



ORIGINAL
PERMAGLIDE

KS PERMAGLIDE®

Catalogue 2013

Catalogue extract

For overall catalogue please visit
www.permaglide.com





ORIGINAL
PERMAGLIDE

KSPG Automotive

KSPG (Kolbenschmidt Pierburg)

As long-standing partners to the automotive industry, the companies in the KSPG Group develop innovative components and system solutions with acknowledged competence for air supply and emission control, for oil and water pumps, for pistons, engine blocks and engine bearings. The products comply with the high demands and quality standards of the automotive industry. Low emission, reduced fuel consumption, reliability, quality and safety – these are the forces that drive innovation at Kolbenschmidt Pierburg.



KS Gleitlager

Within the Kolbenschmidt Pierburg Group, KS Gleitlager is the specialist for high-precision bearings. The introduction of new technologies in production and surface finishing, innovative material developments and a clear customer focus have made KS Gleitlager one of the world's leading suppliers of engine plain bearings and dry plain bearings (KS PERMAGLIDE®)



Motor Service

The Motor Service Group is the sales organisation for the worldwide aftermarket activities of Kolbenschmidt Pierburg. It is one of the leading suppliers of engine components for the independent aftermarket including the premium brands KOLBENSCHMIDT, PIERBURG and TRW Engine Components.

KS PERMAGLIDE® is a registered trademark of KS Gleitlager GmbH

3rd edition 01.2011
Article No. 50 003 863-02

Layout and production:
Motor Service Marketing

This document must not be reprinted, duplicated or translated in full or in part without our prior written consent and without reference to the source of the material.

All content including pictures and diagrams is subject to alteration. No liability accepted.

Published by:
© MS Motor Service International GmbH

Liability

All information in this brochure has been carefully researched and compiled. Nevertheless, it is possible that errors have occurred, information has been translated incorrectly, information is missing or the details provided have changed in the intervening time. As a result, we are unable to provide any guarantee nor to accept any legal liability for the accuracy, completeness, currency or quality of the information provided. We hereby waive all liability for any damages, whether direct or indirect in nature and whether tangible or intangible, resulting from the use or misuse of information or from incomplete or incorrect information in this brochure, unless proven to be the result of deliberate intent or negligence on our part. Names, descriptions and numbers of products, manufacturers, etc. are included for the purpose of comparison only.





Contents	Page
1 Introduction	4
2 Descriptions and units	6
3 KS PERMAGLIDE® plain bearings	7
3.1 Maintenance-free, dry-running plain bearings	8
3.2 Low-maintenance plain bearings	13
4 Material selection, material information	17
4.1 P1 plain bearings	18
4.2 P2 plain bearings	24
5 Nominal service life calculation	28
6 Typical damage to plain bearings	40
7 Design and layout of bearing assembly	43
8 Plain bearing installation	52
9 Versions and dimension tables	56
9.1 KS PERMAGLIDE® bushes, maintenance-free	58
9.2 KS PERMAGLIDE® collar bushes, maintenance-free	64
9.3 KS PERMAGLIDE® thrust washers, maintenance-free	66
9.4 KS PERMAGLIDE® strips, maintenance-free	67
9.5 KS PERMAGLIDE® bushes, low-maintenance	68
9.6 KS PERMAGLIDE® thrust washers, low-maintenance	70
9.7 KS PERMAGLIDE® strips, low-maintenance	71
10 Test methods	72





KS PERMAGLIDE® P1 plain bearings

- Maintenance-free
- Suitable for dry running

Characteristics & properties	Unit	P10 P10Bz*	P14	P147*
lead-free	-	no	yes	yes
$p v_{max}$	MPa · m/s	1.8	1.6	1.4
$p_{max.stat.}$	MPa	250	250	250
$p_{max.dyn.}$	MPa	56	56	56
$v_{max.}$	m/s	2	1	0.8
T	°C	-200 to +280	-200 to +280	-200 to +280

Versions of the KS PERMAGLIDE® P1



PAP bushes
P10, P10Bz*, P14, P147*

PAF collar bushes
P10, P10Bz*, P14, P147*

PAW thrust washers
P10, P10Bz*, P14, P147*

PAS strips
P10, P10Bz*, P14, P147*

KS PERMAGLIDE® P1 materials

Standard material P10

- Contains lead
- Very low stick-slip tendency
- Low wear
- Good chemical resistance
- Low friction coefficient
- No tendency to fuse with metal
- Largely resistant to swelling
- Does not absorb water

Special material P10Bz* (formerly P11)

- Contains lead
- Improved corrosion resistance
- Very good thermal conductivity and therefore greater reliability
- Anti-magnetic
- All other properties as P10

Standard material P14

- Lead-free
- Very low stick-slip tendency
- Low wear
- Low friction coefficient
- No tendency to fuse with metal
- Largely resistant to swelling

Special material P147*

- Lead-free
- Very good corrosion resistance
- All other properties as P14

* On request



KS PERMAGLIDE® P2 plain bearings

- Low-maintenance
- For grease or liquid-lubricated applications

Characteristics & properties	Unit	P20 P22*, P23*	P200 P202*, P203*
lead-free	-	no	yes
$p_{v \max.}$	MPa · m/s	3	3.3
$p_{\max.\text{stat.}}$	MPa	250	250
$p_{\max.\text{dyn.}}$	MPa	70	70
$v_{\max.}$	m/s	3	3.3
T	°C	-40 to +110	-40 to +110

Versions of the KS PERMAGLIDE® P2



PAP bushes

P20, P22*, P23*,
P200, P202*, P203*

PAW thrust washers

P20, P22*, P23*,
P200, P202*, P203*

PAS strips

P20, P22*, P23*,
P200, P202*, P203*

KS PERMAGLIDE® P2 materials

Standard material P20

- Contains lead
- With oil distributing pockets, ready to install
- Lifetime lubrication possible
- Low wear
- Low sensitivity to edge loading
- Good damping characteristics
- Insensitive to impact
- Good chemical resistance

Special material P22*

- Contains lead
- Smooth sliding surface, with machining allowance
- All other properties as P20

Special material P23*

- Contains lead
- Smooth sliding surface, ready to install
- All other properties as P20

Standard material P200

- Lead-free
- With oil distributing pockets, ready to install
- Lifetime lubrication
- Low wear
- Very good dry-running properties
- Insensitive to edge loading and impact
- Good damping characteristics
- Good chemical resistance

Special material P202*

- Lead-free
- Smooth sliding surface, with machining allowance
- All other properties as P20

Special material P203*

- Lead-free
- Smooth sliding surface, ready to install
- All other properties as P20

* On request

Unless otherwise expressly noted in the text, the descriptions, units and meaning of the values used in this catalogue are as follows.

