



LBM
Dry bushes

Stepping forward together with our customers

For more than 50 years, **SANKYO OILLESS** has been one of the leading manufacturers of maintenance-free sliding elements. As a leading supplier and pioneer in the production of stamping and press tool components for the automotive industry, **SANKYO OILLESS** supplies an products for many other applications such as mold making, engineering, packaging, heavy industry, aerospace and many more.

The technologies developed by **SANKYO OILLESS** have reduced or eliminated friction, wear and tear. In addition, **SANKYO OILLESS** provides services and quality products to offer you the best possible solutions for your requirements at all times.

The benefits of slide bearings versus roller bearings

In a variety of applications, designers are increasingly replacing roller bearings with slide bearings. In addition to ease of installation and cost effectiveness, slide bearings offer a number of distinct advantages. Slide bearings require less installation space, have a larger load bearing capacity, are maintenance-free or require little maintenance, are easier to assemble and are less susceptible to noise and vibration.

The following list gives an overview of the general advantages of bearings compared to bearings.

Slide bearing

- Higher load bearing capacity and reduced footprint
- Higher resistance to vibration and increased lifetime
- Easier installation
- Lower installation costs
- Increased shaft tolerances possible
- Compensates misalignment and reduces the edge load

Roller bearing

- sensitive to shock, vibration and edge load
- high costs for bearings, housings, counterfaces and - fixing materials
- large space required
- is prone to noise development

Technologies for top performance

SANKYO products are manufactured in our own plants and distributed worldwide.

We offer high quality maintenance-free sliding elements acc. to international standards and standards for use in

- pressing tools
- injection molds
- general engineering

As an experienced specialist, we have the appropriate know-how in tribology to always offer the best solutions for your needs. We supply a large portfolio of lubrication-free sliding elements and also offer custom products acc. to customer drawing.

Quality and performance are our constant commitment!

Bushes with PTFE sliding layer

The lead-free composite material SO#936FR is used for maintenance-free plain bearings that preferably run dry, i.e. without lubricant. The rolled and calibrated bushings are made of thin-walled strip material. The butt joint runs parallel to the bushing axis.

Properties

- Good sliding properties of the maintenance-free bronze / PTFE sliding layer
- Suitable for dry running and clean operation
- Smooth movement, without stick-slip effect
- For oscillating and rotating movements, even at low speed
- Low friction, low wear and long service life
- High specific load, even shock-wise
- Temperature resistant between -200 and +280 °C
- Temperature resistant between -200 and +280 °C

An adaptation process takes place on the sliding surfaces of the shaft and bushing during the first hours of operation. The surface structure of the shaft smoothes out and absorbs part of the PTFE sliding layer.

Running-in characteristic

Dadurch werden die tragenden Kontaktflächen und die Tragfähigkeit zwischen den Elementen verbessert. Der Einlaufverschleiß nach Abb. 1 stabilisiert sich je nach Belastung schon in kurzer Zeit und führt zu einem günstigen Reibwert.

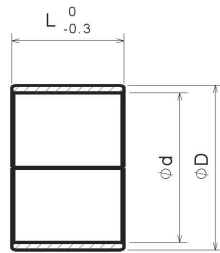
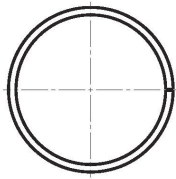
Sliding partners

Suitable sliding partners for Sankyo Oilless Bushes and Plates are **gas nitrated or hardened steel** alloys with **HRC > 35**.

In order to ensure an optimal sliding behaviour, the difference in hardness between the sliding material and sliding partner should at least be **100 HB**.

The surface roughness of the sliding partner should be **Rz = 3...6,3 µm (grinding)**.

If guides, like in large dies of punching tools, are continuously moved apart during operation, the counterpart partner should be provided with correspondingly generous centering chamfers.



