



We make it *possible*

FLEXIBLE BUSHES

 **HOMBERGER**

Homberger S.p.A.
Divisione Prodotti Speciali
Via dei Laboratori 12B
20090 Buccinasco (MI)
tel: +39 02 57 695 301
fax: +39 02 936 507 42
mail: info.ps@homberger.com

 | **HUTCHINSON**[®]

FLEXIBLE BUSHES

FLEXIBLE BUSHES

CONTENTS

	<i>page</i>
I - GENERAL	
I.1 The operation of a flexible bush	275
I.2 Static characteristics	276
I.3 Dynamic characteristics	278
II - PRINCIPAL TYPES OF FLEXIBLE BUSHES	
II.1 Simple bushes	279
II.2 Flanged bushes	279
II.3 Laminated bushes	280
II.4 Void bushes	280
II.5 Pivot bushes	280
II.6 Spherical bushes	281
II.7 Other bushes	281
III - OUTER SLEEVE AND CENTRE AXIS	
III.1 Materials used	282
III.2 Protection during storage	282
III.3 Length tolerances	282
III.4 Diameter tolerances	282
IV - THE SELECTION OF A FLEXIBLE BUSH	283
V - AN EXEMPLE OF A SELECTION	283
VI - CATALOGUE OF FLEXIBLE BUSHES	285-293

Please see current price list for availability of items.

We reserve the right to modify the design and manufacture of the products and materials described in this catalogue.

The pictures of the products are supplied for information only.

I - GENERAL

I.1 - THE OPERATION OF A FLEXIBLE BUSH

A flexible bush has an elastomeric element enclosed between an outer sleeve and a centre axis intended to replace a greased bush.

The improvements achieved in industry due to the use of elastic bushes have been justly compared to the progress achieved in the past by the use of ball joints. In fact, the improvements achieved by the latter by reducing friction and play considerably and reducing wear and noise, have been taken even further by elastomeric rubber bushes which eliminate play completely and isolate high frequency vibrations.



I.2 - STATIC CHARACTERISTICS

I.2.1 - RADIAL CHARACTERISTICS

The application of a radial force F_R causes an elastic eccentricity X by compression of the elastomer on one side and stretching of the other side.

The bush is characterised by the permissible radial static force and by the corresponding eccentricity.

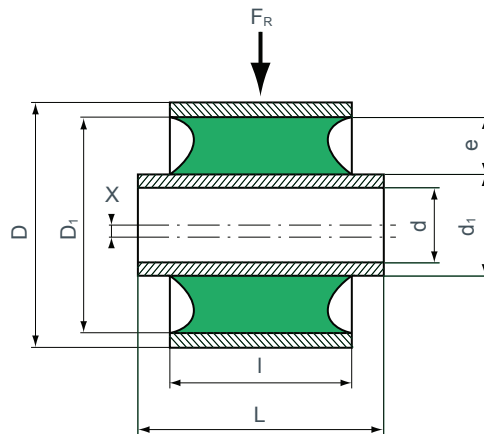
In practice, the permissible radial static forces are estimated by taking the stress rate on the surface area S of the rectangle which represents the projection of part of the elastomer which is in contact with the internal tube.

$$\text{Stress rate} = t = \frac{F_R}{S} = \frac{F_R}{d_1 \times l} \quad \begin{array}{l} F_R \text{ in N} \\ d_1 \text{ and } l \text{ in m} \\ t \text{ in N/m}^2 \end{array}$$

The permissible stress is a function $\frac{1}{D}$ of the bush and of the specific properties of the elastomer.

It is clear that the permissible deformation for a given radial force will be linked in practice to the thickness of the elastomer.

$$e = \frac{D_1 - d_1}{2}$$



I.2.2 - TORSIONAL CHARACTERISTICS

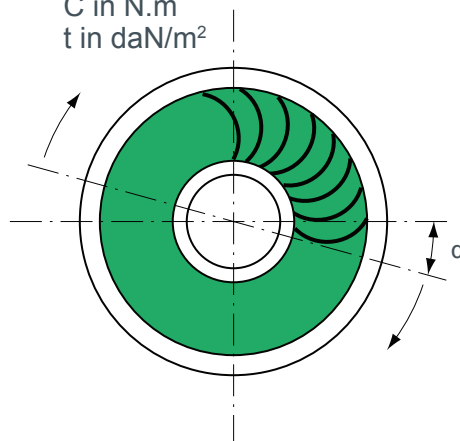
The application of a torque to the centre axis of revolution of a bush causes an angular displacement. This displacement produces a torsional reaction expressed in N.m.

