

GLYCODUR®
RPL and RPH
Injection molded,
thermoplastic bearings

Injection molded, thermoplastic GLYCODUR® sliding bearings offer cost efficient solutions for a wide spectrum of applications.

GLYCODUR® RPL sliding bearings have impressive running characteristics. They have low friction and low wear characteristics, have a high load bearing capacity and guarantee an optimum fit of the sliding bearing even at high temperatures.

GLYCODUR® RPH sliding bearings are manufactured from a premium material, which means that maximum performance is possible. The advantages: better Slide-/friction relationship, high temperature and pressure resilience, as well as a very good heat conductivity of the compound.





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Sliding bearing material

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1.1 Composition

Sliding bearing material

GLYCODUR® RPL and RPH are solid polymer bearings which are economically manufactured in one step using an automatic injection molding process. Through specific blending of

the thermoplastic polymer with additives, the products are suited to a wide range of applications. In this way cost effective solutions are possible. The bearings are available in two standard types.

GLYCODUR® RPL



GLYCODUR® RPL sliding bearings consist of the basis polymer Polybutylenterephthalat (PBT). Embedded in the polymer matrix are Polytetrafluorethylen (PTFE), fine bronze powder and Aramid fibres. The PTFE works to minimize friction and wear whereby the fine bronze

powder increases pressure resilience. The Aramid fibres guarantee the tight fit of the bearing without being abrasive even at high temperatures. Through a well balanced mixing ratio optimum operational characteristics are achieved.

GLYCODUR® RPH



GLYCODUR® RPH sliding bearings are made from the basis Polyamidimid (PAI). In order to further improve the mechanical and tribological properties of PTFE, graphite as well as special additives are incorporated. PTFE, graphite and the special additives improve the sliding/friction performance. In addition to this, graphite causes a

further improvement of the compression strength and the conductivity of the compound. The basis PAI belongs to the highest material class and is one of the most temperature resistant thermoplastics that can be machined.

GLYCODUR® RPL

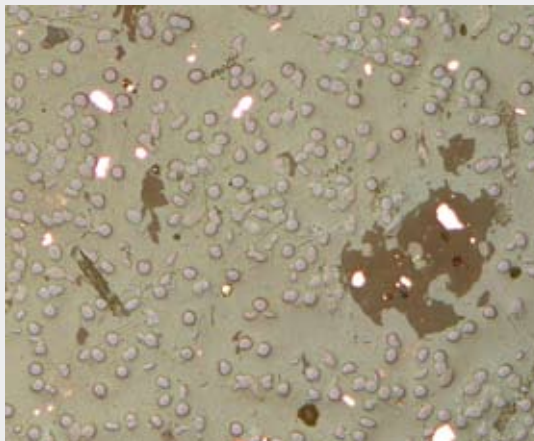


Figure 1.1.1
Microsection
GLYCODUR® RPL

GLYCODUR® RPH



Figure 1.1.2
Microsection
GLYCODUR® RPH

1.2 Characteristics summary of GLYCODUR® RPL

Properties	GLYCODUR® RPL
Basis polymer	Polybutylenterephthalat (PBT)
Additive	Bronze, PTFE, Aramid fibres
Properties, applications	optimised dry bearing, universal
Colour	olive
Permissible static load	80 MPa
Permissible dynamic load	40 MPa
Maximum sliding speed (rotation)	1 m/s
Maximum sliding speed (linear)	4 m/s
Operating temperature	-40 °C to 120 °C ¹⁾
Heat conductivity	0.27 W/mK
Heat expansion coefficient	1.3 * 10 ⁻⁵ 1/K
pv-value	1 MPa * m/s
Friction value	0.1 to 0.2
Stick-Slip-effect	negligible
Wear thickness	Depending on wall thickness and possible allowed bearing clearance tolerance
Lubrication	not required
Edge loading capacity	very good
Embedded dirt and foreign bodies	fair
Alternating loading capacity	good
Application capability with linear movement	very good
Machinability/rework	very good and easy for all dimensions (except inner diameter)

¹⁾ maximum temperature under load, you may risk press-fit from a temperature of ca. 80 °C depending on installation conditions

