30
		40
		50
		55
		60
		70
65	70	30
		40
		50
		60
		65
		70

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
70	75	30
		40
		50
		60
		70
		80
75	80	30
		40
		50
		60
		70
		75
		80
		90
80	85	40
		50
		60
		70
		80
		100
85	90	30
		40
		50
		60
		80
		85
		100
90	95	40
		50
		60
		80
		90
		100
		120
95	100	20
		50
		60
		80
		95
		100
		140
100	105	50
		60
		70
		80
		100
		115
105	110	60
		80
		100

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
105	110	105
		115
110	115	50
		60
		80
		100
		115
115	120	50
		60
		70
		115
120	125	50
		60
		70
		80
		95
		100
		120
125	130	60
		100
		115
		125
130	135	50
		60
		80
		100
		130
135	140	60
		70
		80
		100
140	145	50
		60
		80
		100
		120
		140
145	150	60
		100
150	155	50
		60
		80
		100
		150
155	160	60
		100
160	165	60
		80
		100
		115
		160

SF-1 Bushes - *Metric sizes*



Dimensions (mm)		
d	D	$L^{\pm 0,25}$
165	170	60
		100
170	175	60
		100
175	180	60
		100
180	185	60
		80
		100
		180
190	195	60
		80
		100
		190
200	205	60
		80

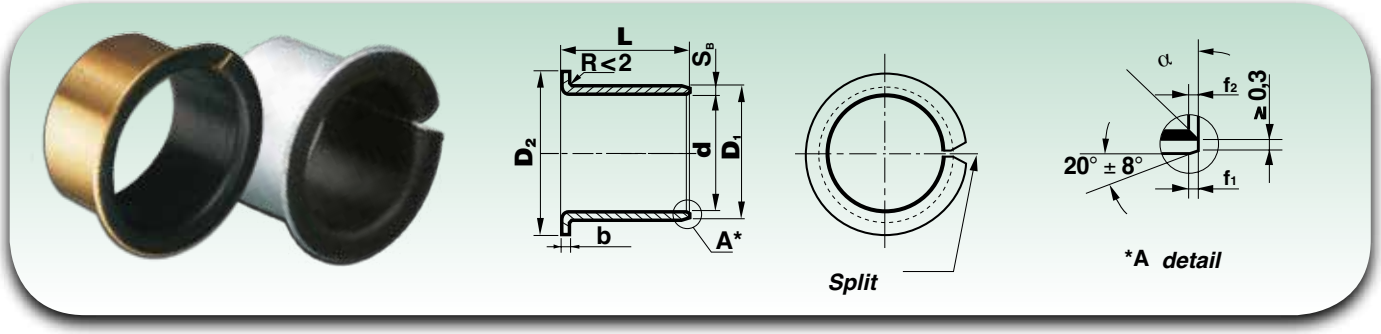
Dimensions (mm)		
d	D	$L^{\pm 0,25}$
200	205	100
		200
205	210	60
		100
210	215	60
		100
215	220	60
		100
220	225	60
		80
		100
		220
230	235	60
		100
240	245	60
		100

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
250	255	60
		80
		100
		250
260	265	80
		100
		260
280	285	60
		80
		100
		280
300	305	60
		80
		100
		300
-	-	-

To order, please specify: SF-1 + d + L

Bushes made according drawings can be supplied if large quantities are ordered.

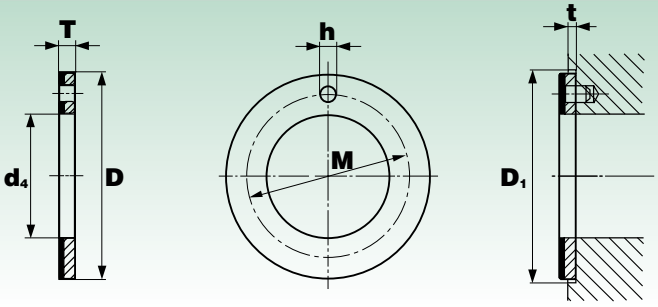
SF-1F Flanged Bushes - Metric sizes



Designation	Dimensions (mm)				
	d	D_1	$D_2^{\pm 0,50}$	$L^{\pm 0,25}$	$b^{-0,2}$
F 3-4	3	4,5	7	4	0,75
F 4-4	4	5,5	9	4	0,75
F 4-5				5	
F 4-6				6	
F 4-7				7	
F 4-8				8	
F 5-4	5	7	10	4	1
F 5-5				5	
F 5-6				6	
F 5-7				7	
F 5-8				8	
F 6-4	6	8	12	4	1
F 6-7				7	
F 6-8				8	
F 6-12,7				12,7	
F 8-5,5	8	10	15	5,5	1
F 8-6				6	
F 8-7,5				7,5	
F 8-8				8	
F 8-9,5				9,5	
F 8-10				10	
F 10-5,5	10	12	18	5,5	1
F 10-7				7	
F 10-9				9	
F 10-12				12	
F 10-17				17	
F 12-7	12	14	20	7	1
F 12-8				8	
F 12-9				9	
F 12-12				12	
F 12-15				15	
F 12-17				17	
F 14-12	14	16	22	12	1
F 14-17				17	
F 15-9	15	17	23	9	1
F 15-12				12	
F 15-17				17	
F 16-12	16	18	24	12	1
F 16-17				17	
F 18-12	18	20	26	12	1
F 18-17				17	
F 18-20				20	
F 18-22				22	
F 20-11,5	20	23	30	11,5	1,5
F 20-12				12	
F 20-15				15	
F 20-16,5				16,5	
F 20-17				17	

Designation	Dimensions (mm)				
	d	D_1	$D_2^{\pm 0,50}$	$L^{\pm 0,25}$	$b^{-0,2}$
F 20-21,5	20	23	30	21,5	1,5
F 20-22				22	
F 22-15	22	25	32	15	1,5
F 22-20				20	
F 25-11,5	25	28	35	11,5	1,5
F 25-12				12	
F 25-16,5				16,5	
F 25-17				17	
F 25-21,5				21,5	
F 25-22				22	
F 30-16	30	34	42	16	2
F 30-26				26	
F 30-30				30	
F 35-16	35	39	47	16	2
F 35-20				20	
F 35-26				26	
F 40-16	40	44	53	16	2
F 40-26				26	
F 40-40				40	
F 45-16	45	50	60	16	2,5
F 45-20				20	
F 45-25				25	
F 45-26				26	
F 45-30				30	
F 45-40				40	
F 45-50				50	
F 50-20	50	55	65	20	2,5
F 50-30				30	
F 50-40				40	
F 55-30	55	60	70	30	2,5
F 55-40				40	
F 60-30	60	65	75	30	2,5
F 60-40				40	
F 60-50				50	
F 65-30	65	70	80	30	2,5
F 65-40				40	
F 70-30	70	75	85	30	2,5
F 70-40				40	
F 75-30	75	80	90	30	2,5
F 75-40				40	
F 80-30	80	85	95	30	2,5
F 80-40				40	
F 85-30	85	90	100	30	2,5
F 85-40				40	
F 90-30	90	95	105	30	2,5
F 90-40				40	
F 95-30	95	100	110	30	2,5
F 95-40				40	

WC SF-1 Thrust washers - Metric sizes



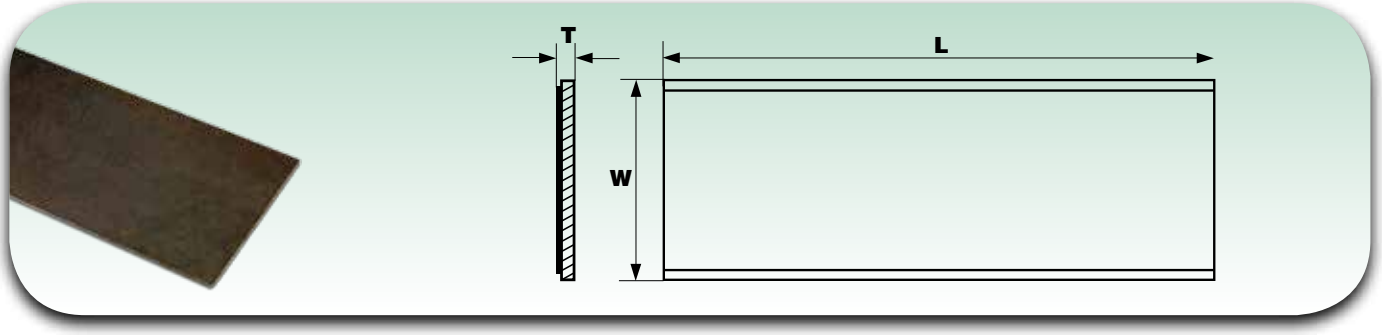
Designation	Dimensions (mm)				Mounting dimensions (mm)		
	d_4 $^{\pm 0,25}$	D $^{-0,25}$	T $^{-0,05}$	M $^{\pm 0,15}$	h $^{+0,4}_{+0,1}$	t $^{\pm 0,2}$	D_1 $^{+0,12}$
WC-1B 10	**10**	20	1,5	15	1,5	1	20
WC-1B 12	**12**	24	1,5	18	1,5	1	24
WC-1B 14	**14**	26	1,5	20	2	1	26
WC-1B 16	**16**	30	1,5	23	2	1	30
WC-1B 18	**18**	32	1,5	25	2	1	32
WC-1B 20	**20**	36	1,5	28	3	1	36
WC-1B 22	**22**	38	1,5	30	3	1	38
WC-1B 24	**24**	42	1,5	33	3	1	42
WC-1B 26	**26**	44	1,5	35	4	1	44
WC-1B 28	**28**	48	1,5	38	4	1	48
WC-1B 32	**32**	54	1,5	43	4	1	54
WC-1B 38	**38**	62	1,5	50	4	1	62
WC-1B 40	**40**	64	1,5	52	4	1	64
WC-1B 42	**42**	66	1,5	54	4	1	66
WC-1B 48	**48**	74	2	61	4	1,5	74
WC-1B 52	**52**	78	2	65	4	1,5	78
WC-1B 62	**62**	90	2	76	4	1,5	90
WC-1B 90	**90**	130	2	110	5	2	130

To order, please specify: designation

The tolerance values given on this page comply with standard ISO 6525:1983

A dowel or counter grub screw should be used to prevent rotation, but the head must be recessed at least 0,25 mm below the thrust washer surface.

NSTR-S Strips *(steel covering) - Metric sizes*



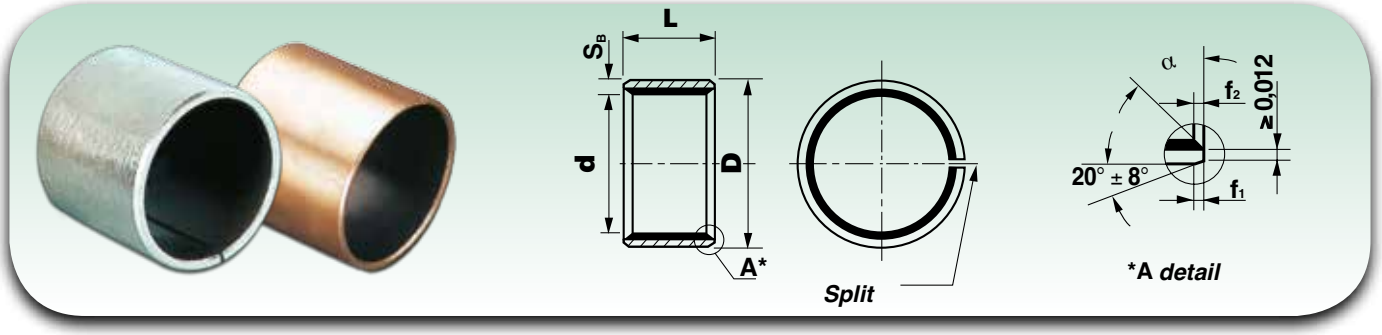
Designation	Dimensions (mm)		
	Length L $^{\pm 1}$	Width W $^{\pm 1}$	Thickness T $^{-0.05}$
NSTR-S 050125	500	125	0,50
NSTR-S 075125	500	125	0,75
NSTR-S 100125	500	125	1,0
NSTR-S 150125	500	125	1,5
NSTR-S 200125	500	125	2,0
NSTR-S 250125	500	125	2,5
NSTR-S 300125	500	125	3

To order, please specify: designation

On request, available also:

- *with bronze covering (NSTR-SB)*
- *090 version (NSTR 090)*

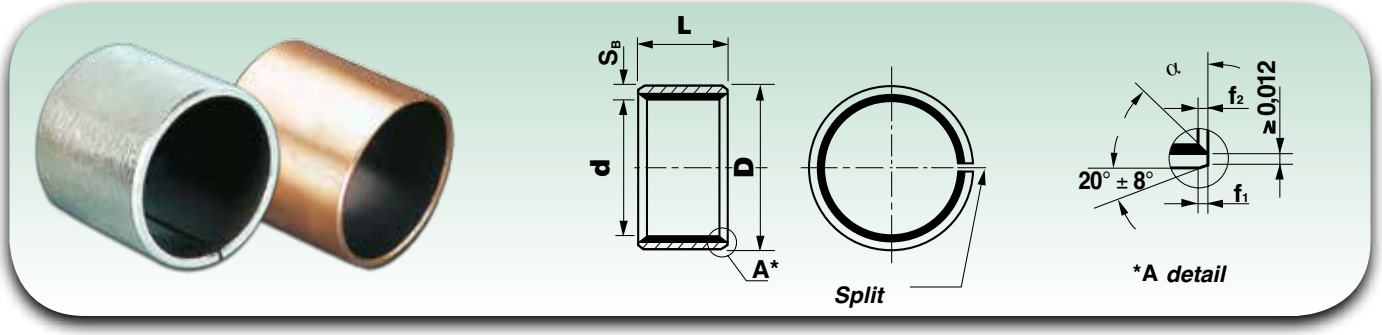
SF-1 Bushes- Inches sizes



Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
1/8-1/8	1/8	3,18	3/16	4,76	1/8	3,18
1/8-3/16					3/16	4,76
5/32-5/32	5/32	3,97	7/32	5,56	5/32	3,97
5/32-1/4					1/4	6,35
3/16-3/16	3/16	4,76	1/4	6,35	3/16	4,76
3/16-1/4					1/4	6,35
3/16-3/8					3/8	9,53
1/4-1/4	1/4	6,35	5/16	7,94	1/4	6,35
1/4-3/8					3/8	9,53
5/16-3/8	5/16	7,94	3/8	9,53	3/8	9,53
5/16-1/2					1/2	12,70
3/8-3/16	3/8	9,53	15/32	11,91	3/16	4,76
3/8-1/4					1/4	6,35
3/8-3/8					3/8	9,53
3/8-1/2					1/2	12,70
3/8-5/8					5/8	15,88
3/8-3/4					3/4	19,05
7/16-3/8	7/16	11,11	17/32	13,49	3/8	9,53
7/16-1/2					1/2	12,70
7/16-3/4					3/4	19,05
1/2-1/4	1/2	12,70	19/32	15,80	1/4	6,35
1/2-3/8					3/8	9,53
1/2-1/2					1/2	12,70
1/2-5/8					5/8	15,88
1/2-3/4					3/4	19,05
1/2-7/8					7/8	22,23
9/16-5/16	9/16	14,29	21/32	16,67	5/16	7,94
9/16-3/8					3/8	9,53
9/16-1/2					1/2	12,70
9/16-5/8					5/8	15,88
9/16-3/4					3/4	19,05
5/8-1/4	5/8	15,88	23/32	18,26	1/4	6,35
5/8-1/2					1/2	12,70
5/8-5/8					5/8	15,88
5/8-3/4					3/4	19,05
5/8-7/8					7/8	22,23
5/8-1					1	25,40
11/16-7/8	11/16	17,46	25/32	19,84	7/8	22,23
3/4-1/4	3/4	19,05	7/8	22,23	1/4	6,35
3/4-3/8					3/8	9,53
3/4-1/2					1/2	12,70
3/4-5/8					5/8	15,88
3/4-3/4					3/4	19,05
3/4-1					1	25,40
13/16-3/4	13/16	20,64	15/16	23,81	3/4	19,05
13/16-1 1/8					1 1/8	28,58
7/8-1/4	7/8	22,23	1	25,40	1/4	6,35

Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
7/8-3/8	7/8	22,23	1	25,40	3/8	9,53
7/8-3/4					3/4	19,05
7/8-7/8					7/8	22,23
7/8-1					1	25,40
7/8-1 1/4					1 1/4	31,75
1-3/8	1	25,40	1 1/8	28,58	3/8	9,53
1-1/2					1/2	12,70
1-3/4					3/4	19,05
1-1					1	25,40
1-1 1/4					1 1/4	31,75
1-1 1/2					1 1/2	38,10
1 1/8-3/8	1 1/8	28,58	1 9/32	32,54	3/8	9,53
1 1/8-5/8					5/8	15,88
1 1/8-3/4					3/4	19,05
1 1/8-1					1	25,40
1 1/4-3/8	1 1/4	31,75	1 13/32	35,72	3/8	9,53
1 1/4-3/4					3/4	19,05
1 1/4-7/8					7/8	22,23
1 1/4-1					1	25,40
1 1/4-1 1/4					1 1/4	31,75
1 1/4-1 3/4					1 3/4	44,45
1 3/8-5/8	1 3/8	34,93	1 17/32	38,89	5/8	15,88
1 3/8-3/4					3/4	19,05
1 3/8-1					1	25,40
1 3/8-1 3/8					1 3/8	34,93
1 3/8-1 1/2					1 1/2	38,10
1 3/8-1 3/4					1 3/4	44,45
1 1/2-1/2	1 1/2	38,10	1 21/32	42,07	1/2	12,70
1 1/2-1					1	25,40
1 1/2-1 1/8					1 1/8	28,58
1 1/2-1 1/4					1 1/4	31,75
1 1/2-1 1/2					1 1/2	38,10
1 1/2-2					2	50,80
1 5/8-1	1 5/8	41,28	1 25/32	45,24	1	25,40
1 5/8-1 1/2					1 1/2	38,10
1 3/4-1	1 3/4	44,45	1 15/16	49,21	1	25,40
1 3/4-1 1/2					1 1/2	38,10
1 3/4-1 3/4					1 3/4	44,45
1 3/4-2					2	50,80
1 7/8-3/4	1 7/8	47,63	2 1/16	52,39	3/4	19,05
1 7/8-1					1	25,40
1 7/8-1 7/8					1 7/8	47,63
1 7/8-2 1/4					2 1/4	57,15
2-1/2	2	50,80	2 3/16	55,56	1/2	12,70
2-1					1	25,40
2-1 1/2					1 1/2	38,10
2-1 3/4					1 3/4	44,45

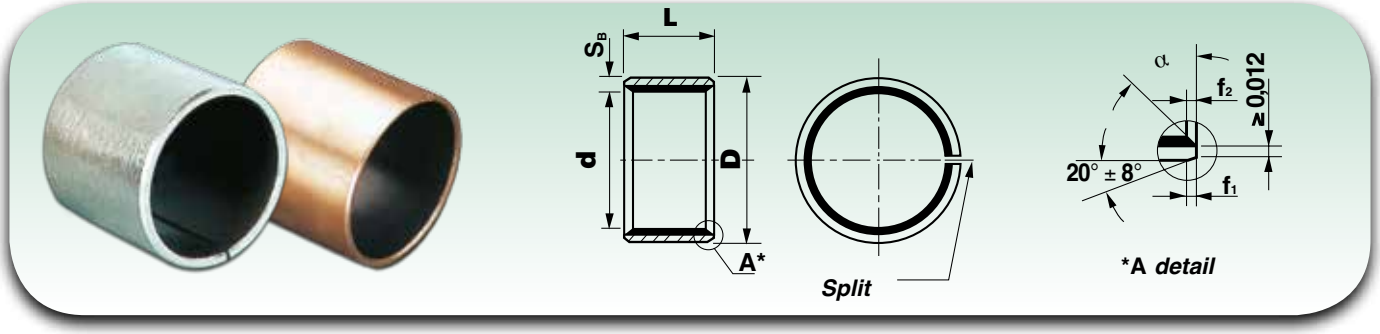
SF-1 Bushes- Inches sizes



Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
2 - 2	2	50,80	2 3/16	55,56	2	50,80
2 - 2 1/2					2 1/2	63,50
2 1/8 - 3	2 1/8	53,98	2 5/16	58,74	3	76,20
2 1/4 - 1 3/4	2 1/4	57,15	2 7/16	61,91	1 3/4	44,45
2 1/4 - 2					2	50,80
2 1/4 - 2 1/4					2 1/4	57,15
2 1/4 - 2 1/2					2 1/2	63,50
2 1/4 - 3					3	76,20
2 1/4 - 3 1/2					3 1/2	88,90
2 1/4 - 3 3/4					3 3/4	95,25
2 1/4 - 4					4	101,60
2 1/4 - 4 1/4					4 1/4	107,95
2 1/2 - 1	2 1/2	63,50	2 11/16	68,26	1	25,40
2 1/2 - 1 5/8					1 5/8	41,28
2 1/2 - 2					2	50,80
2 1/2 - 2 1/2					2 1/2	63,50
2 1/2 - 3					3	76,20
2 1/2 - 3 1/2					3 1/2	88,90
2 1/2 - 3 3/4					3 3/4	95,25
2 1/2 - 4					4	101,60
2 1/2 - 4 1/2					4 1/2	114,30
2 1/2 - 4 3/4					4 1/4	120,65
2 3/4 - 2	2 3/4	69,85	2 15/16	74,61	2	50,80
2 3/4 - 2 1/4					2 1/4	57,15
2 3/4 - 2 1/2					2 1/2	63,50
2 3/4 - 3					3	76,20
2 3/4 - 3 1/2					3 1/2	88,90
2 3/4 - 3 3/4					3 3/4	95,25
2 3/4 - 4					4	101,60
2 3/4 - 4 1/2					4 1/2	114,30
2 3/4 - 4 3/4					4 3/4	120,65
2 3/4 - 5					5	127,00
2 7/8 - 2	2 7/8	73,03	3 1/16	77,79	2	50,80
2 7/8 - 2 1/4					2 1/4	57,15
2 7/8 - 2 1/2					2 1/2	63,50
2 7/8 - 3					3	76,20
2 7/8 - 3 1/2					3 1/2	88,90
2 7/8 - 3 3/4					3 3/4	95,25
2 7/8 - 4					4	101,60
2 7/8 - 4 1/2					4 1/2	114,30
2 7/8 - 4 3/4					4 3/4	120,65
2 7/8 - 5					5	127,00
3 - 2	3	76,20	3 3/16	80,96	2	50,80
3 - 2 1/4					2 1/4	57,15
3 - 2 1/2					2 1/2	63,50
3 - 3					3	76,20
3 - 3 1/2					3 1/2	88,90

Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
3 - 3 3/4	3	76,20	3 3/16	80,96	3 3/4	95,25
3 - 4					4	101,60
3 - 4 1/2					4 1/2	114,30
3 - 4 3/4					4 3/4	120,65
3 - 5					5	127,00
3 1/4 - 2	3 1/4	82,55	3 7/16	87,31	2	50,80
3 1/4 - 2 3/8					2 3/8	60,33
3 1/4 - 2 1/2					2 1/2	63,50
3 1/4 - 3					3	76,20
3 1/4 - 3 1/2					3 1/2	88,90
3 1/4 - 3 3/4					3 3/4	95,25
3 1/4 - 4					4	101,60
3 1/4 - 4 1/2					4 1/2	114,30
3 1/4 - 4 3/4					4 3/4	120,65
3 1/4 - 5					5	127,00
3 1/2 - 2	3 1/2	88,90	3 11/16	93,66	2	50,80
3 1/2 - 2 3/8					2 3/8	60,33
3 1/2 - 2 1/2					2 1/2	63,50
3 1/2 - 3					3	76,20
3 1/2 - 3 1/2					3 1/2	88,90
3 1/2 - 3 3/4					3 3/4	95,25
3 1/2 - 4					4	101,60
3 1/2 - 4 1/2					4 1/2	114,30
3 1/2 - 4 3/4					4 3/4	120,65
3 1/2 - 5					5	127,00
3 5/8 - 2	3 5/8	92,08	3 13/16	96,84	2	50,80
3 5/8 - 2 1/4					2 1/4	57,15
3 5/8 - 2 1/2					2 1/2	63,50
3 5/8 - 3					3	76,20
3 5/8 - 3 1/2					3 1/2	88,90
3 5/8 - 3 3/4					3 3/4	95,25
3 5/8 - 4					4	101,60
3 5/8 - 4 1/2					4 1/2	114,30
3 5/8 - 4 3/4					4 3/4	120,65
3 5/8 - 5					5	127,00
3 3/4 - 2	3 3/4	95,25	3 15/16	100,01	2	50,80
3 3/4 - 2 1/4					2 1/4	57,15
3 3/4 - 2 1/2					2 1/2	63,50
3 3/4 - 3					3	76,20
3 3/4 - 3 1/2					3 1/2	88,90
3 3/4 - 3 3/4					3 3/4	95,25
3 3/4 - 4					4	101,60
3 3/4 - 4 1/2					4 1/2	114,30
3 3/4 - 4 3/4					4 3/4	120,65
3 3/4 - 5					5	127,00
4 - 2	4	101,60	3 3/16	80,96	2	50,80
4 - 2 1/4					2 1/4	57,15

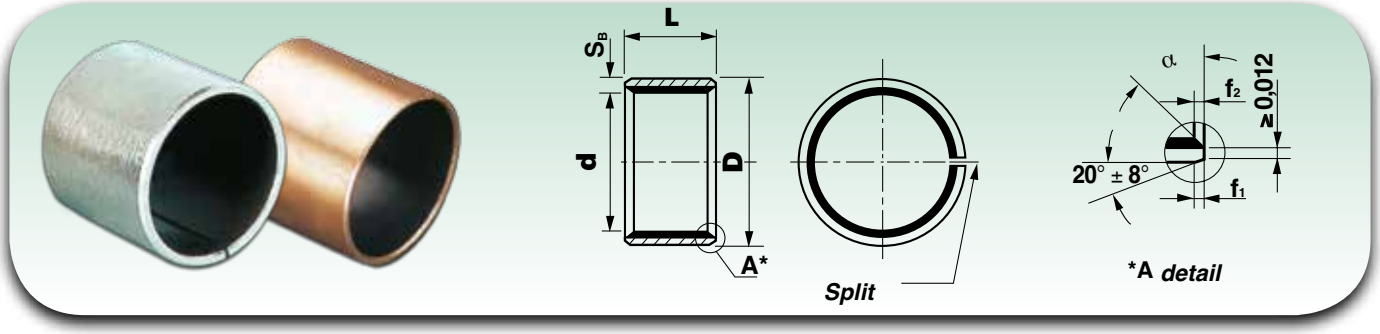
SF-1 Bushes- Inches sizes



Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
4 - 2 1/2	4	101,60	3 3/16	80,96	2 1/2	63,50
4 - 3					3	76,20
4 - 3 1/2					3 1/2	88,90
4 - 3 3/4					3 3/4	95,25
4 - 4					4	101,60
4 - 4 1/2					4 1/2	114,30
4 - 4 3/4					4 3/4	120,65
4 - 5					5	127,00
4 1/4 - 2	4 1/4	107,95	4 7/16	112,71	2	50,80
4 1/4 - 2 1/4					2 1/4	57,15
4 1/4 - 2 1/2					2 1/2	63,50
4 1/4 - 3					3	76,20
4 1/4 - 3 1/2					3 1/2	88,90
4 1/4 - 3 3/4					3 3/4	95,25
4 1/4 - 4					4	101,60
4 1/4 - 4 1/2					4 1/2	114,30
4 1/4 - 4 3/4					4 3/4	120,65
4 1/4 - 5					5	127,00
4 3/8 - 2	4 3/8	111,13	4 9/16	115,89	2	50,80
4 3/8 - 2 1/4					2 1/4	57,15
4 3/8 - 2 1/2					2 1/2	63,50
4 3/8 - 3					3	76,20
4 3/8 - 3 1/2					3 1/2	88,90
4 3/8 - 3 3/4					3 3/4	95,25
4 3/8 - 4					4	101,60
4 3/8 - 4 1/2					4 1/2	114,30
4 3/8 - 4 3/4					4 3/4	120,65
4 3/8 - 5					5	127,00
4 1/2 - 2	4 1/2	114,30	4 11/16	119,06	2	50,80
4 1/2 - 2 1/4					2 1/4	57,15
4 1/2 - 2 1/2					2 1/2	63,50
4 1/2 - 3					3	76,20
4 1/2 - 3 1/2					3 1/2	88,90
4 1/2 - 3 3/4					3 3/4	95,25
4 1/2 - 4					4	101,60
4 1/2 - 4 1/2					4 1/2	114,30
4 1/2 - 4 3/4					4 3/4	120,65
4 1/2 - 5					5	127,00
4 3/4 - 2	4 3/4	120,65	4 15/16	125,41	2	50,80
4 3/4 - 2 1/4					2 1/4	57,15
4 3/4 - 2 1/2					2 1/2	63,50
4 3/4 - 3					3	76,20
4 3/4 - 3 1/2					3 1/2	88,90
4 3/4 - 3 3/4					3 3/4	95,25
4 3/4 - 4					4	101,60
4 3/4 - 4 1/2					4 1/2	114,30
4 3/4 - 4 3/4					4 3/4	120,65

Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
4 3/4 - 5	4 3/4	120,65	4 15/16	125,41	5	127,00
5 - 2	5	127,00	5 3/16	131,76	2	50,80
5 - 2 1/4					2 1/4	57,17
5 - 2 1/2					2 1/2	63,50
5 - 3					3	76,20
5 - 3 1/2					3 1/2	88,90
5 - 3 3/4					3 3/4	95,25
5 - 4					4	101,60
5 - 4 1/2					4 1/2	114,30
5 - 4 3/4					4 3/4	120,65
5 - 5					5	127,00
5 1/4 - 2	5 1/4	133,35	5 7/16	138,11	2	50,80
5 1/4 - 2 1/4					2 1/4	57,15
5 1/4 - 2 1/2					2 1/2	63,50
5 1/4 - 3					3	76,20
5 1/4 - 3 1/2					3 1/2	88,90
5 1/4 - 3 3/4					3 3/4	95,25
5 1/4 - 4					4	101,60
5 1/4 - 4 1/2					4 1/2	114,30
5 1/4 - 4 3/4					4 3/4	120,65
5 1/4 - 5					5	127,00
5 1/2 - 2	5 1/2	139,70	5 11/16	144,46	2	50,80
5 1/2 - 2 1/4					2 1/4	57,15
5 1/2 - 2 1/2					2 1/2	63,50
5 1/2 - 3					3	76,20
5 1/2 - 3 1/2					3 1/2	88,90
5 1/2 - 3 3/4					3 3/4	95,25
5 1/2 - 4					4	101,60
5 1/2 - 4 1/2					4 1/2	114,30
5 1/2 - 4 3/4					4 3/4	120,65
5 1/2 - 5					5	127,00
5 3/4 - 2	5 3/4	146,05	5 15/16	150,81	2	50,80
5 3/4 - 2 1/4					2 1/4	57,15
5 3/4 - 2 1/2					2 1/2	63,50
5 3/4 - 3					3	76,20
5 3/4 - 3 1/2					3 1/2	88,90
5 3/4 - 3 3/4					3 3/4	95,25
5 3/4 - 4					4	101,60
5 3/4 - 4 1/2					4 1/2	114,30
5 3/4 - 4 3/4					4 3/4	120,65
5 3/4 - 5					5	127,00
6 - 2	6	152,40	6 3/16	157,16	2	50,80
6 - 2 1/4					2 1/4	57,15
6 - 2 1/2					2 1/2	63,50
6 - 3					3	76,20
6 - 3 1/2					3 1/2	88,90
6 - 3 3/4					3 3/4	95,25

SF-1 Bushes- Inches sizes

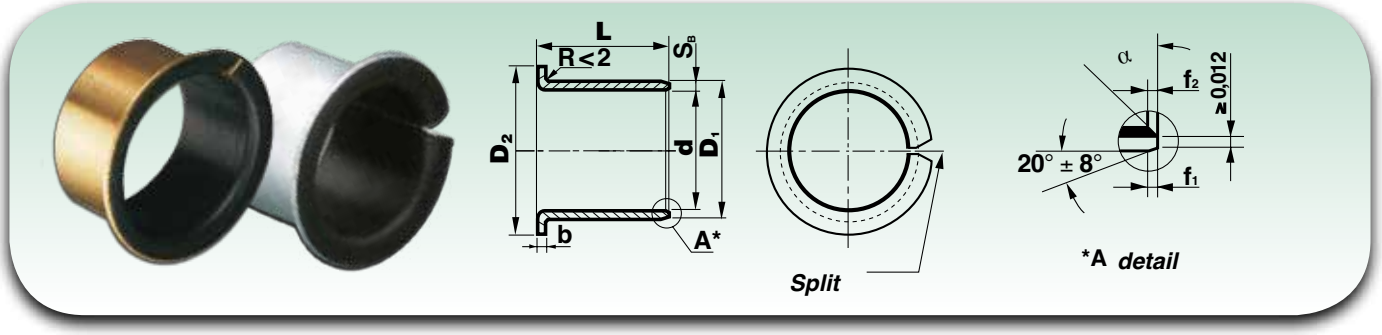


Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
6 - 4	6	152,40	6 3/16	157,16	4	101,60
6 - 4 1/2					4 1/2	114,30
6 - 14 3/4					4 3/4	120,65
6 - 5					5	127,00
6 1/4 - 2	6 1/4	57,15	6 7/16	163,51	2	50,80
6 1/4 - 2 1/4					2 1/4	57,15
6 1/4 - 2 1/2					2 1/2	63,50
6 1/4 - 3					3	76,20
6 1/4 - 3 1/2					3 1/2	88,90
6 1/4 - 3 3/4					3 3/4	95,25
6 1/4 - 4					4	101,60
6 1/4 - 4 1/2					4 1/2	114,30
6 1/4 - 4 3/4					4 3/4	120,65
6 1/4 - 5					5	127,00
6 1/2 - 2	6 1/2	165,10	6 11/16	169,86	2	50,80
6 1/2 - 2 1/4					2 1/4	57,15
6 1/2 - 2 1/2					2 1/2	63,50
6 1/2 - 3					3	76,20
6 1/2 - 3 1/2					3 1/2	88,90
6 1/2 - 3 3/4					3 3/4	95,25
6 1/2 - 4					4	101,60
6 1/2 - 4 1/2					4 1/2	114,30

Designation	Dimensions (inches/mm)					
	d		D		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm
6 1/2 - 4 3/4	6 1/2	165,10	6 11/16	169,86	4 3/4	120,65
6 1/2 - 5					5	127,00
6 3/4 - 2	6 3/4	171,45	6 15/16	176,21	2	50,80
6 3/4 - 2 1/4					2 1/4	57,15
6 3/4 - 2 1/2					2 1/2	63,50
6 3/4 - 3					3	76,20
6 3/4 - 3 1/2					3 1/2	88,90
6 3/4 - 3 3/4					3 3/4	95,25
6 3/4 - 4					4	101,60
6 3/4 - 4 1/2					4 1/2	114,30
6 3/4 - 4 3/4					4 3/4	120,65
6 3/4 - 5					5	127,00
7 - 2	7	177,80	7 3/16	182,56	2	50,80
7 - 2 1/4					2 1/4	57,15
7 - 2 1/2					2 1/2	63,50
7 - 3					3	76,20
7 - 3 1/2					3 1/2	88,90
7 - 3 3/4					3 3/4	95,25
7 - 4					4	101,60
7 - 4 1/2					4 1/2	114,30
7 - 4 3/4					4 3/4	120,65
7 - 5					5	127,00

To order, please specify: SF-1 + designation

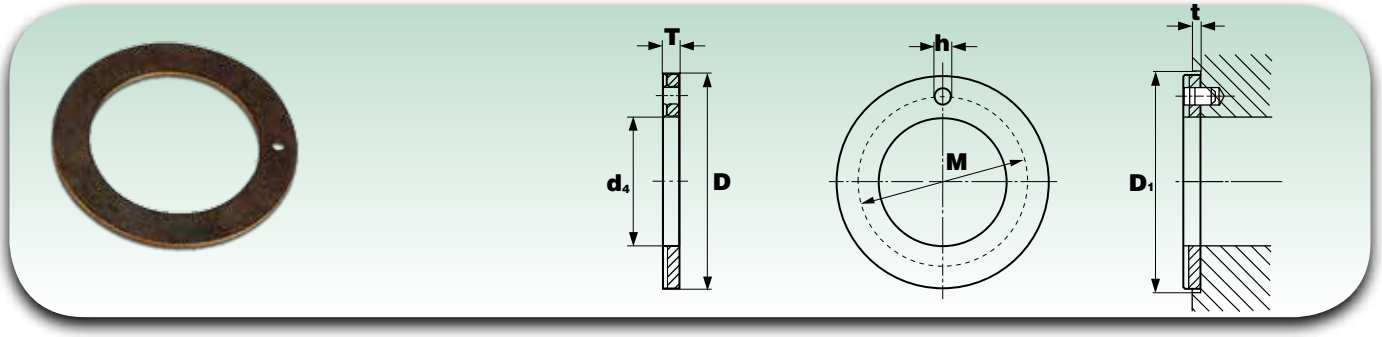
SF-1F Flanged Bushes - *Inches sizes*



Designation	Dimensions (inches/mm)							
	d		D_1		D_2 ±0,020"		L ±0,010"	
	inch.	mm	inch.	mm	inch.	mm	inch.	mm
F 3/8 - 1/4	3/8	9,53	15/32	11,91	11/16	17,46	1/4	6,35
F 3/8 - 3/8							3/8	9,53
F 3/8 - 1/2							1/2	12,70
F 3/8 - 1/2							3/4	19,05
F 1/2 - 1/4	1/2	12,70	19/32	15,08	13/16	20,64	1/4	6,35
F 1/2 - 3/8							3/8	9,53
F 1/2 - 1/2							1/2	12,70
F 1/2 - 3/4							3/4	19,05
F 5/8 - 3/8	5/8	15,88	23/32	18,26	15/16	23,81	3/8	9,53
F 5/8 - 1/2							1/2	12,70
F 5/8 - 5/8							5/8	15,88
F 5/8 - 3/4							3/4	19,05
F 3/4 - 3/8	3/4	19,05	7/8	22,23	1 1/8	28,58	3/8	9,53
F 3/4 - 1/2							1/2	12,70
F 3/4 - 3/4							3/4	19,05
F 3/4 - 1							1	25,40
F 7/8 - 1/2	7/8	22,23	1	25,40	1 1/4	31,75	1/2	12,70
F 7/8 - 3/4							3/4	19,05
F 7/8 - 1							1	25,40
F 7/8 - 1 1/4							1 1/4	31,75
F 1 - 1/2	1	25,40	1 1/8	28,58	1 3/8	34,93	1/2	12,70
F 1 - 3/4							3/4	19,05
F 1 - 1							1	25,40
F 1 - 1 1/4							1 1/4	31,75
F 1 1/4 - 1	1 1/4	31,75	1 13/32	35,72	1 3/4	44,45	1	25,40
F 1 1/4 - 1 1/4							1 1/4	31,75
F 1 1/4 - 1 1/2							1 1/2	38,10
F 1 1/2 - 1	1 1/2	38,10	1 21/32	42,07	2	50,80	1	25,40
F 1 1/2 - 1 1/2							1 1/2	38,10
F 1 1/2 - 2							2	50,80
F 1 3/4 - 1	1 3/4	44,45	1 15/16	49,21	2 3/8	60,33	1	25,40
F 1 3/4 - 1 1/2							1 1/2	38,10
F 1 3/4 - 2							2	50,80

To order, please specify: SF-1 + designation

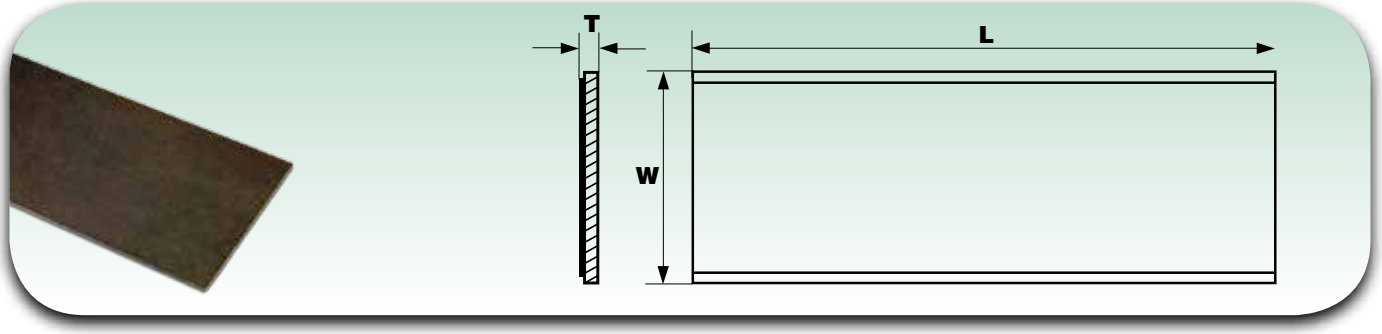
WC SF-1 Thrust washers - Inches sizes



Designation	Dimensions (inches/mm)								Mounting dimensions (inches/mm)					
	d_4 +0,010"		D -0,010"		T +0,0020"		M -0,010"		h +0,010"		t ±0,010"		D_1 +0,010"	
	inch.	mm	inch.	mm	inch.	mm	inch.	mm	inch.	mm	inch.	mm	inch.	mm
WC-1 0500	**0,500**	12,70	0,875	22,23	0,061	1,549	0,692	17,58	0,067	1,70	0,04	1,02	0,875	22,23
WC-1 0562	**0,562**	14,27	1,000	25,40	0,061	1,549	0,786	19,96	0,067	1,70	0,04	1,02	1,000	25,40
WC-1 0625	**0,625**	15,88	1,125	28,58	0,061	1,549	0,880	22,35	0,099	2,51	0,04	1,02	1,125	28,58
WC-1 0687	**0,687**	17,45	1,187	30,15	0,061	1,549	0,942	23,93	0,099	2,51	0,04	1,02	1,187	30,15
WC-1 0750	**0,750**	19,05	1,250	31,75	0,061	1,549	1,005	25,53	0,099	2,51	0,04	1,02	1,250	31,75
WC-1 0812	**0,812**	20,62	1,375	34,93	0,061	1,549	1,009	27,91	0,099	2,51	0,04	1,02	1,375	34,93
WC-1 0875	**0,875**	22,23	1,500	38,10	0,061	1,549	1,192	30,28	0,130	3,30	0,04	1,02	1,500	38,10
WC-1 0937	**0,937**	23,80	1,625	41,28	0,061	1,549	1,286	32,66	0,130	3,30	0,04	1,02	1,625	41,28
WC-1 1000	**1,000**	25,40	1,750	44,45	0,061	1,549	1,380	35,05	0,130	3,30	0,04	1,02	1,750	44,45
WC-1 1125	**1,125**	28,58	2,000	50,80	0,061	1,549	1,567	39,80	0,161	4,09	0,04	1,02	2,000	50,80
WC-1 1250	**1,250**	31,75	2,125	53,98	0,061	1,549	1,692	42,98	0,161	4,09	0,04	1,02	2,125	53,98
WC-1 1375	**1,375**	34,93	2,250	57,15	0,061	1,549	1,817	46,15	0,161	4,09	0,04	1,02	2,250	57,15
WC-1 1500	**1,500**	38,10	2,500	63,50	0,061	1,549	2,005	50,93	0,192	4,88	0,04	1,02	2,500	63,50
WC-1 1625	**1,625**	41,28	2,625	66,68	0,061	1,549	2,130	54,10	0,192	4,88	0,04	1,02	2,625	66,68
WC-1 1750	**1,750**	44,45	2,750	69,85	0,061	1,549	2,255	52,28	0,192	4,88	0,04	1,02	2,750	69,85
WC-1 2000	**2,000**	50,80	3,000	76,20	0,091	2,311	2,505	63,63	0,192	4,88	0,07	1,78	3,000	76,20
WC-1 2125	**2,125**	53,98	3,125	79,38	0,091	2,311	2,630	66,80	0,192	4,88	0,07	1,78	3,125	79,38
WC-1 2250	**2,250**	57,15	3,250	82,55	0,091	2,311	2,755	69,98	0,192	4,88	0,07	1,78	3,250	82,55

To order, please specify: designation

Strips NSTR-S *(steel covering) - Inches sizes*

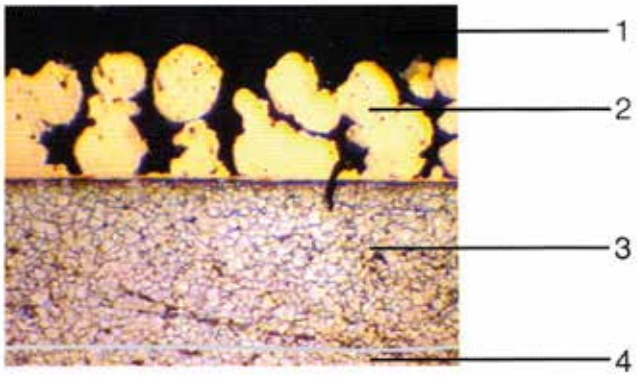


Designation	Dimensions (inches/mm)					
	Length L +0,2"		Width W +0,1"		Thickness T -0,05"	
	inch.	mm	inch.	mm	inch.	mm
NSTR-S 00293-275	19,69	500,13	2,75	69,85	0,0293 $^{0}_{-0,0016}$	0,74 $^{0}_{-0,0406}$
NSTR-S 00447-400	19,69	500,13	4,00	101,60	0,0447 $^{0}_{-0,0016}$	1,14 $^{0}_{-0,0406}$
NSTR-S 00602-400	19,69	500,13	4,00	101,60	0,0602 $^{0}_{-0,0016}$	1,53 $^{0}_{-0,0406}$
NSTR-S 00756-400	19,69	500,13	4,00	101,60	0,0756 $^{0}_{-0,0016}$	1,92 $^{0}_{-0,0406}$
NSTR-S 00913-400	19,69	500,13	4,00	101,60	0,0913 $^{0}_{-0,0016}$	2,32 $^{0}_{-0,0406}$
NSTR-S 01210-400	19,69	500,13	4,00	101,60	0,1210 $^{0}_{-0,0020}$	3,07 $^{0}_{-0,0508}$

To order, please specify: designation

On request, available also:

- *with bronze covering (NSTR-SB)*
- *090 version (NSTR 090)*



2. SF-2 bushes characteristics

1. *Modified polyacetal (POM)*	0,30 ~ 0,50 mm *0,30 ~ 0,50 mm*
2. *Porous bronze*	0,20 ~ 0,30 mm *0,20 ~ 0,30 mm*
3. *Steel backing*	0,40 ~ 2,20 mm *0,40 ~ 2,20 mm*
4. *Electro-plating Copper*	~ 0,008 mm *~ 0,008 mm*

2.1 SF-2 structure

The porous bronze layer is sintered on the steel backing and has the function of bonding the sliding surface in polyacetalic resin and permetting thermal dispersion which presents sockets for collecting and gradually releasing the lubricant in order to reduce friction and protect the surface from the running of the bush. In order to facilitate re-lubrication, the SF-2 bushes are furnished with an external hole for that purpose. It is recommended to use a grease with litio soap; on the contrary MoS_2 *and grease with a graphite base are NOT suitable.*

The SF-2 bushes have uses in multiple sectors, among which we find: mining industry and metallurgies, printing presses, hydroelectric machines and for cold lamination of steel; generally applications with periodic lubrication.

The use of this type of bush is growing rapidly thanks to its principal characteristics listed as follows, which favour the elimination of diverse problems.

- *low maintenance, due to long intervals of re-lubrication*
- *good adaptability to oscillating and rotating movements*
- *limited wear (if applied and used correctly)*
- *water repellent*
- *reduced sensibility to the loading on the edges*
- *good heat dispersion.*

CHAPTER 2

2.2 Technical features

Load capacity	**70N/mm²**
Speed limit v max	**2,5 m/s**
Temperature limit	**-40 °C ~ +130 °C**
Friction coefficient dry	**μ: 0,05~0,25**
Pv limit	**22N/mm² • m/s**

2.3 Durability test

The life of SF-2 bush depends especially on the factor Pv, which is difficult to calculate, because it depends on several and environmental factors which can increase or decrease the operating life.
These elements can be: the temperature, the finishing grade of the shaft, the alignment, the lubrication…SF-2 bushes, thanks to their honey cones surface, can capture and retain more lubricants and require little maintenance compared to SF-1 type bushes, but they must be periodically re-lubricated in order to guarantee a much longer duration.
Once the lubricant has been distributed on the sliding surface, the wear remains relatively contained, even in the presence of specific loads up to 140 N/mm²; when the lubricant starts to decrease, the wear increases noticeably. That's why it is so important to re-lubricate before the wearing process begins.
In the (fig. 4) below, line B indicates the duration of the interval of re-lubrication while line A the duration of the SF-2 material.

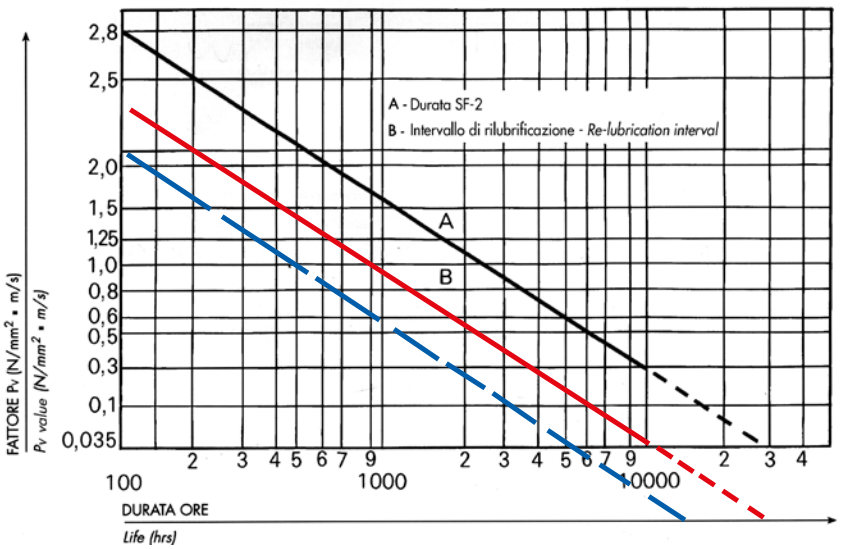


Fig. 4

When the bush reaches wear values equal to 0,15 mm it is considered depleted and therefore to be substituted.

SF-2 Bushes tolerances

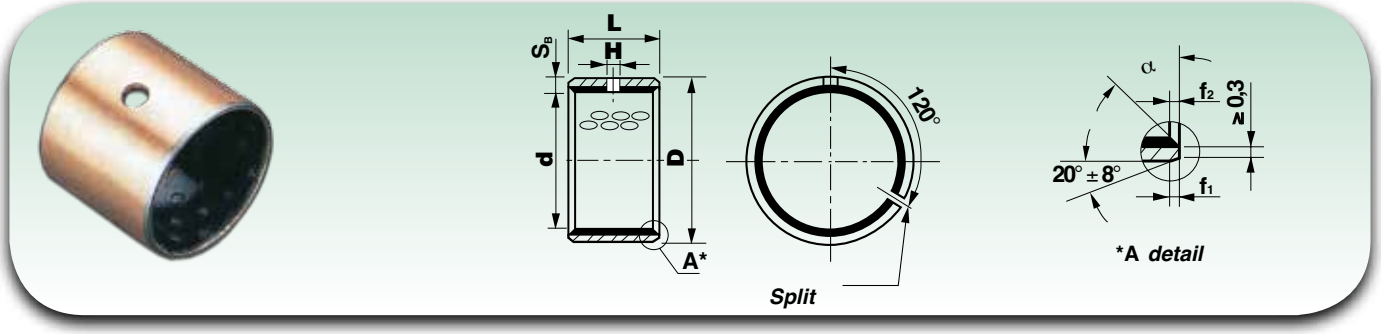
SF-2

Outer diameter D		Outer diameter tolerances D	Thickness tolerances S_B		Chamfer dimensions S_B	f_1	f_2
≤ 10		+ 0,055 + 0,025	1	- 0,020 - 0,045	1	0,6 ± 0,4	- 0,1 - 0,4
10 <	≤ 18	+ 0,065 + 0,030	1	- 0,020 - 0,045	1	0,6 ± 0,4	- 0,1 - 0,4
18 <	≤ 30	+ 0,075 + 0,035	1,5	- 0,025 - 0,055	1,5	0,6 ± 0,4	- 0,1 - 0,6
30 <	≤ 50	+ 0,085 + 0,045	2	- 0,030 - 0,065	2	1,2 ± 0,4	- 0,1 - 0,7
50 <	≤ 80	+ 0,100 + 0,055	2,5	- 0,040 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0
80 <	≤ 120	+ 0,120 + 0,070	2,5	- 0,040 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0
120 <	≤ 180	+ 0,170 + 0,100	2,5	- 0,040 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0
180 <	≤ 305	+ 0,255 + 0,125	2,5	- 0,040 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0

Tolerance values of metric bushings SF-2 comply with standard ISO 3547-1:2006

SF-2 Bushes *(honey cones surface) - Metric sizes*

** without lubrication hole*

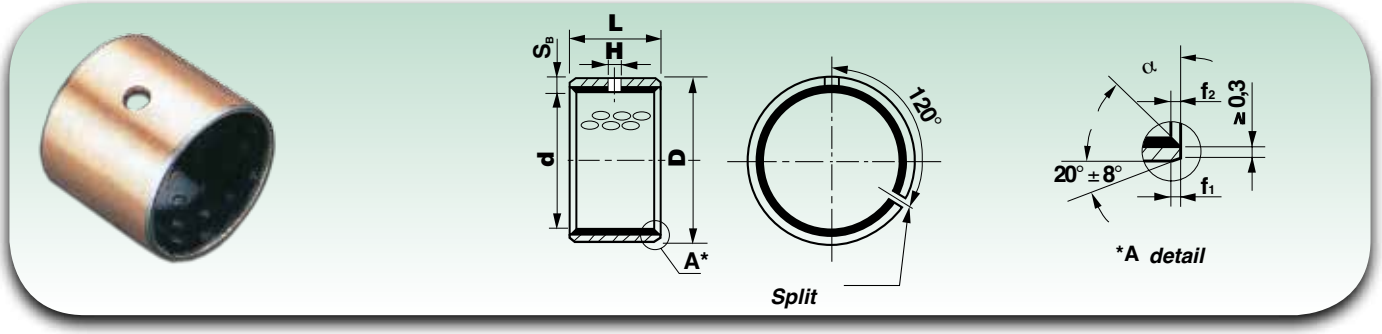


Dimensions (mm)			
d	D	$L^{\pm 0,25}$	H min
6	8	8	⊛
		10	
7	9	10	⊛
8	10	8	3
		10	
		12	
10	12	8	3
		10	
		12	
		15	
		20	
12	14	10	3
		12	
		15	
		20	
		25	
13	15	10	3
14	16	14	3
		15	
		20	
		22	
		25	
		32	
15	17	10	3
		12	
		15	
		20	
		25	
16	18	10	3
		12	
		15	
		16	
		20	
		25	
18	20	15	3
		18	
		20	
		25	
20	23	10	3
		12	
		15	
		17	
		20	
		25	
		30	
22	25	15	3
		20	
		22	
		25	
		30	
24	27	15	4
		20	

Dimensions (mm)			
d	D	$L^{\pm 0,25}$	H min
24	27	25	4
		30	
25	28	10	4
		15	
		20	
		25	
		30	
		40	
		50	
28	31	30	4
28	32	20	4
		25	
		28	
		30	
30	34	15	4
		20	
		25	
		30	
		40	
32	36	20	4
		25	
		30	
		35	
		40	
35	39	15	4
		20	
		25	
		30	
		35	
		40	
		50	
36	40	35	4
37	41	20	4
		30	
40	44	20	4
		25	
		30	
		40	
		50	
45	50	20	5
		25	
		30	
		35	
		40	
		45	
		50	
50	55	20	5
		25	
		30	
		40	
		50	
		55	

Dimensions (mm)			
d	D	$L^{\pm 0,25}$	H min
50	55	60	5
55	60	20	6
		25	
		30	
		40	
		50	
		55	
		60	
60	65	30	6
		40	
		50	
		60	
		70	
65	70	30	6
		40	
		50	
		60	
		65	
		70	
70	75	30	6
		40	
		50	
		60	
		65	
		70	
		80	
75	80	40	6
		60	
		75	
		80	
80	85	40	6
		50	
		55	
		60	
		80	
		100	
85	90	30	6
		40	
		50	
		60	
		80	
		85	
		100	
90	95	40	6
		60	
		80	
		90	
		100	
95	100	30	6
		60	
		100	
100	105	30	6

SF-2 Bushes *(honey cones surface) - Metric sizes*



Dimensions (mm)			
d	D	$L^{\pm 0,25}$	H min
100	105	40	6
		50	
		60	
		80	
		90	
		95	
		100	
		115	
105	110	50	7
		60	
		80	
		95	
		105	
		110	
		115	
110	115	30	7
		50	
		60	
		80	
		95	
		110	
		115	
115	120	50	7
		70	
120	125	40	7
		60	
		80	
		100	
		110	
		120	
125	130	50	7
		60	
		80	
		100	
		110	
		125	
130	135	50	7
		60	
		80	

Dimensions (mm)			
d	D	$L^{\pm 0,25}$	H min
130	135	100	7
		130	
135	140	30	7
		60	
		80	
140	145	50	7
		60	
		80	
		100	
		140	
150	155	50	7
		60	
		80	
		100	
		150	
160	165	50	7
		60	
		80	
		100	
		160	
170	175	50	7
		60	
		80	
		100	
		170	
180	185	50	7
		60	
		80	
		100	
		180	
190	195	50	7
		60	
		80	
		100	
		120	
		190	
200	205	50	7
		60	
		80	

Dimensions (mm)			
d	D	$L^{\pm 0,25}$	H min
200	205	100	7
		120	
		200	
220	225	50	7
		60	
		80	
		100	
		120	
		220	
240	245	50	7
		60	
		80	
		100	
		120	
		240	
250	255	50	7
		60	
		80	
		100	
		120	
		250	
260	265	50	7
		60	
		80	
		100	
		120	
		260	
280	285	50	7
		60	
		80	
		100	
		120	
		280	
300	305	50	7
		60	
		80	
		100	
		120	
		300	

To order, please specify: SF-2 + d + L

Recommended mounting tolerances:

Shaft:

h 8

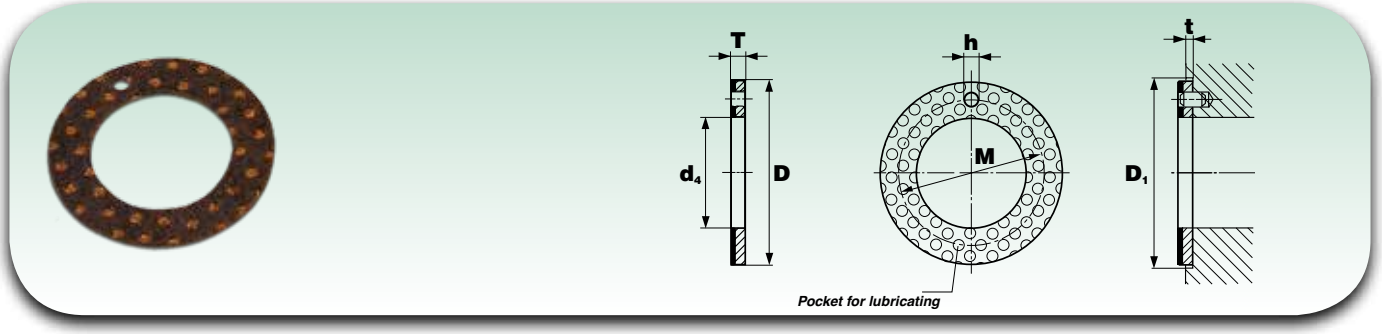
Bore:

≤ 4 = H 6

> 4 = H 7

Bushes made according drawings can be supplied if large quantities are ordered.