Toleranzen / Tolerances
 Gehäuse / Housing: H7
 Welle / Shaft: f7 / h7 (d > 75)

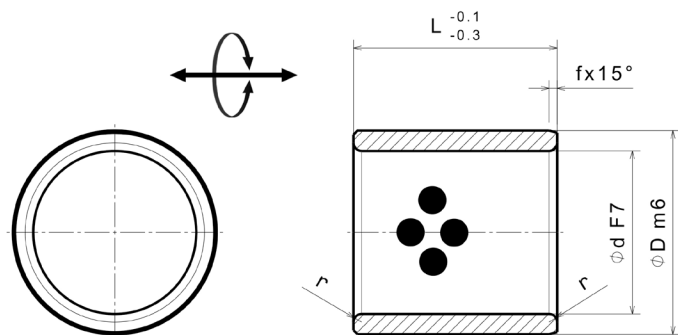
Properties:

Base material		Steel
Self-lubricating		Yes
Lubricant		PTFE
Max. surface pressure P	<100.000 load cases	29 N/mm ²
	>10 Mio. load cases	15 N/mm ²
	rotating, oscillating, gliding	59 N/mm ²
	very slow movement	147 N/mm ²
Max. sliding speed v		120 m/min
Operating temperature		-200°C / +280°C

Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:
11200303	LBM 3-5-3	3	5	3
11200304	LBM 3-5-4			4
11200305	LBM 3-5-5			5
11200306	LBM 3-5-6			6
11200403	LBM 4-6-3	4	6	3
11200404	LBM 4-6-4			4
11200405	LBM 4-6-5			5
11200406	LBM 4-6-6			6
11200408	LBM 4-6-8	5	7	8
11200503	LBM 5-7-3			3
11200504	LBM 5-7-4			4
11200505	LBM 5-7-5			5
11200506	LBM 5-7-6			6
11200508	LBM 5-7-8	6	8	8
11200510	LBM 5-7-10			10
11200603	LBM 6-8-3			3
11200604	LBM 6-8-4			4
11200605	LBM 6-8-5	7	9	5
11200606	LBM 6-8-6			6
11200607	LBM 6-8-7			7
11200608	LBM 6-8-8			8
11200610	LBM 6-8-10	8	10	10
11200612	LBM 6-8-12			12
11200705	LBM 7-9-5			5
11200706	LBM 7-9-6			6
11200707	LBM 7-9-7	9	11	7
11200708	LBM 7-9-8			8
11200710	LBM 7-9-10			10
11200712	LBM 7-9-12			12
11200804	LBM 8-10-4	10	12	4
11200805	LBM 8-10-5			5
11200806	LBM 8-10-6			6
11200807	LBM 8-10-7			7
11200808	LBM 8-10-8	11	13	8
11200810	LBM 8-10-10			10
11200812	LBM 8-10-12			12
11200815	LBM 8-10-15			15
11200906	LBM 9-11-6	9	11	6

Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:
11200910	LBM 9-11-10	9	11	10
11201006	LBM 10-12-6	10	12	6
11201007	LBM 10-12-7			7
11201008	LBM 10-12-8			8
11201010	LBM 10-12-10			10
11201012	LBM 10-12-12	12	14	12
11201015	LBM 10-12-15			15
11201020	LBM 10-12-20			20
11201206	LBM 12-14-6			6
11201208	LBM 12-14-8	12	14	8
11201210	LBM 12-14-10			10
11201212	LBM 12-14-12			12
11201215	LBM 12-14-15			15
11201220	LBM 12-14-20	13	15	20
11201225	LBM 12-14-25			25
11201308	LBM 13-15-8			8
11201310	LBM 13-15-10	13	15	10
11201312	LBM 13-15-12			12
11201315	LBM 13-15-15			15
11201320	LBM 13-15-20			20
11201405	LBM 14-16-5	14	16	5
11201408	LBM 14-16-8			8
11201410	LBM 14-16-10			10
11201412	LBM 14-16-12			12
11201415	LBM 14-16-15	15	17	15
11201420	LBM 14-16-20			20
11201425	LBM 14-16-25			25
11201508	LBM 15-17-8			8
11201510	LBM 15-17-10	15	17	10
11201512	LBM 15-17-12			12
11201515	LBM 15-17-15			15
11201520	LBM 15-17-20			20
11201525	LBM 15-17-25	16	18	25
11201610	LBM 16-18-10			10
11201612	LBM 16-18-12			12
11201615	LBM 16-18-15			15
11201620	LBM 16-18-20	16	18	20
11201625	LBM 16-18-25			25

Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:	Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:
11201710	LBM 17-19-10	17	19	10	11203020	LBM 30-34-20	30	34	20
11201715	LBM 17-19-15			15	11203025	LBM 30-34-25			25
11201720	LBM 17-19-20			20	11203030	LBM 30-34-30			30
11201810	LBM 18-20-10	18	20	10	11203035	LBM 30-34-35			35
11201812	LBM 18-20-12			12	11203040	LBM 30-34-40			40
11201815	LBM 18-20-15			15	11203050	LBM 30-34-50			50
11201820	LBM 18-20-20			20	11203115	LBM 31-35-15	31	35	15
11201825	LBM 18-20-25			25	11203125	LBM 31-35-25			25
11201830	LBM 18-20-30			30	11203130	LBM 31-35-30			30
11201910	LBM 19-22-10	19	22	10	11203140	LBM 31-35-40			40
11201915	LBM 19-22-15			15	11203215	LBM 32-36-15	32	36	15
11201920	LBM 19-22-20			20	11203220	LBM 32-36-20			20
11202010	LBM 20-23-10	20	23	10	11203225	LBM 32-36-25			25
11202012	LBM 20-23-12			12	11203230	LBM 32-36-30			30
11202015	LBM 20-23-15			15	11203240	LBM 32-36-40			40
11202020	LBM 20-23-20			20	11203250	LBM 32-36-50			50
11202025	LBM 20-23-25			25	11203510	LBM 35-39-10	35	39	10
11202030	LBM 20-23-30			30	11203512	LBM 35-39-12			12
11202210	LBM 22-25-10	22	25	10	11203515	LBM 35-39-15			15
11202212	LBM 22-25-12			12	11203520	LBM 35-39-20			20
11202215	LBM 22-25-15			15	11203525	LBM 35-39-25			25
11202220	LBM 22-25-20			20	11203530	LBM 35-39-30			30
11202225	LBM 22-25-25			25	11203535	LBM 35-39-35			35
11202230	LBM 22-25-30			30	11203540	LBM 35-39-40			40
11202415	LBM 24-27-15	24	27	15	11203550	LBM 35-39-50			50
11202420	LBM 24-27-20			20	11203820	LBM 38-42-20	38	42	20
11202425	LBM 24-27-25			25	11203825	LBM 38-42-25			25
11202430	LBM 24-27-30			30	11203830	LBM 38-42-30			30
11202510	LBM 25-28-10	25	28	10	11203835	LBM 38-42-35			35
11202512	LBM 25-28-12			12	11203840	LBM 38-42-40			40
11202515	LBM 25-28-15			15	11204012	LBM 40-44-12	40	44	12
11202520	LBM 25-28-20			20	11204015	LBM 40-44-15			15
11202525	LBM 25-28-25			25	11204020	LBM 40-44-20			20
11202530	LBM 25-28-30			30	11204025	LBM 40-44-25			25
11202535	LBM 25-28-35			35	11204030	LBM 40-44-30			30
11202540	LBM 25-28-40			40	11204035	LBM 40-44-35			35
11202550	LBM 25-28-50			50	11204040	LBM 40-44-40			40
11202615	LBM 26-30-15	26	30	15	11204045	LBM 40-44-45			45
11202620	LBM 26-30-20			20	11204050	LBM 40-44-50			50
11202625	LBM 26-30-25			25	11204520	LBM 45-50-20	45	50	20
11202630	LBM 26-30-30			30	11204525	LBM 45-50-25			25
11202810	LBM 28-32-10	28	32	10	11204530	LBM 45-50-30			30
11202812	LBM 28-32-12			12	11204535	LBM 45-50-35			35
11202815	LBM 28-32-15			15	11204540	LBM 45-50-40			40
11202820	LBM 28-32-20			20	11204545	LBM 45-50-45			45
11202825	LBM 28-32-25			25	11204550	LBM 45-50-50			50
11202830	LBM 28-32-30			30	11205012	LBM 50-55-12	50	55	12
11203010	LBM 30-34-10	30	34	10	11205015	LBM 50-55-15			15
11203012	LBM 30-34-12			12	11205020	LBM 50-55-20			20
11203015	LBM 30-34-15			15	11205025	LBM 50-55-25			25