Symbol	Unit	Description
B	mm	Bush width, total strip width
B ₁	mm	Usable strip width
C _i	mm	Inside bevel of bush (bevelled edge)
C _o	mm	Outside bevel of bush
D _{FL}	mm	Collar diameter
D _i	mm	Bush inside diameter Inside diameter of thrust washer
D _{IE}	mm	Bush inside diameter in pressed-in state
D _o	mm	Outside diameter of bush Outside diameter of thrust washer
d _{ch}	mm	Diameter of test holder (adjusting mandrel)
d _G	mm	Diameter of housing bore
d _H	mm	Inside diameter of auxiliary ring
d _K	mm	Diameter of calibrating mandrel
d _L	mm	Oil hole diameter
d _w	mm	Shaft diameter
d ₁	mm	Diameter of mounting hole in thrust washer
d _{6a}	mm	Diameter of housing recess for thrust washer
F	N	Bearing load, press-in force
F _{ch}	N	Test force
F _E	N	Press-in force per mm of bush width
F _{tot}	N	Total press-in force
f _G	mm	Chamfer width on housing
f _A	-	Load type correction factor
f _L	-	Linear movement correction factor
f _p	-	Load correction factor
f _R	-	Roughness depth correction factor
f _T	-	Temperature correction factor
f _v	-	Sliding speed correction factor
f _w	-	Material correction factor

Symbol	Unit	Description (continued)
H	mm	Stroke on linear movement
J	mm	Pitch circle diameter of thrust washer
L	mm	Strip length
L _N	h	Nominal service life
m	g	Weight
n	rpm	Speed
n _{OSZ}	rpm	Oscillating frequency of oscillating movement
p	MPa	Specific bearing load
pv	MPa · m/s	pv value, product of specific bearing load and sliding speed
R, r	mm	Radius
R _z	µm	Roughness depth
s ₁	mm	Thickness of steel or bronze back
s ₃	mm	Wall thickness of bush
s _{FL}	mm	Collar thickness
T	°C	Temperature
ta	mm	Depth of housing recess
v	m/s	Sliding speed
x	mm	Measuring line distance
z	mm	Distance btwn. test holder halves
α _{Bz}	K ⁻¹	Thermal expansion coefficient of bronze
α _{St}	K ⁻¹	Thermal expansion coefficient of steel
Δs	mm	Theoretical bearing clearance
Δz	mm	Measured value in test holder
λ _{Bz}	W(mK) ⁻¹	Coeff. of thermal conductivity, bronze
λ _{St}	W(mK) ⁻¹	Coeff. of thermal conductivity, steel
μ	-	Coefficient of friction
τ _s	N/mm ²	Shear strength
φ	°	Swivel angle



Bushes



Fig. 55: Bushes

P10, P14, P147*

- For shafts from 2 mm to 300 mm

P10Bz*

- For shafts from 4 mm to 100 mm

P20, P22*, P23*, P200, P202*, P203*

- For shafts from 8 mm to 100 mm

Maintenance-free KS PERMAGLIDE® plain bearings

P10, P10Bz*, P14, P147*

Technical data		P10, P10Bz*	P14	P147*
Symbol	Unit			
$p_{v \max.}$	[MPa · m/s]	1.8	1.6	1.4
$p_{\text{stat.}}$	[MPa]	250	250	250
$p_{\text{dyn.}}$	[MPa]	56	56	56
$v_{\text{max.}}$	[m/s]	2	1	0.8
T	[°C]	-200 to +280	-200 to +280	-200 to +280

KS PERMAGLIDE® P10 with steel back, KS PERMAGLIDE® P10Bz with bronze back

Low-maintenance KS PERMAGLIDE® plain bearings

P20, P22*, P23*, P200, P202*, P203*

Technical data		P20, P22*, P23*	P200, P202*, P203*
Symbol	Unit		
$p_{v \max.}$	[MPa · m/s]	3	3.3
$p_{\text{stat.}}$	[MPa]	250	250
$p_{\text{dyn.}}$	[MPa]	70	70
$v_{\text{max.}}$	[m/s]	3	3.3
T	[°C]	-40 to +110	-40 to +110

Collar bushes



Fig. 56: Collar bushes

P10, P10Bz*, P14, P147*

- For shafts from 6 mm to 40 mm

Thrust washers



Fig. 57: Thrust washers

P10, P10Bz*, P14, P147*

- With inside diameter from 10 mm to 62 mm

P20, P22*, P23*, P200, P202*, P203*

- With inside diameter from 12 mm to 52 mm

Strips

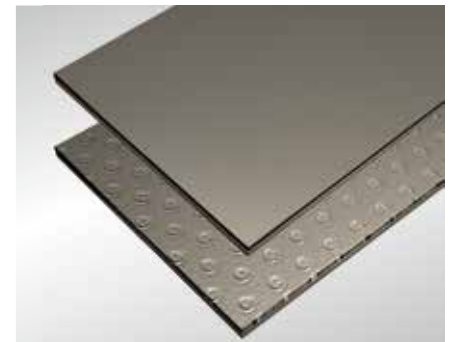


Fig. 58: Strips

P10, P10Bz*, P14, P147*

- Length 500 mm
- For widths see dimension tables
- For wall thicknesses see dimension tables

P20, P22*, P23*, P200, P202*, P203*

- Length 500 mm
- Width 250 mm
- For wall thicknesses see dimension tables

* On request

Example order and example designation

Bush of KS PERMAGLIDE® P10 with steel back:

Inside diameter (D_i) 16 mm
Width (B) 25 mm

Order designation: PAP 1625 P10

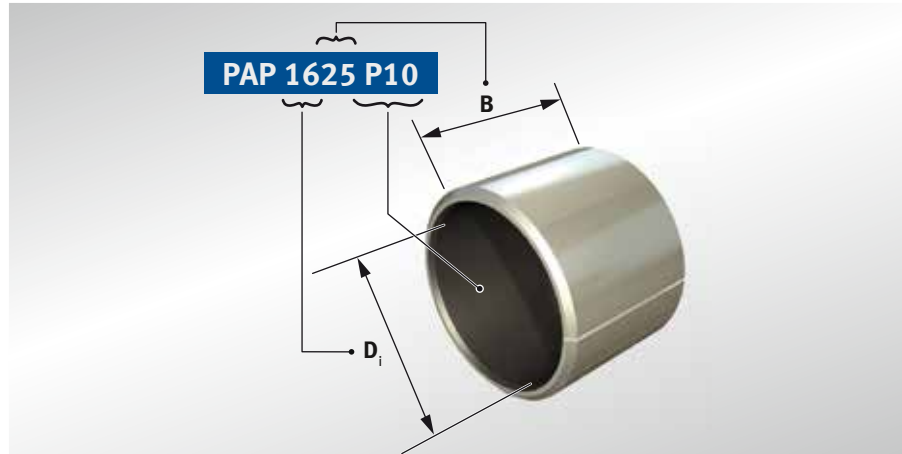


Fig. 59: Example order, P10 bush

Strips of KS PERMAGLIDE® P20:

