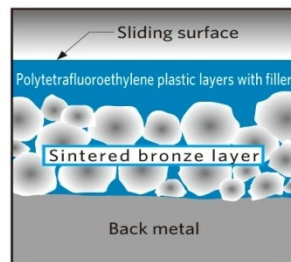


Oiles Drymet LF Polytetrafluoroethylene plastic multi-layer bearings with back metals



Feature

- Serviceable without the need for lubrication. Thin and lightweight for compact design.
- Demonstrate low coefficient of friction and superior load performances in high-load, low-speed conditions.
- Usable at the high PV values even in the middle- and high-speed zones when lubricated.
- Usable in wide temperature ranges from low to high temperatures. Has superior chemical resistance.
- Features superior dimensional stability, mechanical strength, and thermal conductivity.
- The standard products and plate materials are available in various sizes.



image

Service range

Lubrication condition	Dry
Service temperature range °C	−200~+280
Allowable max. pressure P N/mm ² [kgf/cm ²]	49.0 (137) [500 (1,400)]
Allowable max. velocity V m/s [m/min]	0.65 [39]
Allowable max. PV value N/mm ² · m/s [kgf/cm ² · m/min]	3.60 [2,200]

The values in parentheses are static allowable pressures, which are the allowable bearing pressures when accompanied with no sliding or accompanied with sliding at quite low speed not more than 0.0017 m/s [0.1 m/min.].

※ Allowable max. pressure of LFCF is 24.5N/mm² [250Kgf/cm²].

Mechanical properties

Tensile strength	JIS Z 2241	N/mm ² [kgf/cm ²]	380 [3,875]
Elongation	JIS Z 2241	%	27
Hardness	JIS Z 2244	Hv	107

※ The values shown above are typical values, not the standard values.

※ The values shown above are values of back metal.

Oiles Drymet LF PTFE multi-layer bearings with back metals

Press-fitting (Rolled bushing)

Press-fitting jig

Generally, as shown in the figure 1, a mandrel is used for the press-fitting. However use of a guide ring facilitates easier press-fitting. Use of a guide ring prevents damage of a bushing at the time of press-fitting. The dimension of a guide ring should be calculated from the table below.

Inner diameter of the guide ring should be the size so that the bushing can be inserted by hands. Length of the guide ring should be more than one-third of the bushing, or if possible, it should be the same length as the bushing.

The dimension of mandrel should be calculated from table below.

Dimension of bushing		Dimension of mandrel
I.D.	D_0	$\text{※1 } d_0 = D_0 - (0.05 \text{ to } 0.10)$
O.D.	D_1	$\text{※2 } d_1 = D_1 - (0.20 \text{ to } 0.30)$
Length	L	$\ell \geq L$

※1 Techmet B Standard Type (TCB) should be $D_0 - (0.25 \text{ to } 0.30)$.

※2 Use of flange bushings should be the same size of flange.

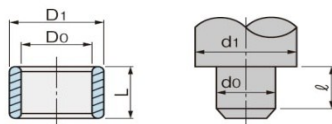


Figure 2

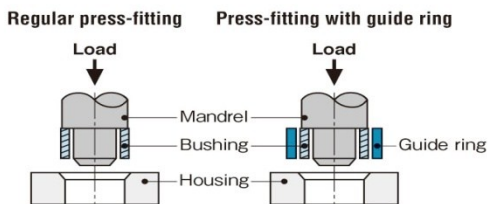


Figure 1

The dimension of guide ring should be calculated from table below.

Dimension of bushing	Guide ring I.D.	Guide ring O.D.
Up to $\phi 40$	$D_1 + (0.1 \text{ to } 0.3)$	$D_1 + (10 \text{ to } 15)$
$\phi 42 \text{ to } \phi 60$	$D_1 + (0.2 \text{ to } 0.5)$	
Over $\phi 65$	$D_1 + (0.5 \text{ to } 1.0)$	

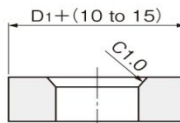


Figure 3

Inner diameter of the guide ring should be the size that bushing can be inserted by hands. The length of the guide ring should be more than one-third of the bushing, or if possible, it should be the same length as the bushing.

