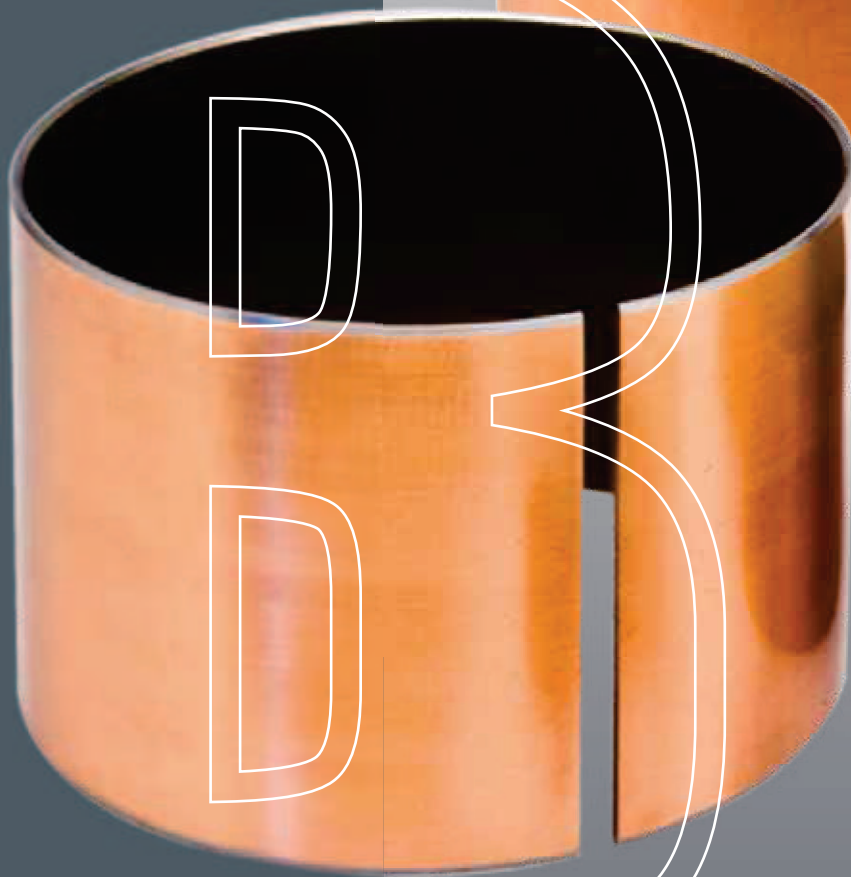
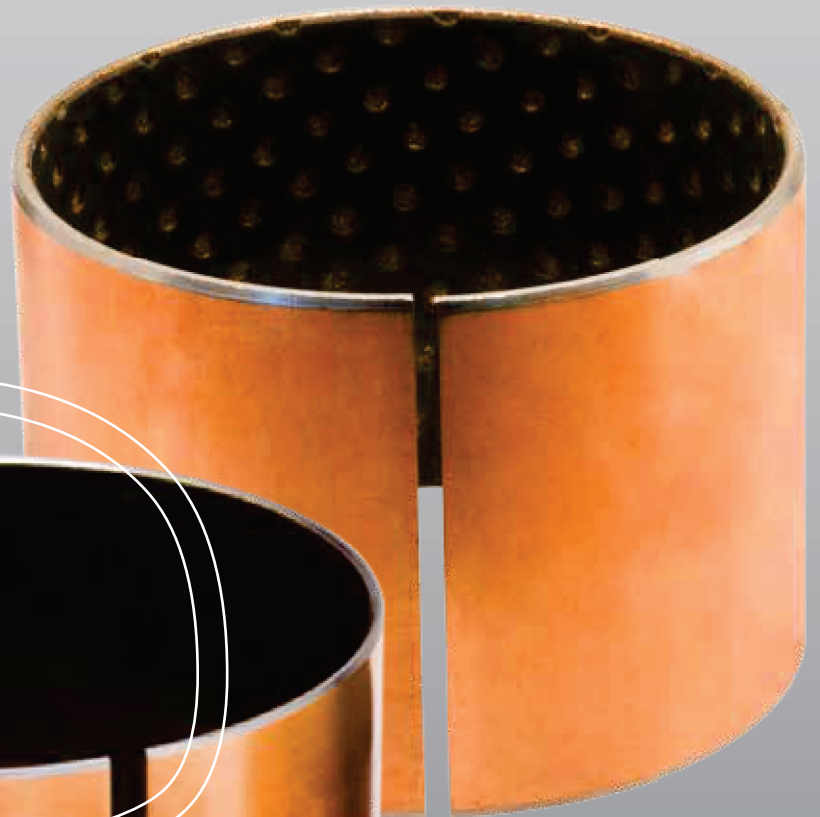