Width (B) 250 mm
Wall thickness (s₃) 1 mm
(Order code: s₃ · 10)

Order designation: PAS 10250 P20

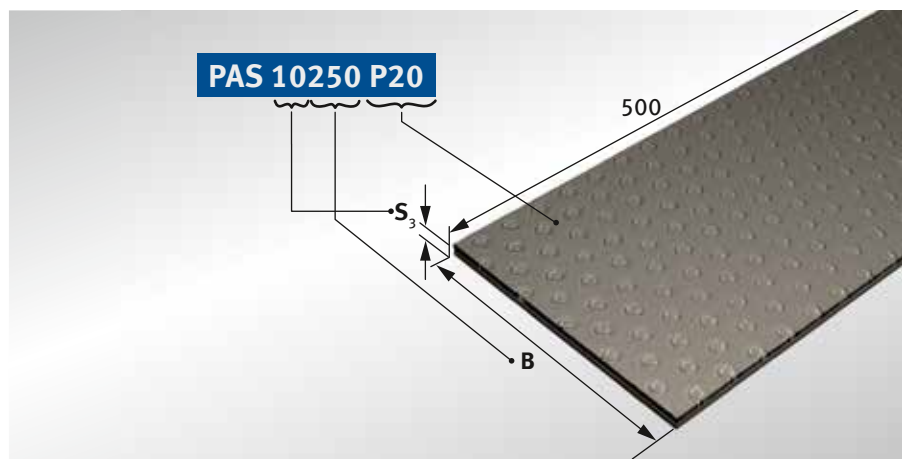


Fig. 60: Example order, P20 strip

Thrust washers of KS PERMAGLIDE® P20:

Inside diameter (D_i) 12 mm

Order designation: PAW 12 P20



Fig. 61: Example order, P20 thrust washer



9.1.1

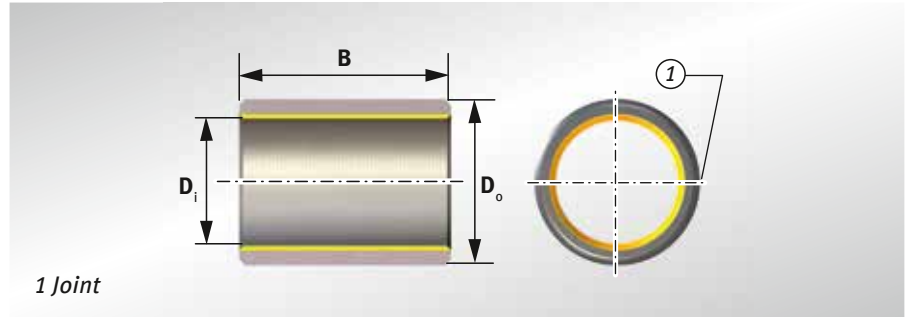
Series P10, P14, P147* with steel back

Recommended fitting tolerance:

Shaft		Housing bore	
$d_w < 5$	h6	$d_G \leq 5.5$	H6
$5 \leq d_w < 80$	f7	$5.5 < d_G$	H7
$80 \leq d_w$	h8		

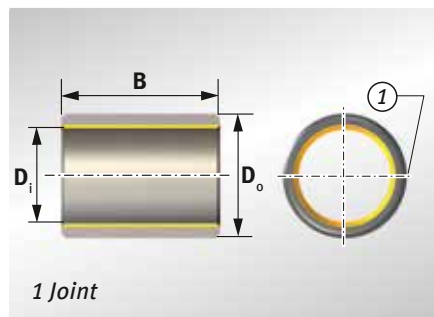
For bearing clearances, wall thicknesses and chamfer tolerances, see section 7, “Design and layout of bearing assembly”, “Theoretical bearing clearance”.

Bushes in special dimensions available on request.



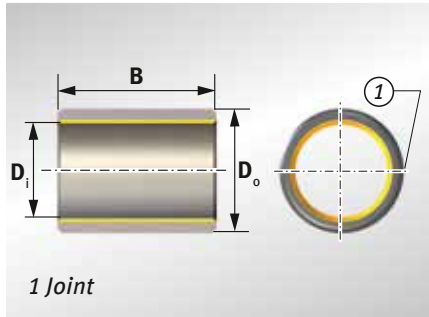
Dimension table (dimensions in mm)					
Shaft diameter	Order designation P10, P14, P147*	Weight g	Dimensions		
			Di	Do	B ±0.25
2	PAP 0203	0.15	2	3.5	3
	PAP 0205	0.25	2	3.5	5
3	PAP 0303	0.2	3	4.5	3
	PAP 0304	0.26	3	4.5	4
	PAP 0305	0.33	3	4.5	5
	PAP 0306	0.4	3	4.5	6
4	PAP 0403	0.25	4	5.5	3
	PAP 0404	0.33	4	5.5	4
	PAP 0406	0.5	4	5.5	6
	PAP 0410	0.84	4	5.5	10
5	PAP 0505	0.72	5	7	5
	PAP 0508	1.1	5	7	8
	PAP 0510	1.4	5	7	10
6	PAP 0606	1	6	8	6
	PAP 0608	1.3	6	8	8
	PAP 0610	1.7	6	8	10
7	PAP 0710	1.9	7	9	10
8	PAP 0808	1.7	8	10	8
	PAP 0810	2.1	8	10	10
	PAP 0812	2.6	8	10	12
10	PAP 1008	2.1	10	12	8
	PAP 1010	2.6	10	12	10
	PAP 1012	3.1	10	12	12
	PAP 1015	3.9	10	12	15
	PAP 1020	5.3	10	12	20
12	PAP 1208	2.5	12	14	8
	PAP 1210	3.1	12	14	10
	PAP 1212	3.7	12	14	12
	PAP 1215	4.7	12	14	15
	PAP 1220	6.2	12	14	20
	PAP 1225	7.8	12	14	25
13	PAP 1310	3.3	13	15	10