Lubrication	Friction	Wear resistance	Load capacity
GLYCODUR® RPL			
Dry	••	••	••
Oil	•••	••	••
Grease	•••	••	••

- Limited applicable • Standard •• Superior ••• Excellent

1.3 Characteristics summary of GLYCODUR® RPH

Properties	GLYCODUR® RPH
Basis polymer	Polyamidimid (PAI)
Additive	PTFE, Graphite, special additives
Properties, applications	high temperature applications, dry bearing, high loads
Colour	dark grey
Permissible static load	150 MPa
Permissible dynamic load	75 MPa
Maximum sliding speed (rotation)	2.5 m/s
Maximum sliding speed (linear)	4.5 m/s
Operating temperature	-120 °C to 240 °C
Heat conductivity	0.53 W/mK
Heat expansion coefficient	$2.5 \cdot 10^{-5} 1/K$
pv-value	4 MPa * m/s
Friction value	0.1 to 0.4
Stick-Slip-effect	negligible
Wear thickness	Depending on wall thickness and possible allowed bearing clearance tolerance
Lubrication	not required
Edge loading capacity	very good
Embedded dirt and foreign bodies	good
Alternating loading capacity	good
Application capability with linear movement	very good
Machinability/rework	very good and easy for all dimensions (except inner diameter)

Lubrication	Friction	Wear resistance	Load capacity
GLYCODUR® RPH			
Dry	•	••	•••
Oil	•••	•••	•••
Grease	•••	•••	•••

- Limited applicable • Standard •• Superior ••• Excellent



1.4 Friction

The friction characteristics of the sliding bearing depends on many factors. The most important are temperature, speed and type of motion as well as loading. The friction coefficient can be reduced even

further by means of appropriate lubrication. As the bearing loading increases, the friction coefficient decreases. Depending on the type of application, Stick-Slip-effects can be ignored.

1.5 Running-in Characteristics

An additive in the compound which positively influences the sliding/friction characteristics is transferred as a sliding layer onto the counterpart when the

sliding bearing is running-in. After the running-in stage, a homogenous wear is observed with the low friction and wear values.

1.6 Chemical Properties

The polymer matrix of PBT and the metallic bronze is responsible for the chemical resistance of GLYCODUR® RPL. PTFE and Aramid are almost universally chemically resistant. GLYCODUR® RPL is resistant to a great extent to organic substances and also to the common oils and greases. Contact with strong acids and alkalines or with aggressive salts can result in damage to the polymer matrix or corrosion of the bronze. A detailed chemical resistance list is available upon request.

GLYCODUR® RPH has a good chemical resilience owing to the additives used which have good resistance properties. In particular this material has proved to be successful when common greases and technical lubricants are used. The resistance to hydrolysis however has limitations at high temperatures. A detailed chemical resistance list is available upon request.

1.7 Machinability

GLYCODUR® RPL and GLYCODUR® RPH sliding bearings can be reworked by boring, milling, turning, sawing or cutting. This means that the outside diameter of the bushing can be shortened or modified to fit unusual installation spaces without the need to manufacture

a special part. All dimensions of the part can be reworked. It should be noted however that the inside running surface should not be altered as the precision injection molded surface guarantees optimum running properties.

1.8 Advantages

- Suspension and absorption of vibration
- Corrosion resistance
- Extensive chemical resistance
- Light weight

1.9 Standard-bearings

GLYCODUR® RPL and GLYCODUR® RPH are available from stock in standard metric sizes as cylindrical bushings, flanged bushings and thrust washers.

1.10 Special Parts

Upon request special shapes and sizes can be delivered for particular applications if the batches large enough

to be economical. This applies to both the material and the dimensional properties of the part.



2

2.1 Design

Determination of bearing size

GLYCODUR® RPL and GLYCODUR® RPH achieve best results in a maintenance-free or low maintenance environment. The operating parameters must be closely monitored similar to metal polymer bearings. Temperature

in particular is an important factor, as injection molded, thermoplastic sliding bearings change their characteristics at different temperatures to a greater extent than conventional metal polymer bearings.

