




METAFRAM[®]

The self-lubricating bearings specialist

S I N T E R E D M E T A L P R O D U C T S





With over 60 years experience, SinterTech is one of the world's leading powder metallurgy specialists. SinterTech engineers develop a wide range of sintered products under 4 brand names, SinterTech®, Poral®, Metafram® & Metaglass®, designed to meet all your industrial needs.



**SINTERTECH®
MECHANICAL PARTS**
Complex and intricate mechanical components, available in a wide range of materials.



**PORAL®
SINTERED METAL POROUS FILTERS**
Liquid and gas filters for critical and demanding applications.



**METAFRAM®
SELF-LUBRICATING BEARINGS**
Plain bearings and bushings in standard or custom dimensions.



**METAGLISS®
SELF-LUBRICATING FRICTION PLATES**
Low friction contact plates.

METAFRAM®

Well-known brand of high performance sintered self-lubricating bearings in bronze or steel alloys.

HIGHEST QUALITY STANDARDS

- › ISO 14001
- › OHSAS 18001
- › ISO/TS 16949
- › ISO 9001



MAIN ADVANTAGES OF SINTERED SELF-LUBRICATING BEARINGS

Depending on the type of material and lubricant used, a self-lubricating bearing can offer the following technical advantages:

Performance

An extremely wide range of operating loads, speeds and temperatures:

- › Dynamic loads from 6 to 75 MPa.
- › Speeds from 0 to 8 m/s.
- › Temperatures from -180°C to +300°C.

Suitable for use in a wide range of environments:

- › Marine environment.
- › Radio-active environments.
- › Contact with corrosive liquids or substances incompatible with oils.
- › Food preparation.

Cost savings

- › Maintenance-free operation.
- › Lower price compared to cast metal and machined bearings.
- › Supports complex forms and shapes.
- › High dimensional accuracy.
- › Excellent surface finish.
- › Reduced weight compared to similar non-porous components.

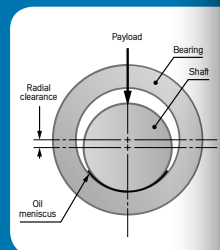
Safety

- › Permanent oil film lubrication.
- › Low friction factor.
- › Quiet operation.
- › Good operation at low speed and shock resistant.
- › Good corrosion resistance.

Principles of lubrication

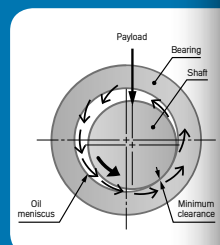
Stationary position:

- › Shaft in contact with the bearing
- › Presence of an oil meniscus at the point of contact through the action of capillary forces.
- › This oil meniscus is very helpful for instant lubrication during startup.



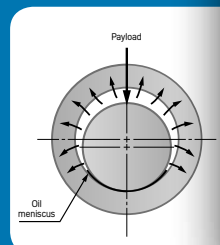
Rotating shaft:

- › Oil is drawn out of the bearing in the upper aspiration zone.
- › The oil is driven around by the rotation of the shaft and forms an oil wedge that produces the pressure necessary to lift the shaft.
- › The pressure produced forces part of the circulating oil into the pores of the bearing.



After operation:

- › The oil is re-absorbed by the porous bearing, under the action of capillary forces.
- › The oil meniscus remains at the point of contact ready for instant lubrication at startup.