* On request



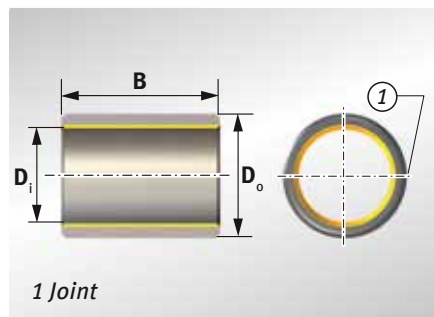
Dimension table · continued (dimensions in mm)					
Shaft diameter	Order designation P10, P14, P147*	Weight g	Dimensions		
			Di	Do	B ±0.25
14	PAP 1410	3.6	14	16	10
	PAP 1412	4.3	14	16	12
	PAP 1415	5.4	14	16	15
	PAP 1420	7.1	14	16	20
	PAP 1425	9	14	16	25
15	PAP 1510	3.8	15	17	10
	PAP 1512	4.6	15	17	12
	PAP 1515	5.7	15	17	15
	PAP 1520	7.6	15	17	20
	PAP 1525	9.5	15	17	25
16	PAP 1610	4	16	18	10
	PAP 1612	4.9	16	18	12
	PAP 1615	6.1	16	18	15
	PAP 1620	8.1	16	18	20
	PAP 1625	10.1	16	18	25
18	PAP 1810	4.5	18	20	10
	PAP 1815	6.8	18	20	15
	PAP 1820	9.1	18	20	20
	PAP 1825	11.3	18	20	25
20	PAP 2010	7.8	20	23	10
	PAP 2015	11.7	20	23	15
	PAP 2020	15.6	20	23	20
	PAP 2025	19.5	20	23	25
	PAP 2030	23.4	20	23	30
	PAP 2040	31.2	20	23	40
22	PAP 2215	12.7	22	25	15
	PAP 2220	17	22	25	20
	PAP 2225	21.3	22	25	25
	PAP 2230	25.5	22	25	30
24	PAP 2415	13.8	24	27	15
	PAP 2420	18.5	24	27	20
	PAP 2425	23.1	24	27	25
	PAP 2430	27.7	24	27	30
25	PAP 2510	9.6	25	28	10
	PAP 2515	14.4	25	28	15
	PAP 2520	19.2	25	28	20
	PAP 2525	24	25	28	25
	PAP 2530	28.8	25	28	30
	PAP 2540	38.4	25	28	40
28	PAP 2820	29.1	28	32	20
	PAP 2830	43.7	28	32	30

* On request



Dimension table · continued (dimensions in mm)					
Shaft diameter	Order designation P10, P14, P147*	Weight g	Dimensions		
			D _i	D _o	B ±0.25
30	PAP 3015	23.3	30	34	15
	PAP 3020	31.1	30	34	20
	PAP 3025	38.8	30	34	25
	PAP 3030	46.6	30	34	30
	PAP 3040	62.1	30	34	40
32	PAP 3230	49.5	32	36	30
	PAP 3240	66	32	36	40
35	PAP 3520	35.9	35	39	20
	PAP 3530	53.9	35	39	30
	PAP 3540	71.8	35	39	40
	PAP 3550	89.8	35	39	50
40	PAP 4020	40.8	40	44	20
	PAP 4030	61.2	40	44	30
	PAP 4040	81.5	40	44	40
	PAP 4050	102	40	44	50
45	PAP 4530	87	45	50	30
	PAP 4540	116	45	50	40
	PAP 4550	145	45	50	50
50	PAP 5020	64	50	55	20
	PAP 5030	96	50	55	30
	PAP 5040	128	50	55	40
	PAP 5060	192	50	55	60
55	PAP 5540	140	55	60	40
	PAP 5560	210	55	60	60
60	PAP 6030	114	60	65	30
	PAP 6040	152	60	65	40
	PAP 6060	228	60	65	60
	PAP 6070	266	60	65	70
65	PAP 6530	123	65	70	30
	PAP 6540	164	65	70	40
	PAP 6550	205	65	70	50
	PAP 6560	246	65	70	60
	PAP 6570	288	65	70	70
70	PAP 7040	176	70	75	40
	PAP 7050	221	70	75	50
	PAP 7070	309	70	75	70
75	PAP 7540	189	75	80	40
	PAP 7550	236	75	80	50
	PAP 7560	283	75	80	60
	PAP 7580	377	75	80	80

* On request



Dimension table · continued (dimensions in mm)

Shaft diameter	Order designation P10, P14, P147*	Weight g	Dimensions		
			Di	Do	B ±0.25
80	PAP 8040	201	80	85	40
	PAP 8060	301	80	85	60
	PAP 8080	402	80	85	80
	PAP 80100	502	80	85	100
85	PAP 8560	319	85	90	60
	PAP 85100	532	85	90	100
90	PAP 9050	281	90	95	50
	PAP 9060	338	90	95	60
	PAP 90100	563	90	95	100
95	PAP 9560	356	95	100	60
	PAP 95100	593	95	100	100
100	PAP 10050	312	100	105	50
	PAP 10060	374	100	105	60
	PAP 100115	717	100	105	115
105	PAP 10560	392	105	110	60
	PAP 105115	752	105	110	115
110	PAP 11060	411	110	115	60
	PAP 110115	787	110	115	115
115	PAP 11550	357	115	120	50
	PAP 11560	429	115	120	60
	PAP 11570	500	115	120	70
120	PAP 12060	447	120	125	60
	PAP 120100	745	120	125	100
125	PAP 125100	776	125	130	100
130	PAP 13060	484	130	135	60
	PAP 130100	806	130	135	100
135	PAP 13560	502	135	140	60
	PAP 13580	669	135	140	80
140	PAP 14060	520	140	145	60
	PAP 140100	867	140	145	100
150	PAP 15060	557	150	155	60
	PAP 15080	742	150	155	80
	PAP 150100	928	150	155	100
160	PAP 16080	791	160	165	80
	PAP 160100	989	160	165	100
180	PAP 180100	1110	180	185	100
200	PAP 200100	1232	200	205	100
220	PAP 220100	1354	220	225	100
250	PAP 250100	1536	250	255	100
300	PAP 300100	1840	300	305	100