Properties:

Base material		Steel
Self-lubricating		Yes
Lubricant		PTFE
Max. surface pressure P	<100.000 load cases	29 N/mm ²
	>10 Mio. load cases	15 N/mm ²
	rotating, oscillating, gliding	59 N/mm ²
	very slow movement	147 N/mm ²
Max. sliding speed v		120 m/min
Operating temperature		-200°C / +280°C

Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:
11205030	LBM 50-55-30	50	55	30
11205035	LBM 50-55-35			35
11205040	LBM 50-55-40			40
11205050	LBM 50-55-50			50
11205060	LBM 50-55-60			60
11205520	LBM 55-60-20	55	60	20
11205525	LBM 55-60-25			25
11205530	LBM 55-60-30			30
11205535	LBM 55-60-35			35
11205540	LBM 55-60-40			40
11205550	LBM 55-60-50			50
11205555	LBM 55-60-55			55
11205560	LBM 55-60-60			60
11206015	LBM 60-65-15	60	65	15
11206020	LBM 60-65-20			20
11206030	LBM 60-65-30			30
11206035	LBM 60-65-35			35
11206040	LBM 60-65-40			40
11206050	LBM 60-65-50			50
11206060	LBM 60-65-60			60
11206070	LBM 60-65-70			70
11206530	LBM 65-70-30	65	70	30
11206540	LBM 65-70-40			40
11206550	LBM 65-70-50			50
11206560	LBM 65-70-60			60
11206570	LBM 65-70-70			70
11207030	LBM 70-75-30	70	75	30
11207035	LBM 70-75-35			35
11207040	LBM 70-75-40			40
11207050	LBM 70-75-50			50
11207060	LBM 70-75-60			60
11207070	LBM 70-75-70			70
11207080	LBM 70-75-80			80
11207530	LBM 75-80-30	75	80	30
11207535	LBM 75-80-35			35
11207540	LBM 75-80-40			40
11207550	LBM 75-80-50			50
11207560	LBM 75-80-60			60

Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:
11207570	LBM 75-80-70	75	80	70
11207580	LBM 75-80-80			80
112080100	LBM 80-85-100	80	85	100
11208040	LBM 80-85-40			40
11208050	LBM 80-85-50			50
11208060	LBM 80-85-60			60
11208080	LBM 80-85-80			80
112085100	LBM 85-90-100	85	90	100
11208530	LBM 85-90-30			30
11208540	LBM 85-90-40			40
11208550	LBM 85-90-50			50
11208560	LBM 85-90-60			60
112090100	LBM 90-95-90	90	95	90
11209035	LBM 90-95-35			35
11209040	LBM 90-95-40			40
11209050	LBM 90-95-50			50
11209060	LBM 90-95-60			60
11209090	LBM 90-95-90			90
112095100	LBM 95-100-100	95	100	100
11209530	LBM 95-100-30			30
11209550	LBM 95-100-50			50
11209560	LBM 95-100-60			60
11210030	LBM 100-105-30	100	105	30
11210050	LBM 100-105-50			50
11210060	LBM 100-105-60			60
11210070	LBM 100-105-70			70
11210080	LBM 100-105-80			80
11210090	LBM 100-105-90			90
11210095	LBM 100-105-95			95
112100100	LBM 100-105-100			100
112100115	LBM 100-105-115			115
11210550	LBM 105-110-50	105	110	50
11210560	LBM 105-110-60			60
11210590	LBM 105-110-90			90
112105100	LBM 105-110-100			100
112105115	LBM 105-110-115			115
11211030	LBM 110-115-30	110	115	30
11211050	LBM 110-115-50			50

Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:
11211060	LBM 110-115-60	110	115	60
11211070	LBM 110-115-70			70
11211095	LBM 110-115-95			95
112110100	LBM 110-115-100			100
112110115	LBM 110-115-115			115
112115115	LBM 115-120-115	115	120	115
11211550	LBM 115-120-50			50
11211560	LBM 115-120-60			60
11211570	LBM 115-120-70			70
11212030	LBM 120-125-30	120	125	30
11212050	LBM 120-125-50			50
11212060	LBM 120-125-60			60
11212070	LBM 120-125-70			70
11212095	LBM 120-125-95			95
112120100	LBM 120-125-100			100
112125100	LBM 125-130-100	125	130	100
11212560	LBM 125-130-60			60
11213050	LBM 130-135-50	130	135	50
11213060	LBM 130-135-60			60
11213080	LBM 130-135-80			80
112130100	LBM 130-135-100			100
112135100	LBM 135-140-100	135	140	100
11213560	LBM 135-140-60			60
11213580	LBM 135-140-80			80
11214050	LBM 140-145-50	140	145	50
11214060	LBM 140-145-60			60
112140100	LBM 140-145-100			100
112140130	LBM 140-145-130			130
112145100	LBM 145-150-100	145	150	100
11214560	LBM 145-150-60			60
11215050	LBM 150-155-50	150	155	50
11215060	LBM 150-155-60			60
11215080	LBM 150-155-80			80
112150100	LBM 150-155-100			100
112155100	LBM 155-160-100	155	160	100
11215560	LBM 155-160-60			60
11216050	LBM 160-165-50	160	165	50
11216060	LBM 160-165-60			60
11216080	LBM 160-165-80			80
112160100	LBM 160-165-100			100
112165100	LBM 165-170-100	165	170	100
11216560	LBM 165-170-60			60
112170100	LBM 170-175-100	170	175	100
11217060	LBM 170-175-60			60
112175100	LBM 175-180-100	175	180	100
11217560	LBM 175-180-60			60
112180100	LBM 180-185-100	180	185	100
11218060	LBM 180-185-60			60
11218080	LBM 180-185-80			80
112190100	LBM 190-195-100	190	195	100

Article no.:	Article name:	Inner Ø d:	Outer Ø D:	Length L:
112190160	LBM 190-195-160	190	195	160
112190195	LBM 190-195-195			195
11219060	LBM 190-195-60			60
11219080	LBM 190-195-80			80
112200100	LBM 200-205-100	200	205	100
11220060	LBM 200-205-60			60
112205100	LBM 205-210-100	205	210	100
11220560	LBM 205-210-60			60
112210100	LBM 210-215-100	210	215	100
11221060	LBM 210-215-60			60
112215100	LBM 215-220-100	215	220	100
11221560	LBM 215-220-60			60
112220100	LBM 220-225-100	220	225	100
11222060	LBM 220-225-60			60
112230100	LBM 230-235-100	230	235	100
11223060	LBM 230-235-60			60
112240100	LBM 240-245-100	240	245	100
11224060	LBM 240-245-60			60
112250100	LBM 250-255-100	250	255	100
11225060	LBM 250-255-60			60
112280100	LBM 280-285-100	280	285	100
11228060	LBM 280-285-60			60
112300100	LBM 300-305-100	300	305	100
11230060	LBM 300-305-60			60

Material data

Material		SO#50SP2*	SO#50SP5	SO#50SP7	SO#50SP8	SO#50SP13	SO#50B
		<i>Hard brass with graphite</i>	<i>Alu-bronze with graphite</i>	<i>Alu-bronze with graphite</i>	<i>Hard brass with graphite</i>	<i>Bronze with graphite</i>	<i>Red brass with graphite</i>
Self-lubricating		Yes	Yes	Yes	Yes	Yes	Yes
Lubricant		Graphite	Graphite	Graphite	Graphite	Graphite	Graphite
Max. surface pressure [N/mm ²]		100	100	120	130	120	50
Max. sliding speed [m/min]		30	10	10	15	10	50
Max. P*v-Wert [N/mm ² * m/min]		200	150	200	200	200	100
Temperature [°C]	<i>Standard Max</i>	-50 / +200 +300	-50 / +200 +300	-50 / +200 +300	-50 / +200 +300	-50 / +200 +300	-50 / +200 +400
Friction coefficient**	<i>initial long term</i>	0,15 0,07	0,15 0,07	0,15 0,07	0,15 0,07	0,2 0,15	0,15 0,07
Brinell hardness [HB]		>210	>210	>260	220 ~ 260	>280	>60
Further information							
Elongation [%]		>12	>18	>2	>3	>0,5	>15
Density [kg/dm ³]		7,9	7,7	7,8	7,8	7,2	8,7
Tensile strength [N/mm ²]		>755	>686	>833	>700	>550	>195
Yield strength [N/mm ²]		>412	>372	>509	-	-	>105
E-Module [N/mm ²]		97000	108000	123600	108000	145000	96000
Thermal expansion [10 ⁻⁵ * grd.-1]		1,9	1,6	1,6	1,9	1,71	1,8