MBI



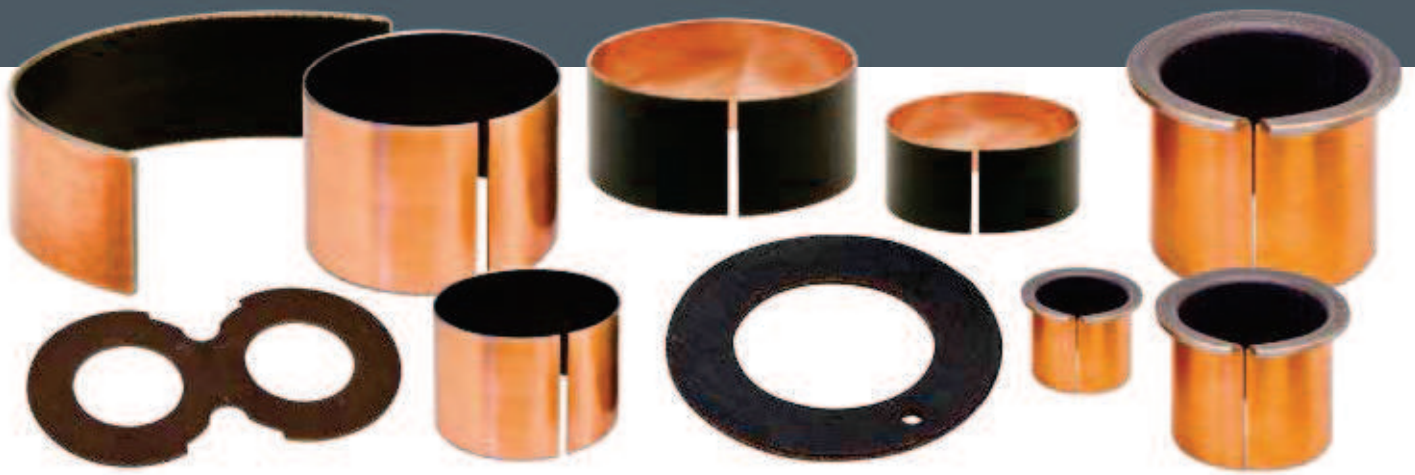
METAL BUSHINGS ITALIA



BUSHINGS

**Self-lubricating
and relubricable bushings
Technical catalogue**





PB e PBF

The **PBF** is a new product without lead and together with **PB**, anticipates times and demands of costumers: it is a dry bearing made in agreement with modern production concept, free from pollutants and lead.

The increasing market competition for high-performance products, imposes continuous research to obtain structural, technical and mechanical improvements and hence to optimize the quality of finished products. The technological evolution of bearings and their applications allowed the development of new products: Oil and grease lubricated bearings, bearings coated by plastic material, and plain sliding bearings with self-lubricating compounds.

Using these materials, we produce bearings which do not require any lubrication.

APPLICATION FIELDS

Parts of motor cars and heavy vehicles
(shock absorbers, fluttering parts)

Hydraulic parts
(hydraulic cylinders, gear pumps, vane pumps)

Electrical applications
(washing machines, electrical engines, electrical appliances)

Machinery constructions
(bull-dozer, buckets, etc.)

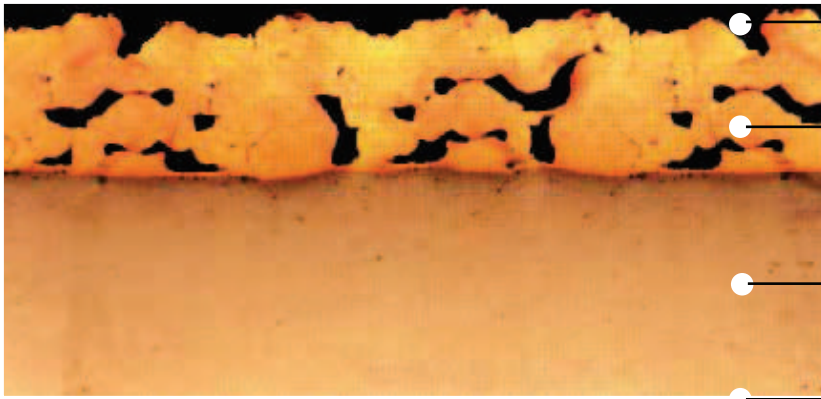
Agricultural Machinery
(tractors, etc.)

PB e PBF value and coefficient of friction

| Speed V (m/s) | Specific load P (kg/cm ²) | Coefficient of friction γ |
|-------------------|---|-------------------------------------|
| up to 0,001 | 3500 ... 1400 | 0,025 |
| < 0,005 | 1400 ... 600 | 0,04 ... 0,07 |
| > 0,005 < 0,05 | 600 ... 100 | 0,07 ... 0,1 |
| > 0,05 < 0,5 | 100 ... 10 | 0,1 ... 0,15 |
| > 0,5 < 2 | < 10 | 0,15 ... 0,25 |

BEARING STRUCTURAL SECTION

Polytetrafluoride of ethylene (PTFE) and (PPS) polyphenylsulphide



Porous bronze layer

Steel strip

External protection treatment

Self-lubricating bushing composition

It consists of a processed steel strip externally protected by a few micron of coppering or tinning.

On this steel strip a porous bronze layer is sintered and the following elements are fixed:

- The PTFE (polytetrafluoride of ethylene) a plastic material with an extremely low coefficient of friction.
- The PPS (polyphenylsulphide) a polymer which gives to the bearing a high resistance to the specific pressure and wear.

FEATURES

1° - the low coefficient of friction, without stick-slip, allows to use the bearing without any kind of lubrication, increasing the duration.

2° - the steel strip allows to quickly remove the heat created in the working area, limiting the structural heat-expansions within extremely low rates. The external protection (copper or tin) screens from oxidation and corrosion, keeps restrained masses and sizes, and makes this product perfect for a solid and adaptable planning.

3° - It is suitable for loads and high impacts, rotating, oscillating and scrolling movements and prevents noise and vibrations.

4° - PPS and PTFE have the highest temperature resistance rate among the renowned resins and allow the bearing to work in different conditions and temperatures.

5° - Low cost solution and easy to assemble.

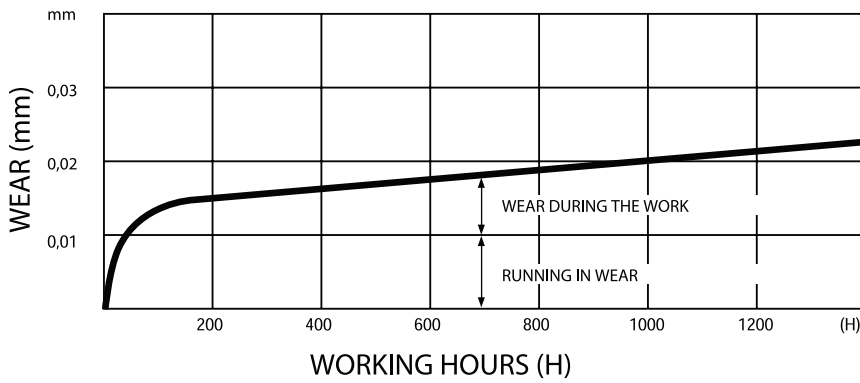
6° - the self-lubricating bearing is inert to most of gas and chemical solvents and it does not accumulate static electricity



PV Product and wear

It is possible to estimate the bearing duration calculating the PV Product, which is generally fixed between **600÷1000 Kg/cm² m/min** for a dry continuous working, but it can substantially increase in the presence of lubrication.