Housing chamfer

For the housing chamfer, either a round chamfer or a tapered chamfer is recommended. In case of a C-surface chamfer, (more than C1.0) make sure there is no burr. Smoother press-fitting is possible by applying small amount of grease or lubricant.

Press-fit force

Press-fit smoothly with hydraulic (pressure), pneumatic pressure, or a vice.

Avoid press-fit by use of impact such as use of a hammer.

It might induce damage of the bushing, or change the size of the inner diameter after press-fit.

Press-fit force is obtained by below formula.

$$F = (0.9 \text{ to } 1.2) \times 10^4 \cdot \frac{t \cdot L \cdot S}{D_1} \text{ [kg]}$$

t : thickness of the steel backing
L : length of the bushing
S : average interference
D1 : O.D. of bushing

● Thickness of the steel backing

Drymet LF Unit : mm

I.D. of bushing	t
Up to φ18	0.65
φ19 to φ25	1.15
φ26 to φ40	1.65
φ42 and over	2.15
LFCF	0.25

※LFCF is obtained by below formula.

$$F = (0.4 \text{ to } 0.8) \times 10^4 \cdot \frac{t \cdot L \cdot S}{D_1} \text{ [kg]}$$

Techmet B Unit : mm

I.D. of bushing	t
Up to φ18	0.50
φ20 to φ22	0.95

Toughmet / Toughmet D Unit : mm

I.D. of bushing	t
Up to φ18	0.70
φ19 to φ25	1.10
φ26 to φ40	1.60
φ42 and over	2.10

Techmet E Unit : mm

thickness of bearing	t
0.5	0.25
1.0	0.65

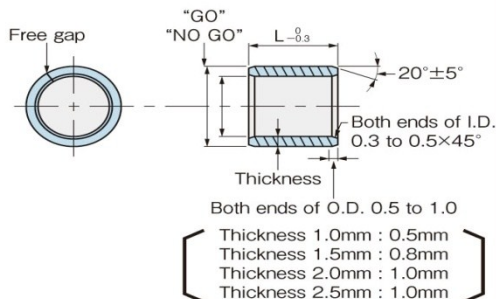
※Techmet E (t0.5) is obtained by below formula.

$$F = (0.4 \text{ to } 0.8) \times 10^4 \cdot \frac{t \cdot L \cdot S}{D_1} \text{ [kg]}$$

Dimensional inspection and chamfering on Oiles Drymet LF

Oiles Drymet LF is dimensionally inspected before shipping as indicated below:

1. The O.D. is checked by "GO" and "NO GO" ring gauges.
2. The I.D. mounted in the "GO" ring gauge is checked by plug gauges.
3. The "GO" ring gauge stands for the upper limit and the "NO GO" ring gauge the lower limit of the O.D. tolerance.
4. Chamfering: Both ends of the I.D. and O.D. are chamfered as shown in the right diagram except those with the ID of 9mm or less which are not chamfered.



LFF

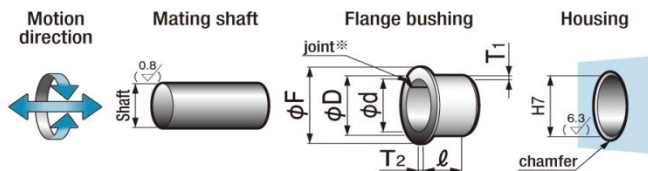
Oiles Drymet LF Flange Bushings



Specify Part No. by required I.D. and length.
(e.g.) I.D. is 20mm and length is 10mm.

LFF - 2010

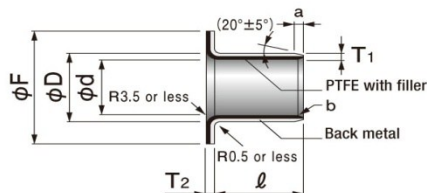
Parts No.