Self-lubricating flanged bearings



Flanged bearing with FP 20 iron alloy base

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Flange		Overall bearing length (L)
		Ø Outside diameter mm (Ø3)	Thickness mm (e)	
C3 ⁺²⁰ / ₊₆	6 ⁺³⁷ / ₊₁₉	9	1,5	4
C6 ⁺²⁸ / ₊₁₀	10 ⁺⁴⁵ / ₊₂₃	14	2	6-10-16
C8 ⁺³⁵ / ₊₁₃	12 ⁺⁵⁵ / ₊₂₈	16	2	8-12-16
C10 ⁺³⁵ / ₊₁₃	13 ⁺⁵⁵ / ₊₂₈	16	1,5	10-16
C10 ⁺³⁵ / ₊₁₃	15 ⁺⁵⁵ / ₊₂₈	20	2,5	10-16-20
C12 ⁺⁴³ / ₊₁₆	15 ⁺⁵⁵ / ₊₂₈	18	1,5	12-16-20
C12 ⁺⁴³ / ₊₁₆	17 ⁺⁵⁵ / ₊₂₈	22	2,5	12-16
C14 ⁺⁴³ / ₊₁₆	18 ⁺⁵⁵ / ₊₂₈	22	2	14-18-22
C16 ⁺⁴³ / ₊₁₆	20 ⁺⁶⁸ / ₊₃₅	24	2	16-20
C16 ⁺⁴³ / ₊₁₆	22 ⁺⁶⁸ / ₊₃₅	28	3	16-20-25
C18 ⁺⁴³ / ₊₁₆	24 ⁺⁶⁸ / ₊₃₅	30	3	18-22

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Flange		Overall bearing length (L)
		Ø Outside diameter mm (Ø3)	Thickness mm (e)	
C20 ⁺⁵³ / ₊₂₀	24 ⁺⁶⁸ / ₊₃₅	28	2	16-20-25
C20 ⁺⁵³ / ₊₂₀	26 ⁺⁶⁸ / ₊₃₅	32	3	16-20-25
C22 ⁺⁵³ / ₊₂₀	29 ⁺⁶⁸ / ₊₃₅	36	3,5	18-22-28-36
C25 ⁺⁵³ / ₊₂₀	30 ⁺⁶⁸ / ₊₃₅	35	2,5	20-32
C25 ⁺⁵³ / ₊₂₀	32 ⁺⁸² / ₊₄₃	39	3,5	25-32
C30 ⁺⁵³ / ₊₂₀	38 ⁺⁸² / ₊₄₃	46	4	30
C32 ⁺⁶⁴ / ₊₂₅	40 ⁺⁸² / ₊₄₃	48	4	20-32
C36 ⁺⁶⁴ / ₊₂₅	45 ⁺⁸² / ₊₄₃	51	4,5	22-36
C40 ⁺⁶⁴ / ₊₂₅	50 ⁺⁸² / ₊₄₃	60	5	25-32-40
C50 ⁺⁶⁴ / ₊₂₅	60 ⁺⁹⁹ / ₊₅₃	70	5	50
C60 ⁺⁷⁶ / ₊₃₀	70 ⁺¹⁰⁵ / ₊₅₉	80	5	50-60

Tolerances in microns

Flanged bearing with BP 25 bronze base

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Flange		Overall bearing length (L)
		Ø Outside diameter mm (Ø3)	Thickness mm (e)	
C3 ⁺²⁰ / ₊₆	6 ⁺³⁷ / ₊₁₉	9	1,5	4-6-10
C4 ⁺²⁸ / ₊₁₀	8 ⁺⁴⁵ / ₊₂₃	12	2	4-8-12
C6 ⁺²⁸ / ₊₁₀	10 ⁺⁴⁵ / ₊₂₃	14	2	6-10-16
C8 ⁺³⁵ / ₊₁₃	12 ⁺⁵⁵ / ₊₂₈	16	2	8-12-16
C9 ⁺³⁵ / ₊₁₃	14 ⁺⁵⁵ / ₊₂₈	19	2,5	6-10-14
C10 ⁺³⁵ / ₊₁₃	13 ⁺⁵⁵ / ₊₂₈	16	1,5	10-16-20
C10 ⁺³⁵ / ₊₁₃	15 ⁺⁵⁵ / ₊₂₈	20	2,5	10-16-20
C10 ⁺³⁵ / ₊₁₃	16 ⁺⁵⁵ / ₊₂₈	22	3	8-10-16
C12 ⁺⁴³ / ₊₁₆	15 ⁺⁵⁵ / ₊₂₈	18	1,5	12-16-20
C12 ⁺⁴³ / ₊₁₆	17 ⁺⁵⁵ / ₊₂₈	22	2,5	12-16-20-25
C12 ⁺⁴³ / ₊₁₆	18 ⁺⁵⁵ / ₊₂₈	24	3	8-12-20
C14 ⁺⁴³ / ₊₁₆	18 ⁺⁵⁵ / ₊₂₈	22	2	14-18-22
C14 ⁺⁴³ / ₊₁₆	20 ⁺⁶⁸ / ₊₃₅	26	3	14-18-22-28
C15 ⁺⁴³ / ₊₁₆	19 ⁺⁶⁸ / ₊₃₅	23	2	16-20-25
C15 ⁺⁴³ / ₊₁₆	21 ⁺⁶⁸ / ₊₃₅	27	3	16-20-25-32
C16 ⁺⁴³ / ₊₁₆	20 ⁺⁶⁸ / ₊₃₅	24	2	16-20-25
C16 ⁺⁴³ / ₊₁₆	22 ⁺⁶⁸ / ₊₃₅	28	3	16-20-25-32
C18 ⁺⁴³ / ₊₁₆	22 ⁺⁶⁸ / ₊₃₅	26	2	18-22-28
C18 ⁺⁴³ / ₊₁₆	24 ⁺⁶⁸ / ₊₃₅	30	3	18-22-28
C20 ⁺⁵³ / ₊₂₀	24 ⁺⁶⁸ / ₊₃₅	28	2	16-20-25