*: Material used according to SANKYO OILLESS standards

**: against steel, hardened and grinded

Tin bronze	Sinter-bronze	SO#50PB	CuSn8	SO#50S45C	SO#50F	Polyacetal
		<i>Ton bronze</i>	<i>acc. to DIN 17662</i>	<i>Steel with graphite</i>	<i>Grey cast iron with graphite</i>	<i>Plastic</i>
No	Yes	No	No	Yes	Yes	No
-	Oil	-	-	Graphite	Graphite	Graphite
80	50	80	40	30	5	25 35 (with oil)
20	300	50	120	10	10	50 200 (with oil)
-	96	100	-	80	50	100 200 (with oil)
-50 / +200 +300	-12 / +90	-50 / +200 +300	-200 / +200	-50 / +150	-50 / +150	-50 / +80
0,16	0,09	0,15 0,07	-	0,01	-	-
>80	>25	>80	-	>375	160 ~ 220	115 (HRR)
n						
>6	-	>5	-	19	-	73
8,7	6,5 ~ 7,0	8,2	8,8	7,8	7,1 ~ 7,3	1,4
>295	-	>295	-	>690	>250	69
>161	-	>161	-	-	-	-
108000	-	108000	115000	-	-	-
1,8	-	1,8	-	1,1	1	7,7

Installation note

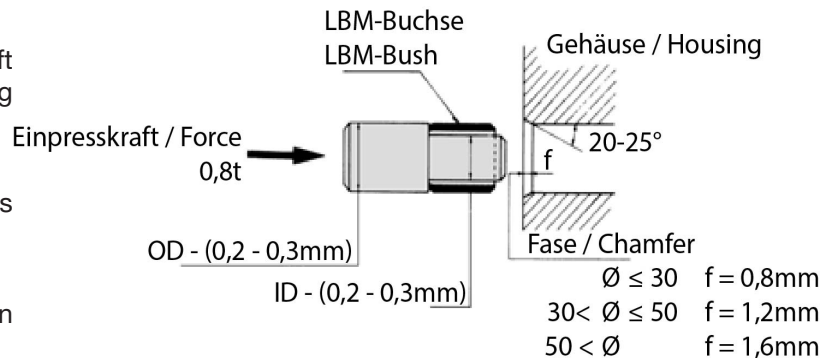
Bush

Observe tolerances of the press-in mandrel (shaft and calibrating mandrel diameter) and the housing when pressing in the bushing.

In large diameter range, use calibrating mandrels if necessary!

Avoid damage to the running surface when mounting the bearings.

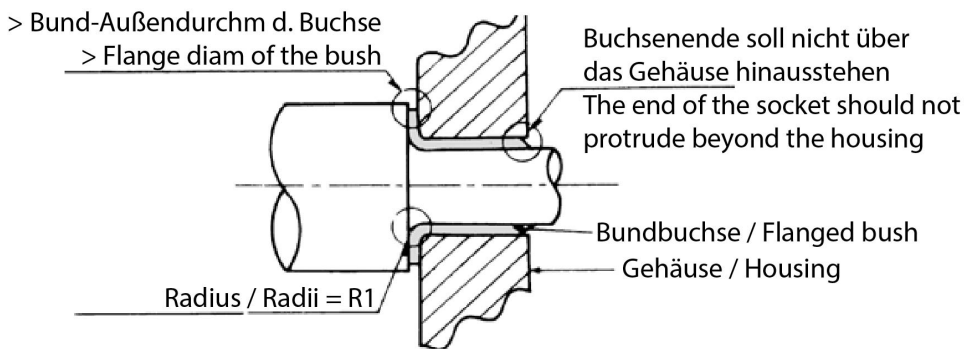
Design of the shaft journal (mating surface): For dry running, surface roughness = Rz2 - Rz3 (ground), for secondary bearing points also drawn material is permissible.