The bush is characterised by its maximum torsion angle α and by the corresponding compensating torque.

In practice, the permissible torsion angles are of the order of 20° to 30° . The maximum permissible static torque can be calculated on the basis of the stress rate at the point of contact between the internal tube and the elastomer.

$$C = t \times \pi \frac{d_1^2}{2} l$$

d_1 and l in m
 C in N.m
 t in daN/m²



I.2.3 - AXIAL CHARACTERISTICS

When the external tube is fixed, the application of an axial force F_a on the internal tube will cause an elastic displacement “ y ” parallel to the axis of the bush, by shearing of the elastomer. The bush is characterised by the permissible axial load and by the corresponding elastic displacement.

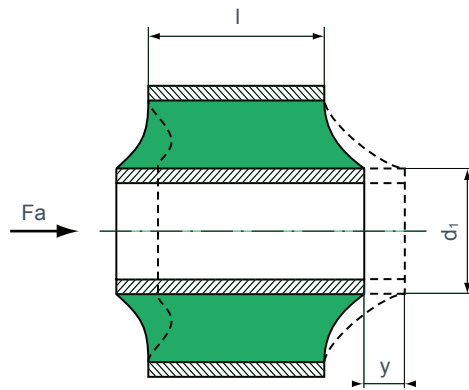
In practice, the permissible static axial loads are estimated by taking the stress rate at the internal tube.

$F_a = \pi \times d_1 \times l \times t$ where d_1 and l are in cm and F_a in daN and t is in daN/cm²

The permissible static deflection is a function of the radial thickness of the elastomer.

$$y = k \cdot \frac{D_1 - d_1}{2}$$

The axial breaking load of a bonded part is of the order of 10 times the permissible static load.



Note :

A Prestressed bush which is not fully bonded must not be subjected to a static axial load.

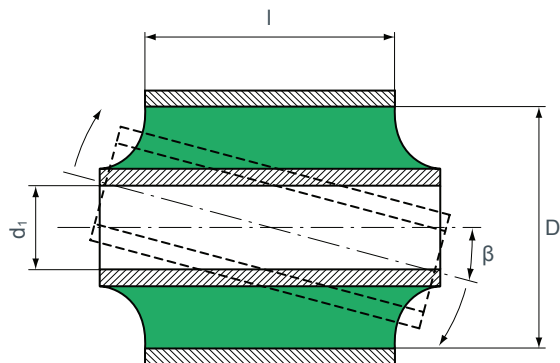
I.2.4 - CONICAL CHARACTERISTICS

The application of a torque whose axis is perpendicular to the axis of rotation of the bush will cause an angular deformation β .

This deformation will in turn produce a compensating elastic torque expressed in N.m.

The bush is characterised by the permissible conical angle and by the corresponding compensating torque.

In practice, the permissible conical angles are of the order of a few degrees. They vary greatly with the slenderness ratio $\frac{l}{D}$ of the part.