* On request



9.1.2

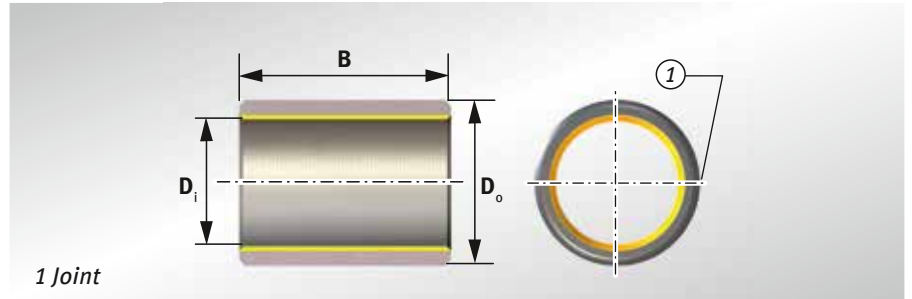
Series P10Bz* with bronze back (formerly P11)

Recommended fitting tolerance:

Shaft		Housing bore
$5 \leq d_w < 80$	f7	H7
$80 \leq d_w$	h8	

For bearing clearances, wall thicknesses and chamfer tolerances, see section 7, “Design and layout of bearing assembly”, “Theoretical bearing clearance”.

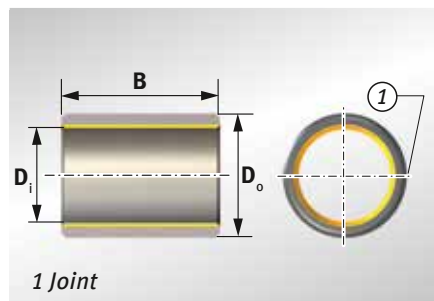
Bushes in special dimensions available on request.



Dimension table (dimensions in mm)

Shaft diameter	Order designation P10Bz*	Weight g	Dimensions		
			D _i	D _o	B ±0.25
4	PAP 0406	0.8	4	6	6
5	PAP 0505	0.8	5	7	5
6	PAP 0606	1.1	6	8	6
	PAP 0610	1.8	6	8	10
8	PAP 0808	1.9	8	10	8
	PAP 0810	2.3	8	10	10
	PAP 0812	2.8	8	10	12
10	PAP 1005	1.4	10	12	5
	PAP 1010	2.8	10	12	10
	PAP 1015	4.2	10	12	15
	PAP 1020	5.7	10	12	20
12	PAP 1210	3.3	12	14	10
	PAP 1212	4	12	14	12
	PAP 1215	5.1	12	14	15
	PAP 1220	6.7	12	14	20
	PAP 1225	8.4	12	14	25
14	PAP 1415	5.8	14	16	15
15	PAP 1515	6.2	15	17	15
	PAP 1525	10.3	15	17	25
16	PAP 1615	6.6	16	18	15
	PAP 1625	11	16	18	25
18	PAP 1815	7.4	18	20	15
	PAP 1825	12.3	18	20	25
20	PAP 2015	12.8	20	23	15
	PAP 2020	17	20	23	20
	PAP 2025	21.3	20	23	25
	PAP 2030	25.5	20	23	30
22	PAP 2215	14	22	25	15
	PAP 2220	18.6	22	25	20
	PAP 2225	23.3	22	25	25
24	PAP2430	30.3	24	27	30
25	PAP 2525	26.2	25	28	25
	PAP 2530	31.5	25	28	30
28	PAP 2830	47.9	28	32	30

* On request



Dimension table · continued (dimensions in mm)

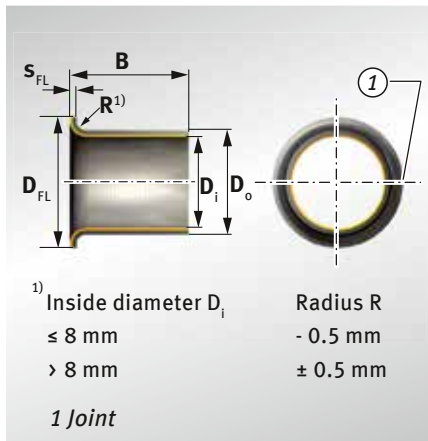
Shaft diameter	Order designation P10Bz*	Weight g	Dimensions		
			Di	Do	B ±0.25
30	PAP 3020	34.1	30	34	20
	PAP 3030	51.1	30	34	30
	PAP 3040	68.2	30	34	40
35	PAP 3520	39.4	35	39	20
	PAP 3530	59.1	35	39	30
40	PAP 4050	112	40	44	50
45	PAP 4550	159	45	50	50
50	PAP 5030	105	50	55	30
	PAP 5040	140	50	55	40
	PAP 5060	211	50	55	60
55	PAP 5540	154	55	60	40
60	PAP 6040	167	60	65	40
	PAP 6050	209	60	65	50
	PAP 6060	251	60	65	60
	PAP 6070	293	60	65	70
70	PAP 7050	242	70	75	50
	PAP 7070	339	70	75	70
80	PAP 8060	331	80	85	60
	PAP 80100	552	80	85	100
90	PAP 9060	371	90	95	60
	PAP 90100	619	90	95	100
95	PAP 9560	391	95	100	60
100	PAP 10060	411	100	105	60
	PAP 100115	788	100	105	115

* On request



9.2.1

Series P10, P14, P147* with steel back



Collar bushes in special dimensions
available on request.

Dimension table (dimensions in mm)							
Shaft diameter	Order designation P10, P14, P147*	Weight g	Dimensions				
			D_i	D_o	D_{FL} ± 0.5	B ± 0.25	S_{FL} -0.2
6	PAF 06040	0.9	6	8	12	4	1
	PAF 06070	1.4	6	8	12	7	1
	PAF 06080	1.6	6	8	12	8	1
8	PAF 08055	1.7	8	10	15	5.5	1
	PAF 08075	2.1	8	10	15	7.5	1
	PAF 08095	2.5	8	10	15	9.5	1
10	PAF 10070	2.5	10	12	18	7	1
	PAF 10090	3	10	12	18	9	1
	PAF 10120	3.8	10	12	18	12	1
	PAF 10170	5	10	12	18	17	1
12	PAF 12070	3	12	14	20	7	1
	PAF 12090	3.6	12	14	20	9	1
	PAF 12120	4.5	12	14	20	12	1
	PAF 12170	5.9	12	14	20	17	1
14	PAF 14120	5.1	14	16	22	12	1
	PAF 14170	6.9	14	16	22	17	1
15	PAF 15090	4.4	15	17	23	9	1
	PAF 15120	5.5	15	17	23	12	1
	PAF 15170	7.3	15	17	23	17	1
16	PAF 16120	5.8	16	18	24	12	1
	PAF 16170	7.8	16	18	24	17	1
18	PAF 18120	6.5	18	20	26	12	1
	PAF 18170	8.7	18	20	26	17	1
	PAF 18220	10.9	18	20	26	22	1
20	PAF 20115	11.4	20	23	30	11.5	1.5
	PAF 20165	15.1	20	23	30	16.5	1.5
	PAF 20215	18.9	20	23	30	21.5	1.5
25	PAF 25115	14	25	28	35	11.5	1.5
	PAF 25165	18.6	25	28	35	16.5	1.5
	PAF 25215	23.5	25	28	35	21.5	1.5
30	PAF 30160	30.5	30	34	42	16	2
	PAF 30260	45.5	30	34	42	26	2
35	PAF 35160	35	35	39	47	16	2
	PAF 35260	53	35	39	47	26	2
40	PAF 40260	61	40	44	53	26	2