3

3.1 Assembly conditions

Sliding bearing installation

These bushings are primarily designed for housings with a H7 bore tolerance. The interference fit depends on the nominal diameter and the respective material. In this way a satisfactory tight fit can always be guaranteed. The interference fit of the outside diameter is around 0.5 to 1.5% depending on the size of the bushing. After pressing-in the inside diameter sets itself to the nominal value. In order to ensure trouble free operation in all conditions, an adequate bearing clearance is required. The nominal value of the clearance

depending on the compound type will be around the tolerance class F10. Shafts should be preferably in the tolerance range of h9 to h7. The ideal counter part is steel with a polished surface (average surface finish 0.4 to 0.8 μm) and a hardness of 50 HRC. Aside from hardened steel nearly all other shaft materials can be considered: Stainless Steel, Carbon Steel, non-ferrous metals and plastics. Drawn or rolled steels are also suitable.

3.2 Machinability

These bearings can be easily machined using conventional tools. Fibres can be laid bare on the newly machined surfaces. These are not abrasive. A compacted non machined surface on

the inside diameter is however more durable, as it preferable to leave the injected surface in its original condition. Burrs arising from subsequent machining can be easily removed.

3.3 Installation

It is preferable to use a mandrel to press in the bushing – see figure 3.3.1. The chamfer on one side of the

bearing facilitates easier assembly. It is preferable to have a comparable chamfer on the housing.

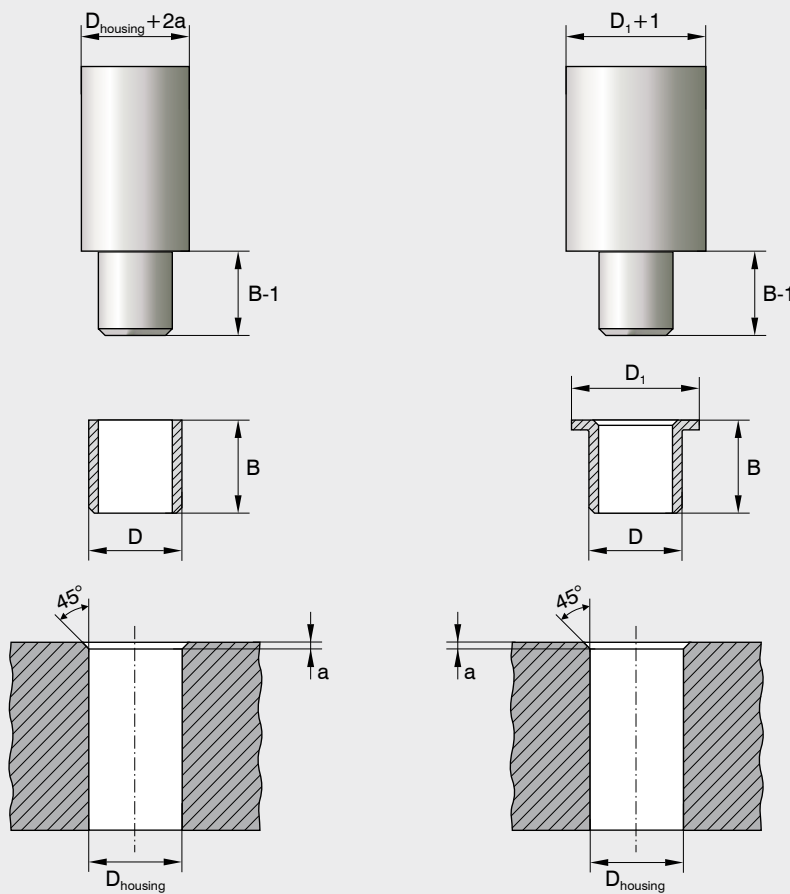


Figure 3.3.1 – Pressing-in of cylindrical bushing

Figure 3.3.2 – Pressing-in of flanged bushing

Width of chamfer	
D_{housing}	a
≤ 12	0.8
$12 < D_{\text{housing}} \leq 65$	1.2
> 65	2.3