After a starting running in, the bearing shows a high lubricant power and makes the wear stable between **0,02÷0,05 mm**.



- SLIDING

V= (1, represent the sliding action in 1 minute)

- OSCILLATION

The oscillations angle can be converted in rpm with the following formula:

$$N = \frac{20^\circ C}{360}$$

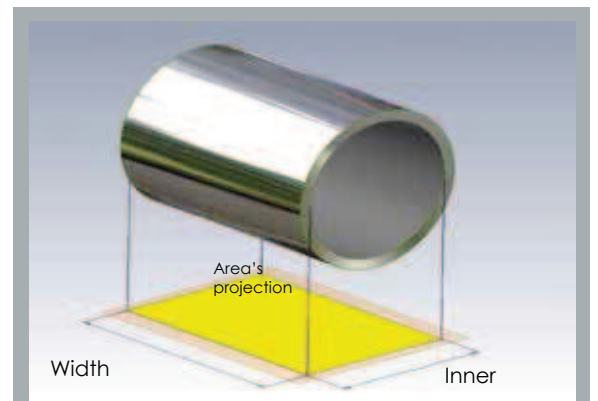
N = Expressed in rpm
 0° = Oscillating angle (theta)
 C = Cycles/min

The diagram shows the wear variation over time. During the starting running in a part of the superficial PTFE+PPS layer is moved to the scraping against-surface, creating a self-lubricating layer with lower coefficient of friction and less wear.

Examining the bearing after the running in, we can note that the copper surface is gradually exposed: it guarantees the correct working of the bearing. The calculations of the friction equations (confirmed by the tests)are the following:

- Continuous working (dynamics load) **170 Kg/cm²**
- Low speed rates working (static load) **1400 Kg/cm²**
- Standard Working **350 Kg/cm²**
- Resistance to pressure **3500 Kg/cm²**
- Working temperature **- 150 + 240 °c**
- Coefficient of heat-expansion **(10⁻⁶/°c)**
- Parallel to the bushing surface **(11)**
- Perpendicular to the surface **(30)**
- Heat conduction **0,1 (cal/sec cm °c)**
- Friction coefficient **γ (chart pag. 1)**

Picture n° 1



BEARING

NB.: The calculation of the PV product is:

$$P = \frac{W \text{ (load)}}{\text{area projection (cm}^2\text{)}}$$

Area's projection = dxL (see pict 1)

V= Axle speed (m/min)

1. PV EQUATION (PV = Kg/cm² m/min)

ROTATION

$$V = \frac{\pi d N}{10^3}$$

$$P = \frac{10^2 W}{Ld}$$

$$PV = \frac{\pi W N}{10 L}$$

AXIAL THRUST WASHERS

$$V = \frac{\pi (d+D) N}{2 \times 10^3}$$

$$P = \frac{W}{\pi(D^2-d^2)} \times 400$$

$$PV = \frac{W N}{5 (D-d)}$$

- V= speed (m/min)
- π= Pi (3,14)
- d= axle diameter (mm)
- N= rotation speed (rpm)
- P= pressure (Kg/cm²)
- W= load (Kg)
- L= width (mm)
- D= outer diameter (mm)

2. 2. The equation of duration

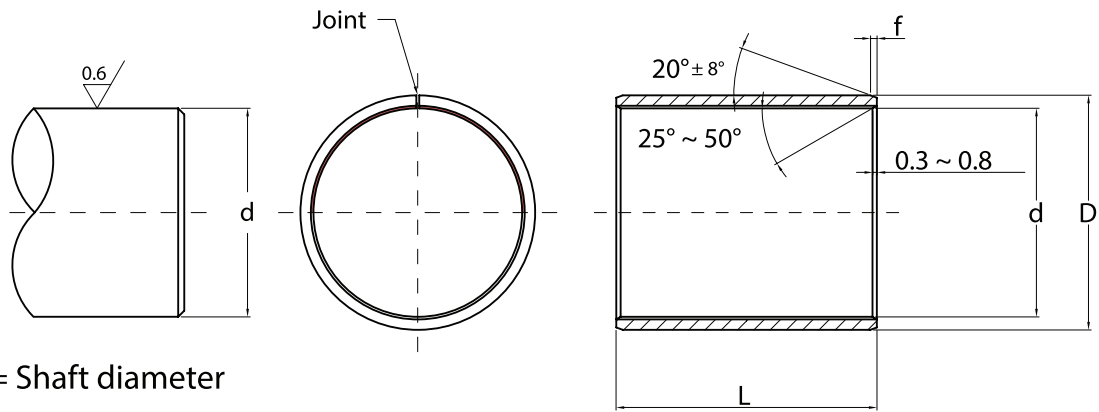
$$T = \frac{\gamma}{CPV}$$

- T= duration (H)
- γ= acceptable coefficient of friction (see chart pag. 1)
- P= pressure (Kg/cm²)
- V= speed (m.min)
- C= coeff. (see table)

The bushing life time can be calculated by the acceptable wear depth in mm and the coefficient C as indicated above.

The equation of duration should be considered only in theory, because it doesn't consider the differences between rotations and sliding motion neither the speed effects, nor the load and the piece roughness surface or other construction.

| Lubrication's conditions | coefficient: C |
|--------------------------|-----------------------------|
| Dry | 1 X 10 ⁻⁵ |
| Little lubrication | 1 X 10 ⁻⁷ |
| Grease lubrication | 1 X 10 ⁻⁸ |
| Oil lubrication | 1 X 10 ^{-11 ~ -13} |

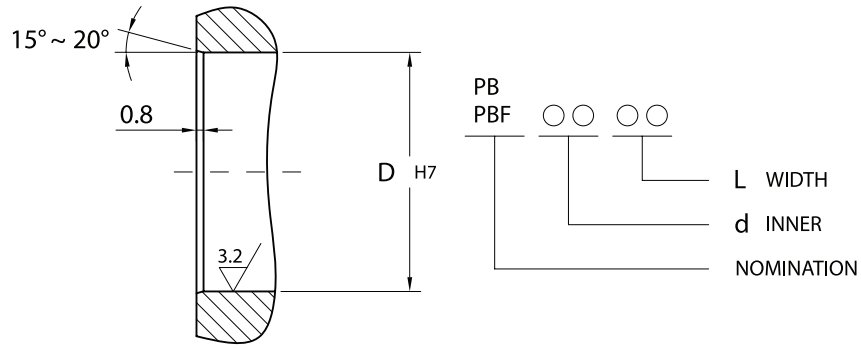


d = Shaft diameter

* diameter of 3 and 4 mm are available with 0,75 thickness on request

Standard cylindrical bushing sizes (available also in inches, on request)

