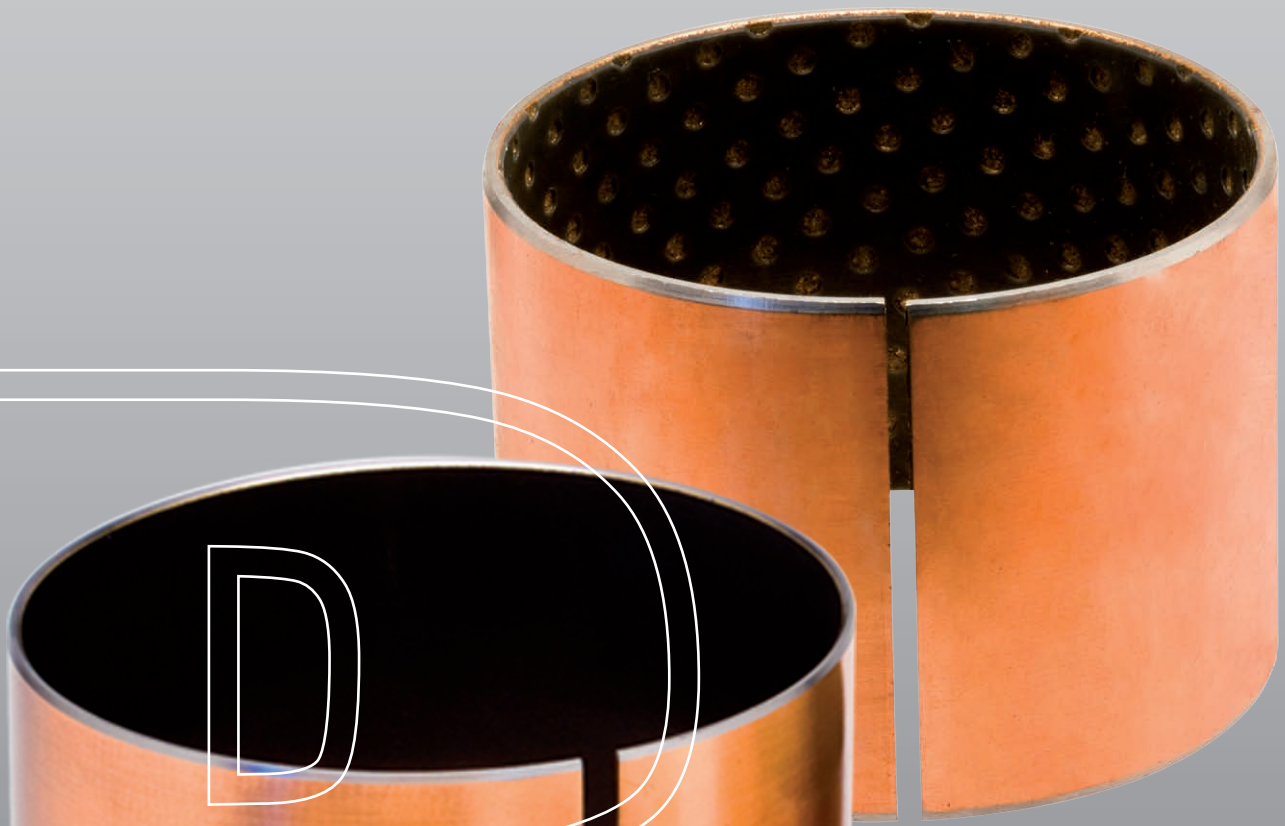
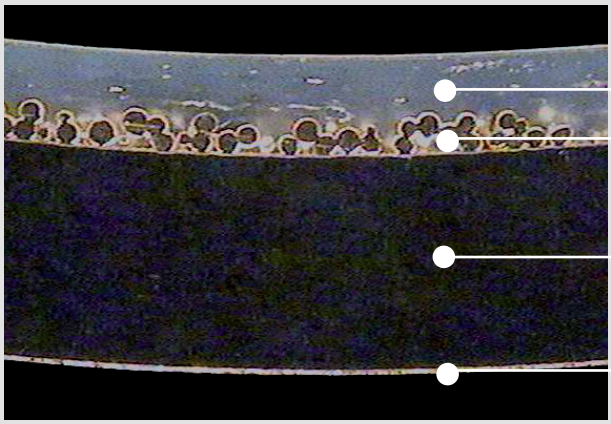
METAL BUSHINGS ITALIA