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Flange		Overall bearing length (L)
		Ø Outside diameter mm (Ø3)	Thickness mm (e)	
C20 ⁺⁵³ / ₊₂₀	26 ⁺⁶⁸ / ₊₃₅	32	3	16-20-25-32
C22 ⁺⁵³ / ₊₂₀	27 ⁺⁶⁸ / ₊₃₅	32	2,5	18-22-28
C22 ⁺⁵³ / ₊₂₀	28 ⁺⁶⁸ / ₊₃₅	34	3	15-20-25-30
C22 ⁺⁵³ / ₊₂₀	29 ⁺⁶⁸ / ₊₃₅	36	3,5	18-22-28-36
C25 ⁺⁵³ / ₊₂₀	30 ⁺⁶⁸ / ₊₃₅	35	2,5	20-25-32
C25 ⁺⁵³ / ₊₂₀	32 ⁺⁸² / ₊₄₃	39	3,5	20-25-32
C28 ⁺⁵³ / ₊₂₀	33 ⁺⁸² / ₊₄₃	38	2,5	22-28-36
C28 ⁺⁵³ / ₊₂₀	36 ⁺⁸² / ₊₄₃	44	4	22-28-36
C30 ⁺⁵³ / ₊₂₀	38 ⁺⁸² / ₊₄₃	46	4	20-25-30
C32 ⁺⁶⁴ / ₊₂₅	38 ⁺⁸² / ₊₄₃	44	3	20-25-32
C32 ⁺⁶⁴ / ₊₂₅	40 ⁺⁸² / ₊₄₃	48	4	20-25-30-32
C36 ⁺⁶⁴ / ₊₂₅	42 ⁺⁸² / ₊₄₃	48	3	22-28-36
C36 ⁺⁶⁴ / ₊₂₅	45 ⁺⁸² / ₊₄₃	54	4,5	22-28-36
C40 ⁺⁶⁴ / ₊₂₅	46 ⁺⁸² / ₊₄₃	52	3	25-32-40
C40 ⁺⁶⁴ / ₊₂₅	50 ⁺⁸² / ₊₄₃	60	5	25-32-40
C45 ⁺⁶⁴ / ₊₂₅	51 ⁺⁹⁹ / ₊₅₃	57	3	28-36-45
C45 ⁺⁶⁴ / ₊₂₅	56 ⁺⁹⁹ / ₊₅₃	67	5,5	28-36-45
C50 ⁺⁶⁴ / ₊₂₅	56 ⁺⁹⁹ / ₊₅₃	62	3	32-40-50
C50 ⁺⁶⁴ / ₊₂₅	60 ⁺⁹⁹ / ₊₅₃	70	5	32-40-50
C60 ⁺⁶⁴ / ₊₂₅	70 ⁺¹⁰⁵ / ₊₅₉	80	5	50-60