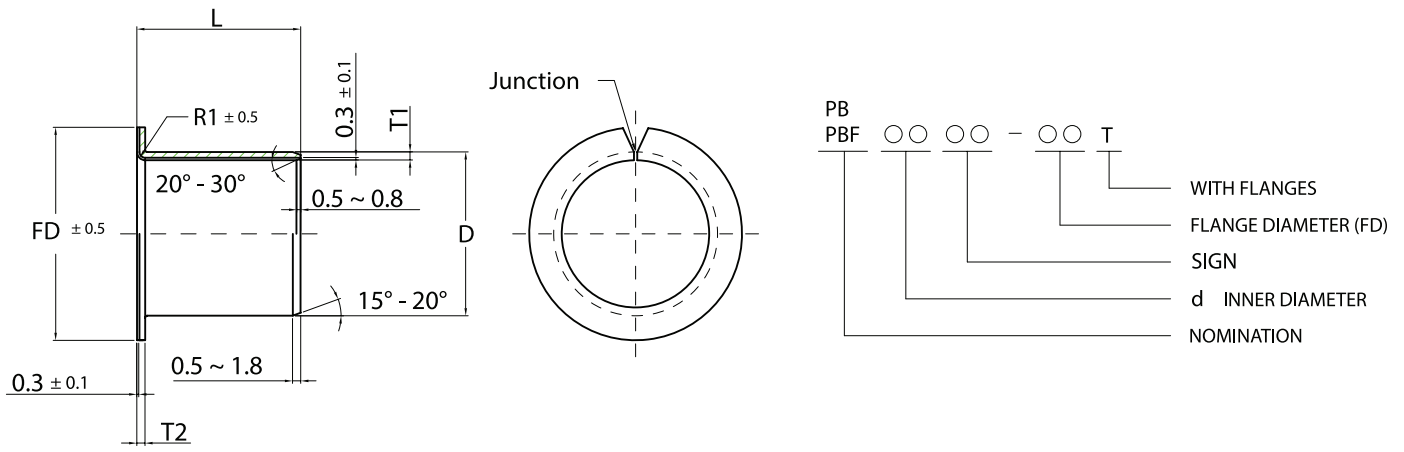
| d | D | d SHAFT (mm) | D HOUSING (mm) | WIDTH L (mm) ⁰ - 0.4 | | | | | | | | | | | | | | | | | f mm. | | | | |
|----|----|---|--|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|----|----|----|----|----------|-----|-----|--|-----|
| | | | | 4 | 5 | 6 | 8 | 10 | 12 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | | 100 | 115 | | |
| 3* | 5 | 3 $\begin{smallmatrix} -0.025 \\ -0.037 \end{smallmatrix}$ | 5 (H7) $\begin{smallmatrix} +0.010 \\ -0 \end{smallmatrix}$ | 0304 | 0305 | 0306 | | | | | | | | | | | | | | | | | | | |
| 4* | 6 | 4 $\begin{smallmatrix} -0.025 \\ -0.040 \end{smallmatrix}$ | 6 (H7) $\begin{smallmatrix} +0.012 \\ -0 \end{smallmatrix}$ | 0404 | | 0406 | 0408 | | | | | | | | | | | | | | | | | | |
| 5 | 7 | 5 " | 7 (H7) $\begin{smallmatrix} +0.015 \\ -0 \end{smallmatrix}$ | 0504 | 0505 | 0506 | 0508 | | | | | | | | | | | | | | | | | | |
| 6 | 8 | 6 " | 8 (H7) | | | 0606 | 0608 | 0610 | | | | | | | | | | | | | | | | | |
| 7 | 9 | 7 $\begin{smallmatrix} -0.025 \\ -0.040 \end{smallmatrix}$ | 9 (H7) | | | | | 0710 | 0712 | | | | | | | | | | | | | | | | |
| 8 | 10 | 8 " | 10 (H7) " | | | 0806 | 0808 | 0810 | 0812 | | 0820 | | | | | | | | | | | | | | |
| 9 | 11 | 9 " | 11 (H7) " | | | | | 0910 | | | | | | | | | | | | | | | | | |
| 10 | 12 | 10 " | 12 (H7) $\begin{smallmatrix} +0.018 \\ -0 \end{smallmatrix}$ | | | 1006 | 1008 | 1010 | 1012 | 1015 | 1020 | | | | | | | | | | | | | | 0.5 |
| 12 | 14 | 12 $\begin{smallmatrix} -0.025 \\ -0.043 \end{smallmatrix}$ | 14 (H7) " | | | 1206 | 1208 | 1210 | 1212 | 1215 | 1220 | 1225 | | | | | | | | | | | | | |
| 13 | 15 | 13 " | 15 (H7) " | | | | | 1310 | | | 1320 | | | | | | | | | | | | | | |
| 14 | 16 | 14 " | 16 (H7) " | | | | | 1410 | 1412 | 1415 | 1420 | 1425 | | | | | | | | | | | | | |
| 15 | 17 | 15 " | 17 (H7) " | | | | | 1510 | 1512 | 1515 | 1520 | 1525 | | | | | | | | | | | | | |
| 16 | 18 | 16 " | 18 (H7) " | | | | | 1610 | 1612 | 1615 | 1620 | 1625 | | | | | | | | | | | | | |
| 17 | 19 | 17 " | 19 (H7) " | | | | | 1710 | 1712 | 1715 | 1720 | | | | | | | | | | | | | | |
| 18 | 20 | 18 " | 20 (H7) $\begin{smallmatrix} +0.021 \\ -0 \end{smallmatrix}$ | | | | | 1810 | 1812 | 1815 | 1820 | 1825 | | | | | | | | | | | | | |
| 20 | 23 | 20 $\begin{smallmatrix} -0.025 \\ -0.046 \end{smallmatrix}$ | 23 (H7) " | | | | | 2010 | 2012 | 2015 | 2020 | 2025 | 2030 | | | | | | | | | | | | |
| 22 | 25 | 22 " | 25 (H7) " | | | | | 2210 | 2212 | 2215 | 2220 | 2225 | 2230 | | | | | | | | | | | | 0.8 |
| 24 | 27 | 24 " | 27 (H7) " | | | | | | | 2415 | 2420 | 2425 | 2430 | | | | | | | | | | | | |
| 25 | 28 | 25 " | 28 (H7) " | | | | | 2510 | 2512 | 2515 | 2520 | 2525 | 2530 | | 2550 | | | | | | | | | | |
| 28 | 32 | 28 " | 32 (H7) $\begin{smallmatrix} +0.025 \\ -0 \end{smallmatrix}$ | | | | | | | 2815 | 2820 | 2825 | 2830 | 2840 | | | | | | | | | | | |
| 30 | 34 | 30 " | 34 (H7) " | | | | | | 3012 | 3015 | 3020 | 3025 | 3030 | 3040 | | | | | | | | | | | |
| 32 | 36 | 32 $\begin{smallmatrix} -0.025 \\ -0.050 \end{smallmatrix}$ | 36 (H7) " | | | | | | | | 3220 | | 3230 | 3240 | | | | | | | | | | | |
| 35 | 39 | 35 " | 39 (H7) " | | | | | | | 3512 | 3515 | 3520 | 3525 | 3530 | 3540 | 3550 | | | | | | | | | 1 |
| 38 | 42 | 38 " | 42 (H7) " | | | | | | | | 3815 | 3820 | | 3830 | 3840 | | | | | | | | | | |
| 40 | 44 | 40 " | 44 (H7) " | | | | | | | 4012 | | 4020 | 4025 | 4030 | 4040 | 4050 | | | | | | | | | |