BUSHINGS

Relubricable bushings catalogue



1. Polyacetal resin (POM)

2. Porous bronze

3. Backing Steel

4. Copper or Tin coating

FEATURES

The **RL** series bushing requires minimal maintenance and consists of three layers: steel, porous bronze, and polyacetal resin. Thanks to cavities within the polyacetal resin that serve as actual grease reserves, the material is, within limits, insensitive to misalignment defects and consequent edge overload phenomena, while also ensuring heat dissipation from the bushing's working surface.

The use of re-lubricate RL bushings is suitable when:

- Loads are high, oscillating, and rotating
- Operation is intermittent
- A low coefficient of friction and limited wear are required
- Maintenance interventions need to be minimized

NOTE: Pre-lubrication of the component is required before operation.

REFERENCE STANDARDS

The wrapped bushings are sized according to **ISO 3547** or **DIN 1494** standards. The strips used in bushings with pre-finished internal diameter after assembly have the following properties:

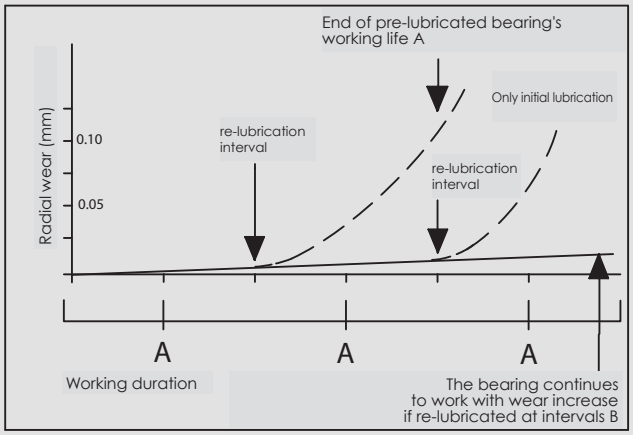
Wall Thickness [mm]	Tolerance
1	-0.020 / -0.045
1.5	-0.025 / -0.055
2	-0.030 / -0.065
2.5 fino a Ø 45 ÷ 80	-0.040 / -0.085



INTERNAL DIAMETER OF BUSHINGS AFTER ASSEMBLY

- min. internal ø = min. housing ø - 2 x max. bushing thickness
- max. internal ø = max. housing ø - 2 x min. bushing thickness

Fig 1



Periodic re-greasing ensures the bushing a long life with minimal wear:
0.025 mm with specific load < 100 N/mm².
When the lubricating properties of the grease diminish (zone A), it is necessary to replenish the lubricant to allow the sliding bearing to operate with low wear increment.

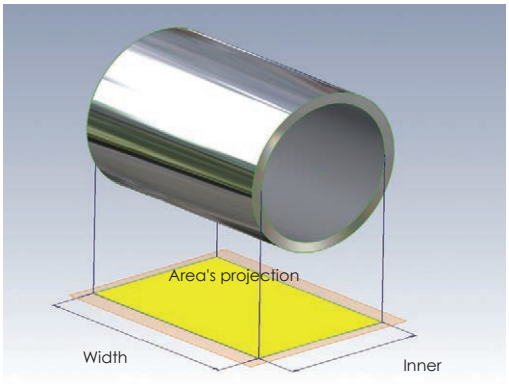
PV PRODUCT

In re-lubricatable bearings, the pressure (P) * velocity (V) product, also known as PV value, is a fundamental parameter for determining the load capacity and lifespan of the sliding bearing. The PV value is often expressed in units such as N/mm² * m/min, indicating the severity of working conditions for a bushing. A higher PV value indicates that the bushing is subjected to high loads and speeds, which can lead to increased wear and shorter lifespan.