Tolerances in microns

Tolerances

BEARING BEFORE ASSEMBLY:

Bore diameter: Ø1	Tolerance: F8
Outside diameter: Ø2	Tolerance: s8
Overall length: L > 10	Tolerance: 1%
Overall length: L ≤ 10	Tolerance: 0,10 mm
Flange: Outside diameter - Ø3	Tolerance: js13
Thickness: e	Tolerance: js14

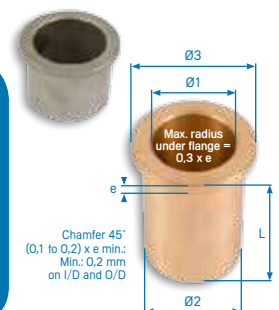
CONCENTRICITY TOLERANCE Ø1 AND Ø2:

Difference between comparator	
Min./Max. readings for one complete rotation of the bearing fitted on a mandrel	
Bore diameter ≤ 20	Tolerance: 50 µm
Bore diameter 20 < a ≤ 35	Tolerance: 70 µm
Bore diameter > 35	Tolerance: 100 µm

Designation

A flanged bearing
I/D 22 - O/D 29 - L 36
is designated by:

- its material grade **METAFRAM®** BP 25 (or FP 20)
- its dimensions C22/29x36 ('C' indicating flanged bearing)



Self-lubricating cylindrical bearings



Cylindrical bearing with FP 20 iron alloy base

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Overall bearing length (L)
3	6	4-10
4	8	8
6	9	6-10-12-16
6	10	6-10-16
6	12	6
8	11	8-12-16
8	12	8-12-16-20
10	13	10-20-25
10	14	10-16-20
10	15	10
12	15	12-16-20
12	16	12-16-20-25
12	17	12
14	18	14-18-22

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Overall bearing length (L)
14	20	14-28
15	19	16-20
16	20	16-20-25-32
16	22	16-20-25
18	22	18-22
18	24	22
20	24	16-20-25-32
20	26	16-20-25-32
22	27	18-22
25	30	20-25-32
25	32	20-25-32
30	38	24-30-38
32	38	32
35	44	22-28-35

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Overall bearing length (L)
36	42	22
40	46	25-32-40
40	50	25-32-40-50
45	51	28-45
45	55	35
45	56	36
50	56	32
50	60	50
60	70	60-90
70	80	120
80	100	120
100	120	120

Tolerances in microns

Cylindrical bearing with BP 25 bronze base

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Overall bearing length (L)
2	5	2-3
3	6	4-6-10
4	7	4-8-12
4	8	4-8-12
5	8	5-8-10-12-16
5	9	4-5-8
6	9	6-10-12-16
6	10	6-10-12-16
6	12	6-10-12-16
7	10	5-8-10
8	11	8-12-16-20
8	12	8-12-16-20
8	14	8-12-16-20
9	12	6-10-14
10	13	10-16-20-25
10	14	10-16-20-25
10	15	10-16-20-25
10	16	10-16-20-25
12	15	12-16-20-25
12	16	12-16-20-25
12	17	12-16-20-25
12	18	12-16-20-25
14	18	14-18-22-28

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Overall bearing length (L)
14	20	14-18-22-28
15	19	16-20-25-32
15	21	16-20-25-32
16	20	16-20-25-32
16	22	16-20-25-32
18	22	18-22-28-36
18	24	18-22-28-36
18	25	18-22-28-36
20	24	16-20-25-32
20	25	16-20-25-32
20	26	16-20-25-32
20	27	16-20-25-32
20	28	16-20-25-32
22	27	18-22-28-36
22	28	18-22-28-36
22	29	18-22-28-36
25	30	20-25-32-40
25	32	20-25-32-40
28	32	22-28-36-45
28	33	22-28-36-45
28	36	22-28-36-45
30	38	24-30-38
32	38	20-25-32-40-50