D = Housing

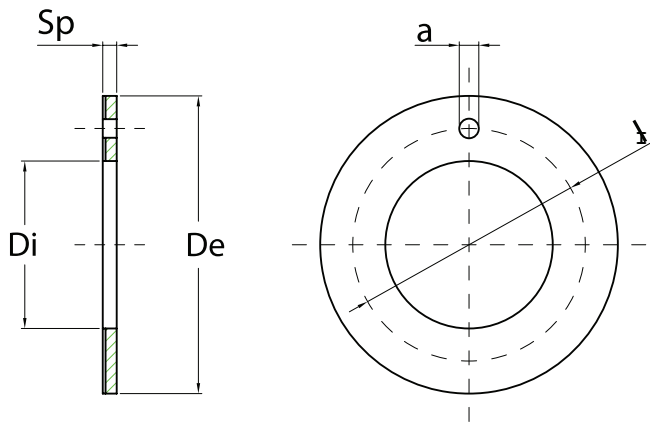
Chart of sizes (continues from page 4)

| d | D | SHAFT (mm) | HOUSING (mm) | WIDTH L (mm) ⁰ - 0.4 | | | | | | | | | | | | | | | | f mm. | | | | | | | | | |
|-----|-----|---|--|---------------------------------|---|---|---|----|----|----|----|----|------|------|------|------|------|------|------|-------|-------|-------|-------|------|-------|-----|--------|-----|--------|
| | | | | 4 | 5 | 6 | 8 | 10 | 12 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | | 95 | 100 | 115 | | | | | | |
| 45 | 50 | 45 ^{-0.025} / _{-0.037} | 50 (H7) ^{+0.025} / ₊₀ | | | | | | | | | | 4520 | 4525 | 4530 | 4540 | 4550 | | | | | | | | 1.2 | | | | |
| 50 | 55 | 50 " | 55 (H7) ^{+0.030} / ₋₀ | | | | | | | | | | 5020 | | 5030 | 5040 | 5050 | 5060 | | | | | | | | | | | |
| 55 | 60 | 55 ^{-0.025} / _{-0.055} | 60 (H7) " | | | | | | | | | | | | 5530 | 5540 | 5550 | 5560 | | | | | | | | | | | |
| 60 | 65 | 60 " | 65 (H7) " | | | | | | | | | | | | | 6030 | 6040 | 6050 | 6060 | 6070 | | | | | | | | | |
| 65 | 70 | 65 ^{+0.005} / _{-0.035} | 70 (H7) " | | | | | | | | | | | | | 6530 | 6540 | 6550 | 6560 | 6570 | | | | | | | | | |
| 70 | 75 | 70 " | 75 (H7) " | | | | | | | | | | | | | | 7040 | 7050 | 7060 | 7070 | 7080 | | | | | | | | |
| 75 | 80 | 75 " | 80 (H7) " | | | | | | | | | | | | | | 7530 | 7540 | 7550 | 7560 | | 7580 | | | | | | | |
| 80 | 85 | 80 " | 85 (H7) ^{+0.035} / ₋₀ | | | | | | | | | | | | | | | 8040 | | 8060 | | 8080 | | | 80100 | 1.4 | | | |
| 85 | 90 | 85 ^{+0.005} / _{-0.030} | 90 (H7) " | | | | | | | | | | | | | | | 8540 | | 8560 | | 8580 | | | 85100 | | | | |
| 90 | 95 | 90 " | 95 (H7) " | | | | | | | | | | | | | | | | 9040 | 9050 | 9060 | | | 9090 | 90100 | | | | |
| 95 | 100 | 95 " | 100 (H7) " | | | | | | | | | | | | | | | | | 9550 | 9560 | | | | | | 95100 | | |
| 100 | 105 | 100 " | 105 (H7) " | | | | | | | | | | | | | | | | | 10050 | 10060 | | | | | | 100115 | | |
| 105 | 110 | 105 " | 110 (H7) " | | | | | | | | | | | | | | | | | | 10560 | | | | | | 105115 | | |
| 110 | 115 | 110 " | 115 (H7) " | | | | | | | | | | | | | | | | | | 11060 | | | | | | 110115 | | |
| 120 | 125 | 120 " | 125 (H7) ^{+0.040} / ₋₀ | | | | | | | | | | | | | | | | | | | 12060 | | | | | 120100 | 1.6 | |
| 125 | 130 | 125 ^{+0.005} / _{-0.045} | 130 (H7) " | | | | | | | | | | | | | | | | | | | | | | | | 125100 | | 125115 |
| 130 | 135 | 130 " | 135 (H7) " | | | | | | | | | | | | | | | | | | | | 13060 | | | | 130100 | | |
| 140 | 145 | 140 " | 145 (H7) " | | | | | | | | | | | | | | | | | | | | 14060 | | | | 140100 | | |
| 150 | 155 | 150 " | 155 (H7) " | | | | | | | | | | | | | | | | | | | | 15050 | | 15080 | | 150100 | | |
| 160 | 165 | 160 " | 165 (H7) " | | | | | | | | | | | | | | | | | | | | | | | | 160100 | | |
| 180 | 185 | 180 " | 185 (H7) ^{+0.046} / ₋₀ | | | | | | | | | | | | | | | | | | | | | | | | 180100 | | |
| 200 | 205 | 200 ⁺⁰ / _{-0.071} | 205 (H7) " | | | | | | | | | | | | | | | | | | | | | | | | 200100 | | |
| 220 | 225 | 220 " | 225 (H7) " | | | | | | | | | | | | | | | | | | | | | | | | 220100 | | |
| 250 | 255 | 250 " | 255 (H7) ^{+0.050} / ₋₀ | | | | | | | | | | | | | | | | | | | | | | | | 250100 | | |
| 300 | 305 | 300 ⁺⁰ / _{-0.081} | 305 (H7) " | | | | | | | | | | | | | | | | | | | | | | | | 300100 | | |