* On request

9.2.2

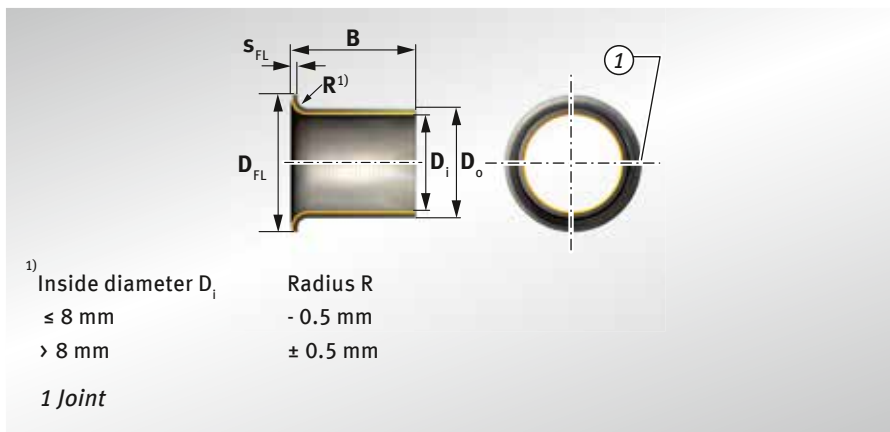
Series P10Bz* with bronze back

Recommended fitting tolerance:

Shaft	Housing bore
f7	H7

For bearing clearances, wall thicknesses and chamfer tolerances, see section 7, “Design and layout of bearing assembly”, “Theoretical bearing clearance”.

Collar bushes in special dimensions available on request.



Dimension table (dimensions in mm)							
Shaft diameter	Order designation P10Bz*	Weight g	Dimensions				
			D_i	D_o	$D_{FL} \pm 0.5$	$B \pm 0.25$	$s_{FL} - 0.2$
6	PAF 06080	1.8	6	8	12	8	1
8	PAF 08055	1.8	8	10	15	5.5	1
	PAF 08095	2.7	8	10	15	9.5	1
10	PAF 10070	2.7	10	12	18	7	1
	PAF 10120	4.1	10	12	18	12	1
	PAF 10170	5.5	10	12	18	17	1
12	PAF 12070	3.2	12	14	20	7	1
	PAF 12090	3.9	12	14	20	9	1
	PAF 12120	4.9	12	14	20	12	1
15	PAF 15120	6	15	17	23	12	1
	PAF 15170	8	15	17	23	17	1
16	PAF 16120	6.3	16	18	24	12	1
18	PAF 18100	6.1	18	20	26	10	1
	PAF 18220	11.8	18	20	26	22	1
20	PAF 20115	12.4	20	23	30	11.5	1.5
	PAF 20165	16.6	20	23	30	16.5	1.5
25	PAF 25215	25.5	25	28	35	21.5	1.5
30	PAF 30160	33.5	30	34	42	16	2
	PAF 30260	50	30	34	42	26	2
35	PAF 35260	58	35	39	47	26	2
40	PAF 40260	67	40	44	53	26	2

* On request

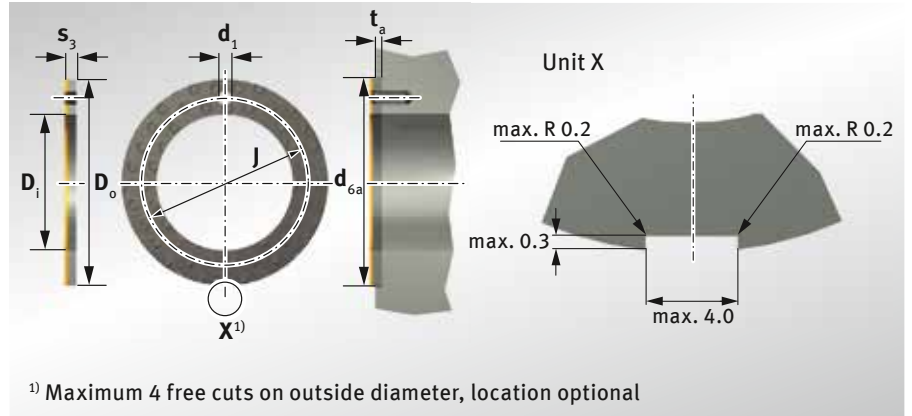


9.3.1

Series P10, P14, P147*
with steel back

Series P10Bz*
with bronze back

Thrust washers in special dimensions
available on request.



¹⁾ Maximum 4 free cuts on outside diameter, location optional

Dimension table (dimensions in mm)								
Order designation --- P10, P10Bz*, P14, P147*	Weight g	Dimensions					Connection dimensions	
		D_i +0.25	D_o -0.25	s_3 -0.05	J ± 0.12	d_1 +0.4 +0.1	t_a ± 0.2	d_{6a} +0.12
PAW 10	2.7	10	20	1.5	15	1.5	1	20
PAW 12	3.9	12	24	1.5	18	1.5	1	24
PAW 14	4.3	14	26	1.5	20	2	1	26
PAW 16	5.8	16	30	1.5	22	2	1	30
PAW 18	6.3	18	32	1.5	25	2	1	32
PAW 20	8.1	20	36	1.5	28	3	1	36
PAW 22	8.7	22	38	1.5	30	3	1	38
PAW 26	11.4	26	44	1.5	35	3	1	44
PAW 28	13.7	28	48	1.5	38	4	1	48
PAW 32	17.1	32	54	1.5	43	4	1	54
PAW 38	21.5	38	62	1.5	50	4	1	62
PAW 42	23.5	42	66	1.5	54	4	1	66
PAW 48	38.5	48	74	2	61	4	1.5	74
PAW 52	41	52	78	2	65	4	1.5	78
PAW 62	52	62	90	2	76	4	1.5	90