Here are the equations for calculating pressure, velocity, and PV in cylindrical bushings or thrust washers:

Cylindrical Bushing	**Washer**
$V = \frac{\pi d N}{10^3}$	$V = \frac{\pi (d+D) N}{2X10^3}$
$P = \frac{W}{Ld}$	$P = \frac{4 W}{\pi (D^2-d^2)}$
$PV = \frac{\pi W N}{10^3 L}$	$PV = \frac{4W N}{10^3 (D^2-d^2)}$

V= Speed (m/s)
π= Pi (3,14)
N= rot. speed (rpm)
P= pressure (N/mm2)
W= Load (N)
L= Width (mm)
D= Outer diameter (mm)
d= Inner diameter (mm)



Area projection

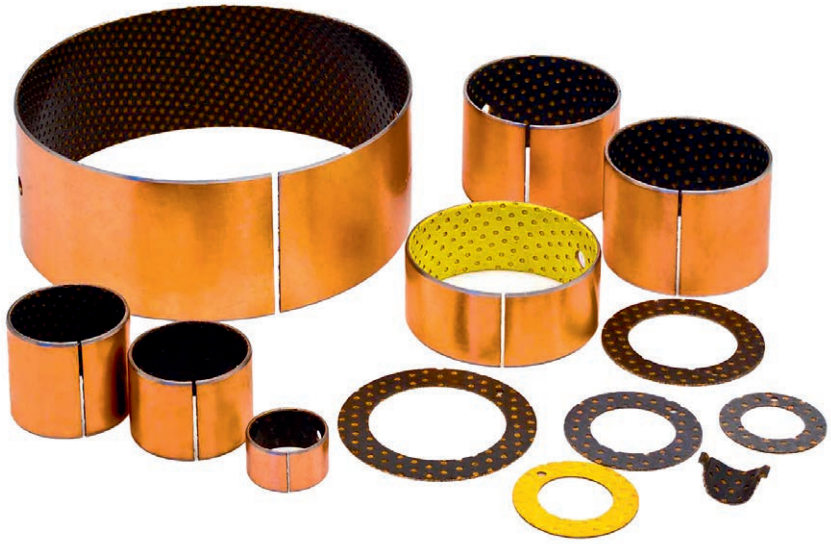
$P = \frac{W\ (Load)}{Area\ Projection\ (mm^2)}$

Area Projection
= dxL (see drawing)

V= Shaft speed (m/s)

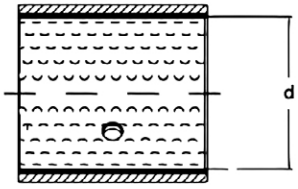
TECHNICAL DATASHEET OF RL MATERIAL

Continuous service (dynamic load)	**140 N/mm²**
Low-speed service (static load)	**250 N/mm²**
Oscillations	**60 N/mm²**
Max PV in dry conditions (Continuous application)	**2,8 N/mm²*m/s**
Max PV in oil lubrication	**22 N/mm²*m/s**
Limiting velocity (with grease)	**2 m/s**
Limiting velocity (with oil lubrication)	**2,5 m/s**
Operating temperature	**- 40 + 110 °C**
Coefficient of friction	**ɣ 0,05 – 0,20**
Coefficient of thermal expansion	**α 11 * 10-6°C**

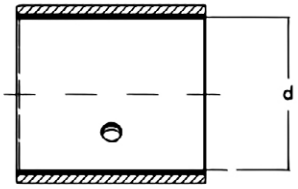


TOLERANCE AND WORKABILITY OF THE BORE

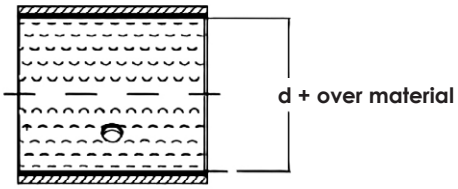
The supplied bearing is ready for installation. The following configurations are also available:



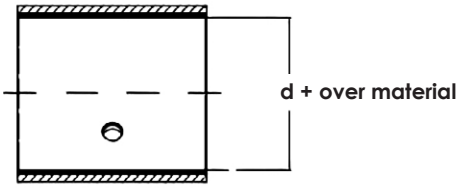
A) RL: Pre-Finished with lubricating pockets (Standard)



B) RL-S: Pre-Finished Smooth



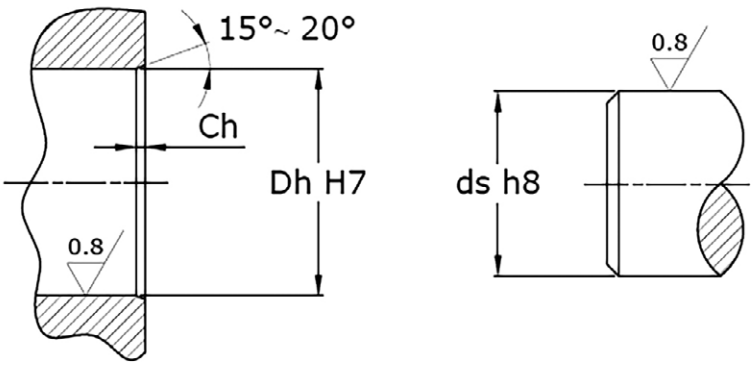
C) RL-T: Reworkable with lubricating pockets