Standard bearing sizes (with flanges)

| d | D | d AXEL (mm) | D HOUSING (mm) | Thickness | | FD diam. flange | "L" Bush total Width (mm) ± 0.25 | | | | | | | | | | | | | | | | | | | |
|----|----|------------------------|-------------------------|-------------------|------------------|-----------------------|----------------------------------|-----|--------------|--------------|--------------|--------------|-----|--------------|--------------|--------------|------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|
| | | | | T1 | T2 | | 4 | 5,5 | 7 | 7,5 | 8 | 9 | 9,5 | 11,5 | 12 | 16 | 16,5 | 17 | 21,5 | 26 | 32,5 | 42,5 | 52,5 | 62,5 | | |
| 6 | 8 | 6 -0.025 -0.037 | 8 (H7) +0.015 -0 | 1.0 0 -0.03 | 1.0 0 -0.2 | 12 | 0603 -12T | | 0606 -12T | | 0608 -12T | | | | | | | | | | | | | | | |
| 8 | 10 | 8 " | 10 " | | | | | 15 | 0804 -15T | | 0806 -15T | | | 0808 -15T | | | | | | | | | | | | |
| 10 | 12 | 10 " | 12 (H7) +0.018 -0 | | | | | 18 | | 1006 -18T | | 1008 -18T | | | 1010 -18T | | | | 1015 -18T | | | | | | | |
| 12 | 14 | 12 -0.025 -0.043 | 14 " | | | | | 20 | | 1206 -20T | | 1208 -20T | | | 1210 -20T | | | | 1215 -20T | | | | | | | |
| 14 | 16 | 14 " | 16 " | | | | | 22 | | | | 1408 -22T | | | 1410 -22T | | | | 1415 -22T | | | | | | | |
| 15 | 17 | 15 " | 17 " | | | | | 23 | | | | 1508 -23T | | | 1510 -23T | | | | 1515 -23T | | | | | | | |
| 16 | 18 | 16 " | 18 " | | | | | 24 | | | | 1608 -24T | | | 1610 -24T | | | | 1615 -24T | | | | | | | |
| 18 | 20 | 18 " | 20 (H7) +0.021 -0 | | | | | 26 | | | | | | | 1810 -26T | | | | 1815 -26T | | | | | | | |
| 20 | 23 | 20 -0.025 -0.046 | 23 " | | | 1.5 0 -0.03 | 1.5 0 -0.2 | 31 | | | | | | | 2010 -31T | | | | 2015 -31T | | 2020 -31T | | | | | |
| 22 | 25 | 22 " | 25 " | | | | | 33 | | | | | | | 2210 -33T | | | 2215 -33T | | 2220 -33T | | | | | | |
| 25 | 28 | 25 " | 28 " | | | | | 36 | | | | | | | 2510 -36T | | | 2515 -36T | | 2520 -36T | | | | | | |
| 30 | 34 | 30 " | 34 " | 2.0 0 -0.03 | 2.0 0 -0.2 | 42 | | | | | | | | | 3015 -42T | | | | | 3025 -42T | | | | | | |
| 35 | 39 | 35 " | 39 " | | | | | 49 | | | | | | | | 3515 -49T | | | | | 3525 -49T | | | | | |
| 40 | 44 | 40 " | 44 " | | | | | 54 | | | | | | | | | | | | | 4025 -54T | | | | | |
| 45 | 50 | 45 " | 50 " | 2.5 0 -0.03 | 2.5 0 -0.3 | 60 | | | | | | | | | | | | | | | 4530 -60T | | | | | |
| 50 | 55 | 50 " | 55 (H7) +0.030 -0 | | | | | 65 | | | | | | | | | | | | | | 5030 -65T | | 5050 -65T | | |
| 60 | 65 | 60 " | 65 " | | | | | 75 | | | | | | | | | | | | | | | 6040 -75T | | 6060 -75T | |