WC SF-2 Thrust washers *(honey cones surface) - Metric sizes*

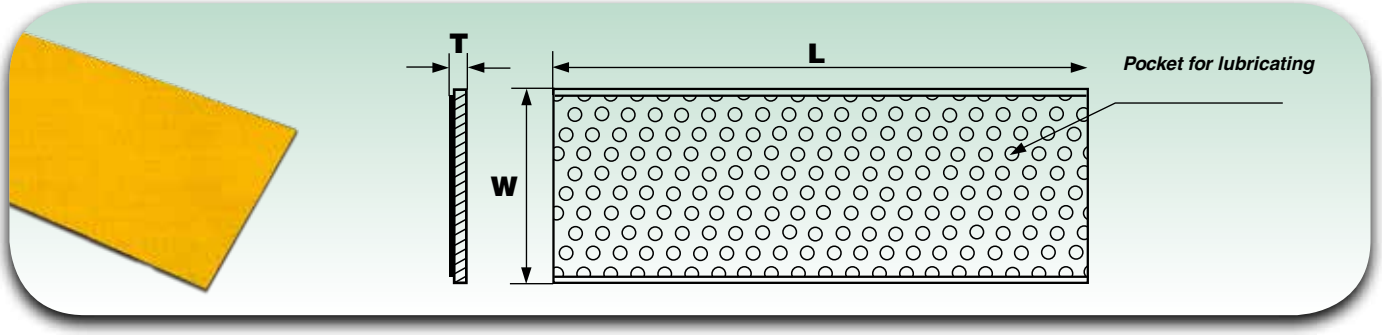


Designation	Dimensions (mm)				Mounting dimensions (mm)		
	d_4 $^{+0,25}$	D $^{-0,25}$	T $^{-0,05}$	M $^{\pm 0,15}$	h $^{+0,4}_{+0,1}$	t $^{\pm 0,2}$	D_1 $^{+0,12}$
WC-2 10	**10**	20	1.5	15	1,5	1	20
WC-2 12	**12**	24	1.5	18	1,5	1	24
WC-2 14	**14**	26	1.5	20	2	1	26
WC-2 16	**16**	30	1.5	23	2	1	30
WC-2 18	**18**	32	1.5	25	2	1	32
WC-2 20	**20**	36	1.5	28	3	1	36
WC-2 22	**22**	38	1.5	30	3	1	38
WC-2 24	**24**	42	1.5	33	3	1	42
WC-2 26	**26**	44	1.5	35	3	1	44
WC-2 28	**28**	48	1.5	38	4	1	48
WC-2 32	**32**	54	1.5	43	4	1	54
WC-2 38	**38**	62	1.5	50	4	1	62
WC-2 42	**42**	66	1.5	54	4	1	66
WC-2 48	**48**	74	2	61	4	1,5	74
WC-2 52	**52**	78	2	65	4	1,5	78
WC-2 62	**62**	90	2	76	4	1,5	90

To order, please specify: designation

The tolerance values given on this page comply with standard ISO 6525:1983

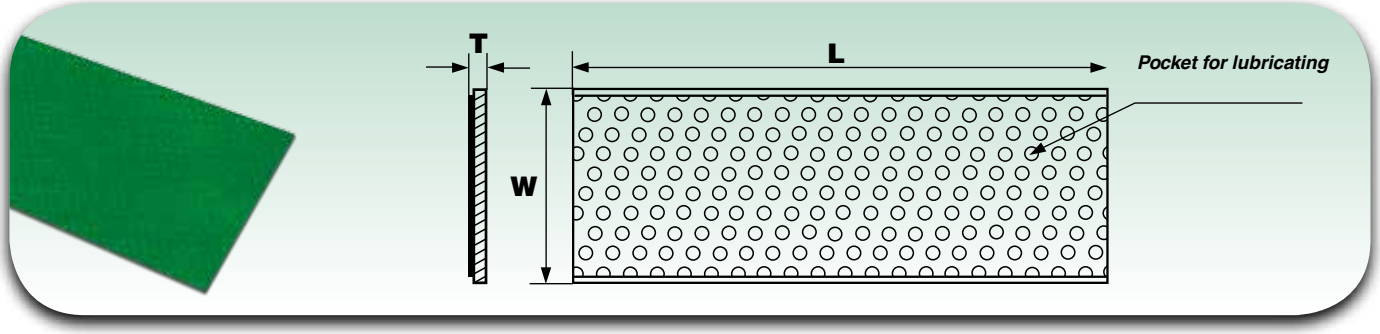
NSTR-1 Strips *(honey cones surface) - Metric sizes*



Designation	Dimensions (mm)		
	Length L ±1	Width W ±1	Thickness T -0,05
NSTR-1 10120	500	120	0,99
NSTR-1 10180	500	180	0,99
NSTR-1 15180	500	180	1,48
NSTR-1 20180	500	180	1,97
NSTR-1 25180	500	180	2,46

To order, please specify: designation

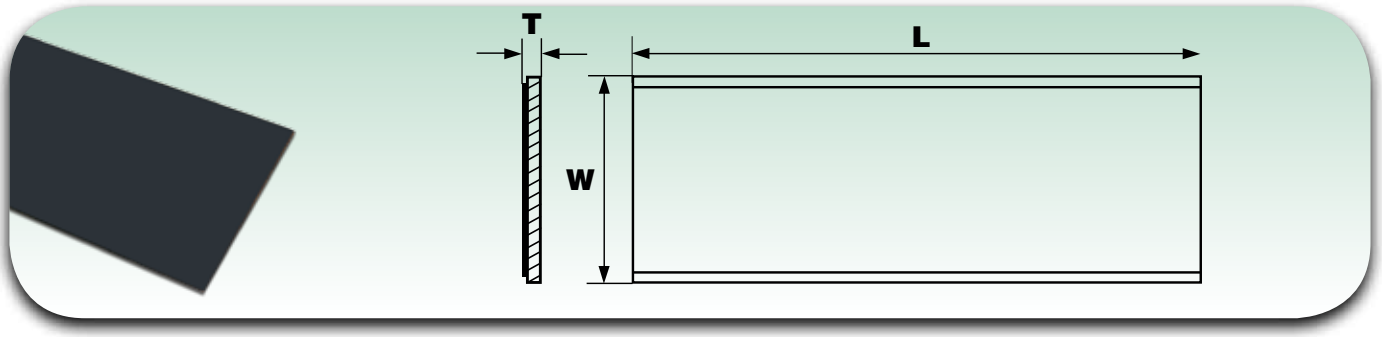
NSTR-2 Strips (honey cones surface with plate) - Metric sizes



Designation	Dimensions (mm)		
	Length L ±1	Width W ±1	Thickness T -0,05
NSTR-2 10120	500	120	1,11
NSTR-2 10180	500	180	1,11
NSTR-2 15180	500	180	1,61
NSTR-2 20180	500	180	2,11
NSTR-2 25180	500	180	2,63

To order, please specify: designation

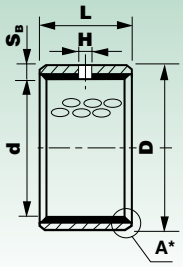
NSTR- 3 Strips *(with plate and without honey cones surface) - Metric sizes*

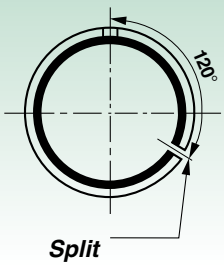


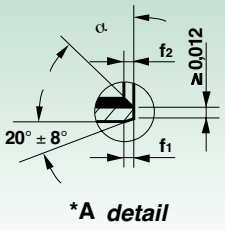
Designation	Dimensions (mm)		
	Length L ±1	Width W ±1	Thickness T -0,05
NSTR-3 10120	500	120	1,11
NSTR-3 10180	500	180	1,11
NSTR-3 15180	500	180	1,61
NSTR-3 20180	500	180	2,11
NSTR-3 25180	500	180	2,63

To order, please specify: designation

SF-2 Bushes *(honey cones surface) - Inches sizes*



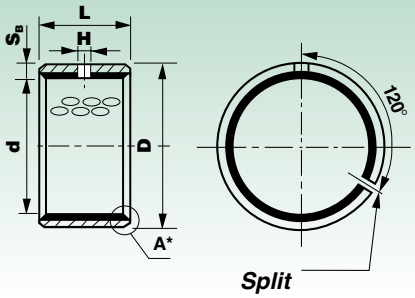


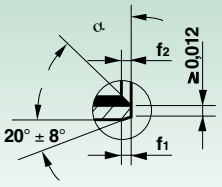


Designation	Dimensions (inches/mm)							
	d		D		L ±0,010"		H	
	inch.	mm	inch.	mm	inch.	mm	inch.	mm
3/8 - 3/8	3/8	9,53	15/32	11,91	3/8	9,53	5/32	3,97
3/8 - 1/2					1/2	12,70		
3/8 - 3/4					3/4	19,05		
7/16 - 1/2	7/16	11,11	17/32	13,49	1/2	12,70	5/32	3,97
7/16 - 3/4					3/4	19,05		
1/2 - 3/8	1/2	12,70	19/32	15,08	3/8	9,53	5/32	3,97
1/2 - 1/2					1/2	12,70		
1/2 - 5/8					5/8	15,88		
1/2 - 7/8					7/8	22,23		
9/16 - 1/2	9/16	14,29	21/32	16,67	1/2	12,70	5/32	3,97
9/16 - 3/4					3/4	19,05		
5/8 - 1/2	5/8	15,88	23/32	18,26	1/2	12,70	5/32	3,97
5/8 - 5/8					5/8	15,88		
5/8 - 3/4					3/4	19,05		
5/8 - 7/8					7/8	22,23		
11/16 - 7/8	11/16	17,46	25/32	19,84	7/8	22,23	5/32	3,97
3/4 - 1/2	3/4	19,05	7/8	22,23	1/2	12,70	5/32	3,97
3/4 - 3/4					3/4	19,05		
3/4 - 1					1	25,40		
7/8 - 3/4	7/8	22,23	1	25,40	3/4	19,05	5/32	3,97
7/8 - 7/8					7/8	22,23		
7/8 - 1					1	25,40		
1 - 3/4	1	25,40	1 1/8	28,58	3/4	19,05	5/32	3,97
1 - 1					1	25,40		
1 - 1 1/2					1 1/2	38,10		
1 1/8 - 3/4	1 1/8	28,58	1 9/32	32,54	3/4	19,05	1/4	6,35
1 1/8 - 1					1	25,40		
1 1/4 - 3/4	1 1/4	31,75	1 13/32	35,72	3/4	19,05	1/4	6,35
1 1/4 - 1					1	25,40		
1 1/4 - 1 1/4					1 1/4	31,75		
1 1/4 - 1 3/4					1 3/4	44,45		
1 3/8 - 1	1 3/8	34,93	1 17/32	38,89	1	25,40	1/4	6,35
1 3/8 - 1 3/8					1 3/8	34,93		
1 3/8 - 1 1/2					1 1/2	38,10		
1 3/8 - 1 3/4					1 3/4	44,45		
1 1/2 - 1	1 1/2	38,10	1 21/32	42,07	1	25,40	1/4	6,35
1 1/2 - 1 1/4					1 1/4	31,75		
1 1/2 - 1 1/2					1 1/2	38,10		

To order, please specify: SF-2 + designation

SF-2 Bushes *(honey cones surface) - Inches sizes*



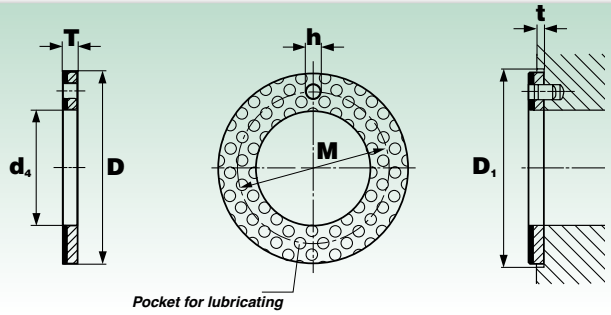


A detail

Designation	Dimensions (inches/mm)							
	d		D		L ±0,010"		H	
	inch.	mm	inch.	mm	inch.	mm	inch.	mm
1 1/2 - 2	1 1/2	38,10	1 21/32	42,07	2	50,80	1/4	6,35
1 5/8 - 1	1 5/8	41,28	1 25/32	45,24	1	25,40	1/4	6,35
1 5/8 - 1 1/2					1 1/2	38,10		
1 5/8 - 2					2	50,80		
1 3/4 - 1	1 3/4	44,45	1 15/16	49,21	1	25,40	1/4	6,35
1 3/4 - 1 1/2					1 1/2	38,10		
1 3/4 - 1 3/4					1 3/4	44,45		
1 3/4 - 2					2	50,80		
1 7/8 - 1	1 7/8	47,63	2 1/16	52,39	1	25,40	1/4	6,35
1 7/8 - 1 1/2					1 1/2	38,10		
1 7/8 - 1 7/8					1 7/8	47,63		
1 7/8 - 2					2	50,80		
1 7/8 - 2 1/4					2 1/4	57,15		
2 - 1	2	50,80	2 3/16	55,56	1	25,40	5/16	7,94
2 - 1 1/2					1 1/2	38,10		
2 - 2					2	50,80		
2 - 2 1/2					2 1/2	63,50		
2 1/4 - 2	2 1/4	57,15	2 7/16	61,91	2	50,80	5/16	7,94
2 1/4 - 2 1/4					2 1/4	57,15		
2 1/4 - 2 1/2					2 1/2	63,50		
2 1/2 - 1 1/2	2 1/4	63,50	2 11/16	68,26	1 1/2	38,10	5/16	7,94
2 1/2 - 2					2	50,80		
2 1/2 - 2 1/2					2 1/2	63,50		
2 3/4 - 2	2 3/4	69,85	2 15/16	74,61	2	50,80	5/16	7,94
2 3/4 - 2 1/2					2 1/2	63,50		
2 3/4 - 3					3	76,20		
2 3/4 - 3 1/2					3 1/2	88,90		
3 - 1 1/2	3	76,20	3 3/16	80,96	1 1/2	38,10	3/8	9,53
3 - 2					2	50,80		
3 - 2 1/2					2 1/2	63,50		
3 - 3					3	76,20		
3 - 3 3/4					3 3/4	95,25		
3 1/2 - 2 1/2	3 1/2	88,90	3 11/16	93,66	2 1/2	63,50	3/8	9,53
3 1/2 - 3					3	76,20		
3 1/2 - 3 3/4					3 3/4	95,25		
4 - 3	4	101,60	3 3/16	80,96	3	76,20	3/8	9,53
4 - 3 3/4					3 3/4	95,25		
4 - 4 3/4					4 3/4	120,65		

To order, please specify: SF-2 + designation

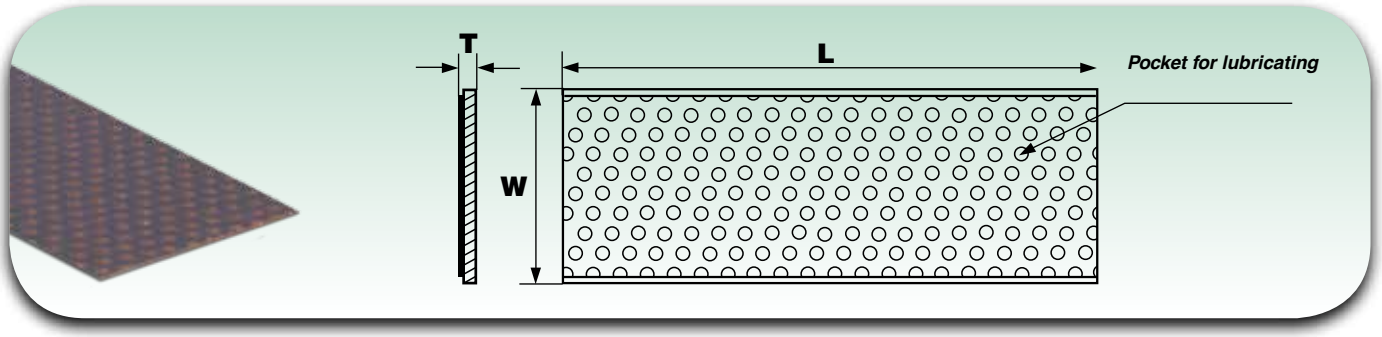
WC SF-2 Thrust washers (honey cones surface) - Inches sizes



Designation	Dimensions (inches/mm)								Mounting dimensions (inches/mm)					
	d_4 +0,010"		D -0,010"		T +0,0035"		M -0,010"		h +0,010"		t +0,010"		D_1 +0,010"	
	inch.	mm	inch.	mm	inch.	mm	inch.	mm	inch.	mm	inch.	mm	inch.	mm
WC-2 0500	0,500	12,70	0,875	22,23	0,066	1,676	0,692	17,58	0,067	1,70	0,04	1,02	0,875	22,23
WC-2 0562	0,562	14,27	1,000	25,40	0,066	1,676	0,786	19,96	0,067	1,70	0,04	1,02	1,000	25,40
WC-2 0625	0,625	15,88	1,125	28,58	0,066	1,676	0,880	22,35	0,099	2,51	0,04	1,02	1,125	28,58
WC-2 0687	0,687	17,45	1,187	30,15	0,066	1,676	0,942	23,93	0,099	2,51	0,04	1,02	1,187	30,15
WC-2 0750	0,750	19,05	1,250	31,75	0,066	1,676	1,005	25,53	0,099	2,51	0,04	1,02	1,250	31,75
WC-2 0812	0,812	20,62	1,375	34,93	0,066	1,676	1,009	27,91	0,099	2,51	0,04	1,02	1,375	34,93
WC-2 0875	0,875	22,23	1,500	38,10	0,066	1,676	1,192	30,28	0,130	3,30	0,04	1,02	1,500	38,10
WC-2 0937	0,937	23,80	1,625	41,28	0,066	1,676	1,286	32,66	0,130	3,30	0,04	1,02	1,625	41,28
WC-2 1000	1,000	25,40	1,750	44,45	0,066	1,676	1,380	35,05	0,130	3,30	0,04	1,02	1,750	44,45
WC-2 1125	1,125	28,58	2,000	50,80	0,066	1,676	1,567	39,80	0,161	4,09	0,04	1,02	2,000	50,80
WC-2 1250	1,250	31,75	2,125	53,98	0,066	1,676	1,692	42,98	0,161	4,09	0,04	1,02	2,125	53,98
WC-2 1375	1,375	34,93	2,250	57,15	0,066	1,676	1,817	46,15	0,161	4,09	0,04	1,02	2,250	57,15
WC-2 1500	1,500	38,10	2,500	63,50	0,066	1,676	2,005	50,93	0,192	4,88	0,04	1,02	2,500	63,50
WC-2 1625	1,625	41,28	2,625	66,68	0,066	1,676	2,130	54,10	0,192	4,88	0,04	1,02	2,625	66,68
WC-2 1750	1,750	44,45	2,750	69,85	0,066	1,676	2,255	52,28	0,192	4,88	0,04	1,02	2,750	69,85
WC-2 2000	2,000	50,80	3,000	76,20	0,097	2,464	2,505	63,63	0,192	4,88	0,07	1,78	3,000	76,20
WC-2 2125	2,125	53,98	3,125	79,38	0,097	2,464	2,630	66,80	0,192	4,88	0,07	1,78	3,125	79,38
WC-2 2250	2,250	57,15	3,250	82,55	0,097	2,464	2,755	69,98	0,192	4,88	0,07	1,78	3,250	82,55

To order, please specify: designation

NSTR- I Strips *(honey cones surface) - Inches sizes*



Designation	Dimensions (mm)					
	Length L +0,2"		Width W +0,1"		Thickness T -0,0035	
	inch.	mm	inch.	mm	inch.	mm
NSTR-I 00492	19,69	500,13	2,75	69,85	0,0492	1,2497
NSTR-I 00642	19,69	500,13	4,00	101,60	0,0642	1,6307
NSTR-I 00795	19,69	500,13	4,00	101,60	0,0795	2,0193
NSTR-I 00949	19,69	500,13	4,00	101,60	0,0949	2,4105

To order, please specify: designation

On request, available also:

- *with bronze covering (NSTR-IB)*
- *090 version (NSTR 090)*

3. BNZ and FE sintered bushes characteristics

We provide an ample range of bushes realized in sintered materials (bronze, iron, compact bronze graphite), available both in cylindrical and flanged formats. Thanks to the particular porous structure of the surface, after the first oiling done by the constructor, which permits the gradual release of the lubricant, the bushes can be used without maintenance for long periods.
The iron bushes compared to those in bronze, can bear heavier loads with lower rotational speed. The bushes in bronze are on the other hand adapt for very dusty ambients where oil can not be used; they are indicated even for applications in contact with water or other bronze compatible liquids. The temperature limit can vary from -80 °C to +160 °C.
The sintered bushes are mainly used in electric machines, in electric tools, textile machines, in the chemical industry, office machines and in the automobile industry.

3.1 Technical features

Composition	**CuSn6Zn6Pb3**
Load capacity	**35N/mm²**
Temperature limit	**-80 °C ~ +160 °C**
Friction coefficient dry	**μ: 0,12~0,18**

BNZ and BNZF Bushes tolerances

BNZ

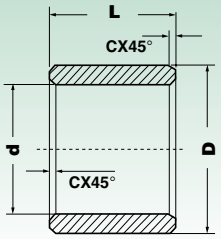
Inner diameter d	Inner diameter tolerances d	Outer diameter D	Outer diameter tolerances D
≤ 3	+ 0,012 + 0,002	3 < ≤ 6	+ 0,031 + 0,019
3 < ≤ 6	+ 0,016 + 0,004	6 < ≤ 10	+ 0,038 + 0,023
6 < ≤ 10	+ 0,020 + 0,005	10 < ≤ 18	+ 0,046 + 0,028
10 < ≤ 18	+ 0,024 + 0,006	18 < ≤ 30	+ 0,056 + 0,035
18 < ≤ 30	+ 0,028 + 0,007	30 < ≤ 50	+ 0,068 + 0,043
30 < ≤ 50	+ 0,034 + 0,009	50 < ≤ 65	+ 0,083 + 0,053
50 < ≤ 80	+ 0,040 + 0,010	65 < ≤ 80	+ 0,089 + 0,059
80 < ≤ 120	+ 0,047 + 0,012	80 < ≤ 100	+ 0,106 + 0,071
120 < ≤ 180	+ 0,054 + 0,014	100 < ≤ 120	+ 0,114 + 0,079
-	-	120 < ≤ 140	+ 0,132 + 0,092
-	-	140 < ≤ 160	+ 0,140 + 0,100

BNZF

Thickness tolerances S_B		Chamfer dimensions S_B	C_{max}	Length, flange diameter, thickness tolerances Dimension	Tolerance
1	+ 0,020 + 0,045	≤ 1	0,2	≤ 3	± 0,07
1	+ 0,020 + 0,045	1 < ≤ 2	0,3	3 < ≤ 6	± 0,09
1,5	+ 0,025 + 0,055	2 < ≤ 3	0,4	6 < ≤ 10	± 0,11
2	+ 0,030 + 0,065	3 < ≤ 4	0,6	10 < ≤ 18	± 0,135
2,5	+ 0,040 + 0,085	4 < ≤ 5	0,7	18 < ≤ 30	± 0,165
2,5	+ 0,040 + 0,085	> 5	0,8	30 < ≤ 50	± 0,195
2,5	+ 0,040 + 0,085	-	-	50 < ≤ 80	± 0,230
2,5	+ 0,040 + 0,085	-	-	80 < ≤ 120	± 0,270

Tolerance values of bushings* BNZ, BNZF, FE and FEF *comply with standard ISO 2795:1991

BNZ Sintered bronze bushes - Metric sizes

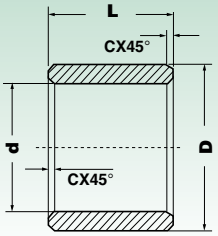


Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
2	5	$2^{\pm0,070}$	0,3
		$3^{\pm0,070}$	
		$4^{\pm0,090}$	
		$6^{\pm0,090}$	
2,5	6	$10^{\pm0,110}$	0,3
3	6	$3^{\pm0,070}$	0,3
		$4^{\pm0,090}$	
		$5^{\pm0,090}$	
		$6^{\pm0,090}$	
		$7^{\pm0,110}$	
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
	8	$6^{\pm0,090}$	0,3
4	6	$5^{\pm0,090}$	0,3
		$8^{\pm0,110}$	
		$8,5^{\pm0,110}$	
		$10^{\pm0,110}$	
	6,5	$4^{\pm0,090}$	0,3
	7	$3^{\pm0,070}$	0,3
		$4^{\pm0,090}$	
		$6^{\pm0,090}$	
		$7^{\pm0,110}$	
		$8^{\pm0,110}$	
		$12^{\pm0,135}$	
	8	$4^{\pm0,090}$	0,3
		$5^{\pm0,090}$	
		$6^{\pm0,090}$	
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$16^{\pm0.135}$	
	10	$10^{\pm0,110}$	0,3
5	8	$4^{\pm0,090}$	0,3
		$5^{\pm0,090}$	
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
	9	$4^{\pm0,090}$	0,3
		$5^{\pm0,090}$	
		$8^{\pm0,110}$	
		$9^{\pm0,110}$	
		$10^{\pm0,110}$	
		$11^{\pm0,110}$	
		$13^{\pm0,135}$	
	10	$5^{\pm0,090}$	0,3
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
6	8	$5^{\pm0,090}$	0,3
		$8^{\pm0,110}$	
		$9,5^{\pm0,110}$	
		$10^{\pm0,110}$	
	8,5	$8^{\pm0,110}$	0,3
	9	$4^{\pm0,090}$	0,3
		$6^{\pm0,090}$	
		$8^{\pm0,110}$	
		$9^{\pm0,110}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
	10	$4^{\pm0,090}$	0,3
		$5^{\pm0,090}$	
		$6^{\pm0,090}$	
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$11^{\pm0,110}$	
		$12^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
	12	$5^{\pm0,090}$	0,3
		$6^{\pm0,090}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$25^{\pm0,165}$	
7	10	$5^{\pm0,090}$	0,3
		$6^{\pm0,090}$	
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
	11	$6^{\pm0,090}$	0,3
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$13^{\pm0,135}$	
	13	$13^{\pm0,135}$	0,3
		$22^{\pm0,165}$	
	14	$10^{\pm0,110}$	0,3
8	10	$6^{\pm0,090}$	0,3
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$15^{\pm0,135}$	
	11	$6^{\pm0,090}$	0,3
		$8^{\pm0,110}$	
		$12^{\pm0,135}$	
		$16^{\pm0,135}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
8	11	$20^{\pm0,165}$	
	12	$6^{\pm0,090}$	0,3
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$12,5^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
	14	$8^{\pm0,110}$	0,3
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
	15	$6^{\pm0,090}$	0,3
		$12^{\pm0,135}$	
	16	$10^{\pm0,110}$	0,3
		$18^{\pm0,135}$	
		$25^{\pm0,165}$	
8,15	12	$12^{\pm0,135}$	0,3
9	12	$6^{\pm0,090}$	0,3
		$10^{\pm0,110}$	
		$14^{\pm0,135}$	
		$16^{\pm0,135}$	
	14	$6^{\pm0,090}$	0,3
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
10	12	$10^{\pm0,110}$	0,4
	13	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
	14	$5^{\pm0,090}$	0,4
		$8^{\pm0,110}$	
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$18^{\pm0,135}$	