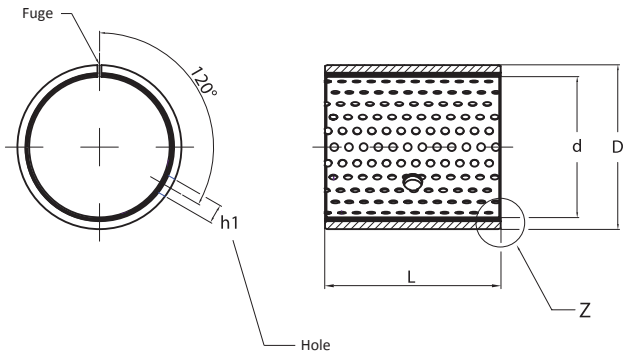


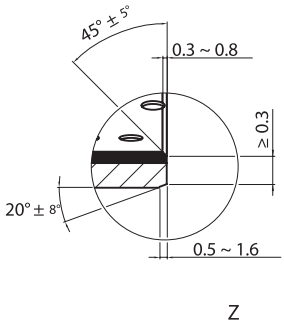
D) RL-ST: Reworkable Smooth

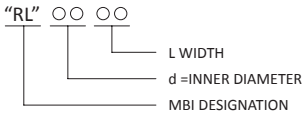
RECOMMENDED MATCHES

Housing (H): H7
Shaft (S): h8
Surface Roughness (Ra): < 0.8 µm



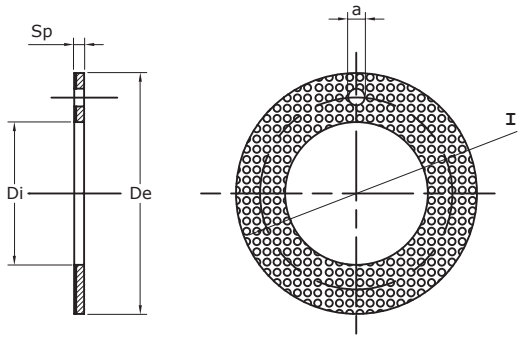






RL Relubricable cylindrical bushings sizes

d	D	d Shaft (mm)	D Housing H7 (mm)	Width L (mm) $^{+0}_{-0,4}$																	
				4	5	6	8	10	12	15	20	25	30	40	50	60	70	80	90	95	100	115
10	12	10 – $^{0}_{0,022}$	12 + $^{0}_{0,018}$				1008	1010	1012	1015	1020											
12	14	12 – $^{0}_{0,027}$	14 + $^{0}_{0,018}$				1208	1210	1212	1215	1220	1225										
14	16	14 – $^{0}_{0,027}$	16 + $^{0}_{0,018}$					1410	1412	1415	1420	1425										
15	17	15 – $^{0}_{0,027}$	17 + $^{0}_{0,018}$					1510	1512	1515	1520	1525										
16	18	16 – $^{0}_{0,027}$	18 + $^{0}_{0,018}$					1610	1612	1615	1620	1625										
18	20	18 – $^{0}_{0,027}$	20 + $^{0}_{0,018}$					1810	1812	1815	1820	1825	1830									
20	23	20 – $^{0}_{0,033}$	23 + $^{0}_{0,021}$					2010	2012	2015	2020	2025	2030	2040								
22	25	22 – $^{0}_{0,033}$	25 + $^{0}_{0,021}$					2210	2212	2215	2220	2225	2230									
24	27	24 – $^{0}_{0,033}$	27 + $^{0}_{0,021}$							2415			2430									
25	28	25 – $^{0}_{0,033}$	28 + $^{0}_{0,021}$					2510		2515	2520	2525	2530	2540	2550							
30	34	30 – $^{0}_{0,033}$	34 + $^{0}_{0,025}$							3015	3020	3025	3030	3040	3050							
32	36	32 – $^{0}_{0,039}$	36 + $^{0}_{0,025}$							3215	3220	3025	3230									
35	39	35 – $^{0}_{0,039}$	39 + $^{0}_{0,025}$							3515	3520	3525	3530	3540	3550							
40	44	40 – $^{0}_{0,039}$	44 + $^{0}_{0,025}$								4020	4025	4030	4040	4050							
45	50	45 – $^{0}_{0,039}$	50 + $^{0}_{0,025}$								4520		4530	4540	4550							
50	55	50 – $^{0}_{0,039}$	55 + $^{0}_{0,03}$								5020	5025	5030	5040	5050	5060						
55	60	55 – $^{0}_{0,046}$	60 + $^{0}_{0,03}$										5530	5540	5550	5560						
60	65	60 – $^{0}_{0,046}$	65 + $^{0}_{0,03}$										6030	6040	6050	6060	6070					
65	70	65 – $^{0}_{0,046}$	70 + $^{0}_{0,03}$												6550	6560	6570					
70	75	70 – $^{0}_{0,046}$	75 + $^{0}_{0,035}$											7040	7050	7060	7070	7080				
75	80	75 – $^{0}_{0,046}$	80 + $^{0}_{0,035}$												7550	7560		7580				
80	85	80 – $^{0}_{0,046}$	85 + $^{0}_{0,035}$											8040	8050	8060					80100	
85	90	85 – $^{0}_{0,054}$	90 + $^{0}_{0,035}$											8540		8560		8580			85100	
90	95	90 – $^{0}_{0,054}$	95 + $^{0}_{0,035}$												9050	9060		9080			90100	
95	100	95 – $^{0}_{0,054}$	100 + $^{0}_{0,035}$													9560					95100	
100	105	100 – $^{0}_{0,054}$	105 + $^{0}_{0,035}$													10060						100115
105	110	105 – $^{0}_{0,054}$	110 + $^{0}_{0,035}$													10560						105115
110	115	110 – $^{0}_{0,054}$	115 + $^{0}_{0,035}$													11060						110115
115	120	115 – $^{0}_{0,054}$	120 + $^{0}_{0,035}$													11560					115100	
120	125	120 – $^{0}_{0,054}$	125 + $^{0}_{0,040}$													12060					120100	
125	130	125 – $^{0}_{0,063}$	130 + $^{0}_{0,040}$																		125100	
130	135	130 – $^{0}_{0,063}$	135 + $^{0}_{0,040}$													13060					130100	
135	140	135 – $^{0}_{0,063}$	140 + $^{0}_{0,040}$																		135100	
140	145	140 – $^{0}_{0,063}$	145 + $^{0}_{0,040}$													14060					140100	
150	155	150 – $^{0}_{0,063}$	155 + $^{0}_{0,040}$													15060					150100	
160	165	160 – $^{0}_{0,063}$	165 + $^{0}_{0,040}$																		160100	
180	185	180 – $^{0}_{0,072}$	185 + $^{0}_{0,040}$																		180100	
200	205	200 – $^{0}_{0,072}$	205 + $^{0}_{0,046}$																		200100	
220	225	220 – $^{0}_{0,072}$	225 + $^{0}_{0,046}$																		220100	
250	255	250 – $^{0}_{0,072}$	255 + $^{0}_{0,046}$																		250100	
300	305	300 – $^{0}_{0,081}$	305 + $^{0}_{0,052}$																		300100	
350	356	350 – $^{0}_{0,089}$	356 + $^{0}_{0,057}$																		350100	