Recommended housing
 From Di 12 to Di 42 mm 1
 From Di 48 to Di 52 mm 1.5

PB -
 PBF - TW ○ ○ M
 TYPE
 NOMINATION

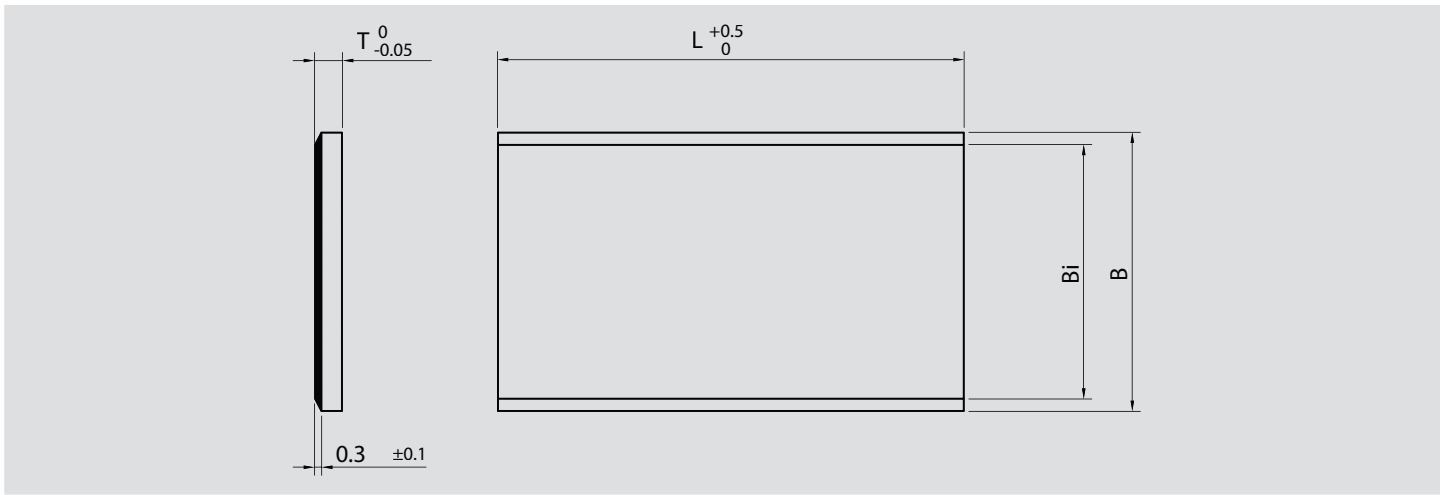
Standard THRUST WASHER sizes

| Nomination | Type | Di + 0,25 mm | De - 0,25 mm | Sp - 0,05 mm | a +0,2 mm | I ± 0,12 mm |
|------------|-------|-----------------|-----------------|-----------------|--------------|----------------|
| PB PBF | TW8M | 10 | 20 | 1,5 | 1,5 | 15 |
| PB PBF | TW10M | 12 | 24 | 1,5 | 1,5 | 18 |
| PB PBF | TW12M | 14 | 26 | 1,5 | 2 | 20 |
| PB PBF | TW14M | 16 | 30 | 1,5 | 2 | 23 |
| PB PBF | TW16M | 18 | 32 | 1,5 | 2 | 25 |
| PB PBF | TW18M | 20 | 36 | 1,5 | 3 | 28 |
| PB PBF | TW20M | 22 | 38 | 1,5 | 3 | 30 |
| PB PBF | TW22M | 24 | 42 | 1,5 | 3 | 33 |
| PB PBF | TW24M | 26 | 44 | 1,5 | 3 | 35 |
| PB PBF | TW25M | 28 | 48 | 1,5 | 4 | 38 |
| PB PBF | TW30M | 32 | 54 | 1,5 | 4 | 43 |
| PB PBF | TW35M | 38 | 62 | 1,5 | 4 | 50 |
| PB PBF | TW40M | 42 | 66 | 1,5 | 4 | 54 |
| PB PBF | TW45M | 48 | 74 | 2 | 4 | 61 |
| PB PBF | TW50M | 52 | 78 | 2 | 4 | 65 |
| PB PBF | TW60M | 62 | 90 | 2 | 4 | 76 |

Example:

PB - TW 16M

PBF - TW 16M



Strip Dimension

| Nomination | STRIP TYPE | SIZES | | | |
|------------|------------|-------|------|-------|------|
| | | T mm | B mm | B1 mm | L mm |
| PB PBF | 125 10 | 1,0 | 125 | 120 | 500 |
| PB PBF | 125 15 | 1,5 | 125 | 120 | 500 |
| PB PBF | 125 20 | 2,00 | 125 | 120 | 500 |
| PB PBF | 125 25 | 2,5 | 125 | 120 | 500 |
| PB PBF | 125 30 | 3,00 | 125 | 120 | 500 |
| PB PBF | 170 10 | 1,0 | 170 | 165 | 1000 |
| PB PBF | 170 15 | 1,5 | 170 | 165 | 1000 |
| PB PBF | 170 20 | 2,0 | 170 | 165 | 1000 |
| PB PBF | 170 25 | 2,5 | 170 | 165 | 1000 |

Example:

PB - 125 10

PBF - 125 10

BUSHING THICKNESS (mm)

1
1,5
2
2,5 until d 60 mm.
2,5 until d 65÷115
2,5 until d 120÷300

TOLERANCE (mm)

0 -0,02
0 -0,03
0 -0,03
0 -0,03
-0,01 -0,05
-0,035 -0,085

INTERNAL BUSHING DIAMETER AFTER ASSEMBLING

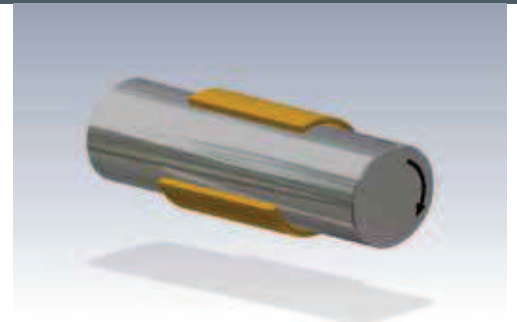
Min. inner \varnothing = min. housing \varnothing - 2 x max bushing thickness

max. inner \varnothing = max housing \varnothing - 2 x max. bushing thickness

ROTATION AND PV VALUE

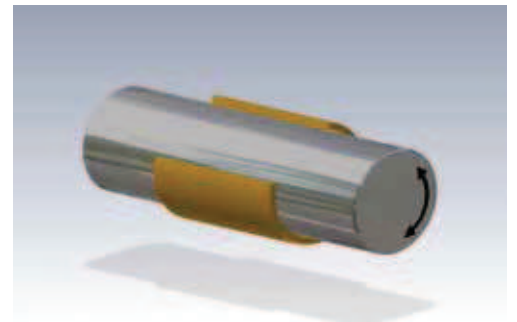
1. ONE-WAY ROTATION

The PV product is generally fixed between 600÷1000 Kg/cm² m/min.