BNZ Sintered bronze bushes - *Metric sizes*

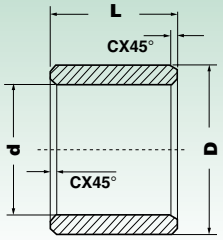


Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
10	14	$20^{\pm0,165}$	0,4
		$25^{\pm0,165}$	
	15	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
	16	$8^{\pm0,110}$	0,4
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$32^{\pm0,195}$	
	18	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
12	14	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
	15	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$12,5^{\pm0,135}$	
		$12,8^{\pm0,135}$	
		$13^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
	16	$8^{\pm0,110}$	0,4
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$23^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$36,5^{\pm0,165}$	
	17	$12^{\pm0,135}$	0,4
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$17^{\pm0,135}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
12	17	$20^{\pm0,165}$	0,4
		$21^{\pm0,165}$	
		$24^{\pm0,165}$	
		$25^{\pm0,165}$	
	18	$8^{\pm0,110}$	0,4
		$10^{\pm0,110}$	
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$29,5^{\pm0,165}$	
		$30^{\pm0,165}$	
	20	$12^{\pm0,135}$	0,4
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
12,1	18	$10^{\pm0,110}$	0,4
13	16	$10^{\pm0,135}$	0,4
14	18	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$26^{\pm0,165}$	
		$28^{\pm0,165}$	
	20	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$14^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
	22	$15^{\pm0,135}$	0,4
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
15	18	$12^{\pm0,135}$	0,4
		$15^{\pm0,135}$	
		$20^{\pm0,165}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
15	18	$25^{\pm0,165}$	0,4
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
	19	$10^{\pm0,110}$	0,4
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
	20	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$24^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$40^{\pm0,195}$	
	21	$15^{\pm0,135}$	0,4
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
	22	$15^{\pm0,135}$	0,4
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$40^{\pm0,195}$	
	24	$30^{\pm0,165}$	0,4
	25	$18^{\pm0,135}$	0,4
16	18	$10^{\pm0,110}$	0,4
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$30^{\pm0,165}$	
	19	$14,2^{\pm0,135}$	0,4
		$16^{\pm0,135}$	
		$19^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
	20	$12^{\pm0,135}$	0,4
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	

BNZ Sintered bronze bushes - Metric sizes

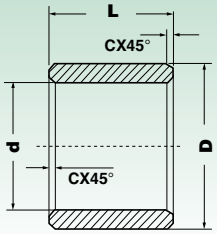


Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
16	20	$30^{\pm0,165}$	0,4
		$32^{\pm0,195}$	
	22	$10^{\pm0,110}$	0,4
		$12^{\pm0,135}$	
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$35^{\pm0,195}$	
	24	$20^{\pm0,165}$	0,4
17	21	$22^{\pm0,165}$	0,4
		$32^{\pm0,195}$	
	22	$15^{\pm0,135}$	0,4
		$17^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$23^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
	23	$17^{\pm0,135}$	0,4
		$23^{\pm0,165}$	
	25	$17^{\pm0,135}$	0,4
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
18	22	$12^{\pm0,135}$	0,4
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$36^{\pm0,195}$	
		$40^{\pm0,195}$	
	23	$18^{\pm0,135}$	0,4
		$23^{\pm0,165}$	
		$24,7^{\pm0,165}$	
		$28^{\pm0,165}$	
	24	$18^{\pm0,135}$	0,4
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$24^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
18	24	$35^{\pm0,195}$	0,4
		$36^{\pm0,195}$	
	25	$16^{\pm0,135}$	0,4
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$36^{\pm0,195}$	
		$40^{\pm0,195}$	
19	25	$19^{\pm0,135}$	0,4
		$25^{\pm0,165}$	
20	22	$10^{\pm0,110}$	0,4
		$20^{\pm0,165}$	
	23	$24^{\pm0,165}$	0,4
	24	$12^{\pm0,135}$	0,4
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$24^{\pm0,165}$	
		$25^{\pm0,165}$	
		$27^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
	25	$15^{\pm0,135}$	0,4
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$34^{\pm0,195}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
	26	$7^{\pm0,110}$	0,4
		$15^{\pm0,135}$	
		$16^{\pm0,135}$	
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$26^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
	27	$16^{\pm0,135}$	0,4
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$32^{\pm0,195}$	
	28	$16^{\pm0,135}$	0,4

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
20	28	$20^{\pm0,165}$	0,4
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$50^{\pm0,195}$	
	30	$20^{\pm0,165}$	0,4
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
	25	$40^{\pm0,195}$	0,4
22	26	$20^{\pm0,165}$	0,4
		$22^{\pm0,165}$	
		$26^{\pm0,165}$	
		$30^{\pm0,165}$	
	27	$15^{\pm0,135}$	0,4
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$36^{\pm0,195}$	
		$40^{\pm0,195}$	
	28	$15^{\pm0,135}$	0,4
		$18^{\pm0,135}$	
		$20^{\pm0,165}$	
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$34^{\pm0,195}$	
		$35^{\pm0,195}$	
		$36^{\pm0,195}$	
		$40^{\pm0,195}$	
	29	$18^{\pm0,135}$	0,4
		$22^{\pm0,165}$	
		$28^{\pm0,165}$	
		$36^{\pm0,195}$	
	30	$40^{\pm0,195}$	0,4
	32	$20^{\pm0,165}$	0,4
		$22^{\pm0,165}$	
		$30^{\pm0,165}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
24	28	$30^{\pm0,165}$	0,4

BNZ Sintered bronze bushes - Metric sizes

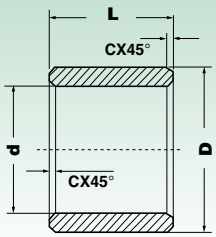


Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
24	30	$24^{\pm0,165}$	0,6
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$40^{\pm0,195}$	
25	30	$20^{\pm0,165}$	0,6
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$50^{\pm0,195}$	
	32	$20^{\pm0,165}$	0,6
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
	35	$15^{\pm0,135}$	0,6
		$20^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
	36	$50^{\pm0,195}$	0,6
26	30	$40^{\pm0,195}$	0,6
	35	$45^{\pm0,195}$	0,6
28	32	$30^{\pm0,165}$	0,6
	33	$20^{\pm0,165}$	0,6
		$22^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$33^{\pm0,195}$	
		$36^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
	35	$15^{\pm0,135}$	0,6
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$44^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
	36	$20^{\pm0,165}$	0,6
		$22^{\pm0,165}$	
		$25^{\pm0,165}$	
		$28^{\pm0,165}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
28	36	$30^{\pm0,165}$	0,6
		$35^{\pm0,195}$	
		$36^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
30	33	$45^{\pm0,195}$	0,6
	34	$40^{\pm0,195}$	0,6
	35	$20^{\pm0,165}$	0,6
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
	36	$10^{\pm0,110}$	0,6
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
	38	$20^{\pm0,165}$	0,6
		$24^{\pm0,165}$	
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$38^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
	40	$20^{\pm0,165}$	0,6
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
		$60^{\pm0,230}$	
30,1	38	$20^{\pm0,165}$	0,6
32	35	$40^{\pm0,195}$	0,6
	38	$20^{\pm0,165}$	0,6
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$38^{\pm0,195}$	
		$40^{\pm0,195}$	
		$50^{\pm0,195}$	
	40	$20^{\pm0,165}$	0,6
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
32	40	$32^{\pm0,195}$	0,6
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
34	40	$50^{\pm0,195}$	0,6
35	40	$20^{\pm0,165}$	0,7
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
	41	$25^{\pm0,165}$	0,7
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
	42	$35^{\pm0,195}$	0,7
		$42^{\pm0,195}$	
		$50^{\pm0,195}$	
	44	$22^{\pm0,165}$	0,7
		$28^{\pm0,165}$	
		$35^{\pm0,195}$	
	45	$20^{\pm0,165}$	0,7
		$25^{\pm0,165}$	
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
		$55^{\pm0,230}$	
		$60^{\pm0,230}$	
36	42	$22^{\pm0,165}$	0,7
		$28^{\pm0,165}$	
		$36^{\pm0,195}$	
		$45^{\pm0,195}$	
	45	$22^{\pm0,165}$	0,7
		$28^{\pm0,165}$	
		$36^{\pm0,195}$	
		$45^{\pm0,195}$	
	50	$50^{\pm0,195}$	0,7
38	44	$25^{\pm0,165}$	0,7
		$35^{\pm0,195}$	
		$45^{\pm0,195}$	
	48	$35^{\pm0,195}$	0,7
		$45^{\pm0,195}$	
		$55^{\pm0,230}$	
40	45	$20^{\pm0,165}$	0,7
		$30^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	

BNZ Sintered bronze bushes - Metric sizes



Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
40	45	$50^{\pm0,195}$	0,7
		$55^{\pm0,230}$	
	46	$25^{\pm0,165}$	0,7
		$30^{\pm0,165}$	
		$32^{\pm0,195}$	
		$40^{\pm0,195}$	
		$50^{\pm0,195}$	
	50	$25^{\pm0,165}$	0,7
		$30^{\pm0,165}$	
		$32^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
		$60^{\pm0,230}$	
		$80^{\pm0,230}$	
	60	$60^{\pm0,230}$	0,7
42	48	$40^{\pm0,195}$	0,7
		$50^{\pm0,195}$	
	52	$40^{\pm0,195}$	0,7
		$50^{\pm0,195}$	
45	51	$28^{\pm0,165}$	0,7
		$35^{\pm0,195}$	
		$36^{\pm0,195}$	
		$45^{\pm0,195}$	
		$55^{\pm0,230}$	
		$56^{\pm0,230}$	
	55	$30^{\pm0,165}$	0,7
		$35^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
		$55^{\pm0,230}$	
		$60^{\pm0,230}$	
		$65^{\pm0,230}$	
	56	$28^{\pm0,165}$	0,7
		$35^{\pm0,195}$	
		$36^{\pm0,195}$	
		$45^{\pm0,195}$	
		$56^{\pm0,230}$	
	60	$40^{\pm0,195}$	0,7
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
		$60^{\pm0,230}$	
48	55	$50^{\pm0,195}$	0,7

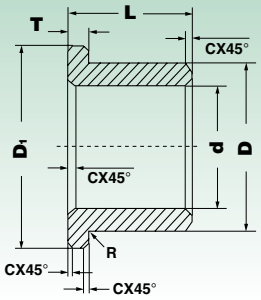
Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
48	58	$50^{\pm0,195}$	0,7
50	54	$45^{\pm0,195}$	0,7
	56	$32^{\pm0,195}$	0,7
		$40^{\pm0,195}$	
		$50^{\pm0,195}$	
		$63^{\pm0,230}$	
	60	$30^{\pm0,165}$	0,7
		$32^{\pm0,165}$	
		$35^{\pm0,195}$	
		$40^{\pm0,195}$	
		$45^{\pm0,195}$	
		$50^{\pm0,195}$	
		$60^{\pm0,230}$	
		$63^{\pm0,230}$	
		$70^{\pm0,230}$	
		$75^{\pm0,230}$	
		$80^{\pm0,230}$	
55	63	$40^{\pm0,195}$	0,7
		$55^{\pm0,230}$	
	65	$40^{\pm0,195}$	0,7
		$55^{\pm0,230}$	
		$60^{\pm0,230}$	
		$65^{\pm0,230}$	
		$70^{\pm0,230}$	
	70	$70^{\pm0,230}$	0,7
		$75^{\pm0,230}$	
60	68	$50^{\pm0,195}$	0,7
		$60^{\pm0,230}$	
	70	$50^{\pm0,195}$	0,8
		$60^{\pm0,230}$	
		$70^{\pm0,230}$	
		$80^{\pm0,230}$	
		$90^{\pm0,270}$	
		$120^{\pm0,270}$	
	72	$50^{\pm0,195}$	0,8
		$60^{\pm0,230}$	
		$70^{\pm0,230}$	
	75	$60^{\pm0,230}$	0,8
		$70^{\pm0,230}$	
		$75^{\pm0,230}$	
		$80^{\pm0,230}$	0,8
		$90^{\pm0,270}$	
	80	$90^{\pm0,270}$	0,8
		$120^{\pm0,270}$	

Dimensions (mm)			
$d_{(G7)}$	$D_{(s7)}$	$L_{(js13)}$	C_{max}
63	70	$40^{\pm0,195}$	0,8
		$50^{\pm0,195}$	
65	75	$65^{\pm0,230}$	0,8
		$70^{\pm0,230}$	
		$80^{\pm0,230}$	
	80	$60^{\pm0,230}$	0,8
		$80^{\pm0,230}$	
		$90^{\pm0,270}$	
70	80	$35^{\pm0,195}$	0,8
		$60^{\pm0,230}$	
		$70^{\pm0,230}$	
		$80^{\pm0,230}$	
		$90^{\pm0,270}$	
		$120^{\pm0,270}$	
	85	$60^{\pm0,230}$	0,8
		$70^{\pm0,230}$	
		$90^{\pm0,270}$	
75	90	$60^{\pm0,230}$	0,8
		$70^{\pm0,230}$	
80	90	$35^{\pm0,195}$	0,8
	95	$70^{\pm0,230}$	0,8
		$80^{\pm0,230}$	
		$90^{\pm0,270}$	
	96	$60^{\pm0,230}$	0,8
	100	$80^{\pm0,230}$	0,8
		$120^{\pm0,270}$	
85	100	$70^{\pm0,230}$	0,8
		$80^{\pm0,230}$	
		$100^{\pm0,270}$	
90	100	$70^{\pm0,230}$	0,8
		$80^{\pm0,230}$	
		$90^{\pm0,270}$	
		$100^{\pm0,270}$	
	110	$65^{\pm0,230}$	0,8
		$80^{\pm0,230}$	
100	110	$65^{\pm0,230}$	1
	120	$65^{\pm0,230}$	1
		$80^{\pm0,230}$	
		$100^{\pm0,270}$	
		$120^{\pm0,270}$	
	120,3	$65^{\pm0,230}$	1
110	125	$120^{\pm0,270}$	1
125	150	$120^{\pm0,270}$	1
-	-	-	-

To order, please specify: BNZ e/o FE + d + L

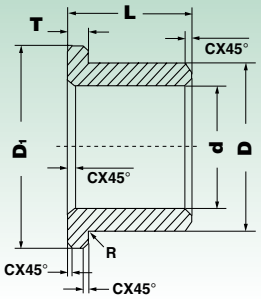
Iron (FE) is available on request

BNZF Sintered bronze flanged bushes - Metric sizes



Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
2	5	8	1,5	$3^{\pm0,070}$	0,3	0,3
3	6	8	1,5	$10^{\pm0,110}$	0,3	0,3
		9		$4^{\pm0,090}$		
				$5^{\pm0,090}$		
				$6^{\pm0,090}$		
				$10^{\pm0,110}$		
4	8	10	2	$6^{\pm0,090}$	0,3	0,3
				$8^{\pm0,110}$		
		12	2	$3^{\pm0,070}$		
				$4^{\pm0,090}$		
				$5^{\pm0,090}$		
				$6^{\pm0,090}$		
				$8^{\pm0,110}$		
				$10^{\pm0,110}$		
				$12^{\pm0,135}$		
5	9	13	2	$4^{\pm0,090}$	0,3	0,3
				$5^{\pm0,090}$		
				$8^{\pm0,110}$		
	10	12	2	$7^{\pm0,110}$	0,3	0,3
				$8^{\pm0,110}$		
				$12^{\pm0,135}$		
				$15^{\pm0,135}$		
				$16^{\pm0,135}$		
		13	2	$15^{\pm0,135}$		
6	9	13	2	$8^{\pm0,110}$	0,3	0,3
	10	12	2	$6^{\pm0,090}$	0,3	0,3
				$8^{\pm0,110}$		
				$10^{\pm0,110}$		
				$12^{\pm0,135}$		
				$14^{\pm0,135}$		
				$16^{\pm0,135}$		
		14	1,5	$13^{\pm0,135}$		
			2	$4^{\pm0,090}$		
				$5^{\pm0,090}$		
				$6^{\pm0,090}$		
				$8^{\pm0,110}$		
				$10^{\pm0,110}$		
				$12^{\pm0,135}$		
				$14^{\pm0,135}$		
				$15^{\pm0,135}$		
				$16^{\pm0,135}$		
	12	14	2	$8^{\pm0,110}$	0,3	0,3
				$10^{\pm0,110}$		
				$12^{\pm0,135}$		
				$13^{\pm0,135}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
7	11	15	2	$5^{\pm0,090}$	0,6	0,3
				$8^{\pm0,110}$		
				$10^{\pm0,110}$		
	12	15	2,5	$15^{\pm0,135}$	0,6	0,3

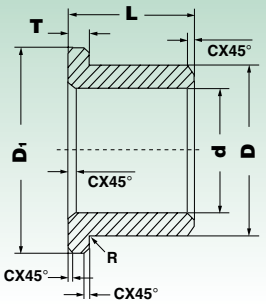
Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
7	12	16	2	$8^{\pm0,110}$	0,6	0,3
				$12^{\pm0,135}$		
8	12	16	2	$6^{\pm0,090}$	0,6	0,3
				$8^{\pm0,110}$		
				$10^{\pm0,110}$		
				$12^{\pm0,135}$		
				$14^{\pm0,135}$		
				$15^{\pm0,135}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
	14	18	3	$8^{\pm0,110}$	0,6	0,3
				$11^{\pm0,135}$		
				$12^{\pm0,135}$		
				$14^{\pm0,135}$		
				$20^{\pm0,165}$		
	15	18	2	$20^{\pm0,165}$	0,6	0,3
9	14	19	2,5	$6^{\pm0,090}$	0,6	0,4
				$10^{\pm0,110}$		
				$14^{\pm0,135}$		
	15	20	4,5	$20^{\pm0,165}$	0,6	0,4
10	13	16	1,5	$10^{\pm0,110}$	0,6	0,4
			2	$6^{\pm0,090}$		
		17	2,5	$10^{\pm0,110}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
	14	18	2	$6^{\pm0,090}$	0,6	0,4
			3			
			2	$8^{\pm0,110}$		
				$10^{\pm0,110}$		
			3			
			2	$12^{\pm0,135}$		
				$14^{\pm0,135}$		
			3			
				$15^{\pm0,135}$		
			2	$16^{\pm0,135}$		
				$20^{\pm0,165}$		
			3			
	15	19	2	$20^{\pm0,165}$	0,6	0,4
		20				
		21	3	$8^{\pm0,110}$		
				$10^{\pm0,110}$		
				$15^{\pm0,135}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
	16	20	3	$8^{\pm0,110}$	0,6	0,4
				$10^{\pm0,110}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
				$30^{\pm0,165}$		
		22		$8^{\pm0,110}$		
				$10^{\pm0,110}$		



Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
10	16	22	3	$16^{\pm0,135}$	0,6	0,4
12	15	18	1,5	$8^{\pm0,110}$	0,6	0,4
				$20^{\pm0,165}$		
			2	$7^{\pm0,110}$		
		21	3	$12^{\pm0,135}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
	16	18	2	$12^{\pm0,135}$	0,6	0,4
				$14^{\pm0,135}$		
				$20^{\pm0,165}$		
		20		$10^{\pm0,110}$		
				$12^{\pm0,135}$		
				$16^{\pm0,135}$		
				$18^{\pm0,135}$		
				$25^{\pm0,165}$		
		25	3	$18^{\pm0,135}$		
	17	23	3	$12^{\pm0,135}$	0,6	0,4
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
	18	22	3	$10^{\pm0,110}$	0,6	0,4
				$12^{\pm0,135}$		
				$16^{\pm0,135}$		
				$18^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
		24		$8^{\pm0,110}$		
				$12^{\pm0,135}$		
				$20^{\pm0,165}$		
14	18	22	2	$14^{\pm0,135}$	0,6	0,4
				$18^{\pm0,135}$		
				$22^{\pm0,165}$		
	20	24	4	$25^{\pm0,165}$	0,6	0,4
		25	3	$10^{\pm0,110}$		
				$12^{\pm0,135}$		
				$14^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
		26		$10^{\pm0,110}$		
				$14^{\pm0,135}$		
				$15^{\pm0,135}$		
				$18^{\pm0,135}$		
				$20^{\pm0,165}$		
				$22^{\pm0,165}$		
				$28^{\pm0,165}$		
15	19	25	3	$16^{\pm0,135}$	0,6	0,4
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
	20	24	2,5	$30^{\pm0,165}$	0,6	0,4
		25	3	$15^{\pm0,135}$		

Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
15	20	25	3	$20^{\pm0,165}$	0,6	0,4
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
		28	4	$20^{\pm0,165}$		
				$32^{\pm0,195}$		
	21	27	3	$10^{\pm0,110}$	0,6	0,4
				$15^{\pm0,135}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$32^{\pm0,195}$		
	22	28	3	$12^{\pm0,135}$	0,6	0,4
				$15^{\pm0,135}$		
				$16^{\pm0,135}$		
				$22^{\pm0,165}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
16	20	24	2	$9^{\pm0,110}$	0,6	0,4
				$20^{\pm0,165}$		
		27	3	$15^{\pm0,135}$		
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
	22	28	3	$12^{\pm0,135}$	0,6	0,4
			4			
			3	$15^{\pm0,135}$		
			3,5	$16^{\pm0,135}$		
			4			
			3	$20^{\pm0,165}$		
			4			
			3,5	$22^{\pm0,165}$		
			3	$25^{\pm0,165}$		
			3,5	$30^{\pm0,165}$		
			3	$32^{\pm0,195}$		
			3,5	$35^{\pm0,195}$		
17	22	26	2	$30^{\pm0,165}$	0,6	0,4
	25	32	4	$17^{\pm0,135}$	0,6	0,4
				$25^{\pm0,165}$		
				$35^{\pm0,195}$		
18	22	26	2	$18^{\pm0,135}$	0,6	0,4
				$22^{\pm0,165}$		
				$28^{\pm0,165}$		
	24	30	3	$12^{\pm0,135}$	0,6	0,4
				$18^{\pm0,135}$		
				$22^{\pm0,165}$		
				$28^{\pm0,165}$		
				$30^{\pm0,165}$		
	25	31	5	$30^{\pm0,165}$	0,6	0,4
		32	4	$16^{\pm0,135}$		

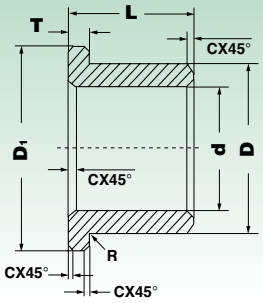
BNZF Sintered bronze flanged bushes - Metric sizes



Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
18	25	32	4	$18^{\pm0,135}$	0,6	0,4
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
			5	$35^{\pm0,195}$		
20	24	30	3	$16^{\pm0,135}$	0,6	0,4
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
	25	28	2	$30^{\pm0,165}$	0,6	0,4
		30	4	$25^{\pm0,165}$		
	26	32	3	$15^{\pm0,135}$	0,6	0,4
				$16^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$32^{\pm0,195}$		
			2	$25^{\pm0,165}$		
				$40^{\pm0,195}$		
	28	35	4	$16^{\pm0,135}$	0,6	0,4
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$35^{\pm0,195}$		
				$40^{\pm0,195}$		
22	27	32	2,5	$18^{\pm0,135}$	0,6	0,4
				$22^{\pm0,165}$		
				$28^{\pm0,165}$		
	28	32	3	$20^{\pm0,165}$	0,6	0,4
		34		$15^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
		35		$22^{\pm0,165}$		
	29	36	3,5	$18^{\pm0,135}$	0,6	0,4
				$22^{\pm0,165}$		
				$28^{\pm0,165}$		
				$40^{\pm0,195}$		
	32	40	5	$20^{\pm0,165}$	0,6	0,4
				$22^{\pm0,165}$		
				$30^{\pm0,165}$		
				$40^{\pm0,195}$		
24	32	35	4,6	$14,6^{\pm0,135}$	0,6	0,4
25	30	35	3	$40^{\pm0,195}$	0,6	0,4
		36		$20^{\pm0,165}$		
				$45^{\pm0,195}$		
		39	3,5	$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$32^{\pm0,195}$		
		40	4	$16^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		

Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
25	32	39	3,5	$20^{\pm0,165}$	0,6	0,6
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$32^{\pm0,195}$		
		40	5	$16^{\pm0,135}$		
				$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$32^{\pm0,195}$		
				$40^{\pm0,195}$		
				$53^{\pm0,230}$		
		35	45	$16^{\pm0,135}$		
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$35^{\pm0,195}$		
				$45^{\pm0,195}$		
	35	45	5	$25^{\pm0,165}$	0,6	0,6
				$39^{\pm0,195}$		
				$45^{\pm0,195}$		
28	33	38	2,5	$22^{\pm0,165}$	0,6	0,6
				$28^{\pm0,165}$		
				$35^{\pm0,195}$		
	35	38	2,5	$20^{\pm0,165}$	0,6	0,6
				$28^{\pm0,165}$		
	36	44	4	$20^{\pm0,165}$	0,6	0,6
				$22^{\pm0,165}$		
				$25^{\pm0,165}$		
				$28^{\pm0,165}$		
				$30^{\pm0,165}$		
				$35^{\pm0,195}$		
				$36^{\pm0,195}$		
				$40^{\pm0,195}$		
30	35	40	3	$30^{\pm0,165}$	0,6	0,6
				$35^{\pm0,195}$		
				$40^{\pm0,195}$		
	38	46	4	$20^{\pm0,165}$	0,6	0,6
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
		50		$45^{\pm0,195}$		
	40	45	5	$36^{\pm0,195}$	0,6	0,6
		48	4	$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$35^{\pm0,195}$		
				$40^{\pm0,195}$		
		50	5	$20^{\pm0,165}$		
				$30^{\pm0,165}$		
				$40^{\pm0,195}$		
				$42^{\pm0,195}$		
				$55^{\pm0,230}$		
32	38	46	4	$20^{\pm0,165}$	0,8	0,6
				$25^{\pm0,165}$		

BNZF Sintered bronze flanged bushes - Metric sizes



Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
32	38	46	4	$32^{\pm0,195}$	0,8	0,6
	40	45	5	$50^{\pm0,195}$	0,8	0,6
		48	4	$20^{\pm0,165}$		
				$25^{\pm0,165}$		
				$28^{\pm0,165}$		
				$30^{\pm0,165}$		
				$32^{\pm0,195}$		
				$35^{\pm0,195}$		
				$36^{\pm0,195}$		
				$40^{\pm0,195}$		
	42	48	5	$32^{\pm0,195}$	0,8	0,6
				$40^{\pm0,195}$		
35	45	55	5	$20^{\pm0,165}$	0,8	0,7
				$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$35^{\pm0,195}$		
				$40^{\pm0,195}$		
				$45^{\pm0,195}$		
				$50^{\pm0,195}$		
36	45	48	4,5	$22^{\pm0,165}$	0,8	0,7
38	48	58	5	$25^{\pm0,165}$	0,8	0,7
				$35^{\pm0,195}$		
40	46	56	5	$25^{\pm0,165}$	0,8	0,7
				$32^{\pm0,195}$		
				$40^{\pm0,195}$		
	50	60	5	$25^{\pm0,165}$	0,8	0,7
				$30^{\pm0,165}$		
				$32^{\pm0,195}$		
				$35^{\pm0,195}$		
				$40^{\pm0,195}$		
				$50^{\pm0,195}$		
			6	$25^{\pm0,165}$		
				$30^{\pm0,165}$		
				$40^{\pm0,195}$		
				$50^{\pm0,195}$		
				$60^{\pm0,230}$		
42	52	62	5	$30^{\pm0,165}$	0,8	0,7
				$40^{\pm0,195}$		
				$50^{\pm0,195}$		
45	51	57	3	$28^{\pm0,165}$	0,8	0,7
				$36^{\pm0,195}$		
				$45^{\pm0,195}$		
	55	65	5	$35^{\pm0,195}$	0,8	0,7

Dimensions (mm)						
$d_{(G7)}$	$D_{(s7)}$	$D_{1(js13)}$	$T_{(js13)}$	$L_{(js13)}$	R	C_{max}
45	55	65	5	$45^{\pm0.195}$	0,8	0,7
				$55^{\pm0,230}$		
				$65^{\pm0,230}$		
			6	$30^{\pm0.165}$		
				$35^{\pm0.195}$		
				$40^{\pm0.195}$		
				$45^{\pm0.195}$		
				$55^{\pm0.230}$		
				$65^{\pm0.230}$		
	56	67	5,5	$28^{\pm0.165}$	0,8	0,7
				$36^{\pm0.165}$		
				$45^{\pm0.195}$		
50	56	62	3	$32^{\pm0.195}$	0,8	0,7
				$40^{\pm0.195}$		
				$50^{\pm0.195}$		
	60	70	5	$32^{\pm0.195}$	0,8	0,7
				$35^{\pm0.195}$		
				$40^{\pm0.195}$		
				$50^{\pm0.195}$		
				$60^{\pm0.230}$		
			6	$30^{\pm0.195}$		
				$40^{\pm0.195}$		
				$50^{\pm0.195}$		
				$60^{\pm0.230}$		
				$70^{\pm0.230}$		
55	64	71	5	$45^{\pm0.195}$	0,8	0,7
60	70	80	5	$50^{\pm0.195}$	0,8	0,8
				$60^{\pm0.230}$		
	75	85	6	$60^{\pm0.230}$	0,8	0,8
			8			
			6	$65^{\pm0.230}$		
				$70^{\pm0.230}$		
70	85	95	6	$60^{\pm0.230}$	0,8	0,8
			8			
			6	$65^{\pm0.230}$		
			8	$70^{\pm0.230}$		
			6	$80^{\pm0.230}$		
80	95	105	8	$60^{\pm0.230}$	0,8	0,8
				$70^{\pm0.230}$		
				$80^{\pm0.230}$		
				$90^{\pm0.230}$		

To order, please specify: BNZF e/o FEF + d + D + D_1 + T + L

Iron (FEF) is available on request

CHAPTER 4

4. 090 e 092 bronze bushes characteristics

090 and 092 are bushes in phosphorous bronze which is particularly indicated to achieve coupling with construction steels. These types of bushes, either cylindrical or flanged, are cut out of bronze sheets that are from 1 to 2,5mm thick. Among the principal characteristics that distinguish these bushes we find:

- *good capacity to slide*
- *good resistance to chemical agents*
- *high load capacity*
- *high thermal conductivity*
- *each mounting in diverse applications*
- *easy to lubricate*
- *reduced obstruction*
- *longer ranges lubrication*
- *resistance to bumping and to oscillations*

Their internal surface, can be supplied with spherical pockets (spherical cap pockets) or with a diamond shape (lozenge cap pockets).
These bushes are widely used in the machinery sector and bridges for lifting, tooling machines, automobiles, tractors and trucks.
There is also a series of bushes entirely in bronze, deriving from the series 090, where pockets have been substitute by circular passthrough holes (092 series).
All of the other characteristics are the same for 090 and 092 series, including the dimensions.
See the following tables.