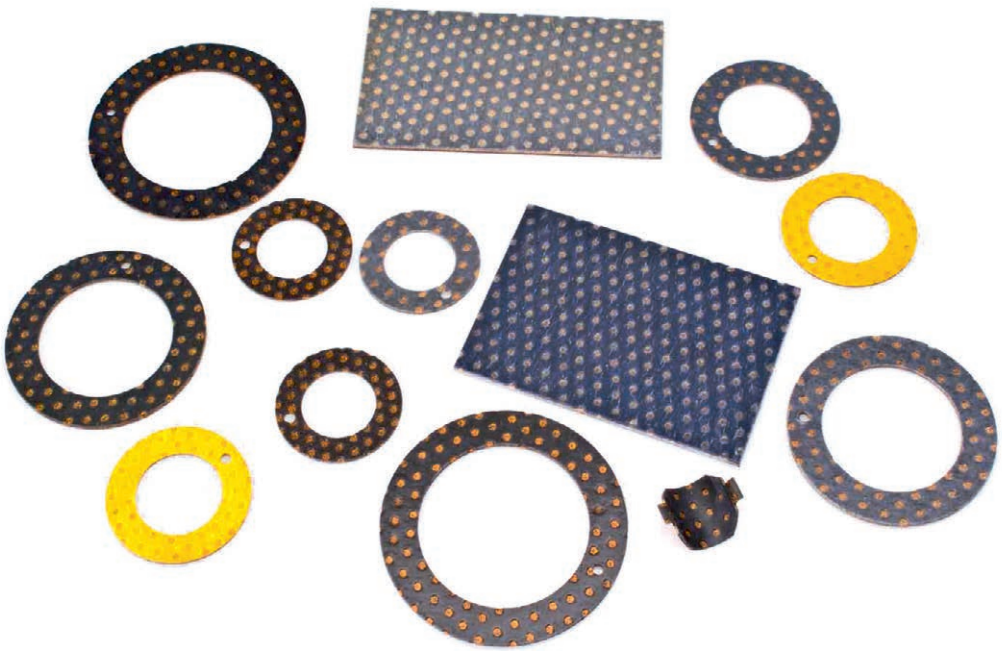
Recommended Housing:
From Di 12 up to Di 42 mm 1
From Di 48 up to Di 52 mm 1.5

"RL" - TW ○○ M

TYPE

MBI DESIGNATION

MBI Material	SIGLA	Di + 0,25	De – 0,25	Sp – 0,05	a + 0,2	I ± 0,12
RL	TW10RL	12	24	1,5	1,5	18
RL	TW12RL	14	26	1,5	2	20
RL	TW14RL	16	30	1,5	2	23
RL	TW16RL	18	32	1,5	2	25
RL	TW18RL	20	36	1,5	3	28
RL	TW20RL	22	38	1,5	3	30
RL	TW22RL	24	42	1,5	3	33
RL	TW24RL	26	44	1,5	3	35
RL	TW25RL	28	48	1,5	4	38
RL	TW30RL	32	54	1,5	4	43
RL	TW35RL	38	62	1,5	4	50
RL	TW40RL	42	66	1,5	4	54
RL	TW45RL	48	74	2	4	61
RL	TW50RL	52	78	2	4	65



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