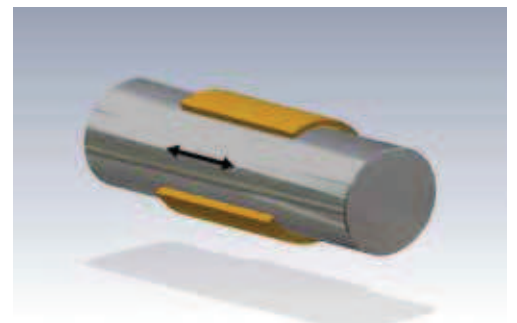
2. OSCILLATION:

In this case the PV product should be considered between 300÷500 Kg/cm² m/min



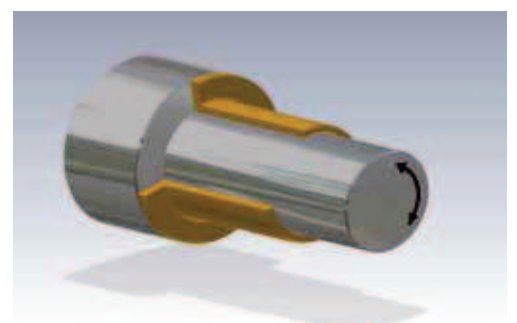
3. LINEAR INTERMITTENT MOTION:

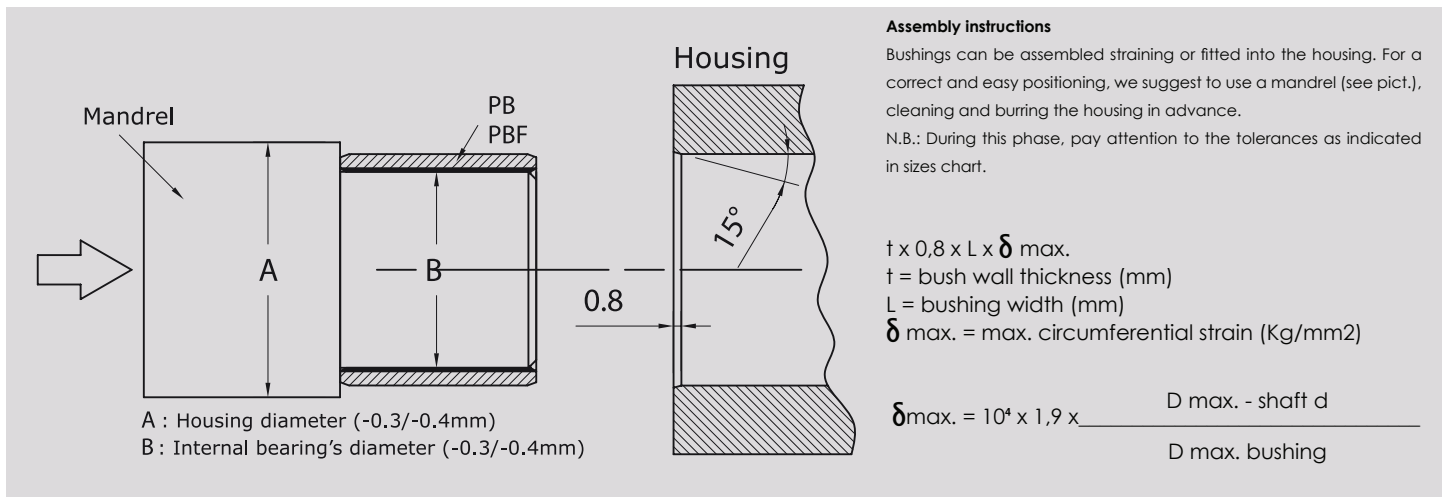
The PV Product should be considered between 300÷500 Kg/cm² m/min



4. ALTERNATIVE ROTATION:

In case of bushings with flanges, see point 1.





ASSEMBLING:

1) Recommended tolerances for shaft and housing bore

The bushing is suitable to be positioned according to the following parameters:

housing tolerance H7

shaft tolerance refer to the sizes chart

If different assembly rules must be followed, note that the clearance between axle and housing bore should be equally adapted to H7 value (housing bore) and h7 (shaft).

2) To calculate the working clearance, three factors must be considered:

- housing dimension
- bushing thickness
- shaft dimension

minimum clearance = (housing bore diameter - max. bushing thickness x 2) - max shaft tolerance value

maximum clearance = (max. housing diameter tolerance - min. bearing thickness size x 2) - min. shaft tolerance value.

In presence of lubrication, 0,33 mm (or more) is suggested.

In presence of temperatures of 180° or more, the following coefficients of heat-expansion should be added to normal shaft tolerance values:

Heat-expansion = shaft heat-expansion coefficient (alpha) x shaft (d) x (room temp. - working temp.)

N.B.: The coefficient (alpha) of heat-expansion is usually $1,2 \times 10^{-5}$

3) Shaft execution

a) For general applications the following materials can be used:

- carbon steel (C35)
- nichel-cromium steel (35NiCr9)
- nichel-cromium-molybdenum steel (30NiCrMo8)
- chrome steel

Flexible or nonferrous metals are not suggested because they limit the bearing life (acceptable but not optimum values). Those materials can be used after a plating or a heat process in order to increase resistance and also performance.

For immersed application, martensitic or austenitic steel is suggested.

b) Acceptable Roughness

The shaft superficial roughness is extremely important for the bushing life time. If the roughness is elevated, it's possible that the self-lubricating surface can be irreparably damaged. For high bushing performances a good quality of shaft surface is recommended. The suggested roughness is **0,6±0,8 µm**.

MBI

METAL BUSHINGS ITALIA

M.B.I. metal bushings italia s.p.a.

Via Brescia, 65 - 36040

Torri di Quartesolo (VI) IT

Tel. 0039.0444.218000

Fax 0039.0444.218080

www.metalbushings.it

mbi@metalbushings.it