4

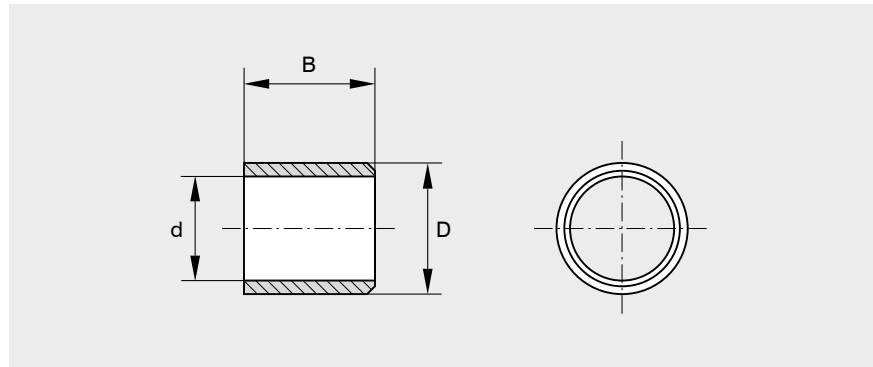
4.1 Dimension table GLYCODUR® RPL bushings

GLYCODUR®
RPL

Dimension			Mass	Designation
d	D	B		
mm	mm	mm	g	
2	3.5	3	0.03	PG 020303 RPL/3.5
3	4.5	4	0.06	PG 030404 RPL/4.5
	4.5	6	0.09	PG 030406 RPL/4.5
4	5.5	4	0.07	PG 040504 RPL/5.5
	5.5	6	0.11	PG 040506 RPL/5.5
5	7	5	0.16	PG 050705 RPL
	7	8	0.30	PG 050708 RPL
	7	10	0.32	PG 050710 RPL
	7	15	0.48	PG 050715 RPL
6	8	6	0.22	PG 060806 RPL
	8	8	0.30	PG 060808 RPL
	8	10	0.36	PG 060810 RPL
8	10	6	0.30	PG 081006 RPL
	10	8	0.40	PG 081008 RPL
	10	10	0.47	PG 081010 RPL
	10	12	0.60	PG 081012 RPL
	10	15	0.70	PG 081015 RPL
10	12	8	0.46	PG 101208 RPL
	12	10	0.57	PG 101210 RPL
	12	12	0.68	PG 101212 RPL
	12	15	0.85	PG 101215 RPL
	12	20	1.14	PG 101220 RPL
	12	25	1.43	PG 101225 RPL
12	14	8	0.50	PG 121408 RPL
	14	10	0.67	PG 121410 RPL
	14	12	0.81	PG 121412 RPL
	14	15	1.01	PG 121415 RPL
	14	20	1.35	PG 121420 RPL
	14	30	2.03	PG 121430 RPL
13	15	10	0.70	PG 131510 RPL
	15	20	1.50	PG 131520 RPL
14	16	10	0.78	PG 141610 RPL
	16	15	1.17	PG 141615 RPL
	16	20	1.55	PG 141620 RPL
	16	25	1.94	PG 141625 RPL
15	17	10	0.80	PG 151710 RPL
	17	15	1.24	PG 151715 RPL
	17	20	1.66	PG 151720 RPL
	17	25	2.07	PG 151725 RPL
16	18	10	0.88	PG 161810 RPL
	18	12	1.00	PG 161812 RPL