Bore diameter mm (Ø1)	Outside diameter mm (Ø2)	Overall bearing length (L)
32	40	20-25-32-40-50
35	44	22-28-35
35	45	25-35-40-50
36	42	22-28-36-45
36	45	22-28-36-45
38	44	25-35-45
40	46	25-32-40-50
40	50	25-32-40-50
45	51	28-36-45-56
45	55	35-45-55-65
45	56	28-36-45-56
50	56	32-40-50-63
50	60	32-40-50-63
55	65	40-55-70
60	70	50-60-90-120
60	72	50-60-70
60	80	90-120
63	70	40-50
70	80	90-120
80	100	120
100	120	120
110	125	120
125	150	120

Tolerances in microns

Tolerances

BEARING BEFORE ASSEMBLY:

Bore diameter: Ø1	Tolerance: F7 (F8 for Ø1>50 mm)
Outside diameter: Ø2	Tolerance: s7 (s8 for Ø2>50 mm)
Overall length: L > 10	Tolerance: 1%
Overall length: L ≤ 10	Tolerance: 0,10 mm

CONCENTRICITY TOLERANCE Ø1 AND Ø2:

Difference between comparator Min./Max. readings for one complete rotation of the bearing *tied on a mandrel	
Bore diameter ≤ 20	Tolerance: 50 µm
Bore diameter 20 < a ≤ 35	Tolerance: 70 µm
Bore diameter > 35	Tolerance: 100 µm

Designation

A cylindrical bearing I/D 22 - O/D 29 - L 36 is designated by:

- Its material grade **METAFRAM® BP 25** (or FP 20)
- Its dimensions 22/29x36

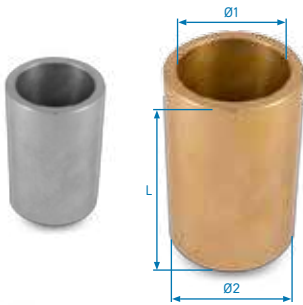


Chamfer 45° (0,1 to 0,2) x e min.: Min: 0,2 mm on I/D and O/D

Self lubricating standard blanks



Hollow rod



BP 25 - FP 20 - SO 16					
Ø1		Ø2		L	
38	+0.8 -0.8	70	+1.5 -1.5	120	+4 -0
45	+0.8 -0.8	105	+1.5 -1.5	120	+4 -0
80	+0.8 -0.8	145	+2 -2	120	+4 -0
80	+0.8 -0.8	175	+2 -2	120	+4 -0
85	+1.5 -1.5	105	+2 -2	120	+4 -0

Tolerances in mm

Solid rod



BP 25 - FP 20 - SO 16			
Ø1		L	
20	+0.8 -0.8	40	+4 -0
30	+0.8 -0.8	50	+4 -0
45	+0.8 -0.8	90	+4 -0
54	+0.8 -0.8	110	+4 -0
70	+0.8 -0.8	120	+4 -0
105	+0.8 -0.8	120	+4 -0
145	+1.5 -1.5	120	+4 -0

Tolerances in mm

Machining

Follow the machining instructions recommended in the brochure entitled "Machining guidelines for METAFRAM® self-lubricating blanks."

Self-lubricating spherical bearings (available on request only)

Bronze BP 25	Bore diameter Ø1	Sphere diameter Ø2	Outside diameter Ø3	Overall length	Iron alloy FP 20			
	Tolerance	+0.012 +0	Tolerance	+0.050 -0.050	Tolerance	+0.200 -0.200	Tolerance	+0.100 -0.100
	4	10	9.5	8				
	5	13	12.5	10				
	6	13	12.6	8				
	6	15	14.5	12				
	6	16	15.5	12.5				
	7	17	16.5	14				
	8	16	15.5	12.5				

Tolerances in mm

Assembly

Follow the assembly instructions recommended in the brochure entitled "Machining guidelines for METAFRAM® self-lubricating blanks."