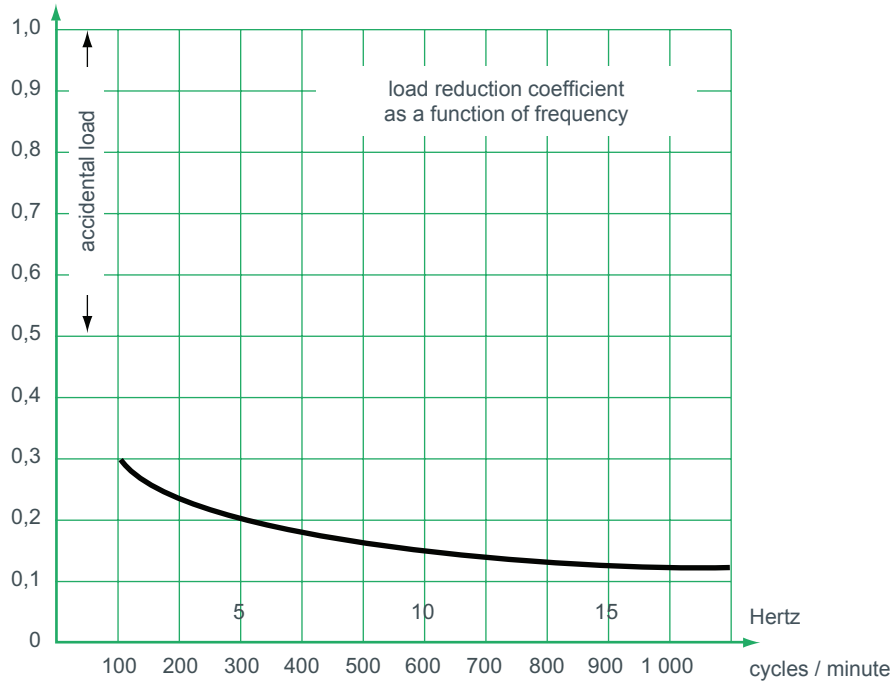


I.3 - DYNAMIC CHARACTERISTICS

I.3.1 - DYNAMIC LOADS

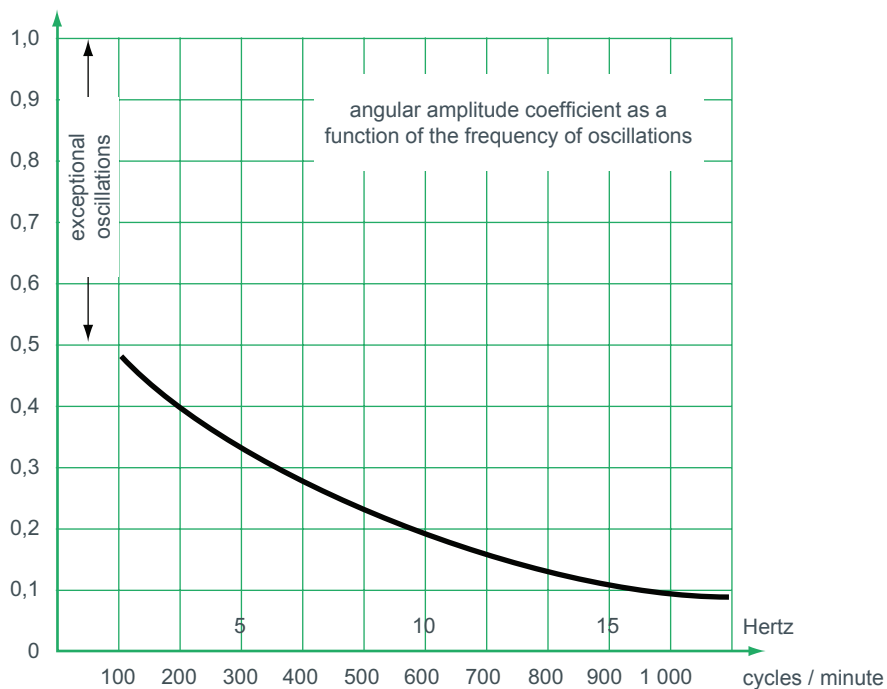
For dynamic loads, the following corrections must be added to the static loads provided in the catalogue :

- for infrequent forces of very short duration (shocks), the loads can be doubled;
- in the case of continuing periodic forces, the loads must be multiplied by a reduction coefficient λ which is a function of the frequency of the forces.



I.3.2 - TORSIONAL AMPLITUDES

The torsion amplitudes provided in the catalogue must be multiplied by a reduction coefficient μ which is a function of the frequency of the oscillations.