CHAPTER 4

4.1 Technical features

Composition	**CuSn8P0,3**
Max static load	**150N/mm²**
Max dynamic load	**60N/mm²**
Hardness	**90 ~120 HB**
Limit speed	**2,5 m/s**
Operating temperature	**-40 °C ~ + 150 °C**

4.2 Lubrication

For proper functioning of these bushes, the lubrication is determining factor as it prevents deterioration both of the bush as well as the countering piece used as a plain for running. Once the bush is exposed to chemical agents or in other situations where the proper functioning can be compromised a shield is indicated.
When lubricated sporadically a grease lubricant in indicated, on the contrary, if the lubrication is continuous an oil is recommended.
In the case of grease lubricating the bush with the specific cap containing the lubricating grease whereas when using oil to lubricate a smooth surface is advisable.
In more frequent cases when lubrication is sporadic, grease when it is possible to use two different types of bushes, with lozenge cap pockets, that permit a grease lubrication at longer intervals, while using the spherical cap pockets bushes, is possible even with oil lubrication, when the intervals will be brief compared to the lubrication effected with grease, which in addition, can be left in an excellent way even when the spherical cap is used. For this lubrication a soap based grease with litio is indicated.

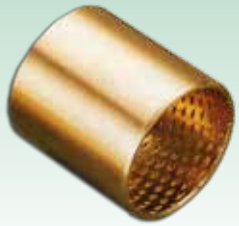
090 and 092 Bushes tolerances

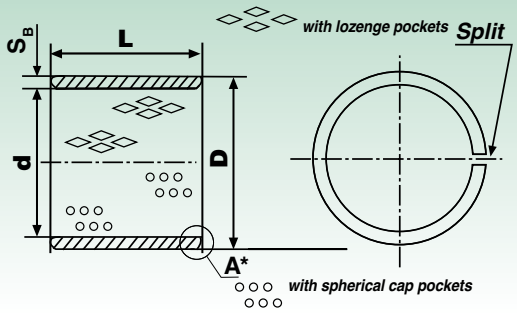
090 - 092

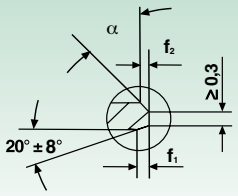
Outer diameter D		Outer diameter tolerances D	Thickness tolerances S_B			Chamfer dimensions S_B	f_1	f_2
≤ 10		+ 0,055 + 0,025	-		-	0,75	0,5 ± 0,3	- 0,05 - 0,30
10 <	≤ 18	+ 0,065 + 0,030	1		+ 0,005 - 0,020	1	0,6 ± 0,4	- 0,1 - 0,4
18 <	≤ 30	+ 0,075 + 0,035	1,5		+ 0,005 - 0,025	1,5	0,6 ± 0,4	- 0,1 - 0,6
30 <	≤ 50	+ 0,085 + 0,045	2		+ 0,005 - 0,030	2	1,2 ± 0,4	- 0,1 - 0,7
50 <	≤ 80	+ 0,100 + 0,055	2,5	D ≤ 80	+ 0,005 - 0,040	2,5	1,8 ± 0,6	- 0,2 - 1,0
80 <	≤ 120	+ 0,120 + 0,070	2,5	80 < D ≤ 120	- 0,010 - 0,060	2,5	1,8 ± 0,6	- 0,2 - 1,0
120 <	≤ 180	+ 0,170 + 0,100	2,5	D > 120	- 0,035 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0
180 <	≤ 305	+ 0,255 + 0,125	2,5	D > 120	- 0,035 - 0,085	2,5	1,8 ± 0,6	- 0,2 - 1,0

Recommended mounting tolerances:	
Shaft:	***Bore:***
≤ 4 = h 6	*≤ 4 = H 6*
from 5 to 75 = f7	*> 4 = H 7*
≥ 80 = h 8	

Tolerance values of bushings* 090 and 092 *comply with standard ISO 3547-1:2006





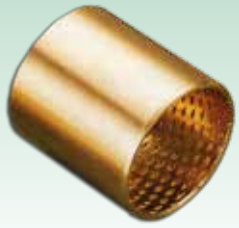


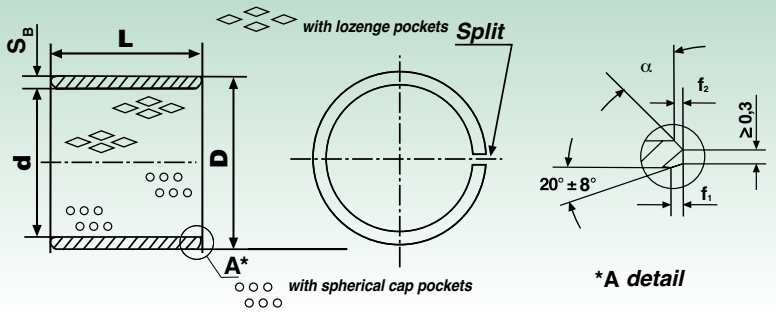
*A detail

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
10	12	10
		15
		20
12	14	10
		15
		20
13	15	10
		15
		20
		25
14	16	10
		15
		20
		25
		30
15	17	10
		15
		20
		25
		30
16	18	10
		15
		20
		25
		30
17	19	10
		15
		20
		25
18	20	10
		15
		20
		25
18	21	10
		15
		20
		25
20	22	10
		15
		20
		25
20	23	10
		15
		20
		25
		30
		40

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
22	25	15
		20
		25
		30
		40
		50
24	27	15
		20
		25
		30
24	28	15
		20
		25
		30
		50
25	28	15
		20
		25
		30
		40
		50
28	31	15
		20
		25
		30
		40
		50
28	32	15
		20
		25
		30
30	34	15
		20
		25
		30
		35
		40
		50
		60
32	36	15
		20
		25
		30
		35
		40
		50
		60

Dimensions (mm)		
d	D	$L^{\pm 0,25}$
35	39	15
		20
		25
		30
		35
		40
		50
		60
40	44	20
		25
		30
		35
		40
		50
		60
45	50	20
		25
		30
		35
		40
		50
		60
		80
50	55	20
		25
		30
		35
		40
		50
		60
		80
55	60	20
		25
		30
		35
		40
		50
		60
		80
60	65	25
		30
		35
		40
		50
		60
		70
		80



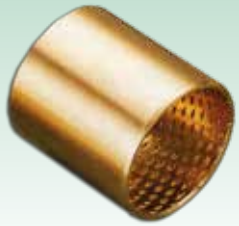


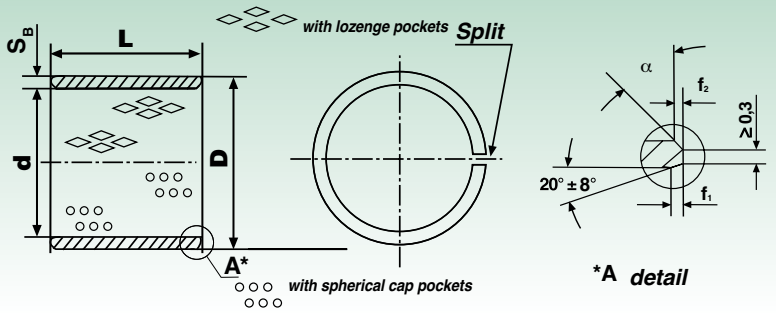
Dimensions (mm)		
d	D	L ± 0,25
60	65	90
65	70	25
		30
		35
		40
		50
		60
		70
		80
70	75	25
		30
		35
		40
		50
		60
		70
		80
		90
75	80	25
		30
		35
		40
		50
		60
		70
		80
80	85	30
		35
		40
		50
		60
		70
		80
		100
85	90	30
		35
		40
		50
		60
		70
		80
		90
		100
90	95	30
		35
		40
		50

Dimensions (mm)		
d	D	L ± 0,25
90	95	60
		70
		80
		90
		95
		100
95	100	30
		40
		50
		60
		70
		80
		90
		95
		100
100	105	30
		40
		50
		60
		70
		80
		90
		95
		100
105	110	50
		60
		70
		80
		90
		100
110	115	50
		60
		70
		80
		90
		100
115	120	50
		60
		70
		80
		90
		100
120	125	60
		70
		80
		90
		100

Dimensions (mm)		
d	D	L ± 0,25
125	130	60
		70
		80
		90
		100
130	135	60
		70
		80
		90
		100
135	140	60
		70
		80
		90
		100
140	145	60
		70
		80
		90
		100
145	150	60
		70
		80
		90
		100
150	155	60
		70
		80
		90
		100
155	160	60
		70
		80
		90
		100
160	165	60
		70
		80
		90
		100
165	170	60
		70
		80
		90
		100
170	175	60
		70

090 Bushes - Metric sizes





Dimensions (mm)		
d	D	L ± 0,25
170	175	80
		90
		100
175	180	60
		70
		80
		90
		100
180	185	60
		70
		80
		90
		100
185	190	60
		70
		80
		90
		100
190	195	60
		70
		80
		90
		100
195	200	60
		70
		80
		90
		100
200	205	60
		70
		80
		90
		100
205	210	60
		70
		80
		90
		100

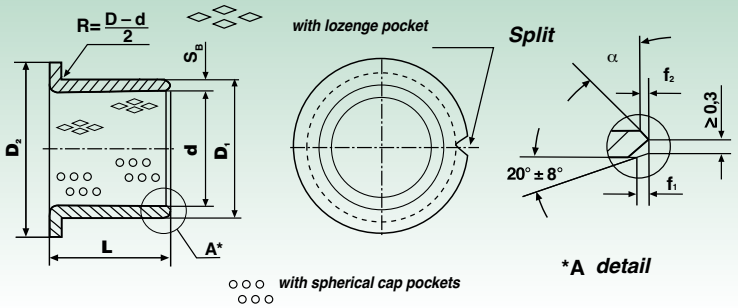
Dimensions (mm)		
d	D	L ± 0,25
210	215	60
		80
		100
215	220	60
		70
		80
		90
		100
220	225	60
		80
		100
225	230	60
		70
		80
		90
		100
230	235	60
		70
		80
		90
		100
235	240	60
		80
		100
240	245	60
		70
		80
		90
		100
245	250	60
		80
		100
250	255	60
		70
		80
		90
		100
255	260	60

Dimensions (mm)		
d	D	L ± 0,25
255	260	80
		100
260	265	60
		70
		80
		90
		100
265	270	60
		80
		100
270	275	60
		70
		80
		90
		100
275	280	60
		80
		100
280	285	60
		70
		80
		90
		100
285	290	60
		80
		100
290	295	60
		70
		80
		90
		100
295	300	60
		80
		100
300	305	60
		70
		80
		90
		100

To order, please specify: 090 + d + L + pockets type

Lozenge and spherical cap pockets are available on request

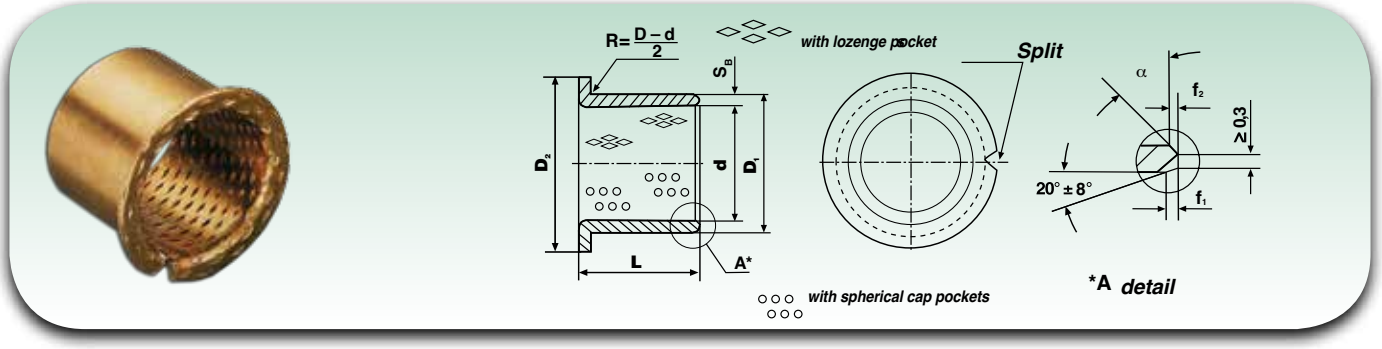
090F Flanged bushes - Metric sizes



Designation	Dimensions (mm)			
	d	D_1	D_2 ±0,50	L ±0,25
F 12-15	12	14	20	15
F 20-15	20	23	30	15
F 20-20				20
F 25-15	25	28	35	15
F 25-20				20
F 25-25				25
F 30-15	30	34	45	15
F 30-20				20
F 30-25				25
F 30-30				30
F 35-20	35	39	50	20
F 35-25				25
F 35-30				30
F 35-35				35
F 35-45				45
F 40-25	40	44	55	25
F 40-30				30
F 40-35				35
F 40-40				40
F 45-30	45	50	60	30
F 45-35				35
F 45-40				40
F 45-45				45
F 45-50				50
F 45-60				60
F 50-30	50	55	65	30
F 50-35				35
F 50-40				40
F 50-50				50
F 55-20	55	60	70	20
F 55-25				25
F 55-30				30
F 55-35				35
F 55-40				40
F 55-50				50
F 60-20	60	65	75	20
F 60-25				25
F 60-30				30
F 60-35				35
F 60-40				40
F 60-45				45
F 60-50				50
F 60-60				60
F 65-30	65	70	80	30
F 65-35				35
F 65-40				40

Designation	Dimensions (mm)			
	d	D_1	D_2 ±0,50	L ±0,25
F 65-50	65	70	80	50
F 65-60				60
F 70-35	70	75	85	35
F 70-40				40
F 70-50				50
F 70-60				60
F 70-70				70
F 75-35	75	80	90	35
F 75-40				40
F 75-50				50
F 75-60				60
F 75-70				70
F 80-35	80	85	100	35
F 80-40				40
F 80-50				50
F 80-60				60
F 80-70				70
F 80-80				80
F 90-40	90	95	110	40
F 90-50				50
F 90-60				60
F 90-70				70
F 90-80				80
F 90-90				90
F 100-35	100	105	120	35
F 100-50				50
F 100-60				60
F 100-70				70
F 100-80				80
F 100-90				90
F 110-50	110	115	130	50
F 110-60				60
F 110-70				70
F 110-80				80
F 110-90				90
F 120-45	120	125	140	45
F 120-50				50
F 120-60				60
F 120-70				70
F 120-80				80
F 120-90				90
F 130-60	130	135	155	60
F 130-70				70
F 130-80				80
F 130-90				90
F 140-60	140	145	165	60

090F Flanged bushes - Metric sizes



Designation	Dimensions (mm)			
	d	D_1	D_2 ±0,50	L ±0,25
F 140-70	140	145	165	70
F 140-80				80
F 140-90				90
F 150-60	150	155	180	60
F 150-70				70
F 150-80				80
F 150-90				90
F 160-60	160	165	190	60
F 160-70				70
F 160-80				80
F 160-90				90
F 170-60	170	175	200	60
F 170-70				70
F 170-80				80
F 170-90				90
F 180-60	180	185	215	60
F 180-70				70
F 180-80				80
F 180-90				90
F 190-60	190	195	225	60
F 190-70				70
F 190-80				80
F 190-90				90
F 200-60	200	205	235	60

Designation	Dimensions (mm)			
	d	D_1	D_2 ±0,50	L ±0,25
F 200-70	200	205	235	70
F 200-80				80
F 200-90				90
F 225-60	225	230	260	60
F 225-70				70
F 225-80				80
F 225-90				90
F 250-60	250	255	290	60
F 250-70				70
F 250-80				80
F 250-90				90
F 265-60	265	270	305	60
F 265-70				70
F 265-80				80
F 265-90				90
F 285-60	285	290	325	60
F 285-70				70
F 285-80				80
F 285-90				90
F 300-60	300	305	340	60
F 300-70				70
F 300-80				80
F 300-90				90

To order, please specify: 090 + designation + pockets type

Lozenge and spherical cap pockets are available on request

1) *On request available also **WASHERS TYPE 090,** with lozenge pockets.*

For metric dimensions, please (see page 10) and for inch dimensions, please (see page 17).

1) To order, please specify: 090 washers + d_4

Please find dimensions on pages from 48 to50 (cylindrical bushes) and pages 51-52 (flanged bushes).

2) To order, please specify: 092 + cylindrical or flanged + dimensions

CHAPTER 5

5. BM bimetal bushes characteristics

The bimetal bushes BM are constituted of two metallic strips of different material; the first is normally in steel while the second is made by a copper alloy. The metals are coupled so that the non steel strip is the internal covering. The particular construction of these bushes, permits them to have good resistance to wear, in particular at medium speed and medium load or low speed with high load. The internal surface of bronze can be channelled with different types of channels (fig. 6) depending on and conditions of lubrication in which the bushes can be used. Furthermore, in some cases, an external hole is present for ri-lubricating.

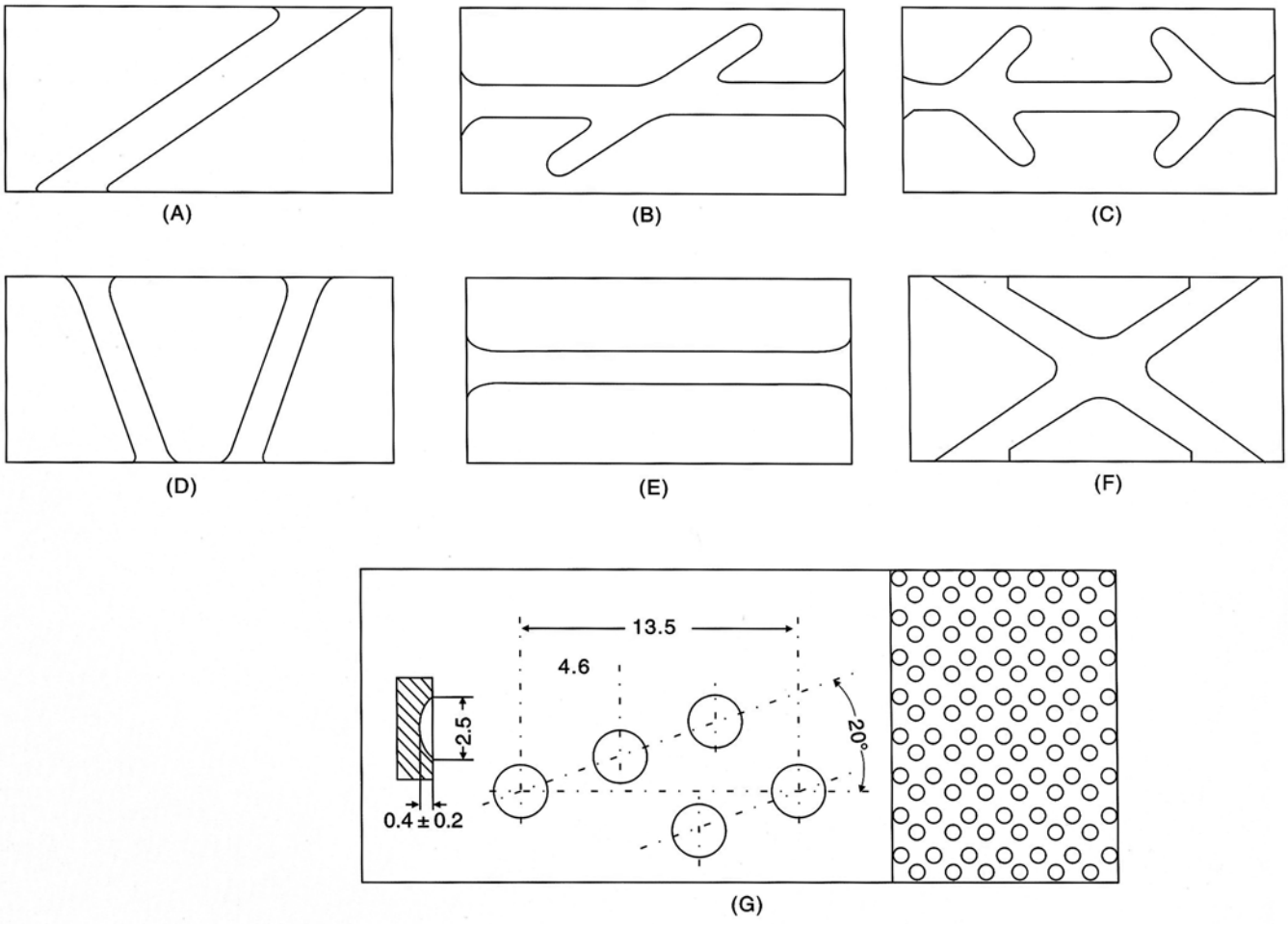
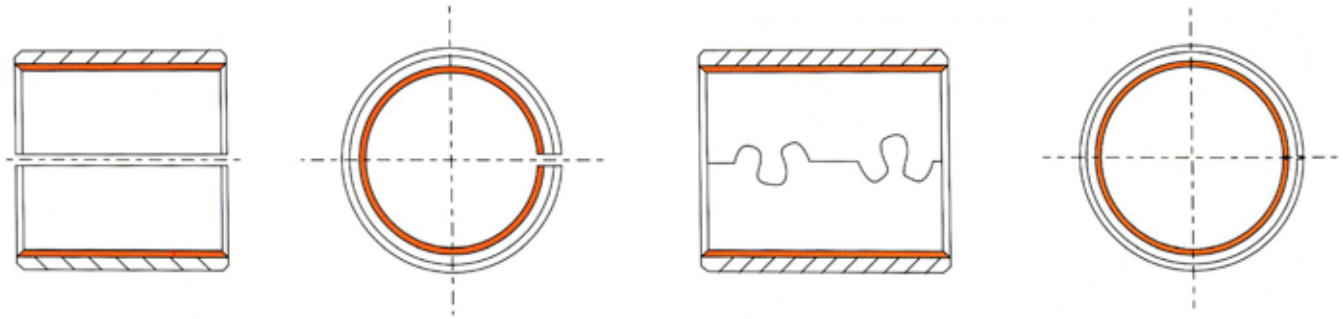


Fig. 6

CHAPTER 5

Available in various cylindrical formats, flanged and washer, some of these bushes can be open with a type of joint (fig. 7).



The principal applications of the bimetal bushes are: automotive, (motors, motorcycle clutches, circular knitters, tire removes etc...), agricultural machinery, for lifting (hydraulic cranes, lifting bridges, etc...) pumps, compressor.