※The joint causes no influences upon rotation of the shaft. Be careful when press-fitting so that the joint is not at the position to which the maximum load is applied.

Shaft		Housing		I.D.	O.D.	Flange			Wall thickness		Length ℓ		Tolerance $-_{0.3}^{+0}$		
Size	Tolerance	Size	H7 Tolerance	ϕd	ϕD	ϕF	Tolerance	T ₂	Tolerance	T ₁	Tolerance	3	4	5	6
3	$-_{0.034}^{-0.025}$	4.6	$+_{0}^{+0.012}$	3	4.6	7	$-_{0.8}^{0}$	0.8	$-_{0.15}^{0}$	0.8	$-_{0.025}^{0}$	0303		0305	
4	$-_{0.037}^{-0.025}$	5.6	$+_{0}^{+0.012}$	4	5.6	9	$-_{0.8}^{0}$	0.8	$-_{0.15}^{0}$	0.8	$-_{0.025}^{0}$		0404		0406
5	$-_{0.037}^{-0.025}$	7	$+_{0}^{+0.015}$	5	7	10	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$		0504	0505	0506
6	$-_{0.037}^{-0.025}$	8	$+_{0}^{+0.015}$	6	8	12	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$			0605	0606
7	$-_{0.040}^{-0.025}$	9	$+_{0}^{+0.015}$	7	9	13	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$			0705	
8	$-_{0.040}^{-0.025}$	10	$+_{0}^{+0.015}$	8	10	15	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				0806
9	$-_{0.040}^{-0.025}$	11	$+_{0}^{+0.018}$	9	11	16	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				
10	$-_{0.040}^{-0.025}$	12	$+_{0}^{+0.018}$	10	12	18	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				1006
12	$-_{0.043}^{-0.025}$	14	$+_{0}^{+0.018}$	12	14	20	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				1206
13	$-_{0.043}^{-0.025}$	15	$+_{0}^{+0.018}$	13	15	21	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				
14	$-_{0.043}^{-0.025}$	16	$+_{0}^{+0.018}$	14	16	22	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				
15	$-_{0.043}^{-0.025}$	17	$+_{0}^{+0.018}$	15	17	23	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				
16	$-_{0.043}^{-0.025}$	18	$+_{0}^{+0.018}$	16	18	24	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				
18	$-_{0.043}^{-0.025}$	20	$+_{0}^{+0.021}$	18	20	26	$-_{0.8}^{0}$	1.0	$-_{0.15}^{0}$	1.0	$-_{0.025}^{0}$				
20	$-_{0.046}^{-0.025}$	23	$+_{0}^{+0.021}$	20	23	31	$-_{0.8}^{0}$	1.5	$-_{0.15}^{0}$	1.5	$-_{0.030}^{0}$				
22	$-_{0.046}^{-0.025}$	25	$+_{0}^{+0.021}$	22	25	33	$-_{0.8}^{0}$	1.5	$-_{0.15}^{0}$	1.5	$-_{0.030}^{0}$				
24	$-_{0.046}^{-0.025}$	27	$+_{0}^{+0.021}$	24	27	35	$-_{0.8}^{0}$	1.5	$-_{0.15}^{0}$	1.5	$-_{0.030}^{0}$				
25	$-_{0.046}^{-0.025}$	28	$+_{0}^{+0.021}$	25	28	36	$-_{0.8}^{0}$	1.5	$-_{0.15}^{0}$	1.5	$-_{0.030}^{0}$				
26	$-_{0.046}^{-0.025}$	30	$+_{0}^{+0.021}$	26	30	38	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
28	$-_{0.046}^{-0.025}$	32	$+_{0}^{+0.025}$	28	32	40	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
30	$-_{0.046}^{-0.025}$	34	$+_{0}^{+0.025}$	30	34	42	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
31	$-_{0.050}^{-0.025}$	35	$+_{0}^{+0.025}$	31	35	45	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
32	$-_{0.050}^{-0.025}$	36	$+_{0}^{+0.025}$	32	36	46	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
35	$-_{0.050}^{-0.025}$	39	$+_{0}^{+0.025}$	35	39	49	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
38	$-_{0.050}^{-0.025}$	42	$+_{0}^{+0.025}$	38	42	52	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
40	$-_{0.050}^{-0.025}$	44	$+_{0}^{+0.025}$	40	44	54	$-_{0.8}^{0}$	2.0	$-_{0.15}^{0}$	2.0	$-_{0.030}^{0}$				
45	$-_{0.050}^{-0.025}$	50	$+_{0}^{+0.025}$	45	50	60	$-_{0.8}^{0}$	2.5	$-_{0.15}^{0}$	2.5	$-_{0.040}^{0}$				
50	$-_{0.050}^{-0.025}$	55	$+_{0}^{+0.030}$	50	55	65	$-_{0.8}^{0}$	2.5	$-_{0.15}^{0}$	2.5	$-_{0.040}^{0}$				
55	$-_{0.055}^{-0.025}$	60	$+_{0}^{+0.030}$	55	60	70	$-_{0.8}^{0}$	2.5	$-_{0.15}^{0}$	2.5	$-_{0.040}^{0}$				
60	$-_{0.055}^{-0.025}$	65	$+_{0}^{+0.030}$	60	65	75	$-_{0.8}^{0}$	2.5	$-_{0.15}^{0}$	2.5	$-_{0.040}^{0}$				