II - PRINCIPAL TYPES OF FLEXIBLE BUSHES

II.1 - SIMPLE BUSHES

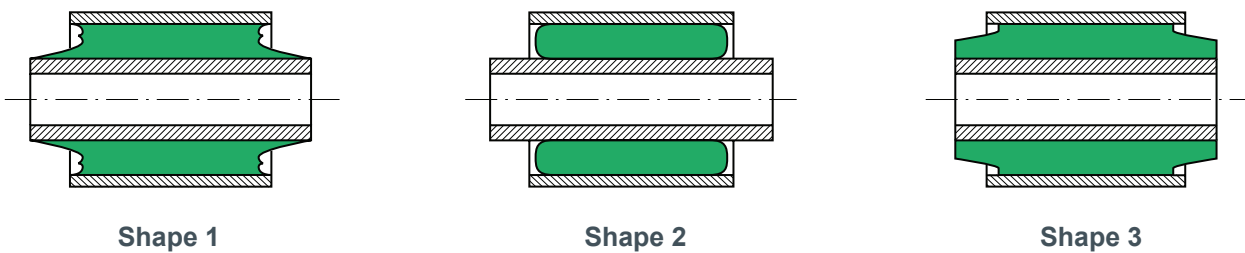
FLEXIBLOC (fig. 1) - FULLY BONDED

This is a bush made up of 2 concentric tubes between which of elastomer is bonded. Under the effect of external forces or torques, the relative movement of the tubes will cause an elastic deformation of the elastomer. By consulting the service conditions, a bush should be chosen which will remain within its elastic operational limits.

SILENTBLOC (fig. 2) - PRESTRESSED

This is a bush made up of 2 concentric tubes between which a ring of “adhérite®” elastomer is inserted by force. Under the effect of external forces or torques, the relative movement of the tubes will cause an elastic deformation of the elastomer. Above a certain value the adhereite will slide in the tubes.

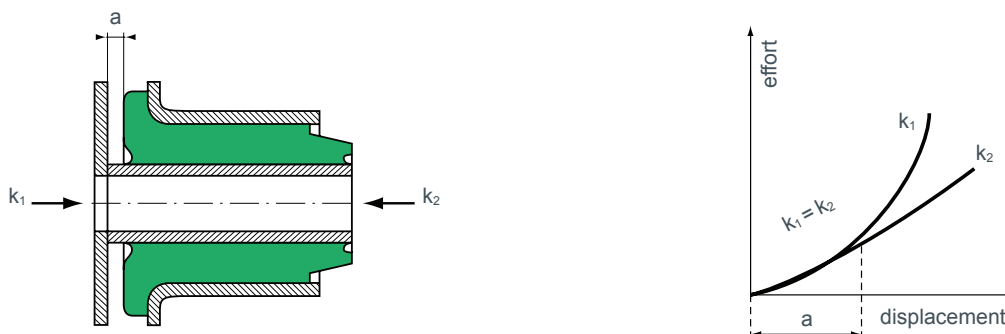
These simple bushes are considered to have lateral stops (shape. 3) when the elastomer protrudes from the external tube in the form of a support surface with various profiles.



The lateral stop only comes into operation when the bush is forced off centre by a radial load. This causes the stop to protrude, thus ensuring an “anti-noise” role at the limit of axial movement.

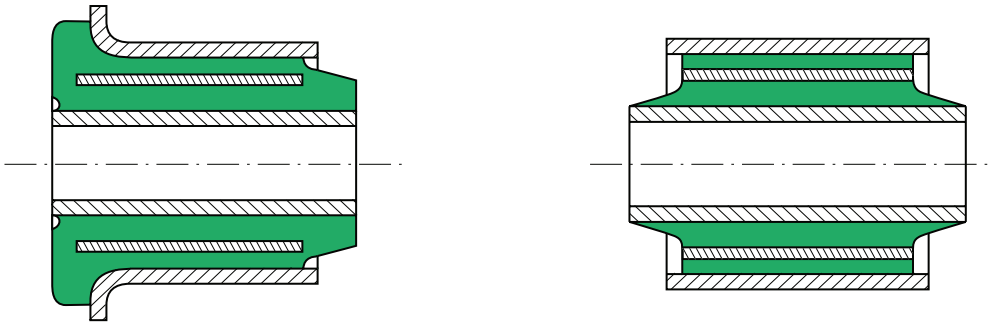
II.2 - FLANGED BUSHES

In this type of bush, one of the tubes is flanged.