Dimension			Mass	Designation
d	D	B		
mm	mm	mm	g	
16	18	15	1.32	PG 161815 RPL
	18	20	1.76	PG 161820 RPL
	18	25	2.20	PG 161825 RPL
18	20	15	1.48	PG 182015 RPL
	20	20	1.97	PG 182020 RPL
	20	25	2.46	PG 182025 RPL
20	23	10	1.67	PG 202310 RPL
	23	15	2.51	PG 202315 RPL
	23	20	3.34	PG 202320 RPL
	23	25	4.18	PG 202325 RPL
22	23	30	5.00	PG 202330 RPL
	25	15	2.74	PG 222515 RPL
	25	20	3.65	PG 222520 RPL
24	25	25	4.57	PG 222525 RPL
	25	30	5.48	PG 222530 RPL
	27	15	2.97	PG 242715 RPL
25	27	20	3.96	PG 242720 RPL
	27	30	6.00	PG 242730 RPL
	28	15	3.09	PG 252815 RPL
28	28	20	4.12	PG 252820 RPL
	28	25	5.15	PG 252825 RPL
	28	30	6.18	PG 252830 RPL
	28	50	10.30	PG 252850 RPL
30	32	15	4.65	PG 283215 RPL
	32	20	6.20	PG 283220 RPL
	32	25	7.80	PG 283225 RPL
	32	30	9.30	PG 283230 RPL
32	34	20	6.63	PG 303420 RPL
	34	25	8.29	PG 303425 RPL
	34	30	9.95	PG 303430 RPL
	30	40	13.26	PG 303440 RPL
35	36	20	7.00	PG 323620 RPL
	36	30	10.57	PG 323630 RPL
	36	40	14.09	PG 323640 RPL
	36	50	17.62	PG 323650 RPL
40	39	20	7.67	PG 353920 RPL
	39	30	11.50	PG 353930 RPL
	39	40	15.60	PG 353940 RPL
	39	50	19.17	PG 353950 RPL
40	44	20	8.70	PG 404420 RPL
	44	30	13.06	PG 404430 RPL

Dimension			Mass	Designation
d	D	B		
mm	mm	mm	g	
40	44	40	17.41	PG 404440 RPL
	44	50	21.76	PG 404450 RPL
45	50	20	12.30	PG 455020 RPL
	50	30	18.46	PG 455030 RPL
	50	40	24.61	PG 455040 RPL
	50	50	30.76	PG 455050 RPL
50	55	20	13.60	PG 505520 RPL
	55	30	20.40	PG 505530 RPL
	55	40	27.20	PG 505540 RPL
	55	50	34.00	PG 505550 RPL
55	60	40	29.79	PG 556040 RPL
	60	60	44.70	PG 556060 RPL
60	65	30	24.29	PG 606530 RPL
	65	40	32.38	PG 606540 RPL
	65	60	48.57	PG 606560 RPL
	65	70	56.67	PG 606570 RPL
65	70	40	34.97	PG 657040 RPL
	70	60	52.46	PG 657060 RPL
70	75	40	37.56	PG 707540 RPL
	75	60	56.34	PG 707560 RPL
75	80	40	42.74	PG 758040 RPL
	80	80	85.49	PG 758080 RPL
80	85	40	42.74	PG 808540 RPL
	85	50	53.43	PG 808550 RPL
	85	60	64.11	PG 808560 RPL
	85	100	106.85	PG 8085100 RPL
85	90	40	45.33	PG 859040 RPL
	90	50	56.66	PG 859050 RPL
	90	80	90.67	PG 859080 RPL
90	95	50	59.91	PG 909550 RPL
	95	90	107.83	PG 909590 RPL
100	105	50	66.38	PG 10010550 RPL
	105	100	132.76	PG 100105100 RPL
120	125	50	79.33	PG 12012550 RPL
125	130	30	49.55	PG 12513030 RPL
	130	60	99.09	PG 12513060 RPL
130	135	60	102.97	PG 13013560 RPL
150	155	60	118.52	PG 15015560 RPL