※The I.D. tolerance after press fitting is for reference only.



a: O.D. chamfering for the bushing I.D. of $\phi 10$ or more

T1	1.0	1.5	2.0	2.5
a	0.5	0.8	1.0	1.0

(mm)

b: I.D. chamfering for the bushing I.D. of $\phi 10$ or more

T1	1.0	1.5	2.0	2.5
b	C0.3	C0.5	C0.5	C0.5

(mm)

※ Chamfering of inner or outer diameters less than $\phi 10$ mm is done only to remove burrs.

Length ℓ Tolerance $^{+0}_{-0.3}$											I.D. tolerance after press fitting (reference)	I.D. ϕd
7	8	10	12	15	20	25	30	40	50	60		
											$+0.062$ 0	3
											$+0.062$ 0	4
											$+0.065$ 0	5
0607	0608	0610									$+0.065$ 0	6
0707		0710	0712								$+0.065$ 0	7
	0808	0810	0812								$+0.065$ 0	8
		0910									$+0.068$ 0	9
1007	1008	1010	1012	1015							$+0.068$ 0	10
1207	1208	1210	1212	1215	1220						$+0.068$ 0	12
		1310		1315							$+0.068$ 0	13
		1410	1412	1415	1420						$+0.068$ 0	14
		1510	1512	1515	1520	1525					$+0.068$ 0	15
		1610	1612	1615	1620	1625					$+0.068$ 0	16
		1810	1812	1815	1820	1825					$+0.071$ 0	18
		2010	2012	2015	2020	2025	2030				$+0.081$ 0	20
		2210	2212	2215	2220	2225					$+0.081$ 0	22
				2415	2420	2425	2430				$+0.081$ 0	24
		2510	2512	2515	2520	2525	2530				$+0.081$ 0	25
				2615	2620						$+0.081$ 0	26
			2812	2815	2820		2830				$+0.085$ 0	28
			3012	3015	3020	3025	3030	3040			$+0.085$ 0	30
						3125					$+0.085$ 0	31
					3220	3225	3230				$+0.085$ 0	32
			3512		3520	3525	3530	3540	3550		$+0.085$ 0	35
					3820		3830	3840			$+0.085$ 0	38
			4012		4020	4025	4030	4040	4050		$+0.085$ 0	40
					4520	4525	4530	4540	4550		$+0.105$ 0	45
					5020		5030	5040		5060	$+0.110$ 0	50
							5530	5540		5560	$+0.110$ 0	55
							6030	6040		6060	$+0.110$ 0	60