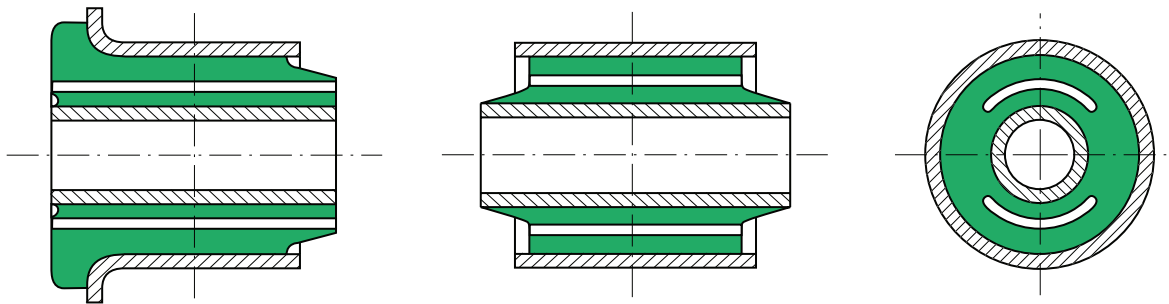
The rigidity k_1 is equal to k_2 if the travel is less than “a”, and it becomes greater than k_2 when the travel is greater than “a”.

II.3 - LAMINATED BUSHES



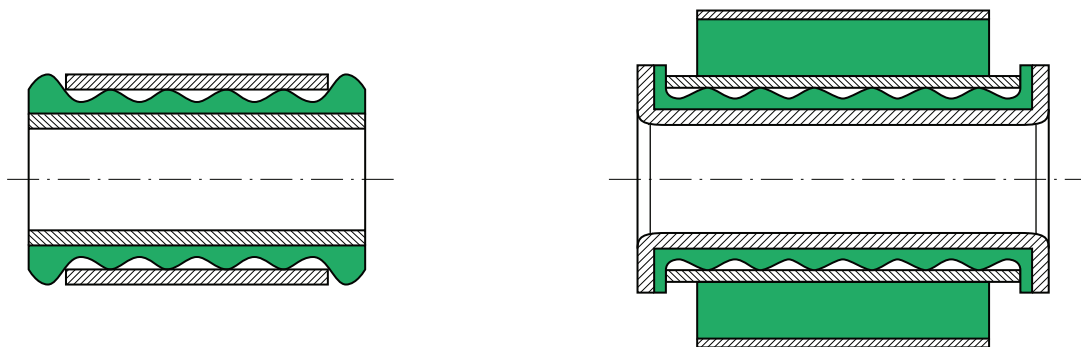
This type of bush has a thin metallic tube between the internal tube and the external tube. The object is to have a higher stiffness radially while keeping practically the same stiffness in torsion. The lamination of a bush also helps to decrease the work rate of the elastomer under high radial loads.

II.4 - VOID BUSHES



A void bush is designed to have radial stiffness which are very different at 90° to each other. The difference in rigidity is governed by the size of the voids, which may or may not run the whole length of the bush.

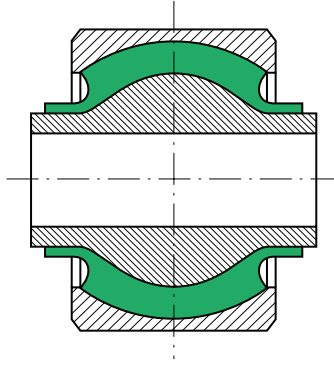
II.5 - PIVOT BUSHES



FLUIDBLOC :

This type of bush is intended to offer minimum resistance to torsion. The elastomer is bonded to only one of the armatures, and a suitable permanent lubricant ensures the lubrication between the elastomer and the second armature ensures a very low torsional resistance. Seals are provided at each end to prevent the lubricant from coming out and stop impurities from getting in. Resistance to axial force is provided by a flange in the elastomer which bears against the side of the outer sleeve, the force being transmitted by a lateral washer.

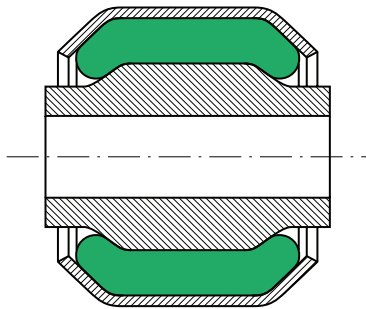
II.6 - Spherical bushes



SPHERIFLEX :