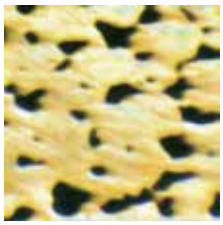
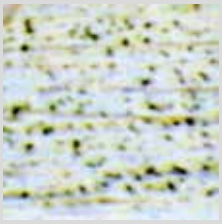
5.1 Technical features

Description	*Bronze alloys types*			
	BM 1 CuPb10Sn10	**BM 2** CuPb24Sn4	**BM 3** CuPb30	**BM 4** AlSn20Cu
Load limit (N/mm²)	150	130	120	100
Tensile strength (N/mm²)	185	150	200	200
Max speed* (m/s)	5	10	15	25
Friction coefficient (µm)	0,06 ~ 0,14	0,06 ~ 0,16	0,08 ~ 0,16	0,08 ~ 0,17
Grasso - *Grease*	2,8	2,8	2,5	/
Olio - *Oil*	10	10	8	6

** with oil lubrication*

CHAPTER 5

5.2 Material specifications

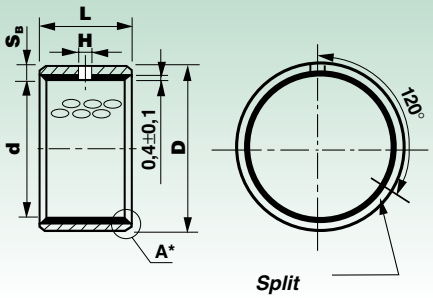
Alloy	Hardness	Temperature	Metallographic	Characteristics
BM 1 CuPb10Sn10	70 ~ 100 HB	+260 °C		*The type with highest hardness, wide application field, most suitable for high impact vibrating load bushes and washers.*
BM 2 CuPb24Sn4	45 ~ 70 HB	+200 °C		*Relative high fatigue strength and load capacity, good sliding performance, poor oil corrosion resistance, fit for middle load/ middle speed. Normally applied in bushes for inner-combustion engines, connecting rods (when plated).*
BM 3 CuPb30	30 ~ 45 HB	+170 °C		*Good fatigue strength, normally applied in high speed bushings. Applied in bushes for inner-combustion engines and connecting rods with low to moderate load.*
BM 4 AlSn20Cu	30 ~ 40 HB	+150 °C		*Moderate fatigue strength and load capacity, good corrosion resistance. Applied in bushes for inner-combustion engines with low load, air compressors, refrigerators.*

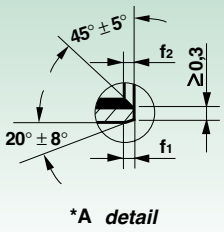
BM Bushes tolerances

BM

Outer diameter D		Outer diameter tolerances D	Thickness tolerances S_B		Chamfer dimensions S_B	f_1	f_2
10 <	≤ 17	+ 0,065 + 0,030	1	0 -0,025	1	0,5	0,3
17 <	≤ 20	+ 0,075 + 0,035	1	0 -0,025	1	0,8	0,4
20 <	≤ 25	+ 0,075 + 0,035	1,5	0 -0,030	1,5	0,8	0,4
25 <	≤ 28	+ 0,075 + 0,035	1,5	0 -0,030	1,5	1	0,5
28 <	≤ 30	+ 0,075 + 0,035	2	0 -0,035	2	1	0,5
30 <	≤ 32	+ 0,085 + 0,045	2	0 -0,035	2	1	0,5
32 <	≤ 44	+ 0,085 + 0,045	2	0 -0,035	2	1,2	0,6
44 <	≤ 50	+ 0,085 + 0,045	2,5	0 -0,040	2,5	1,5	1
50 <	≤ 80	+ 0,100 + 0,055	2,5	0 -0,040	2,5	1,5	1
80 <	≤ 85	+ 0,120 + 0,070	2,5	0 -0,040	2,5	1,5	1
85 <	≤ 120	+ 0,120 + 0,070	3	0 -0,045	3	1,8	1,2
120 <	≤ 125	+ 0,170 + 0,100	3	0 -0,045	3	1,8	1,2
125 <	≤ 180	+ 0,170 + 0,100	3,5	0 -0,050	3,5	2	1,5

BM1 Bimetal bushes - Metric sizes



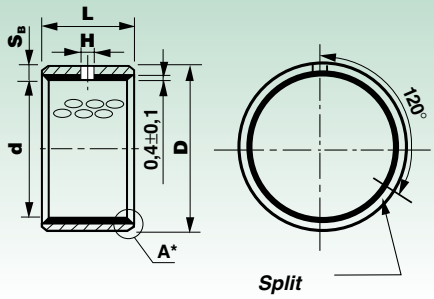


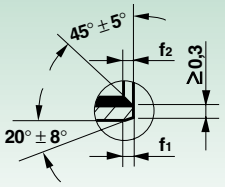
Dimensions (mm)			
d	D	$L^{0}_{-0,40}$	H
10	12	10	4
		15	
		20	
12	14	10	4
		15	
		20	
		25	
13	15	10	4
		15	
		20	
14	16	10	4
		15	
		20	
		25	
15	17	10	4
		15	
		20	
		25	
16	18	10	4
		15	
		20	
		25	
17	19	10	4
		15	
		20	
		25	
18	20	10	4
		15	
		20	
		25	
20	22	10	4
		15	
		20	
		25	
20	23	10	4
		15	
		20	
		25	
		30	
22	25	10	6
		15	
		20	
		25	
		30	
24	27	10	6
		15	
		20	

Dimensions (mm)			
d	D	$L^{0}_{-0,40}$	H
24	27	25	6
		30	
24	28	15	6
		20	
		25	
		30	
25	28	15	6
		20	
		25	
		30	
26	30	15	6
		20	
		25	
		30	
28	32	15	6
		20	
		25	
		30	
		40	
30	34	15	6
		20	
		25	
		30	
		40	
32	36	15	6
		20	
		25	
		30	
		40	
35	39	20	6
		25	
		30	
		35	
		40	
		50	
38	42	20	-
		25	
		30	
		40	
		50	
40	44	20	8
		25	
		30	
		40	
		50	
45	50	20	8
		25	

Dimensions (mm)			
d	D	$L^{0}_{-0,40}$	H
45	50	30	8
		40	
		45	
		50	
50	55	20	8
		30	
		40	
		50	
		60	
55	60	20	8
		30	
		40	
		50	
		60	
60	65	30	8
		40	
		50	
		60	
		70	
65	70	30	8
		40	
		50	
		60	
		70	
70	75	30	8
		40	
		50	
		60	
		70	
		80	
75	80	30	9,5
		40	
		50	
		60	
		70	
		80	
80	85	40	9,5
		50	
		60	
		80	
		100	
85	90	30	9,5
		60	
		100	
90	95	60	9,5
		100	

BM1 Bimetal bushes - Metric sizes





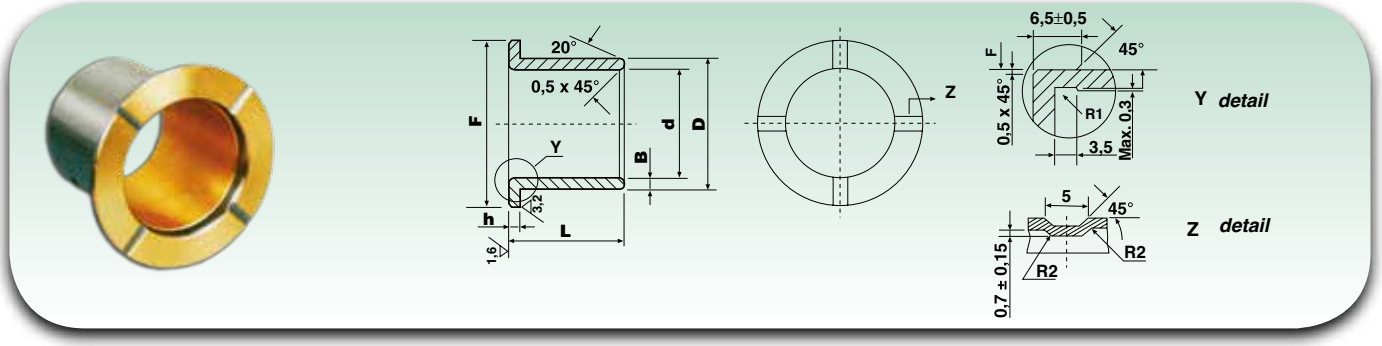
Dimensions (mm)			
d	D	L $^{0}_{-0,40}$	H
95	100	60	9,5
		100	
100	105	60	9,5
		100	
		115	
105	110	60	9,5
		100	
		115	
110	115	60	9,5
		100	
		115	
115	120	50	9,5
		60	
		70	
		100	
120	125	50	9,5
		60	
		100	
125	130	60	9,5
		100	

Dimensions (mm)			
d	D	L $^{0}_{-0,40}$	H
130	135	60	9,5
		100	
135	140	60	9,5
		80	
		100	
140	145	60	9,5
		100	
145	150	60	9,5
		80	
		100	
150	155	60	-
		100	
155	160	60	-
		100	
160	165	60	-
		100	
165	170	60	-
		100	
170	175	60	-
		100	
175	180	60	-
		100	

Dimensions (mm)			
d	D	L $^{0}_{-0,40}$	H
180	185	60	-
		100	
200	205	60	-
		100	
205	210	60	-
		100	
210	215	60	-
		100	
215	220	60	-
		100	
220	225	60	-
		100	
230	235	60	-
		100	
240	245	60	-
		100	
250	255	60	-
		100	
280	285	60	-
		100	
300	305	60	-
		100	

To order, please specify: BM + type 1/2/3/4 + d + L

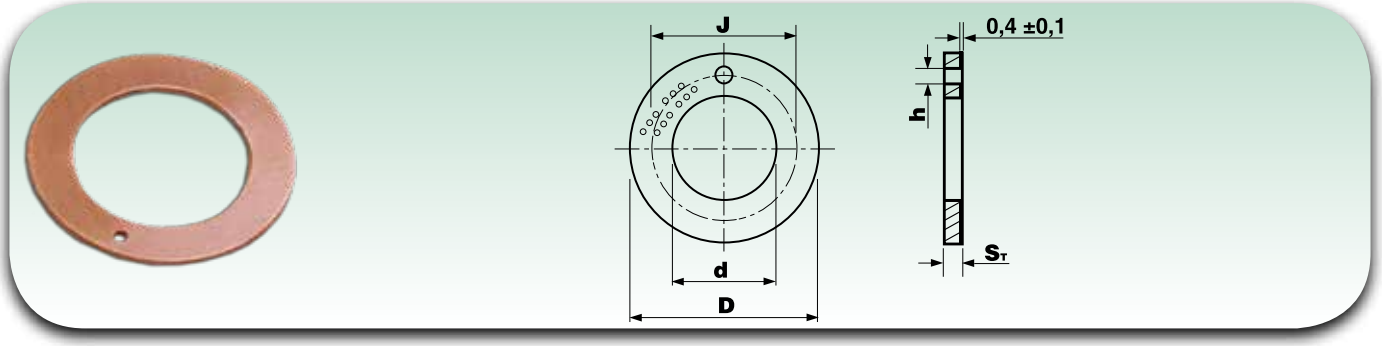
BM1F Bimetal flanged bushes - Metric sizes



Dimensions (mm)					
d $^{+0,20}_{+0,15}$	D $^{+0,28}_{+0,20}$	F $^{-0,50}$	L $^{0}_{-0,40}$	h	B
40	46	60	39,5	3,5	3,0
	47	62	35	3,5	3,5
45	55	68	55	3,5	5,0
50	57	72	40	3,5	3,5
		70	50		
54	60,6	92	60	3,5	3,3
60	67	83	53	3,5	3,5
		87	60		
		77	65		
	68	88	60	4,0	4,0
		87			
63,5	70,4	102,6	65	3,5	3,5
63,8	70,8	103	73	3,5	3,5
65	72	85	53	3,5	3,5
		87	64		
		108	75		
70	77	93	60	3,5	3,5
	80	108	90	5,0	5,0
75	82	100	60	3,5	3,5
80	87	105	68	3,5	3,5
85	92	127	80	3,5	3,5
	92,6	128	103,5	3,5	3,8
89,2	97,5	138	126,5	4,2	4,2
95	105	144	127	5,0	5,0

To order, please specify: BM + type 1/2/3/4 F + d + D + F

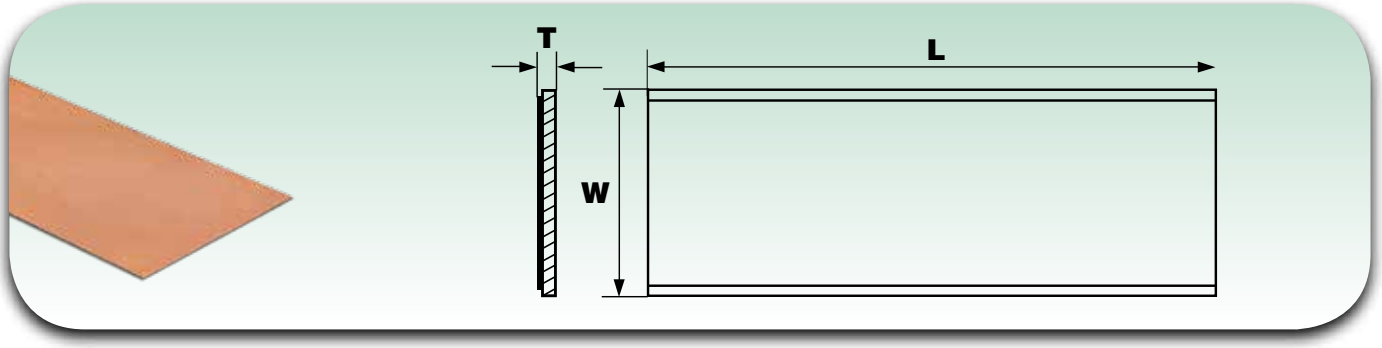
BM1R Bimetal washers - Metric sizes



Dimensions (mm)				
$d^{+0,25}_{0}$	$D^{0}_{-0,25}$	$S_T{}^{0}_{0,05}$	$J^{\pm 0,12}$	$h^{+0,4}_{+0,1}$
10	20	1,5	16	1,5
12	24	1,5	18	1,5
14	26	1,5	20	2
16	30	1,5	23	2
18	32	1,5	25	3
20	36	1,5	28	3
22	38	1,5	30	3
24	42	1,5	33	3
26	44	1,5	35	4
28	48	1,5	38	4
32	54	1,5	43	4
38	62	1,5	50	4
42	66	1,5	54	4
48	74	2	61	4
52	78	2	65	4
62	90	2	76	4

To order, please specify: BM + type 1/2/3/4 R + d

NSTR-BM Strips (bimetal covering) - Metric sizes



Designation	Dimensions (mm)		
	Length L	Width W	Thickness T - 0,05
NSTR-BM 050.15	500	150	1,5
NSTR-BM 050.20	500	150	2,0
NSTR-BM 050.25	500	150	2,5

To order, please specify: designation + type 1/2/3/4

6. BG bushes with solid lubricant characteristics

This particular type of bushes is characterized by a base structure constructed in bronze (BG2) with sockets filled with solid lubricants, normally graphite. The construction material of the bushes can be also brass (BG1), cast iron (BG4), steel (BG5), and even in bimetal alloy (BG3) if requested.
This particular combination, thanks to its self-lubrication, permits a long duration in the application, guaranteeing as well high performance over time.
These characteristics become particularly important during applications which present the conditions indicated below:

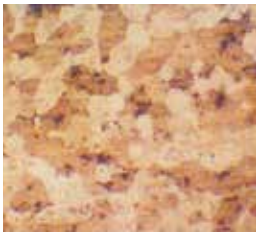
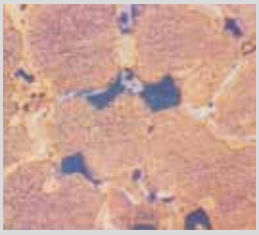
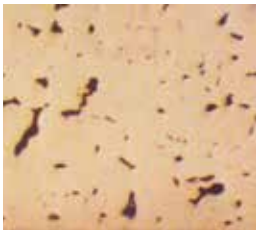
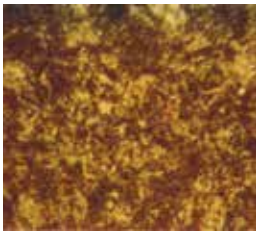
- *external lubrication is not possible*
- *a standard self-lubricating bush is required to be mounted.*
- *the operating temperature is very low or very high.*

The bushes with solid lubricant is used especially in the metallurgic industry, in machines for the field of mining, in the naval industry, in hydraulic turbines, and in environments with corrosive agents or other chemical substances.
These items are available as cylindrical and flanged bushes, thrust washers, and as sliding plates.

6.1 Technical features

					
Characteristics	**BG1**	**BG2**	**BG3**	**BG4**	**BG5**
Composition	CuZn25Al6Fe3Mn3	CuSn6Zn6Pb3	Steel + CuSn6Zn6Pb3	GJL-250	100Cr6
Hardness	210 ~ 250 HB	80 ~ 120 HB	60 ~ 90 HB	180 ~ 230 HB	55 ~ 60 HRC (550 ~ 600 HB)
Max temperature	300° C	350° C	300° C	400° C	350° C
Max load	100 N/mm^2	60 N/mm^2	70 N/mm^2	60 N/mm^2	250 N/mm^2
Friction coeff.	< 0,16	< 0,15	< 0,14	< 0,18	< 0,17
Max speed (dry)	0,4 m/s	2 m/s	2 m/s	0,5 m/s	0,1 m/s
Max speed (oil)	5 m/s	10 m/s	10 m/s	5 m/s	3 m/s
Max Pv (dry)	1,8 N/mm^2 • m/s	0,5 N/mm^2 • m/s	0,6 N/mm^2 • m/s	0,8 N/mm^2 • m/s	2,5 N/mm^2 • m/s
Max Pv (oil)	3,8 N/mm^2 • m/s	3,8 N/mm^2 • m/s	3,8 N/mm^2 • m/s	3,8 N/mm^2 • m/s	3,8 N/mm^2 • m/s

6.2 Material specifications

Alloy	Metallographic	Characteristics
BG 1 **CuZn25Al6Fe3Mn3**		*Basically general-purpose products, suitable for various circumstances including high or low load, high or low temperature, with oil or oilless lubrication, or even in the water. Thanks to its matrix made of high strength brass, its hardness doubles that of normal bronze bushes, and the wear performance increases to a large extent, so that it is suitable for continuous casting machines, and conveyors for metallurgy industry. It could also be used in plastic injection machines, in the automatic switch of high tension electricity, in the luffing and supporting parts of construction machines, drying tunnel of paper machines, sliding parts for ship unmooring, etc.*
BG 2 **CuSn6Zn6Pb3**		*Suitable for low load and high temperature applications, such as raceway of bakery, machines of light industry, machine tools industry, etc.*
BG 3 **Acciaio/Steel** **+ CuSn6Zn6Pb3**		*The inner side of BG3 bushings is made of the same material of BG2 bushings, so they can be used in the same applications. Morevoer, BG3 have some advantages, as saving on material costs, and improved compressive strength. They are suitable for parts of construction machines that don't need oil lubrication, metallurgy machines, and conveying machines.*
BG 4 **GJL-250**		*BG4 are made of a typical cost saving material. They could replace BG2 products where the mechanical requirements are not so high. They could reduce the cost largely, and meet the demands for application. Suitable for mould guide bushes, die carrier of plastic moulding machines, etc.*
BG 5 **100Cr6**		*BG5 are a kind of fortified products. Due to their excellent comprehensive capabilities, they are especially suitable in the supporting parts of hoisting machines, e.g. support of rooter, hoist engine, crane, etc. But as for material being steel, they are not suitable for applications with water, acids, and alkali.*

BG Bushes tolerances

BG1 - BG2 - BG4-AF

Inner diameter d		Inner diameter tolerances d	Outer diameter D		Outer diameter tolerances D
6 <	≤ 10	+ 0,028 + 0,013	10 <	≤ 18	+ 0,018 + 0,007
10 <	≤ 18	+ 0,034 + 0,016	18 <	≤ 30	+ 0,021 + 0,008
18 <	≤ 30	+ 0,041 + 0,020	30 <	≤ 50	+ 0,025 + 0,009
30 <	≤ 50	+ 0,050 + 0,025	50 <	≤ 80	+ 0,030 + 0,011
50 <	≤ 80	+ 0,060 + 0,030	80 <	≤ 120	+ 0,035 + 0,013
80 <	≤ 120	+ 0,071 + 0,036	120 <	≤ 180	+ 0,040 + 0,015
120 <	≤ 160	+ 0,083 + 0,043	-		-

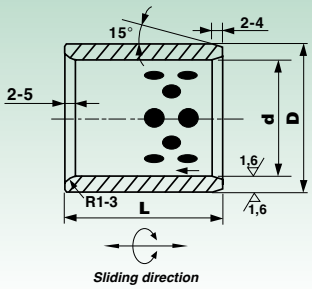
BG1-F - BG2-F

Inner diameter d		Inner diameter tolerances d	Outer diameter D		Outer diameter tolerances D
6 <	≤ 10	+ 0,040 + 0,025	10 <	≤ 18	+ 0,0348 + 0,023
10 <	≤ 18	+ 0,050 + 0,032	18 <	≤ 30	+ 0,041 + 0,028
18 <	≤ 30	+ 0,061 + 0,040	30 <	≤ 50	+ 0,050 + 0,034
30 <	≤ 50	+ 0,075 + 0,050	50 <	≤ 65	+ 0,060 + 0,041
50 <	≤ 80	+ 0,090 + 0,060	65 <	≤ 80	+ 0,062 + 0,043
80 <	≤ 120	+ 0,107 + 0,072	81 <	≤ 100	+ 0,073 + 0,051
-		-	101 <	≤ 120	+ 0,054 + 0,022
-		-	120 <	≤ 140	+ 0,088 + 0,063

BG4 - BG4-F

Inner diameter d		Inner diameter tolerances d	Outer diameter D		Outer diameter tolerances D
18 <	≤ 30	+ 0,021 0	30 <	≤ 50	± 0,008
30 <	≤ 50	+ 0,025 0	50 <	≤ 80	± 0,0095
50 <	≤ 80	+ 0,030 0	80 <	≤ 120	± 0,011
80 <	≤ 120	+ 0,035 0	120 <	≤ 140	± 0,0125

BG1 Bushes *(bronze and graphite) - Metric sizes*

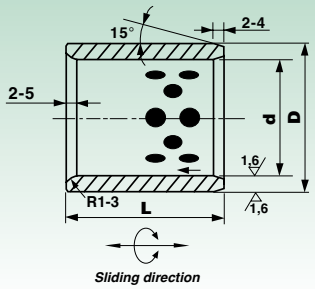


Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
8	12	8
		10
		12
		15
10	14	8
		10
		12
		15
		20
12	18	8
		10
		12
		15
		16
		19
		20
		25
		30
13	19	10
		12
		15
		16
		20
14	20	10
		12
		15
		20
		25
		30
15	21	10
		12
		15
		16
		20
		25
		30
16	22	10
		12
		15
		16
		19
		20
		25
		30
		35
		40
17	23	15
18	24	12

Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
18	24	15
		16
		20
		25
		30
		35
		40
19	26	15
		20
20	28	10
		12
		15
		16
		19
		20
		25
		30
		40
		45
		50
20	30	16
		20
		25
		30
		35
		40
22	32	12
		15
		20
		25
25	30	16
		20
		25
		30
		35
		40
25	33	12
		15
		16
		20
		25
		30
		35
		40
		45
		50
		60
25	35	12

Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
25	35	15
		16
		20
		25
		30
		35
		40
		45
		50
28	38	20
		25
		30
		40
30	35	16
		20
		25
		30
		35
		40
		45
		50
30	36	20
		25
		30
		35
		40
		45
		50
		60
30	38	12
		15
		20
		25
		30
		35
		40
		45
		50
		60
30	40	12
		15
		20
		25
		30
		35
		40
		45
		50

BG1 Bushes *(bronze and graphite) - Metric sizes*

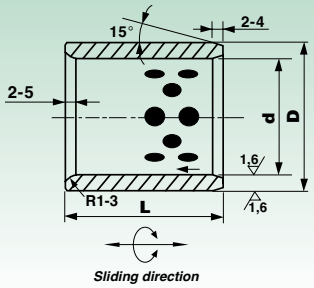


Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
30	40	60
31,5	42	30
		40
32	42	20
		30
		40
35	44	20
		25
		30
		35
		40
		45
		50
		60
35	45	20
		25
		30
		35
		40
		45
		50
		60
38	48	30
		40
40	50	15
		20
		25
		30
		35
		40
		45
		50
		60
		70
		80
40	55	15
		25
		30
		35
		40
		45
		50
		60
45	55	30
		35
		40
		45
		50

Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
45	55	60
45	56	30
		35
		40
		45
		50
		60
		70
		80
45	60	30
		35
		40
		45
		50
		60
		70
		80
50	60	20
		30
		35
		40
		45
		50
		60
		70
		80
50	62	30
		35
		40
		45
		50
		60
		70
50	65	30
		40
		45
		50
		60
		70
		80
		100
55	70	30
		35
		40
		45
		50
		60
		70

Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
60	74	30
		35
		40
		45
		50
		60
		70
		80
60	75	30
		35
		40
		45
		50
		60
		70
		80
		100
63	75	50
		60
		70
		80
63	76	60
		70
		80
65	80	40
		50
		60
		70
		80
70	85	30
		35
		40
		45
		50
		60
		70
		80
		100
70	90	50
		60
		70
		80
75	90	50
		60
		70
		80
		100
75	95	60

BG1 Bushes *(bronze and graphite) - Metric sizes*



Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
75	95	70
		80
		100
80	96	35
		40
		45
		50
		60
		70
		80
		100
		120
80	100	40
		45
		50
		60
		70
		80
		100
		120
		140
85	100	60
		80

Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
90	100	40
		45
		50
		60
		70
		80
		100
		120
		140
90	110	60
		80
		100
		120
100	120	50
		60
		70
		80
		90
		100
		120
		140
110	130	50
		70

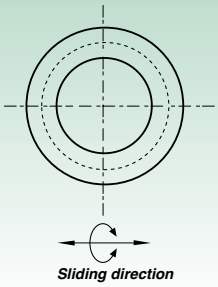
Dimensions (mm)		
$d_{(F7)}$	$D_{(m6)}$	$L^{-0,10}_{-0,30}$
110	130	80
		100
		120
120	140	70
		80
		90
		100
		120
		140
125	145	100
		120
130	150	80
		100
		130
140	160	100
		140
150	170	80
		100
		150
160	180	80
		100
		150
		-

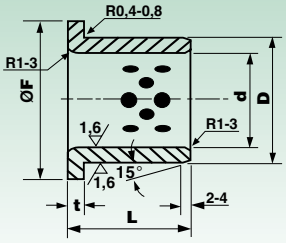
To order, please specify: BG..type 1/2/3/4/5 + d + D + L

Recommended mounting tolerances:

Housing:	*Shaft:*
H7	***d8 (high load)***
	e7 (low load)
	f7 (high precision)

BG1-F Flanged bushes (bronze and graphite) - Metric sizes

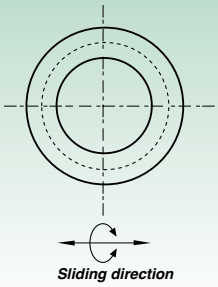


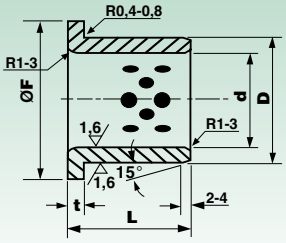


Dimensions (mm)				
$d_{(E7)}$	$D_{(r6)}$	F	$t\ ^{0}_{-0,1}$	$L\ ^{-0,10}_{-0,30}$
8	12	20	2	10
				15
10	14	22	2	10
				12
				15
				17
				20
12	18	25	3	10
				15
				20
				25
				30
13	19	26	3	10
				15
				20
14	20	27	3	15
				20
				25
15	21	28	3	10
				15
				20
				25
				30
16	22	29	3	15
				18
				20
				23
				25
				30
				35
				40
18	24	32	3	20
				30
20	28	40	5	15
				20
				25
				30
				35
20	30	40	5	15
				20
				25
				30
				35
				40
25	33	45	5	15
				20
				25
				30

Dimensions (mm)				
$d_{(E7)}$	$D_{(r6)}$	F	$t\ ^{0}_{-0,1}$	$L\ ^{-0,10}_{-0,30}$
25	33	45	5	40
25	35	45	5	15
				20
				25
				30
				35
				40
				50
30	38	50	5	20
				25
				30
				35
				40
				50
30	40	50	5	20
				25
				30
				35
				40
				50
31,5	40	50	5	20
				30
				35
				40
35	45	60	5	20
				25
				30
				35
				40
				50
40	50	65	5	20
				25
				30
				40
				50
				60
45	55	70	5	30
				35
				40
				50
				60
50	60	75	5	30
				35
				40
				50
				60
55	65	80	5	40
				60

BG1-F Flanged bushes (bronze and graphite) - Metric sizes





Dimensions (mm)				
$d_{(E7)}$	$D_{(r6)}$	F	$t\ ^{0}_{-0,1}$	$L\ ^{-0,10}_{-0,30}$
55	70	80	5	40
				60
60	75	90	7,5	40
				50
				60
				80
63	75	85	7,5	67
65	80	95	7,5	40
				60
				80
70	85	105	7,5	50
				80
75	90	110	7,5	60
				80

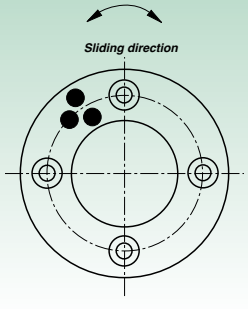
Dimensions (mm)				
$d_{(E7)}$	$D_{(r6)}$	F	$t\ ^{0}_{-0,1}$	$L\ ^{-0,10}_{-0,30}$
80	100	120	10	50
				60
				80
				100
90	110	130	10	50
				60
				80
				100
100	120	150	10	60
				80
				100
120	140	170	10	60
				80
				100

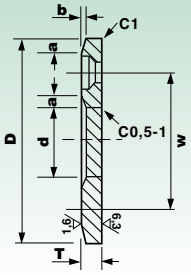
To order, please specify: BG-F..type 1/2/3/4/5 + d + D + L

Recommended mounting tolerances:

Housing:	*Shaft:*
H7	*d8 (high load)*
	e7 (low load)
	f7 (high precision)

BG1-W Thrust Washers *(bronze and graphite)* - Metric sizes

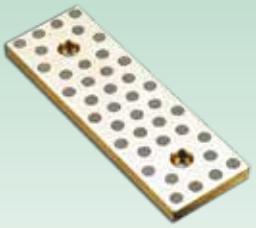


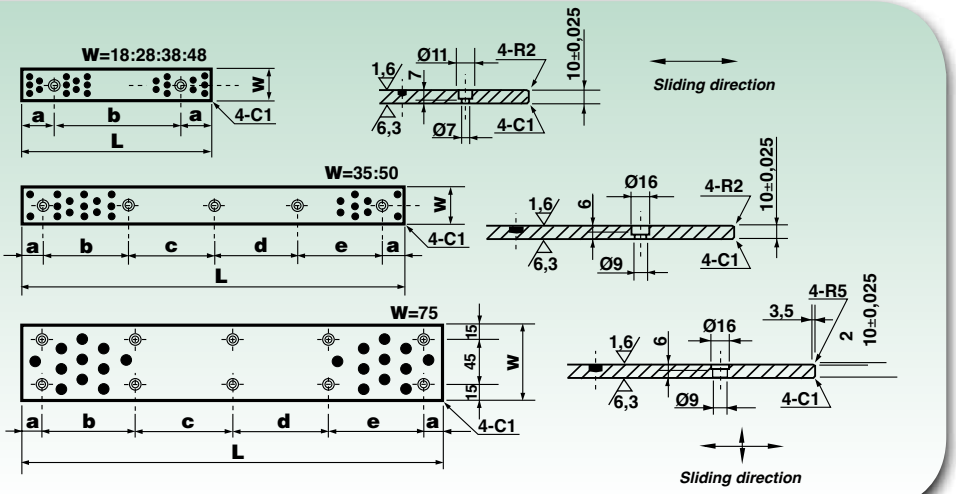


Designation	Dimensions (mm.)							
	d	D	T $^{0}_{-0,1}$	W	Hole		a	b
					n°	Thread		
BG1-W 10	10,2 $^{+0,2}_{+0,1}$	30	3	20	2	M3	1,5	0,3
BG1-W 10 (SF)	10,2 $^{+0,2}_{+0,1}$	30	3	20	*without hole*		1,5	0,3
BG1-W 12	12,2 $^{+0,2}_{+0,1}$	40	3	28	2	M3	2	0,4
BG1-W 12 (SF)	12,2 $^{+0,2}_{+0,1}$	40	3	28	*without hole*		2	0,4
BG1-W 13	13,2 $^{+0,2}_{+0,1}$	40	3	28	2	M3	2	0,4
BG1-W 14	14,2 $^{+0,2}_{+0,1}$	40	3	28	2	M3	2	0,4
BG1-W 15	15,2 $^{+0,2}_{+0,1}$	50	3	35	2	M3	2	0,4
BG1-W 16	16,2 $^{+0,2}_{+0,1}$	50	3	35	2	M3	2	0,4
BG1-W 16 (SF)	16,2 $^{+0,2}_{+0,1}$	50	3	35	*without hole*		2	0,4
BG1-W 18	18,2 $^{+0,2}_{+0,1}$	50	3	35	2	M3	2	0,4
BG1-W 20	20,2 $^{+0,2}_{+0,1}$	50	5	35	2	M5	2,5	0,4
BG1-W 20 (SF)	20,2 $^{+0,2}_{+0,1}$	50	5	35	*without hole*		2,5	0,4
BG1-W 25	25,2 $^{+0,2}_{+0,1}$	55	5	40	2	M5	2,5	0,4
BG1-W 25 (SF)	25,2 $^{+0,2}_{+0,1}$	55	5	40	*without hole*		2,5	0,4
BG1-W 30	30,2 $^{+0,2}_{+0,1}$	60	5	45	2	M5	2,5	0,4
BG1-W 35	35,2 $^{+0,2}_{+0,1}$	70	5	50	2	M5	2,5	0,4
BG1-W 40	40,2 $^{+0,2}_{+0,1}$	80	7	60	2	M6	3	0,5
BG1-W 45	45,3 $^{+0,2}_{+0,1}$	90	7	70	2	M6	3	0,5
BG1-W 50	50,3 $^{+0,3}_{+0,1}$	100	8	75	4	M6	4	0,6
BG1-W 55	55,3 $^{+0,3}_{+0,1}$	110	8	85	4	M6	4	0,6
BG1-W 60	60,3 $^{+0,3}_{+0,1}$	120	8	90	4	M8	5	0,8
BG1-W 65	65,3 $^{+0,3}_{+0,1}$	125	8	95	4	M8	5	0,8
BG1-W 70	70,3 $^{+0,3}_{+0,1}$	130	10	100	4	M8	5	0,8
BG1-W 75	75,3 $^{+0,3}_{+0,1}$	140	10	110	4	M8	5	0,8
BG1-W 80	80,3 $^{+0,3}_{+0,1}$	150	10	120	4	M8	5	0,8
BG1-W 90	90,5 $^{+0,3}_{+0,1}$	170	10	140	4	M10	5	0,8
BG1-W 100	100,5 $^{+0,3}_{+0,1}$	190	10	160	4	M10	5	0,8
BG1-W 120	120,5 $^{+0,3}_{+0,1}$	200	10	175	4	M10	5	0,8