Parts with no standard sizes and specific lubricants

- For small quantities, our partners can provide machined parts from our blanks in accordance with **METAFRAM®** guidelines and your drawings.
- For large quantities or repetitive series, we can design customized tooling (contact us for details).
- To optimize your equipment, we can design bearings with specific shapes to fit your special applications (contact us for details).

High payload, low speed (rolling mill, press, lifting gear, heavy duty vehicles). Standard blanks with SO 16 and TR 16 material grades (see the material grades brochure).

High or low temperature

In situations where the operating temperature lies outside the -5 / +90 °C range, we can change the impregnation lubricant used.

Immersion, corrosive fluid splashing

Refer to the paragraph "material grade with solid lubricant".

Impregnation with oil suitable for contact with foodstuffs (FDA standard)

Impregnation lubricants

STANDARD MATERIAL GRADES	Bronze BP 25	Iron alloy FP 20	Iron alloy SO 16 (blanks only)
AFNOR equivalent	FU-E10-62	FC10-U3-56	FC50-U20-60
DIN 30910 equivalent	Sint A50	Sint A10	N/A
Min. density (g/cm ³)	6,2	5,6	6
Max. payload (daN/cm ²)	100	225	600
Max. linear speed (m/s)	6	4	0,3
Max. PV (daN/cm ² x m/s)	18	18	9
Temperature range (°C)	-5 / +90	-5 / +90	0 / +105
Impregnation oil	MT100	MT100	METADOP
Min. open porosity (%)	23	20	16

How to choose the correct material grade?

Bronze BP 25	Iron alloy FP 20	Iron alloy SO 16
Good coefficient of friction	Recommended for medium or low speeds	Recommended for medium or low speeds
Good corrosion resistance	Good bearing strength	Good bearing strength
Recommended for high speeds	Recommended for high payloads	Recommended for very high payloads
Shaft surface finish Ra ≤ 0,6	Shaft surface finish Ra ≤ 0,3	Shaft surface finish Ra ≤ 0,3
Shaft hardness ≥ 80 kg/mm ²	Shaft hardness ≥ 120 kg/mm ²	Shaft hardness ≥ 120 kg/mm ²

Material grades with solid lubricant

Designation	Max. speed (m/s)	Max. payload (daN/cm ²)	Payload x Speed (daN/cm ² x m/s)	Operating temperature (°C)	Payload at V=0 (daN/cm ²)	Shaft surface finish	
						Max. Ra	Min. HB
BP 25 + PTFE	1	100	3	-180 / +180	200	0,3	240
FP 20 + PTFE	1	225	3	-180 / +180	450	0,3	300
BP 25 + MoS ₂	0,1	100	1	-180 / +300	200	0,3	355
FP 20 + MoS ₂	0,1	225	1	-180 / +300	450	0,3	355
BG 10 with 5% graphite	0,1	60	1	-180 / +250	120	0,3	355

Usage Guidelines

- › Our products are always supplied in plastic bags
- › Keep the products in their original packaging
- › Do not store on absorbent supports
- › Do not drop or otherwise shock the packaging or the products
- › Do not splash or submerge the products in water
- › Do not reuse after dis-assembly





METAFRAM

ZI de Légugnon
Rue du pic d'Ayous
F-64400 Oloron-Sainte-Marie
Tél. +33 (0)5 59 36 30 00
Fax +33 (0)5 59 39 41 96
Email: metafram.sales@sintertech.org

METAGLISS

ZI de Légugnon
Rue du pic d'Ayous
F-64400 Oloron-Sainte-Marie
Tél. +33 (0)5 59 36 30 00
Fax +33 (0)5 59 39 41 96
Email: metagliss.sales@sintertech.org

SINTERTECH

518 route de Valence - Actipôle
F-38113 Veurey-Voroize
Tél. +33 (0)4 76 53 79 00
Fax +33 (0)4 76 53 90 54
Email: sintertech.sales@sintertech.org

PORAL SALES

Voie des collines
F-38800 Pont-de-Claix
Tél. +33 (0)4 76 99 04 41
Fax +33 (0)4 76 99 04 42
Email: poral.sales@sintertech.org

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