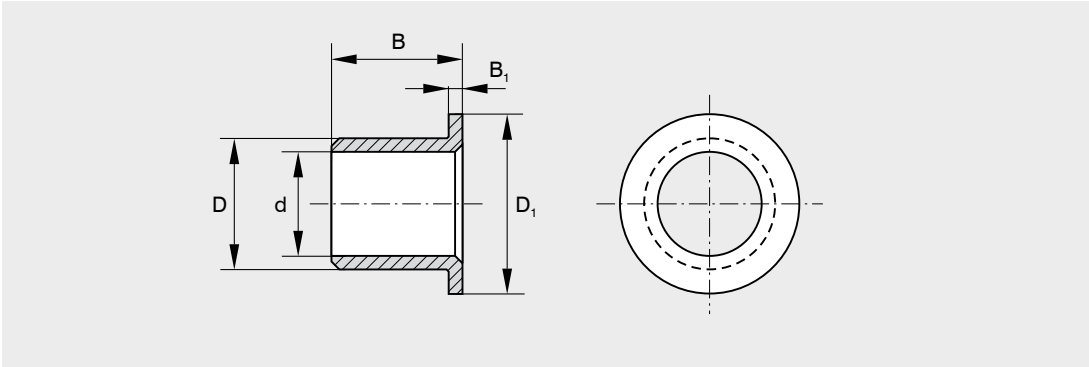


Delivery of special shapes and sizes on request if the batches are large enough to be economical.

4.2 Dimension table GLYCODUR® RPL flanged bushings

Dimension					Mass	Designation
d	D	D ₁	B	B ₁		
mm	mm	mm	mm	mm	g	
3	4.5	7	0.75	3	0.1	PBG 030403 RPL/4.5
	4.5	7	0.75	5	0.1	PBG 030405 RPL/4.5
4	5.5	9	0.75	3	0.1	PBG 040503 RPL/5.5
	5.5	9	0.75	4	0.1	PBG 040504 RPL/5.5
	5.5	9	0.75	6	0.1	PBG 040506 RPL/5.5
5	7	10	1	4	0.2	PBG 050704 RPL
	7	10	1	6	0.2	PBG 050706 RPL
6	8	12	1	4	0.2	PBG 060804 RPL
	8	12	1	6	0.3	PBG 060806 RPL
	8	12	1	8	0.4	PBG 060808 RPL
	8	12	1	10	0.5	PBG 060810 RPL
8	10	15	1	5.5	0.4	PBG 081005.5 RPL
	10	15	1	9.5	0.6	PBG 081009.5 RPL
10	12	18	1	7	0.6	PBG 101207 RPL
	12	18	1	17	1.2	PBG 101217 RPL
12	14	18	1	10	0.8	PBG 121410 RPL
	14	18	1	12	1.0	PBG 121412 RPL
14	16	22	1	12	1.04	PBG 141612 RPL
	16	22	1	30	2.6	PBG 141630 RPL
15	17	23	1	12	1.2	PBG 151712 RPL
	17	23	1	17	1.7	PBG 151717 RPL
16	18	24	1	12	2.4	PBG 161812 RPL
	18	24	1	15	2.9	PBG 161815 RPL
	18	24	1	17	3.5	PBG 161817 RPL
18	20	26	1	12	1.27	PBG 182012 RPL
	20	26	1	17	1.8	PBG 182017 RPL
	20	26	1	22	2.3	PBG 182022 RPL
20	23	30	1.5	12	3.0	PBG 202312 RPL
	23	30	1.5	15	3.5	PBG 202315 RPL
	23	30	1.5	20	4.3	PBG 202320 RPL
	23	30	1.5	25	5.1	PBG 202325 RPL
25	28	35	1.5	22	5.7	PBG 252822 RPL
	28	35	1.5	25	6.48	PBG 252825 RPL
	28	35	1.5	32	7.7	PBG 252832 RPL
30	34	45	2	18	8.2	PBG 303418 RPL
	34	45	2	22	9.5	PBG 303422 RPL
	34	45	2	32	12.9	PBG 303432 RPL
35	39	50	2	12	6.0	PBG 353912 RPL
	39	50	2	22	11.0	PBG 353922 RPL
	39	50	2	32	14.8	PBG 353932 RPL
40	44	55	2	17	9.32	PBG 404417 RPL
	44	55	2	25	13.7	PBG 404425 RPL
	44	55	2	40	20.2	PBG 404440 RPL