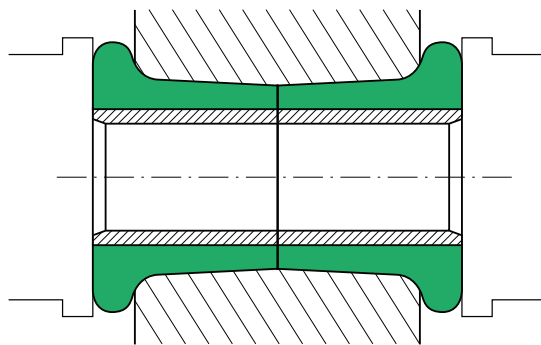
In this bush, the outer sleeve and centre axis are spherical, which enables the bush to resist relatively high radial and axial loads and to obtain a circular rigidity which is independent of the axis of rotation.

II.7 - OTHER BUSHES



“PRESTRESSED BUSHES” with turned down sides :

For the same dimensions, this type of bush provides a radial load capacity which is superior to that of the classic “prestressed”. In addition, versions of relatively short length permit conical movement more easily (reduced torque and increased angle).



CONICAL BUSH :

This takes the form of a rubber sleeve whose external surface is a truncated cone, and which surrounds a cylindrical internal part to which it adheres strongly by high radial expansion.

Assembly in pair, in a housing made up of two truncated cones placed small end to small end.

By axial pressure, a high compression is created which ensures the external adherence of the rubber and causes lateral cushions to form at each end of the housing. These cushions ensure resistance to axial forces.

III - OUTER SLEEVE AND CENTRE AXIS

III.1 - MATERIALS USED

In general, the outer sleeve and centre axis of flexible bushes are made of :

- Mild steel or polyamide for the external outer sleeve.
- Medium carbon steel for the centre axis.

The reason for the difference has to do with the method of fixation onto the internal armature, which is usually done by forcing from one end. The armature must therefore be both strong and not too thin, to avoid buckling.

III.2 - PROTECTION DURING STORAGE

To avoid corrosion of the steel parts, the parts are protected by a layer of phosphate which gives them a grey appearance, the whole being protected by a layer of oil.

To ease removal of fixing bolts, the internal tubes are also protected on the interior by a layer of phosphate. This protection is good for storage, but it does not constitute a “tropicalised” protection, nor is it intended to resist saline mist.

III.3 - LENGTH TOLERANCES

- Length L (internal tube) : $\pm 0.1\text{mm}$
- Length l (external tube) : JS 15, according to NF E02 100-1 and NF E02 100-2

- Longitudinal overhang : $\frac{L - l}{2} \pm 0,4 \text{ mm}$

III.4 - DIAMETER TOLERANCES

On the internal diameter d : H10

d (mm)	3 to 6	6 to 10	10 to 18	18 to 30	30 to 50
H10	+ 0,048 + 0	+ 0,058 + 0	+ 0,070 + 0	+ 0,084 + 0	+ 0,1 + 0

On the external diameter D :

D ≤ 25 (mm)	25 < D ≤ 40 (mm)	D > 40 (mm)
+ 0,05 + 0	+ 0,1 + 0	+ 0,15 + 0

Recommended tolerance for fitting into a bored hole : boring D : N9 :

D (mm)	10 to 18	18 to 30	30 to 50	50 to 80	80 to 120
N9	- 0 - 0,043	- 0 - 0,052	- 0 - 0,062	- 0 - 0,074	- 0 - 0,087

IV - THE SELECTION OF A FLEXIBLE BUSH

In order to specify a bush correctly for a given application, the following criteria must be determined :

Basic data

For each of the 4 characteristics of the part (axial, radial, torsion or conical), the following values must be taken into account :

- the maximum static values (of force and/or of deflection) to which the part is subjected;
- the maximum dynamic values and their frequencies.

Fundamental parameters

Depending on the application, determine from the basic data the major fundamental parameter(s) which govern the choice of the bush to be used.

Dimensions

The fundamental parameters enable you to consult the catalogue for the range of dimensions of various bushes.

Stiffness

The final selection of the bush will depend on the required stiffness for the application. In particular, length, diameter and the thickness of the elastomer required for the desired bush will be determined.

Environmental conditions

Most of our standard bushes are in natural rubber. This has been chosen because of its good dynamic qualities.

In normal conditions of use, the types of rubber used guarantee a good life and limit creep in particular.