To order, please specify: designation + type 1/2/3/4/5

BG1-SP Sliding plates *(bronze and graphite - Metric sizes*

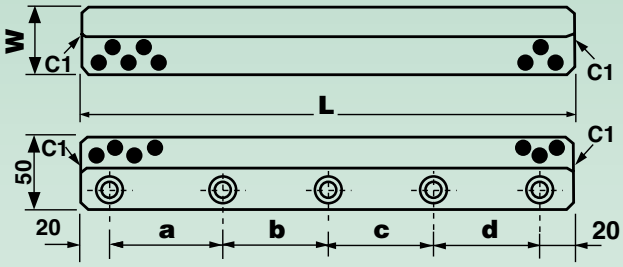


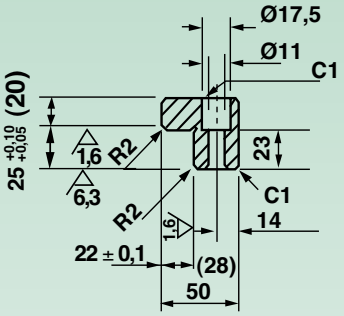


Designation	Dimensions (mm)								
	W $^{0}_{-0,2}$	L	Distance between bolts					Bolt	
			a	b	c	d	e	n°	Thread
BG1-SP 18-75	18	75 $^{0}_{-0,2}$	15	45	-	-	-	2	M6
BG1-SP 18-100		100 $^{0}_{-0,2}$	25	50	-	-	-		
BG1-SP 18-125		125 $^{0}_{-0,2}$		75	-	-	-		
BG1-SP 18-150		150 $^{0}_{-0,2}$		100	-	-	-		
BG1-SP 18-160		160 $^{0}_{-0,2}$		110	-	-	-		
BG1-SP 18-220		220 $^{0}_{-0,3}$	50	120	-	-	-		
BG1-SP 28-75	28	75 $^{0}_{-0,2}$	15	45	-	-	-	2	M6
BG1-SP 28-100		100 $^{0}_{-0,2}$	25	50	-	-	-		
BG1-SP 28-125		125 $^{0}_{-0,2}$		75	-	-	-		
BG1-SP 28-150		150 $^{0}_{-0,2}$		100	-	-	-		
BG1-SP 28-160		160 $^{0}_{-0,2}$		110	-	-	-		
BG1-SP 28-220		220 $^{0}_{-0,3}$	50	120	-	-	-		
BG1-SP 35-100	35	100 $^{0}_{-0,2}$	20	60	-	-	-	2	M8
BG1-SP 35-150		150 $^{0}_{-0,2}$		55	55	-	-	3	
BG1-SP 35-200		200 $^{0}_{-0,3}$			50	55	-	4	
BG1-SP 35-250		250 $^{0}_{-0,3}$		70	70	70	-		
BG1-SP 35-300		300 $^{0}_{-0,3}$		65	65	65	65	5	
BG1-SP 35-350		350 $^{0}_{-0,3}$		80	75	75	80		
BG1-SP 38-75	38	75 $^{0}_{-0,2}$	15	45	-	-	-	2	M6
BG1-SP 38-100		100 $^{0}_{-0,2}$	25	50	-	-	-		
BG1-SP 38-125		125 $^{0}_{-0,2}$		75	-	-	-		
BG1-SP 38-150		150 $^{0}_{-0,2}$		100	-	-	-		
BG1-SP 38-160		160 $^{0}_{-0,2}$		110	-	-	-		
BG1-SP 38-220		220 $^{0}_{-0,3}$	50	120	-	-	-		
BG1-SP 48-75	48	75 $^{0}_{-0,2}$	15	45	-	-	-	2	M6
BG1-SP 48-100		100 $^{0}_{-0,2}$	25	50	-	-	-		
BG1-SP 48-125		125 $^{0}_{-0,2}$		75	-	-	-		
BG1-SP 48-150		150 $^{0}_{-0,2}$		100	-	-	-		
BG1-SP 50-100	50	100 $^{0}_{-0,2}$	20	60	-	-	-	2	M8
BG1-SP 50-150		150 $^{0}_{-0,2}$		55	55	-	-	3	
BG1-SP 50-200		200 $^{0}_{-0,3}$			50	55	-	4	
BG1-SP 50-250		250 $^{0}_{-0,3}$		70	70	70	-		
BG1-SP 50-300		300 $^{0}_{-0,3}$		65	65	65	65	5	
BG1-SP 50-400		400 $^{0}_{-0,5}$		90	90	90	90		
BG1-SP 75-150	75	150 $^{0}_{-0,2}$	20	110	-	-	-	4	M8
BG1-SP 75-200		200 $^{0}_{-0,3}$		80	80	-	-	6	
BG1-SP 75-250		250 $^{0}_{-0,3}$		105	105	-	-		
BG1-SP 75-300		300 $^{0}_{-0,3}$		85	90	85	-	8	
BG1-SP 75-400		400 $^{0}_{-0,5}$		120	120	120	-		
BG1-SP 75-500		500 $^{0}_{-0,5}$		115	115	115	115	10	

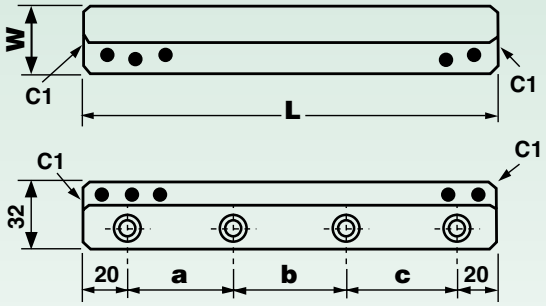
To order, please specify: designation + type 1/2/3/4/5

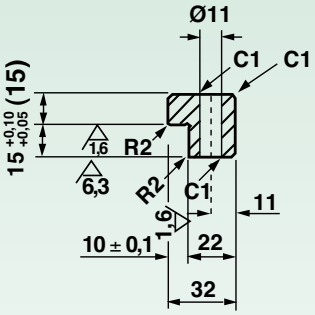
A Type



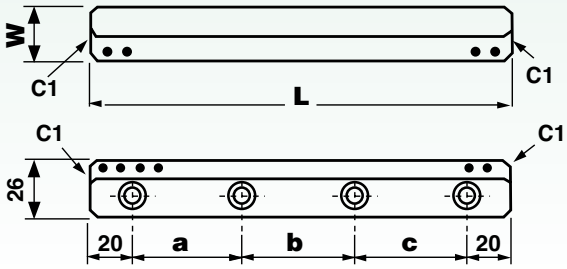


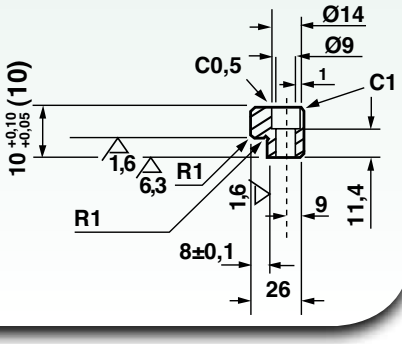
B Type





C Type

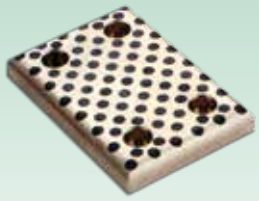


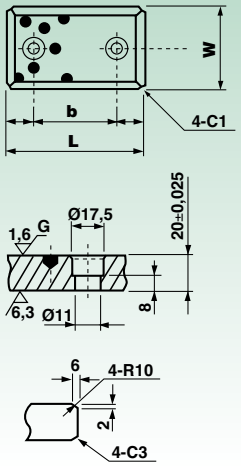


Designation	Type	Dimensions (mm)							
		W	L	Distance between bolts				Bolt	
				a	b	c	d	n°	Thread
BG1-SPL 20-100	C	20	100	60	-	-	-	2	M8
BG1-SPL 20-150			150	55	55	-	-	3	
BG1-SPL 20-200			200	55	50	55	-	4	
BG1-SPL 30-100	B	30	100	60	-	-	-	2	M10
BG1-SPL 30-150			150	55	55	-	-	3	
BG1-SPL 30-200			200	55	50	55	-	4	
BG1-SPL 30-250			250	70	70	70	-		
BG1-SPL 45-200	A	45	200	55	50	55	-	4	M10
BG1-SPL 45-250			250	70	70	70	-		
BG1-SPL 45-300			300	65	65	65	65	5	
BG1-SPL 45-350			350	80	75	75	80		

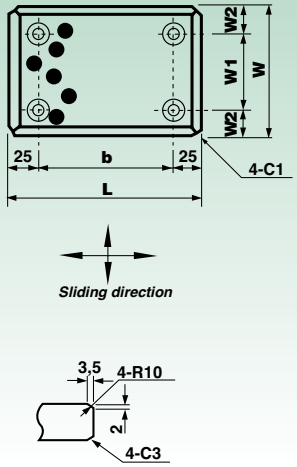
To order, please specify: designation + type 1/2/3/4/5

BG1-GP Plane guides (bronze and graphite) - Metric sizes





A Type

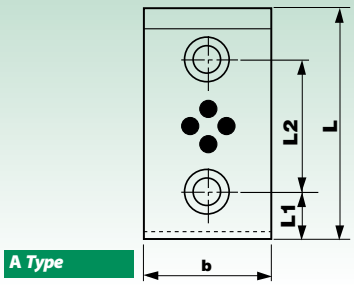


B Type

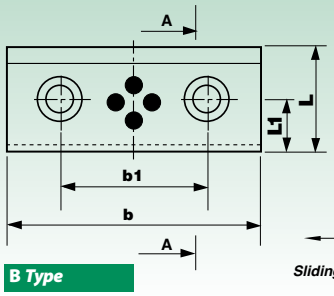
Designation	Dimensions (mm)						
	W -0,1 -0,3	L -0,1 -0,3	W1 ±0,2	W2	b ±0,2	Holes n°	Type
BG1-GP 28-75	28	75	-	-	45	2	A
BG1-GP 28-100		100	-	-	50		
BG1-GP 28-125		125	-	-	75		
BG1-GP 28-150		150	-	-	100		
BG1-GP 28-200		200	-	-	150		
BG1-GP 38-75	38	75	-	-	45	2	A
BG1-GP 38-100		100	-	-	50		
BG1-GP 38-125		125	-	-	75		
BG1-GP 38-150		150	-	-	100		
BG1-GP 38-200		200	-	-	150		
BG1-GP 48-75	48	75	-	-	45	2	A
BG1-GP 48-100		100	-	-	50		
BG1-GP 48-125		125	-	-	75		
BG1-GP 48-150		150	-	-	100		
BG1-GP 48-200		200	-	-	150		
BG1-GP 58-75	58	75	-	-	45	2	A
BG1-GP 58-100		100	-	-	50		
BG1-GP 58-150		150	-	-	100		
BG1-GP 75-75	75	75	-	-	25	2	A
BG1-GP 75-100		100	-	-	50		
BG1-GP 75-125		125	-	-	75		
BG1-GP 75-150		150	-	-	100		
BG1-GP 75-200		200	-	-	150		
BG1-GP 100-100	100	100	50	25	50	4	B
BG1-GP 100-125		125			75		
BG1-GP 100-150		150			100		
BG1-GP 100-200		200			150		
BG1-GP 100-250		250			200		
BG1-GP 125-125	125	125	50	37,50	75	4	B
BG1-GP 125-150		150			100		
BG1-GP 125-200		200			150		
BG1-GP 125-250		250			200		
BG1-GP 150-150	150	150	100	25	100	4	B
BG1-GP 150-200		200			150		
BG1-GP 150-250		250			200		
BG1-GP 150-300		300			250		
BG1-GP 200-200	200	200	150	25	150	4	B
BG1-GP 200-250		250			200		
BG1-GP 200-300		300			250		

To order, please specify: designation + type 1/2/3/4/5

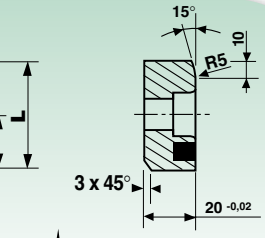
BG1-GPS Plane sliding guide (bronze and graphite) - Metric sizes



A Type



B Type

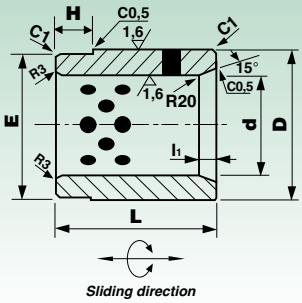


Sliding direction

Designation	Dimensions (mm)					
	b $^{-0,2}$	L $^{-0,2}$	b1 $^{\pm 0,1}$	L1 $^{\pm 0,1}$	L2 $^{\pm 0,1}$	Type
BG1-GPS 50-80	50	80	-	25	30	A
BG1-GPS 50-100		100	-		50	
BG1-GPS 50-125		125	-		75	
BG1-GPS 50-160		160	-		110	
BG1-GPS 50-200		200	-		150	
BG1-GPS 80-50	80	50	30	25	-	B
BG1-GPS 80-80		80	-		30	A
BG1-GPS 80-100		100	-		50	
BG1-GPS 80-125		125	-		75	
BG1-GPS 80-160		160	-		110	
BG1-GPS 80-200		200	-		150	
BG1-GPS 80-250		250	-	40	170	
BG1-GPS 80-315		315	-		235	
BG1-GPS 100-50	100	50	50	25	-	B
BG1-GPS 100-80		80		40	-	
BG1-GPS 100-100		100	-	25	50	A
BG1-GPS 100-125		125	-		75	
BG1-GPS 100-160		160	-		110	
BG1-GPS 100-200		200	-		150	
BG1-GPS 100-250		250	-	40	170	
BG1-GPS 100-315		315	-		235	
BG1-GPS 125-50	125	50	75	25	-	B
BG1-GPS 125-80		80		40	-	
BG1-GPS 160-50	160	50	100	25	-	B
BG1-GPS 160-80		80		40	-	

To order, please specify: designation + type 1/2/3/4/5

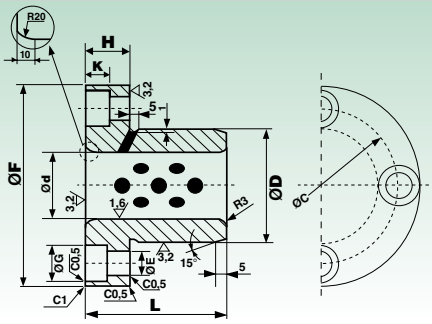
BG4 Bushes *(cast iron and graphite) - Metric sizes*



Designation	Dimensions (mm)					
	$d_{(H7)}$	$D_{(js6)}$	$L^{0}_{-0,20}$	$E^{0}_{-0,20}$	H	l_1
BG4 30	**30**	50	50	49	10	5
BG4 40	**40**	60	60	59	10	5
BG4 50	**50**	70	75	69	15	5
BG4 60	**60**	80	90	79	20	10
BG4 80	**80**	100	120	99	25	10
BG4 100	**100**	120	150	119	25	10
BG4 120	**120**	140	180	139	25	10

To order, please specify: designation + type 1/2/3/4/5

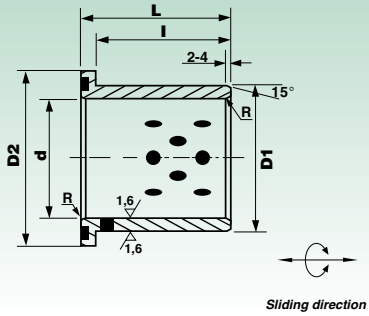
BG4-F Flanged bushes (cast iron and graphite) - Metric sizes



Designation	Dimensions (mm)								
	$d_{(H7)}$	$F^{0}_{-0,25}$	$D_{(js6)}$	H	$L^{-0,10}_{-0,30}$	C	E	G	K
BG4-F 30	**30**	90	50	20	50	70	11	17,5	10,8
BG4-F 40	**40**	100	60	20	65	80	11	17,5	10,8
BG4-F 50	**50**	125	75	20	80	100	11	17,5	10,8
BG4-F 60	**60**	135	85	20	100	110	11	17,5	10,8
BG4-F 80	**80**	170	110	25	130	140	14	20	13
BG4-F 100	**100**	190	130	25	160	160	14	20	13

To order, please specify: designation + type 1/2/3/4/5

BG4-AF Flanged bushes (with graphite insert on the flange) - Metric sizes



Designation	Dimensions (mm)				
	$d_{(F7)}$	$D1_{(m6)}$	D2	l	L
BG4-AF 12	**12**	18	25	11	15
BG4-AF 16	**16**	22	30	15	20
BG4-AF 20	**20**	28	36	20	25
BG4-AF 25	**25**	33	43	25	30
BG4-AF 30	**30**	38	48	30	35
BG4-AF 40	**40**	50	60	40	45
BG4-AF 50	**50**	62	75	49	55
BG4-AF 60	**60**	75	90	58	65

To order, please specify: designation + type 1/2/3/4/5

7. BSI ball retainer bushes characteristics (spiral or straight line array)

This kind of bushings can be manufactured in different types of materials such as copper, aluminium, plastic (POM).
There are steels spheres that are crated inside bushing surface according to two different arrays, that generate two quite different kind of bushes straight line or spiral.
Thanks to their low friction coefficient, long duration and high precision, the bushes with crated spheres can be widely used in tooling machines that necessitate high performance in terms of precision and in high speed conditions ensuring both rotating and vertical movements.

7.1 Technical features

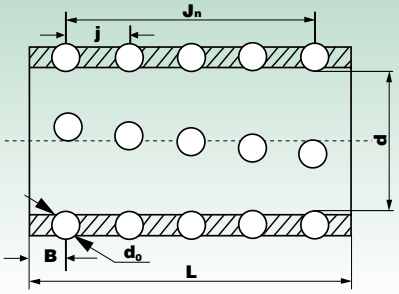
Characteristics	Measure unit
Max load capacity	30 N / mm²
Shrink fit	0,01 mm ~ 0,02 mm
Max sliding speed	6 m / s
Friction coefficient	0,01 ~ 0,08 µ
Tolerance for spheres diameter	< 0,002 mm

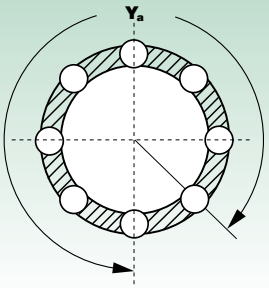
7.2 Tolerances

Specification	Material	Hardness	Tolerance
Structure	100 Cr6	62 ~ 66	[1] 0,01 ~ 0,02 mm
Shaft	100 Cr6	62 ~ 66	[2] h5
Steel spheres	100 Cr6	62 ~ 66	[3] ±0,001

[1] When installed (shaft + 2steel ball diameter - structure)
[2] Shaft tolerance
[3] Outside diameter tolerance

BSI-A Ball retainer straight line array - Metric sizes





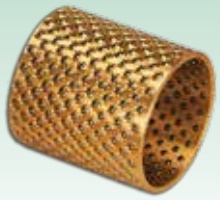
Designation	Dimensions (mm)							
	d	L	d_o	Y_a	J_n	n°	j	B
BSI-A 19-50	19	50	3	12	8	96	5,50	5,75
BSI-A 19-60		60			10	120	5,50	5,25
BSI-A 20-50	20	50	3	12	8	96	5,50	5,75
BSI-A 20-60		60			10	120	5,50	5,25
BSI-A 22-50	22	50	3	14	8	112	5,50	5,75
BSI-A 22-60		60			10	140	5,50	5,25
BSI-A 23-60	23	60	3	14	10	140	5,50	5,25
BSI-A 24-75	24	75	3	16	13	208	5,45	4,80
BSI-A 25-50	25	50	3	16	8	128	5,50	5,75
BSI-A 25-60		60			10	160	5,50	5,25
BSI-A 25-75		75			13	208	5,45	4,00
BSI-A 27-75	27	75	3	16	13	208	5,45	4,00
BSI-A 28-60	28	60	4	14	8	112	6,50	7,25
BSI-A 28-75		75			11	154	6,50	5,00
BSI-A 30-60	30	60	4	14	8	112	6,50	7,25
BSI-A 30-75		75			11	154	6,50	5,00
BSI-A 32-60	32	60	4	16	8	128	6,50	7,25
BSI-A 32-75		75			11	176	6,50	5,00
BSI-A 32-90		90			13	208	6,50	6,00
BSI-A 36-85	36	85	4	16	12	192	6,50	6,75
BSI-A 36-90		90			13	203	6,50	6,00
BSI-A 38-70	38	70	5	16	8	128	8,00	7,00
BSI-A 38-90		90			11	176	7,90	5,50
BSI-A 40-90	40	90	5	16	11	176	7,90	5,50
BSI-A 45-90	45	90	5	18	11	198	7,90	5,50
BSI-A 45-110		110			13	234	8,00	7,00
BSI-A 50-90	50	90	5	20	11	220	7,90	5,50
BSI-A 50-110		110			13	260	8,00	7,00
BSI-A 60-90	60	90	5	22	11	242	7,90	5,50
BSI-A 60-110		110			13	286	8,00	7,00
BSI-A 80-130	80	130	5	28	15	420	8,00	9,00

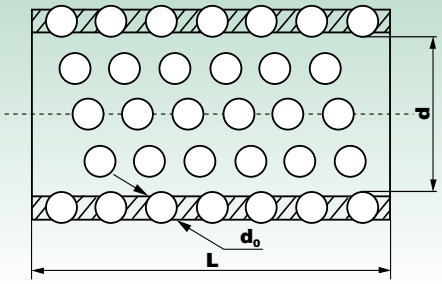
To order, please specify: designation + structure type

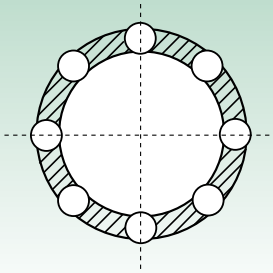
Copper, aluminium and plastic (POM) are available on request

Copper structure: ***CO***
Aluminium structure: ***AL***
Plastic structure (POM): ***PL***

BSI-S Ball retainer spiral array - Metric sizes



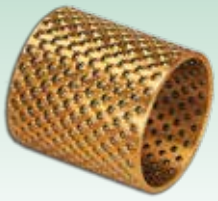


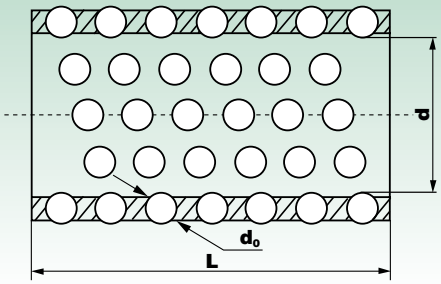


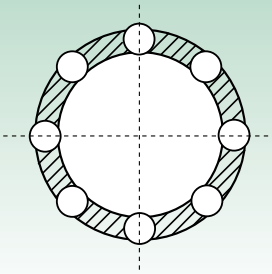
Designation	Dimensions (mm)			
	d	L	d_o	n°
BSI-S 10-40	10	40	2,5	72
BSI-S 18-43	18	43	3	74
BSI-S 18-50		50		90
BSI-S 18-55		55		100
BSI-S 18-60		60		112
BSI-S 18-64		64		120
BSI-S 18-76		76		146
BSI-S 19-43	19	43	3	74
BSI-S 19-50		50		90
BSI-S 19-55		55		100
BSI-S 19-60		60		112
BSI-S 20-43	20	43	3	74
BSI-S 20-50		50		90
BSI-S 20-55		55		100
BSI-S 20-60		60		112
BSI-S 20-64		64		120
BSI-S 20-75		75		144
BSI-S 21-43	21	43	3	74
BSI-S 21-50		50		90
BSI-S 21-55		55		100
BSI-S 21-60		60		112
BSI-S 21-65		65		122
BSI-S 22-50	22	50	3	90
BSI-S 22-55		55		100
BSI-S 22-60		60		112
BSI-S 22-64		64		120
BSI-S 22-70		70		132
BSI-S 23-60	23	60	3	112
BSI-S 24-60	24	60	3	112
BSI-S 24-65		65		122
BSI-S 24-70		70		132
BSI-S 24-75		75		144
BSI-S 24-80		80		154
BSI-S 25-48	25	48	3	86
BSI-S 25-50		50		90
BSI-S 25-55		55		100
BSI-S 25-60		60		112
BSI-S 25-64		64		120
BSI-S 25-75		75		144
BSI-S 25-76		76		146
BSI-S 25-80		80		154
BSI-S 25-85		85		164
BSI-S 26-60	26	60	3	112
BSI-S 26-65		65		122
BSI-S 26-70		70		132
BSI-S 26-80		80		154
BSI-S 26-85		85		164
BSI-S 27-75	27	75	3	144

Designation	Dimensions (mm)			
	d	L	d_o	n°
BSI-S 28-60	28	60	4	108
BSI-S 28-64		64		118
BSI-S 28-75		75		142
BSI-S 28-76		76		144
BSI-S 28-84		84		160
BSI-S 28-90		90		174
BSI-S 30-53	30	53	4	94
BSI-S 30-60		60		108
BSI-S 30-65		65		120
BSI-S 30-70		70		130
BSI-S 30-75		75		140
BSI-S 30-80		80		152
BSI-S 30-85		85		162
BSI-S 31-40	31	40	4	66
BSI-S 31-50		50		88
BSI-S 31-60		60		108
BSI-S 31-75		75		142
BSI-S 31-85		85		162
BSI-S 32-50	32	50	4	88
BSI-S 32-53		53		94
BSI-S 32-60		60		108
BSI-S 32-70		70		130
BSI-S 32-75		75		140
BSI-S 32-76		76		142
BSI-S 32-84		84		160
BSI-S 32-85		85		162
BSI-S 32-90		90		174
BSI-S 32-95		95		184
BSI-S 34-70	34	70	4	130
BSI-S 34-75		75		142
BSI-S 34-80		80		152
BSI-S 34-90		90		174
BSI-S 34-95		95		184
BSI-S 35-70	35	70	4	130
BSI-S 35-76		76		144
BSI-S 35-84		84		160
BSI-S 35-90		90		174
BSI-S 35-95		95		184
BSI-S 36-80	36	80	4	152
BSI-S 36-85		85		162
BSI-S 36-90		90		174
BSI-S 37-95	37	95	5	182
BSI-S 38-68	38	68	5	124
BSI-S 38-70		70		128
BSI-S 38-75		75		138
BSI-S 38-80		80		150
BSI-S 38-85		85		160
BSI-S 38-90		90		172