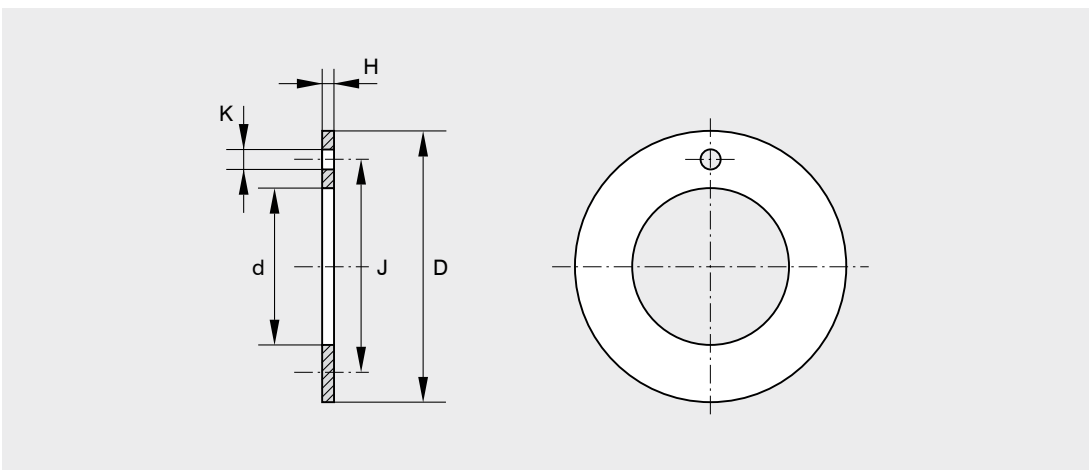
Delivery of special shapes and sizes on request if the batches are large enough to be economical.



4.3 Dimension table GLYCODUR® RPL thrust washers

Dimension						Mass	Designation
d	D	H	J	K	H _a		
mm	mm	mm	mm	mm	mm	g	
10	20	1.5	15	1.75	1.75	0.58	PXG 102001.5 RPL
12	25	1.5	18	1.75	1.75	0.84	PXG 122401.5 RPL
14	26	1.5	20	2.25	2.25	0.93	PXG 142601.5 RPL
16	30	1.5	22	2.25	2.25	1.25	PXG 163001.5 RPL
18	32	1.5	25	2.25	2.25	1.36	PXG 183201.5 RPL
20	36	1.5	28	3.25	3.25	1.74	PXG 203601.5 RPL
22	38	1.5	30	3.25	3.25	1.87	PXG 223801.5 RPL

Delivery of special shapes and sizes on request if the batches are large enough to be economical.

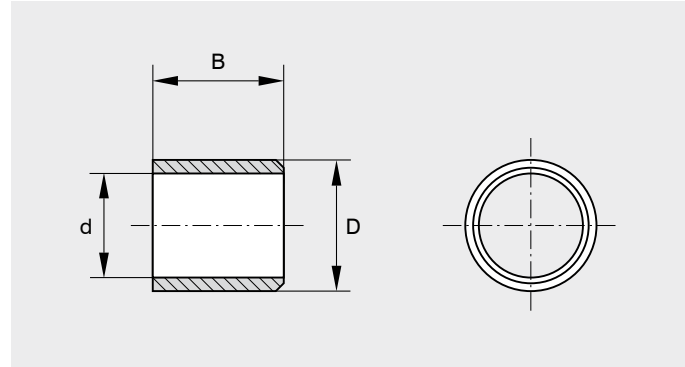


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5.1 Dimension table GLYCODUR® RPH bushings

GLYCODUR®
RPH

Dimension			Mass	Designation
d	D	B		
mm	mm	mm	g	
3	4.5	6	0.09	PG 030406 RPH/4.5
5	7	5	0.16	PG 050705 RPH
	7	15	0.48	PG 050715 RPH
6	8	20	0.73	PG 060820 RPH
8	10	15	0.70	PG 081015 RPH
	10	12	12	0.68
12		20	1.14	PG 101220 RPH
12	14	20	1.35	PG 121420 RPH
14	16	12	0.93	PG 141612 RPH
	16	25	1.94	PG 141625 RPH
15	17	25	2.07	PG 151725 RPH
20	23	15	2.51	PG 202315 RPH
	23	20	3.34	PG 202320 RPH
	23	30	5.00	PG 202330 RPH
25	28	30	6.18	PG 252830 RPH
30	34	15	4.97	PG 303415 RPH
	30	40	13.26	PG 303440 RPH
35	39	50	19.17	PG 353950 RPH
40	44	50	21.75	PG 404450 RPH
45	50	50	30.76	PG 455050 RPH
50	55	60	40.80	PG 505560 RPH
60	65	70	56.67	PG 606570 RPH
70	75	80	75.12	PG 707580 RPH
80	85	80	85.48	PG 808580 RPH
90	95	90	107.83	PG 909590 RPH
100	105	90	119.48	PG 10010590 RPH