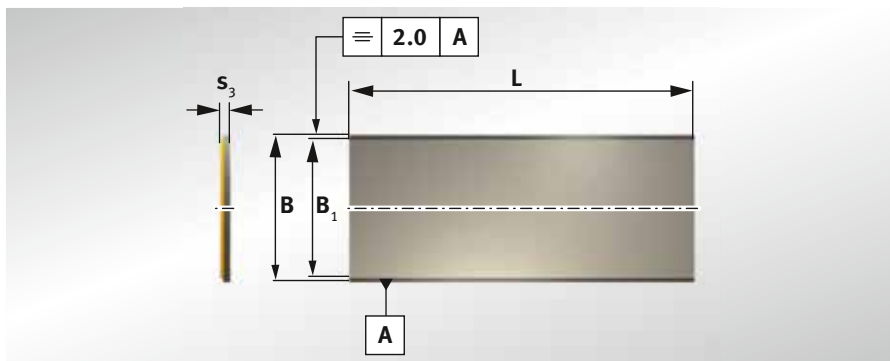
* On request

9.4.1

Series P10, P14, P147*
with steel back

Series P10Bz*
with bronze back
(formerly P11)

Strips in special dimensions available
on request.



Dimension table (dimensions in mm)

Order designation P10, P14, P147*	Weight g	Dimensions			
		s_3 -0.04	B +1.5	B_1	L +3
PAS 07250	703	0.75	250	238	500
PAS 10250	948	1	250	238	500
PAS 15250	1439	1.5	250	238	500
PAS 20250	1930	2	250	238	500
PAS 25250	2420	2.5	250	238	500
PAS 30250	2970	3.06	250	238	500

Dimension table (dimensions in mm)

Order designation P10Bz*	Weight g	Dimensions			
		s_3 -0.04	B +1.5	B_1	L +3
PAS 10160	658	1	160	148	500
PAS 15180	1132	1.5	180	168	500
PAS 20180	1523	2	180	168	500
PAS 25180	1915	2.5	180	168	500

B = overall width

B_1 = useful width

* On request



9.5

Series P20, P200

Recommended fitting tolerance:

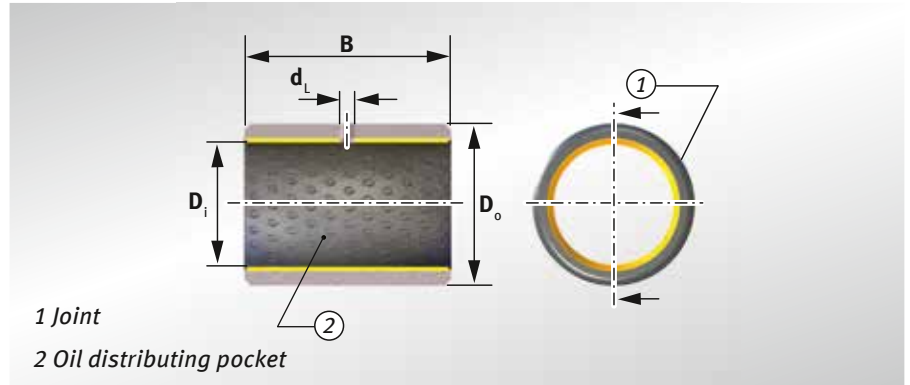
Shaft	Housing bore
h8	H7

For bearing clearances, wall thicknesses and chamfer tolerances, see section 7, “Design and layout of bearing assembly”, “Theoretical bearing clearance”.

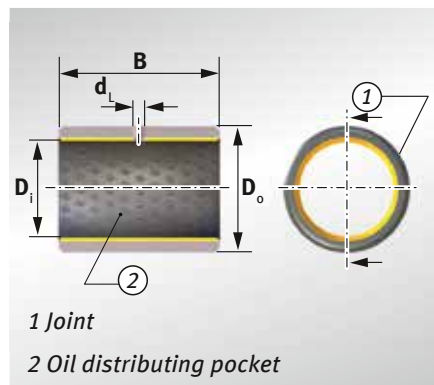
Shaping the lubricating bore by roll bending is permitted.

Bushes P22, P23, P202 and P203 available on request.

Bushes in special dimensions available on request.



Dimension table (dimensions in mm)						
Shaft diameter	Order designation P20, P200	Weight g	Dimensions			
			D _i	D _o	B ±0.25	d _L
8	PAP 0808	1,6	8	10	8	- ¹⁾
	PAP 0810	2	8	10	10	- ¹⁾
	PAP 0812	2,4	8	10	12	- ¹⁾
10	PAP 1008	2	10	12	8	- ¹⁾
	PAP 1010	2,4	10	12	10	3
	PAP 1015	3,7	10	12	15	3
12	PAP 1210	2,9	12	14	10	3
	PAP 1212	3,5	12	14	12	3
	PAP 1215	4,4	12	14	15	3
	PAP 1220	5,9	12	14	20	3
14	PAP 1420	6,8	14	16	20	3
15	PAP 1510	3,6	15	17	10	3
	PAP 1515	5,4	15	17	15	3
	PAP 1525	9	15	17	25	3
16	PAP 1612	4,6	16	18	12	3
	PAP 1615	5,7	16	18	15	3
	PAP 1620	7,7	16	18	20	3
18	PAP 1815	6,4	18	20	15	3
	PAP 1820	8,6	18	20	20	3
20	PAP 2015	11,2	20	23	15	3
	PAP 2020	15	20	23	20	3
	PAP 2025	18,8	20	23	25	3
	PAP 2030	23,1	20	23	30	3