BSI-S Ball retainer spiral array - Metric sizes







Designation	Dimensions (mm)			
	d	L	d_o	n°
BSI-S 38-95	38	95	5	182
BSI-S 40-68	40	68	5	124
BSI-S 40-75		75		138
BSI-S 40-80		80		150
BSI-S 40-85		85		160
BSI-S 40-90		90		172
BSI-S 40-95		95		182
BSI-S 42-70	42	70	5	128
BSI-S 42-75		75		138
BSI-S 42-80		80		150
BSI-S 42-85		85		160
BSI-S 42-90		90		172
BSI-S 42-95		95		182
BSI-S 45-73	45	73	5	134
BSI-S 45-80		80		150
BSI-S 45-85		85		160
BSI-S 45-90		90		172
BSI-S 45-95		95		182
BSI-S 45-100		100		192
BSI-S 45-110		110		214
BSI-S 48-70	48	70	5	128
BSI-S 48-80		80		150
BSI-S 48-90		90		172
BSI-S 48-95		95		182
BSI-S 50-70	50	70	5	128
BSI-S 50-80		80		150
BSI-S 50-90		90		172
BSI-S 50-95		95		182
BSI-S 50-100		100		192
BSI-S 50-110		110		214
BSI-S 52-70	52	70	5	128
BSI-S 52-80		80		150
BSI-S 52-90		90		172
BSI-S 52-95		95		182
BSI-S 55-80	55	80	5	150
BSI-S 55-90		90		172
BSI-S 55-100		100		192
BSI-S 56-106	56	106	5	206

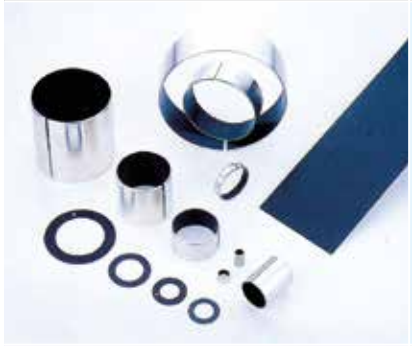
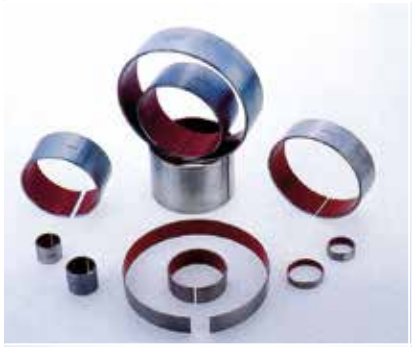
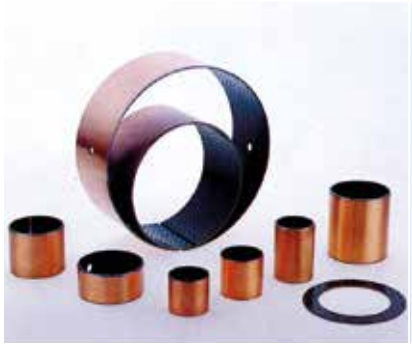
Designation	Dimensions (mm)			
	d	L	d_o	n°
BSI-S 58-80	58	80	5	150
BSI-S 58-90		90		172
BSI-S 58-100		100		192
BSI-S 60-80	60	80	5	150
BSI-S 60-90		90		172
BSI-S 60-100		100		192
BSI-S 60-110		110		214
BSI-S 70-90	70	90	5	170
BSI-S 70-95		95		182
BSI-S 70-100		100		192
BSI-S 70-110		110		214
BSI-S 75-90	75	90	5	172
BSI-S 75-95		95		182
BSI-S 75-100		100		192
BSI-S 75-110		110		214
BSI-S 80-90	80	90	5	172
BSI-S 80-100		100		192
BSI-S 80-110		110		214
BSI-S 80-120		120		236
BSI-S 80-125		125		246
BSI-S 80-130		130		258
BSI-S 85-90	85	90	5	172
BSI-S 85-100		100		192
BSI-S 85-110		110		214
BSI-S 85-120		120		236
BSI-S 90-100	90	100	5	192
BSI-S 90-110		110		214
BSI-S 90-120		120		236
BSI-S 90-130		130		258
BSI-S 90-140		140		278
BSI-S 95-120	95	120	5	236
BSI-S 100-100	100	100	5	192
BSI-S 100-110		110		214
BSI-S 100-120		120		236
BSI-S 100-130		130		258
BSI-S 100-140		140		278
BSI-S 100-150		150		290
-	-	-	-	-

To order, please specify: designation + structure type

Copper, aluminium and plastic (POM) are available on request

Copper structure: ***CO***
Aluminium structure: ***AL***
Plastic structure (POM): ***PL***

General sales program

Product photo	Type and main applications	Characteristics	
	**SF-1 Bushes** *SF-1 is wrapped bearing made of triple layer composites material which consists of a steel backing, a sintered porous bronze particles interlayer and coated with PTFE and lead mixture as surface layer. It is of low friction coefficient, anti-wear, anti-corrosion and can be used without oil, or only a trace of oil is needed. Moreover, it is of low cost, low vibration and low noise, compact and light in weight. SF-1 is widely applied in various sliding articles of different kind of machines such as textile machines, tobacco machines, hydraulic vehicles, automobiles, agriculture and forests machines and soon.*	*Load capacity* *Limit temperature* *Speed limit* *Friction coefficient* *Pv limit (dry)* *Pv limit (oil)*	**140N/mm²** **-195 °C ~ +280 °C** **5m/s** **0,04 ~ 0,18** **2N/mm² • m/s** **50N/mm² • m/s**
	**SF-1D Bushes** *SF-1D hydraulic bearing is particularly suitable for use in oil pump and dumper. It shows it advantages when working under high frequency reciprocating motion with a big side force. It has good anti-wear performances. It is widely used in various hydraulic cylinders, hydraulic motors, and pneumatic elements, motor damper and oil cylinders, etc.*	*Load capacity* *Limit temperature* *Speed limit* *Friction coefficient* *Pv limit (dry)* *Pv limit (oil)*	**140N/mm²** **-195 °C ~ +280 °C** **5m/s** **0,04 ~ 0,20** **3,8N/mm² • m/s** **50N/mm² • m/s**
	**SF-1SS Bushes (stainless steel)** *SF-1SS is bearing made of triple layer composites: a bronze powder is sintered on stainless steel base, and then the PTFE layer is coated on the bronze layer. SF-1SS can resist to oil, acids, alkali, and sea water. It is lead free, so it is popular in food machinery, acid and alkali flow meters for valves and pumps, pharmaceutical machines, printing machines, chemical machines, and other marine industry.*	*Load capacity* *Limit temperature* *Speed limit* *Friction coefficient* *Pv limit (dry)* *Pv limit (oil)*	**140N/mm²** **-195 °C ~ +280 °C** **2,5m/s** **0,04 ~ 0,20** **3,6N/mm² • m/s** **50N/mm² • m/s**
	**SF-1SSA Bushes (anti-corrosion stainless steel)** *SF-1SSA is stainless steel bearing coated with PTFE: it is made by stainless steel, with spray-painted PTFE on the sliding surface. It has good performance in acid, alkali and salty liquids, and can be widely used in chemical industry such as in strong acid/alkali flow meters, pumps, valves, etc. It shows its superior performances when anti-corrosion at the sliding part is necessary in marine industry.*	*Load capacity* *Limit temperature* *Speed limit* *Friction coefficient* *Pv limit (dry)* *Pv limit (oil)*	**100N/mm²** **-190 °C ~ +280 °C** **2,5m/s** **0,03 ~ 0,18** **3,0N/mm² • m/s** **40N/mm² • m/s**
	**SF-2 Bushes** *SF2 boundary lubrication bearing is based on a composite material with three firmly bonded layers: steel as backing, sintered porous bronze powder as interlayer, and modified POM as sliding layer. It works well under working condition of low speed, heavy duty, and normal temperature. It is cost effective and it has longer working life when it acts as substitute of normal bronze bushings. It is widely applied in auto chassis, forging machine, metallurgical and mining equipment, construction machinery, power station, strip rolling industries, etc.*	*Load capacity* *Limit temperature* *Speed limit* *Friction coefficient* *Pv limit (dry)* *Pv limit (oil)*	**70N/mm²** **-40 °C ~ +130 °C** **2,5 m/s** **0,05 ~ 0,25** **2,8N/mm² • m/s** **22N/mm² • m/s**

General sales program

Product photo	Type and main applications	Characteristics	
	**FE Sintered bushes** *FE sintered bush is made by iron powder, mould pressed under high pressure, and then sintered under high temperature, and finally oil impregnated under vacuum for better lubrication. It has good performance of anti-friction if it works under low load. It can be widely used in sliding part of textile machines, electric tools, shock absorbers of automobiles and motorcycles. Under static condition, it can be used as base housing for guiding and fixing position.*	*Load capacity* *Limit temperature* *Friction coefficient* *Chemical composition*	**45 N/mm²** **-80 °C ~ +160 °C** **0,15 ~ 0,20** **FE**
	**BNZ Sintered bushes** *BNZ sintered bush is made by bronze powder, mould pressed under high pressure, and then sintered under high temperature, and finally oil impregnated under vacuum for better lubrication. It can be used under conditions of medium speed and low load. It is widely used in domestic electric equipments, electric tools, woven and chemical engineering machines, textile machines, automobiles industry, office equipment, etc.*	*Load capacity* *Limit temperature* *Friction coefficient* *Chemical composition*	**35 N/mm²** **-80 °C ~ +160 °C** **0,12 ~ 0,18** **CuSn6Zn6Pb3**
	**090 Bronze bushes** *090 bearing is wrapped by bronze strip. The material is made of particular formulation with high specific gravity, and on its surface may be incorporated with spherical or diamond shaped indentations or oil grooves as required by customers. It is of high load capacity and long life. It is widely used in hoisting machines, construction machines, automobiles, tractors, trucks, machine tools and some mining industry.*	*Load capacity* *Limit temperature* *Speed limit* *Hardness* *Chemical composition* *Pv limit (oil)*	**150N/mm²** **-40 °C ~ +150 °C** **2,5m/s** **HB 90 ~ 120** **CuSn8 P0,3** **75N/mm² • m/s**
	**092 Bronze bushes** *092 bronze bearing is made of bronze with oil holes evenly distributed on it. When assemble it, the bearing should be lubricated with grease before both ends of the bearing is assembled with seals. 092 has the advantages of abundant oil storage, easy-to-assembly or easy to be machined etc. It can substitute bushings made by complete copper material, in addition, it suits for conditions of middle load and low speed including convey machine, hoisting machine, windlass, aligning machine etc.*	*Load capacity* *Limit temperature* *Speed limit* *Hardness* *Chemical composition* *Pv limit (oil)*	**150N/mm²** **-40 °C ~ +150 °C** **2,5m/s** **HB 90 ~ 120** **CuSn8 P0,3** **60N/mm² • m/s**
	**BM1 Bimetal bushes** *BM1 bimetal bearing is made of steel sintered with CuPb10Sn10 as a lining layer. This type of bushing shows its best performance among bushings made of Cu-lead alloy material in this product range. It suits most for middle speed and high impact conditions. Its application includes suspensions of heavy-duty trucks, auto chassis etc.*	*Chemical composition* *Limit load capacity* *Limit temperature* *Hardness*	**CuPb10Sn10** **150N/mm²** **+260 °C** **HB 70 ~ 100**

General sales program

Product photo	Type and main applications	Characteristics
	**BM2 Bimetal bushes** *BM2 is a bimetal bearing with steel back and sintered CuPb24Sn4 as lining. This type has fairly good performances in anti-fatigue and heavy load capacity. It is suitable for middle speed and middle load. When soft alloy is plated on the bushing surface and with oil lubrication, it can be applied in high-speed internal combustion engine and connect-rod.*	*Chemical composition* **CuPb24Sn4** *Limit load capacity* **130N/mm²** *Limit temperature* **+200 °C** *Hardness* **HB 45 ~ 70**
	**BM3 Bimetal bushes** *BM3 is a bimetal bearing with steel as backing and sintered CuPb30 as lining layer. It has good performance in anti-seizing shaft, and covers up alien substance due to the high lead composition. When soft alloy is plated on the bushing, it can be used under high speed and middle or low load, e.g. master bearing shell of internal combustion engine, connect-rod and rocker arm bushing.*	*Chemical composition* **CuPb30** *Limit load capacity* **120N/mm²** *Limit temperature* **+170 °C** *Hardness* **HB 30 ~ 45**
	**BM4 Bimetal bushes** *BM4 is a bearing with high percentage of tin and aluminium. With steel as back and press AlSn20Cu as lining, the bushing has fairly good performance in anti-fatigue, load capacity, anti-corrosion, and smooth sliding movement. It is widely applied under high speed and low load. It can be made into bearing shells for internal combustion engine with mid or low power or bearing shells for trains, air compressor and cooling machines. It is a good substitution for Babbitt material.*	*Chemical composition* **AlSn20Cu** *Limit load capacity* **100N/mm²** *Limit temperature* **+150 °C** *Hardness* **HB 30 ~ 40**
	**BG1 Brass bushes with graphite insert** *BG1 solid lubricant embedded bearing is made of casting brass with graphite embedded evenly in it. It has superior performances than normal bearing whose lubrication depends on oil film. Under condition of heavy duty, high temperature, slow speed, corrosion or where oil is hard to be introduced, its performance doubles that of the normal bearing both in hardness and anti-friction. It can be widely applied in continuous casting machines, mining machine, ships, air turbine, hydraulic turbines and plastic injection moulding machines.*	*Material* **CuZn25Al6Fe3Mn3** *Hardness* **HB 210 ~ 250** *Friction coefficient (μ)* **< 0,16** *Limit temperature* **+300 °C** *Load limit* **100N/mm²** *Sliding velocity limit* **con olio oil 5 m/s**
	**BG2 Bronze bushes with graphite insert** *BG2 is made of bronze CuSn6Zn6Pb3 with graphite evenly embedded in it. It can work under low load, high temperature and middle speed, e. g. in convey way of the baking furnace, rubber machine, light industry and machine tools industry etc.*	*Material* **CuSn6Zn6Pb3** *Hardness* **HB 80 ~ 120** *Friction coefficient (μ)* **< 0,15** *Limit temperature* **+350 °C** *Load limit* **60N/mm²**

General sales program

Product photo	Type and main applications	Characteristics
	**BG3 Bimetal bushes with graphite insert** *BG3 has almost the same performance as BG2. It is made of two kinds of material, steel back sintered with CuSn6Zn6Pb3 powder as a lining, then solid lubricant is embedded evenly in it. It is cost effective and has higher crash strength comparing with BG2 type; its ends can even be welded with machine part and assemble together. It is suitable for metallurgy machine, construction machine part, and where oil is hard to be employed such as oil convey equipment.*	*Material* **CuSn6Zn6Pb3** *Hardness* **HB 60 ~ 90** *Friction coefficient (μ)* **< 0,14** *Limit temperature* **+300 °C** *Load limit* **70N/mm²**
	**BG4 Cast iron bushes with graphite insert** *BG4 is made of casting iron GJL-250 and embedded with solid lubricant. It is a typical cost saving product. It can be substitute of BG2 if requirement in mechanical performance is not high, including guide post of mould, mould-frame of plastic injection machine etc.*	*Material* **GJL 250** *Hardness* **HB 180 ~ 230** *Friction coefficient (μ)* **< 0,18** *Limit temperature* **+400 °C** *Load limit* **60N/mm²**
	**BG5 Steel bushes with graphite insert** *BG5 is made of reinforced material steel 100Cr6 with solid lubricant embedded in it. Its good performance of high crash strength can be shown in supporting position of hoisting machine, e. g. support part of windlass and crane. It can not be used in water or in acid/alkali condition.*	*Material* **100Cr6** *Hardness* **HRC 55 ~ 60** *Friction coefficient (μ)* **< 0,17** *Limit temperature* **+350 °C** *Load limit* **250N/mm²**
	**BSI Ball retainer bushes** *The structure of this type of bush can be in copper, aluminium or plastic (POM) being produced through special workmanship, on which the high quality spheres are arranged orderly in certain angle and density. It is used in cold punching mould and machine tools with high precision.*	*Load capacity* **30N/mm²** *Shrink fit* **0,01 mm ~ 0,02 mm** *Speed limit* **6m/s** *Friction coefficient* **0,01 ~ 0,08** *Tolerance for spheres diameter* **< 0,002 mm**

9. Interchangeability table

Type	VICOPARTS	INA	SKF	GGB
Bushes	SF-1B	EGB..E40	PCM..B	DU*
Flanged bushes	SF-1B F	EGF..E40	PCMF..B	DU*
Thrust washers	SF-1B WC	EGW..E40	PCMW..B	DU*
Strips	NSTR-S	EGS..E40	PCMS..B	DU*
Bushes (Inches sizes)	SF-1B	EGBZ..E40	PCZ..B	-
Flanged bushes (Inches sizes)	SF-1B F	-	-	-
Thrust washers (Inches sizes)	SF-1B WC	-	-	-
Strips (Inches sizes)	NSTR-S	-	-	-
Bushes	SF-2	EGB..E50	PCM..M	DX*
Thrust washers	SF-2 WC	EGW..E50	PCMW..M	DX*
Strips (honey cones surface)	NSTR-1	EGS..E50	PCMS..M	DX*
Strips (honey cones surface with plate)	NSTR-2	-	-	-
Strips (with plate and without honey cones surface)	NSTR-3	-	-	-
Bushes (Inches sizes)	SF-2	-	PCZ..M	-
Thrust washers (Inches sizes)	SF-2 WC	-	-	-
Strips honey cones surface (Inches sizes)	NSTR-I	-	-	-
Sintered bronze bushes	BNZ	-	PBM	BP 25
Iron bushes	FE	-	-	-
Sintered bronze flanged bushes	BNZF	-	PBMF	BP 25
Iron flanged bushes	FEF	-	-	-

Interchangeability table

Type	VICOPARTS	INA	SKF	GGB
Bushes	090	-	PRM	MBZ-B09[IM]
Flanged bushes	090F	-	PRMF	-
Thrust washers	090	-	-	-
Bushes (with spherical holes)	092	-	-	LD[TM]
Bimetal bushes	BM1	-	-	SY[TM]
Bimetal flanged bushes	BM1 F	-	-	SY[TM]
Bimetal washers	BM1 R	-	-	SY[TM]
Strips (bimetal covering)	NSTR-BM	-	-	SY[TM]
Bushes (bronze and graphite)	BG1	-	-	DB[TM]
Flanged bushes (bronze and graphite)	BG1-F	-	-	DB[TM]
Thrust washers (bronze and graphite)	BG1-W	-	-	DB[TM]
Sliding plates (bronze and graphite)	BG1-SP	-	-	DB[TM]
Linear sliding plates (bronze and graphite)	BG1-SPL	-	-	-
Plane guides (bronze and graphite)	BG1-GP	-	-	-
Plane sliding guides (bronze and graphite)	BG1-GPS	-	-	-
Bushes (cast iron and graphite)	BG4	-	-	-
Flanged bushes (cast iron and graphite)	BG4-F	-	-	-
Flanged bushes (with graphite insert on the flange)	BG4-AF	-	-	-
Ball retainer straight line array	BSI-A	-	-	-
Ball retainer spiral array	BSI-S	-	-	-

10. Inches/mm conversion table

1″=25,4 mm

Fractions	Decimals	Inch 0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″
		Millimetres										
0	0,000000	0,0000	25,4000	50,8000	76,2000	101,6000	127,0000	152,4000	177,8000	203,2000	228,6000	254,0000
1/64	0,015625	0,3969	25,7969	51,1969	76,5969	101,9969	127,3969	152,7969	178,1969	203,5969	228,9969	254,3969
1/32	0,031250	0,7938	26,1938	51,5938	76,9938	102,3938	127,7938	153,1938	178,5938	203,9938	229,3938	254,7938
3/64	0,046875	1,1906	26,5906	51,9906	77,3906	102,7906	128,1906	153,5906	178,9906	204,3906	229,7906	255,1906
1/16	0,062500	1,5875	26,9875	52,3875	77,7875	103,1875	128,5875	153,9875	179,3875	204,7875	230,1875	255,5875
5/64	0,078125	1,9844	27,3844	52,7844	78,1844	103,5844	128,9844	154,3844	179,7844	205,1844	230,5844	255,9844
3/32	0,093750	2,3812	27,7812	53,1812	78,5812	103,9812	129,3812	154,7812	180,1812	205,5812	230,9812	256,3812
7/64	0,109375	2,7781	28,1781	53,5781	78,9781	104,3781	129,7781	155,1781	180,5781	205,9781	231,3781	256,7781
1/8	0,125000	3,1750	28,5750	53,9750	79,3750	104,7750	130,1750	155,5750	180,9750	206,3750	231,7750	257,1750
9/64	0,140625	3,5719	28,9719	54,3719	79,7719	105,1719	130,5719	155,9719	181,3719	206,7719	232,1719	257,5719
5/32	0,156250	3,9688	29,3688	54,7688	80,1688	105,5688	130,9688	156,3688	181,7688	207,1688	232,5688	257,9688
11/64	0,171875	4,3656	29,7656	55,1656	80,5656	105,9656	131,3656	156,7656	182,1656	207,5656	232,9656	258,3656
3/16	0,187500	4,7625	30,1625	55,5625	80,9625	106,3625	131,7625	157,1625	182,5625	207,9625	233,3625	258,7625
13/64	0,203125	5,1594	30,5594	55,9594	81,3594	106,7594	132,1594	157,5594	182,9594	208,3594	233,7594	259,1594
7/32	0,218750	5,5562	30,9562	56,3562	81,7562	107,1562	132,5562	157,9562	183,3562	208,7562	234,1562	259,5562
15/64	0,234375	5,9531	31,3531	56,7531	82,1531	107,5531	132,9531	158,3531	183,7531	209,1531	234,5531	259,9531
1/4	0,250000	6,3500	31,7500	57,1500	82,5500	107,9500	133,3500	158,7500	184,1500	209,5500	234,9500	260,3500
17/64	0,265625	6,7469	32,1469	57,5469	82,9469	108,3469	133,7469	159,1469	184,5469	209,9469	235,3469	260,7469
9/32	0,281250	7,1438	32,5438	57,9438	83,3438	108,7438	134,1438	159,5438	184,9438	210,3438	235,7438	261,1438
19/64	0,296875	7,5406	32,9406	58,3406	83,7406	109,1406	134,5406	159,9406	185,3406	210,7406	236,1406	261,5486
5/16	0,312500	7,9375	33,3375	58,7375	84,1375	109,5375	134,9375	160,3375	185,7375	211,1375	236,5375	261,9375
21/64	0,328125	8,3344	33,7344	59,1344	84,5344	109,9344	135,3344	160,7344	186,1344	211,5344	236,9344	262,3344
11/8	0,343750	8,7312	34,1312	59,5312	84,9312	110,3312	135,7312	161,1312	186,5312	211,9312	237,3312	262,7312
23/64	0,359375	9,1281	34,5281	59,9281	85,3281	110,7281	136,1281	161,5281	186,9281	212,3281	237,7281	263,1281
3/8	0,375000	9,5250	34,9250	60,3250	85,7250	111,1250	136,5250	161,9250	187,3250	212,7250	238,1250	263,5250
25/64	0,390625	9,9219	35,3219	60,7219	86,1219	111,5219	136,9219	162,3219	187,7219	213,1219	238,5219	263,9219
13/32	0,406250	10,3188	35,7188	61,1188	86,5188	111,9188	137,3188	162,7188	188,1188	213,5188	238,9188	264,3188
27/64	0,421875	10,7156	36,1156	61,5156	86,9156	112,3156	137,7156	163,1156	188,5156	213,9156	239,3156	264,7156
7/16	0,437500	11,1125	36,5125	61,9125	87,3125	112,7125	138,1125	163,5125	188,9125	214,3125	239,7125	265,1125
29/64	0,453125	11,5094	36,9094	62,3094	87,7094	113,1094	138,5094	163,9094	189,3094	214,7094	240,1094	265,5094
15/32	0,468750	11,9062	37,3062	62,7062	88,1062	113,5062	138,9062	164,3062	189,7062	215,1062	240,5062	265,9062
31/64	0,484375	12,3031	37,7031	63,1031	88,5031	113,9031	139,3031	164,7031	190,1031	215,5031	240,9031	266,3031
1/2	0,500000	12,7000	38,1000	63,5000	88,9000	114,3000	139,7000	165,1000	190,5000	215,9000	241,3000	266,7000
33/64	0,515625	13,0969	38,4969	63,8969	89,2969	114,6969	140,0969	165,4969	190,8969	216,2969	241,6969	267,0969
17/32	0,531250	13,4938	38,8938	64,2938	89,6938	115,0938	140,4938	165,8938	191,2938	216,6938	242,0938	267,4938
35/64	0,546875	13,8906	39,2906	64,6906	90,0906	115,4906	140,8906	166,2906	191,6906	217,0906	242,4906	267,8906
9/16	0,562500	14,2875	39,6875	65,0875	90,4875	115,8875	141,2875	166,6875	192,0875	217,4875	242,8875	268,2875
37/64	0,578125	14,6844	40,0844	65,4844	90,8844	116,2844	141,6844	167,0844	192,4844	217,8844	243,2844	268,6844
19/32	0,593750	15,0812	40,4812	65,8812	91,2812	116,6812	142,0812	167,4812	192,8812	218,2812	243,6812	269,0812
39/64	0,609375	15,4781	40,8781	66,2781	91,6781	117,0781	142,4781	167,8781	193,2781	218,6781	244,0781	269,4781
5/8	0,625000	15,8750	41,2750	66,6750	92,0750	117,4750	142,8750	168,2750	193,6750	219,0750	244,4750	269,8750
41/64	0,640625	16,2719	41,6719	67,0719	92,4719	117,8719	143,2719	168,6719	194,0719	219,4719	244,8719	270,2719
21/32	0,656250	16,6688	42,0688	67,4688	92,8688	118,2688	143,6688	169,0688	194,4688	219,8688	245,2688	270,6688
43/64	0,671875	17,0656	42,4656	67,8656	93,2656	118,6656	144,0656	169,4656	194,8656	220,2656	245,6656	271,0656
11/16	0,687500	17,4625	42,8625	68,2625	93,6625	119,0625	144,4625	169,8625	195,2625	220,6625	246,0625	271,4625
45/64	0,703125	17,8594	43,2594	68,6594	94,0594	119,4594	144,8594	170,2594	195,6594	221,0594	246,4594	271,8594
23/32	0,718750	18,2562	43,6562	69,0562	94,4562	119,8562	145,2562	170,6562	196,0562	221,4562	246,8562	272,2562
47/64	0,734375	18,6531	44,0531	69,4531	94,8531	120,2531	145,6531	171,0531	196,4531	221,8531	247,2531	272,6531
3/4	0,750000	19,0500	44,4500	69,8500	95,2500	120,6500	146,0500	171,4500	196,8500	222,2500	247,6500	273,0500
49/64	0,765625	19,4469	44,8469	70,2469	95,6469	121,0469	146,4469	171,8469	197,2469	222,6469	248,0469	273,4469
25/32	0,781250	19,8438	45,2438	70,6438	96,0438	121,4438	146,8438	172,2438	197,6438	223,0438	248,4438	273,8438
51/64	0,796875	20,2406	45,6406	71,0406	96,4406	121,8406	147,2406	172,6406	198,0406	223,4406	248,8406	274,2406
13/16	0,812500	20,6375	46,0375	71,4375	96,8375	122,2375	147,6375	173,0375	198,4375	223,8375	249,2375	274,6375
53/64	0,828125	21,0344	46,4344	71,8344	97,2344	122,6344	148,0344	173,4344	198,8344	224,2344	249,6344	275,0344
27/32	0,843750	21,4312	46,8312	72,2312	97,6312	123,0312	148,4312	173,8312	199,2312	224,6312	250,0312	275,4312
55/64	0,859375	21,8281	47,2281	72,6281	98,0281	123,4281	148,8281	174,2281	199,6281	225,0281	250,4281	275,8281
7/8	0,875000	22,2250	47,6250	73,0250	98,4250	123,8250	149,2250	174,6250	200,0250	225,4250	250,8250	276,2250
57/64	0,890625	22,6219	48,0219	73,4219	98,8219	124,2219	149,6219	175,0219	200,4219	225,8219	251,2219	276,6219
29/32	0,906250	23,0188	48,4188	73,8188	99,2188	124,6188	150,0188	175,4188	200,8188	226,2188	251,6188	277,0188
59/64	0,921875	23,4156	48,8156	74,2156	99,6156	125,0156	150,4156	175,8156	201,2156	226,6156	252,0156	277,4156
15/16	0,937500	23,8125	49,2125	74,6125	100,0125	125,4125	150,8125	176,2125	201,6125	227,0125	252,4125	277,8125
61/64	0,953125	24,2094	49,6094	75,0094	100,4094	125,8094	151,2094	176,6094	202,0094	227,4094	252,8094	278,2094
31/32	0,968759	24,6062	50,0062	75,4062	100,8062	126,2062	151,6062	177,0062	202,4062	227,8062	253,2062	278,6062
63/64	0,984375	25,0031	50,4031	75,8031	101,2031	126,6031	152,0031	177,4031	202,8031	228,2031	253,6031	279,0031

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