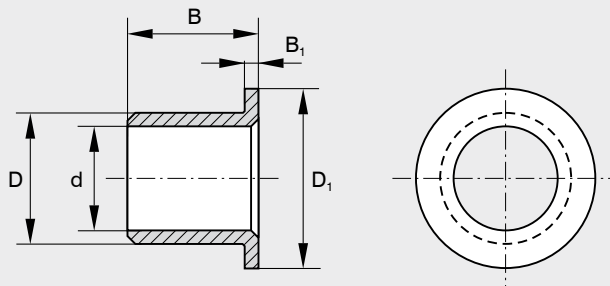


Delivery of special shapes and sizes on request if the batches are large enough to be economical.

5.2 Dimension table GLYCODUR® RPH flanged bushings

Dimension					Mass	Designation
d	D	D ₁	B	B ₁		
mm	mm	mm	mm	mm	g	
5	7	10	1	5	0.25	PBG 050705 RPH
6	8	12	1	10	0.5	PBG 060810 RPH
8	10	15	1	9.5	0.6	PBG 081009.5 RPH
10	12	18	1	12	1.03	PBG 101212 RPH
	12	18	1	17	1.2	PBG 101217 RPH
12	14	18	1	20	1.6	PBG 121420 RPH
14	16	22	1	17	1.47	PBG 141617 RPH
15	17	23	1	20	2.0	PBG 151720 RPH
16	18	24	1	12	2.4	PBG 161812 RPH
	18	24	1	20	4.0	PBG 161820 RPH
18	20	26	1	14	1.48	PBG 182014 RPH
	20	26	1	20	2.12	PBG 182020 RPH
20	23	30	1.5	17	4.25	PBG 202317 RPH
	23	30	1.5	22	5.5	PBG 202322 RPH
25	28	35	1.5	22	5.7	PBG 252822 RPH
30	34	45	2	26	11.8	PBG 303426 RPH
35	39	50	2	40	20.0	PBG 353940 RPH
	39	50	2	50	25.0	PBG 353950 RPH
40	44	55	2	16	8.08	PBG 404416 RPH
	44	55	2	40	20.2	PBG 404440 RPH

Delivery of special shapes and sizes on request if the batches are large enough to be economical.



6

6.1

Applications

GLYCODUR® RPL and GLYCODUR® RPH

- Automotive
- Farming machinery
- Engineering
- Hydraulics
- Precision engineering
- Valves
- Chemical apparatus engineering
- Pneumatics
- Pistons
- Ovens
- Semiconductor manufacturing units
- Electrical motors
- Textile machines
- Medicine and laboratories
- Pumps
- Printing machines
- Paper machines
- Household equipment
- Food industry
- Furniture
- Industry
- Pharmaceuticals
- Conveyor belts
- Galvanising machines
- Office equipment
- Press manufacture
- Automation
- ...



The materials are also suitable for use in the applications and shapes listed below:

- Sliding blocks
- Washers
- Castors
- Ball socket
- Cup and ball bearing
- Ball lining
- Spindle nut
- Hinge bearing
- Wiper
- Bearing
- Half shell
- ...



GLYCODUR®

This catalog provides a description of our products. Information contained herein does not imply any guarantee of performance or recommendation of suitability for a specific application. Loading capacities and wear characteristics of GLYCODUR® dry sliding bearings depend on individual, specific environmental effects, therefore all calculations shown can be approximations only. In cases where the relevant experience is not available the user is advised to carry out tests with the product under the required application conditions. The right is reserved to make any changes

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GLYCODUR®
Dry Bearings
Catalogue



GLYCODUR®
RB and RS



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