Flanged bush

The mandrel shank diameter should be larger than the collar outside diameter of the bushing when pressing in.

The shaft outside diameter of the shaft should be larger than the collar outside diameter of the bushing.



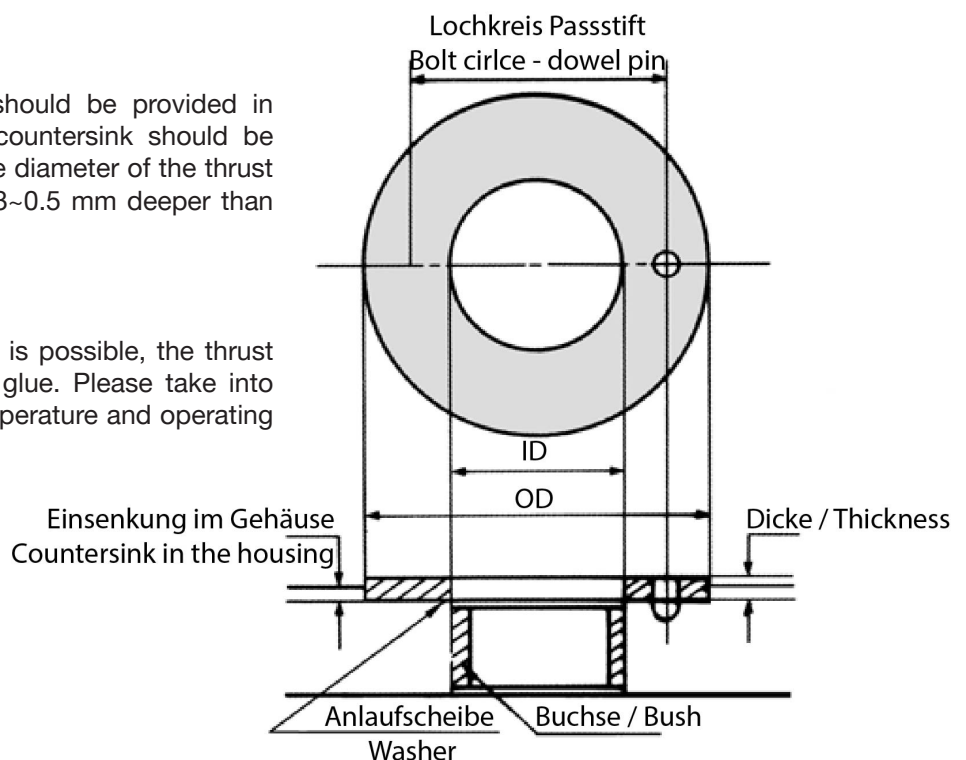
Thrust washer

In case of locking by dowel pin:

If possible, a countersink (cavity) should be provided in the housing. The diameter of the countersink should be 0.05~0.15 mm larger than the outside diameter of the thrust washer. The dowel pin should be 0.3~0.5 mm deeper than the top edge - thrust surface.

Glue in place:

If no dowel pin or screw connection is possible, the thrust washer can also be fixed by using glue. Please take into account the maximum operating temperature and operating conditions of the glue.



Chemical resistance

Water

Material	SO#50SP2 SO#50SP8	SO#50B	SO#50SP5 SO#50SP7 SO#50SP13 SO#50AIB	SO#50F	SO#50S45C	Polyacetal
	<i>High strength brass casting</i>	<i>Red brass</i>	<i>Alu-bronze</i>	<i>Grey cast</i>	<i>Steel</i>	<i>Red brass mit FSS</i>
Fresh Water	○	◎	◎	X	◎	○
Sea Water	△	○	○	X	◎	○