Dimension table · continued (dimensions in mm)						
Shaft diameter	Order designation P20, P200	Weight g	Dimensions			
			D_i	D_o	$B \pm 0.25$	d_L
22	PAP 2220	16.4	22	25	20	3
25	PAP 2515	13.9	25	28	15	4
	PAP 2520	18.5	25	28	20	4
	PAP 2525	23.1	25	28	25	4
	PAP 2530	27.8	25	28	30	4
28	PAP 2830	42.6	28	32	30	4
30	PAP 3020	30.3	30	34	20	4
	PAP 3025	37.8	30	34	25	4
	PAP 3030	45.4	30	34	30	4
	PAP 3040	60.6	30	34	40	4
32	PAP 3230	48.2	32	36	30	4
35	PAP 3520	35	35	39	20	4
	PAP 3530	52.5	35	39	30	4
	PAP 3550	87.5	35	39	50	4
40	PAP 4020	39.7	40	44	20	4
	PAP 4030	59.6	40	44	30	4
	PAP 4040	79.5	40	44	40	4
	PAP 4050	99.3	40	44	50	4
45	PAP 4540	113	45	50	40	5
	PAP 4550	142	45	50	50	5
50	PAP 5025	78	50	55	25	5
	PAP 5040	125	50	55	40	5
	PAP 5060	188	50	55	60	5
55	PAP 5540	137	55	60	40	5
60	PAP 6030	112	60	65	30	6
	PAP 6040	142	60	65	40	6
	PAP 6060	224	60	65	60	6
70	PAP 7040	173	70	75	40	6
	PAP 7050	216	70	75	50	6
	PAP 7070	303	70	75	70	6
75	PAP 7540	185	75	80	40	6
	PAP 7580	370	75	80	80	6
80	PAP 8040	197	80	85	40	6
	PAP 8055	271	80	85	55	6
	PAP 8060	295	80	85	60	6
	PAP 8080	394	80	85	80	6
90	PAP 9060	331	90	95	60	6
100	PAP 10050	305	100	105	50	8
	PAP 10060	366	100	105	60	8

¹⁾ No lubricating hole

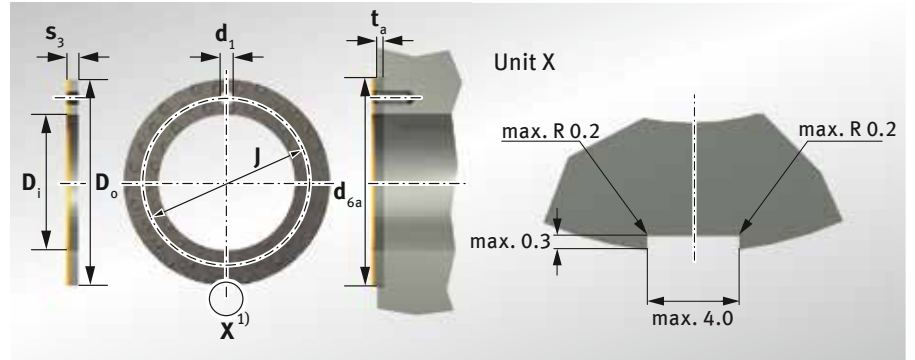


9.6

Series P20, P200

Thrust washers of P22, P23, P202 and P203 available on request.

Thrust washers in special dimensions available on request.



Dimension table (dimensions in mm)								
Order designation P20, P200	Weight g	Dimensions					Connection dimensions	
		D_i +0.25	D_o -0.25	s_3 -0.05	J ± 0.12	d_1 +0.4 +0.1	t_a ± 0.2	d_{6a} +0.12
PAW 12	3.8	12	24	1.5	18	1.5	1	24
PAW 14	4.2	14	26	1.5	20	2	1	26
PAW 18	6.1	18	32	1.5	25	2	1	32
PAW 20	7.8	20	36	1.5	28	3	1	36
PAW 22	8.4	22	38	1.5	30	3	1	38
PAW 26	11	26	44	1.5	35	3	1	44
PAW 28	13.3	28	48	1.5	38	4	1	48
PAW 32	16.5	32	54	1.5	43	4	1	54
PAW 38	21	38	62	1.5	50	4	1	62
PAW 42	22.5	42	66	1.5	54	4	1	66
PAW 48	37.5	48	74	2	61	4	1.5	74
PAW 52	40	52	78	2	65	4	1.5	78

¹⁾ Maximum 4 free cuts on outside diameter, location optional

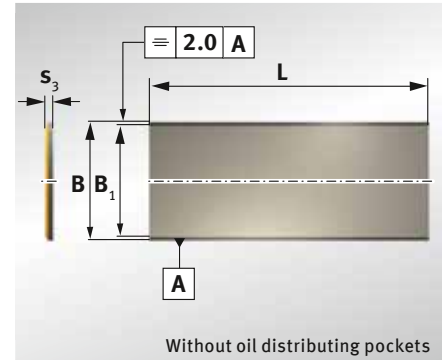
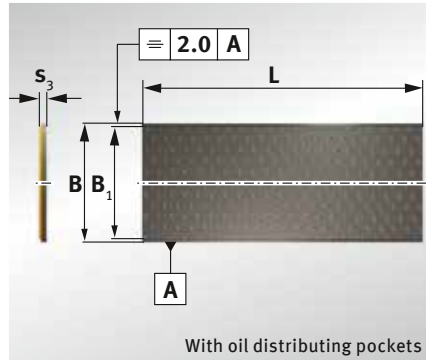
9.7

Series P20, P200

- P20 With oil distributing pocket, ready to install
- P22 Without oil distributing pocket, with machining allowance
- P23 Without oil distributing pocket, ready to install
- P200 With oil distributing pocket, ready to install
- P202 Without oil distributing pocket, with machining allowance
- P203 Without oil distributing pocket, ready to install

Strips P22, P23, P202 and P203 available on request.

Strips in special dimensions available on request.



Dimension table (dimensions in mm)					
Order designation P20, P200	Weight g	Dimensions			
		s ₃ -0.04	B +1.5	B ₁	L +3
PAS 10250	889	0.99	250	238	500
PAS 15250	1321	1.48	250	238	500
PAS 20250	1779	1.97	250	238	500
PAS 25250	2225	2.46	250	168	500

B = overall width

B₁ = useful width

Dimension table (dimensions in mm)					
Order designation P22, P202	Weight g	Dimensions			
		s ₃ ¹⁾ -0.04	B +1.5	B ₁	L +3
PAS 10250	988	1.11	250	238	500
PAS 15250	1375	1.61	250	238	500
PAS 20250	1833	2.11	250	238	500
PAS 25250	2279	2.63	250	238	500

Supplied on request.

¹⁾ Machining allowance: 0.15 mm.



ORIGINAL
PERMAGLIDE



ORIGINAL PERMAGLIDE

www.permaglide.com



KS PERMAGLIDE® Partner:

International Sales:

MS Motor Service International GmbH

Wilhelm-Maybach-Straße 14-18

74196 Neuenstadt, Germany

www.ms-motor-service.com

Production:

KS Gleitlager GmbH

Am Bahnhof 14

68789 St. Leon-Rot, Germany

Phone: +49 6227 56-0

Fax: +49 6227 56-302

www.kspg-ag.de

KSPG AUTOMOTIVE GROUP



4 028977 672484



**MOTOR
SERVICE**