Acid

Material	SO#50SP2 SO#50SP8	SO#50B	SO#50SP5 SO#50SP7 SO#50SP13 SO#50AIB	SO#50F	SO#50S45C	Polyacetal
	<i>High strength brass casting</i>	<i>Red brass</i>	<i>Alu-bronze</i>	<i>Grey cast</i>	<i>Steel</i>	
Alcohol	◎	◎	◎	-	◎	-
Formic acid	-	-	-	-	-	X
Chlorine (dry)	◎	◎	◎	-	◎	-
Chlorine (wet)	X	△	△	-	-	-
Chromic acid	X	X	X	X	-	-
Acetic acid	X	X	◎ (20°C) △ (118°C)	X	◎	○
Hydrochloric acid	-	○	○	X	-	X
Concentrated hydrochloric acid	X	X	△	X	X	-
Lactic acid	X	X	X	X	○	X
Phenol	-	-	-	-	-	X
Phosphoric acid	X	○	○	X	△	X
Nitric acid	X	X	X	X	○	-
Sulfuric acid (40-80%)	X	△	△	X	△	X* △**
Sulfuric acid (80-95%)	X	○	○	X	△	X* △**
Diluted hydrochloric acid	△	-	-	-	-	X
Hydrogen peroxide	△	○	○	X	○	-

*: High concentration

** : Low concentration

Explanation		
◎: Preferred	○: no problem in use	△: Affected
X: Not allowed for use	-: unknown	

Chemical resistance

Alkali

Material	SO#50SP2 SO#50SP8	SO#50B	SO#50SP5 SO#50SP7 SO#50SP13 SO#50AIB	SO#50F	SO#50S45C	Polyacetal
	<i>High strength brass casting</i>	<i>Red brass</i>	<i>Alu-bronze</i>	<i>Grey cast</i>	<i>Steel</i>	
Ammonia (dry)	◎	◎	◎	O	◎ (20°C) X (Gas)	X
Ammonia (wet)	X	X	X	O	◎ (20°C) X (Gas)	X
Ammonia (liquid)	X	X	X	-	◎	X
Iron chloride	X	O	O	X	△	-
Potassium hydroxide	O	O	O	-	-	-
Calcium chloride	X	O	O	△	O	-
Calcium hydroxide	O	◎	◎	O	-	O
Sodium hydroxide	O	O	O	-	◎	-
Sulfur (dry)	◎	O	O	△	-	O
Sulfur (wet)	X	X	X	△	-	O

Solvent

Material	SO#50SP2 SO#50SP8	SO#50B	SO#50SP5 SO#50SP7 SO#50SP13 SO#50AIB	SO#50F	SO#50S45C	Polyacetal
	<i>High strength brass casting</i>	<i>Red brass</i>	<i>Alu-bronze</i>	<i>Grey cast</i>	<i>Steel</i>	
Acetone	◎	◎	◎	O	◎	△
Benzene	-	-	-	-	-	△
Ethylene glycol	O	◎	◎	△	-	-
Carbon tetrachloride (dry)	◎	◎	◎	X	◎	-
Carbon tetrachloride (wet)	X	O	O	X	-	-
Methyl alcohol	◎	◎	◎	O	O	△
Toluene	◎	◎	◎	O	-	-

Explanation		
◎: Preferred	O: no problem in use	△: Affected
X: Not allowed for use	-: unknown	

Chemical resistance

Grease and others

Material	SO#50SP2 SO#50SP8	SO#50B	SO#50SP5 SO#50SP7 SO#50SP13 SO#50AIB	SO#50F	SO#50S45C	Polyacetal
	<i>High strength brass casting</i>	<i>Red brass</i>	<i>Alu-bronze</i>	<i>Grey cast</i>	<i>Steel</i>	
Gasoline	◎	◎	◎	○	◎	○
Diesel	-	-	-	-	-	○
Crude oil	△	○	○	○	○	-
Lacquer	◎	◎	◎	△	-	-
Kerosene	◎	◎	◎	○	◎	-
Vegetable oil	◎	◎	◎	△	-	-
Lubricants	◎	◎	◎	◎	◎	○
Heavy oil	○	◎	◎	○	○	-
Animal oil	◎	◎	◎	-	-	-

Explanation		
◎: Preferred	○: no problem in use	△: Affected
X: Not allowed for use	-: unknown	