The following conditions of use are considered abnormal :

- temperatures above 70° C;
- prolonged contact with aggressive fluids;
- aggressive environments, such as oil or petrol;
- prolonged contact with acids or alkalis;
- aggressive atmospheres (e.g. ozone, chlorine).

Use in this conditions can accelerated ageing of the bushes, and cause the degradation or even the destruction of the rubber. An abnormally aggressive environment can, in particular, increase the deformation of the bush (by creep).

Flexible bushes can be made with special elastomers which are capable of surviving the abnormal conditions mentioned above and enabling the bushes to perform well.

Our technical services are at your disposal to reply to your questions about the properties of our various elastomers.

V - AN EXAMPLE OF A SELECTION

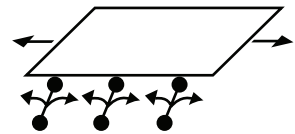
For the bushes of a vibrating carpet.

Weight : 120 daN. Number of fixing points : 6

Angle of movement : $\pm 2^\circ$. Frequency: 600 cycles/mn = 10 Hz

Radial load per bush : ± 20 daN (evenly loaded).

Amplitude reduction coefficient at 10 Hz : $m = 0.18$. Torsion angle : $\frac{2^\circ}{0.18} = 11^\circ$



In this case, the axial and conical parameters are not of major importance in the selection of the bushes. Since the fixing diameter of the connecting rods is 10 mm, we would select reference 561 205 from the bush catalogue.

$d = 10$ mm $D = 22$ mm $L = 17$ mm $l = 15$ mm Radial load = 40 daN
Maximum torsion angle = 25°

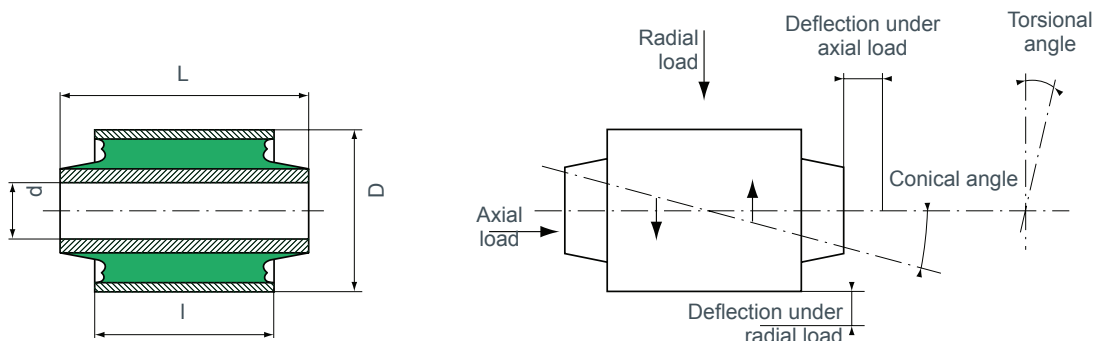
Therefore, for the given application we would use : 12 Flexibloc 561205 bushes.

VI - CATALOGUE OF FLEXIBLE BUSHES



SIMPLE BUSHES

FLEXIBLOC® AND SILENTBLOC®



FLEXIBLOC - Fully Bonded : The elastomer is bonded to the 2 concentric tubes, Parts Number 560..., 561...

SILENTBLOC - Prestressed Elastomer : The ring of “adherite” is inserted by force between the 2 concentric tubes, Parts Number 861..., 862..., 864...

BL : Bushes with a lateral stop.

d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
6	16	14	12		10	0,1	25°	10	0,6	5°	561101
	16	14	12		10	0,07	30°	5	0,3	7°	861601
	16	24	20		20	0,05	30°	15	0,4	3°	861602
	20	22	16		25	0,4	30°	20	2,2	6°	561239
8	16	17	15		30	0,1	15°	15	1,3	3°	561102
	16	24	20		50	0,1	10°	15	1	1°	561104
	16	25	22		55	0,03	20°	35	0,2	1°	861104
	16	28	25		65	0,03	20°	45	0,2	1°	861103
	20	17	15		15	0,1	30°	10	0,3	7°	861603
	20	19	15		20	0,1	30°	10	0,3	7°	861783
	32	23,2	18		30	0,5	35°	20	1,5	6°	561418
9	21	21	17	BL	40	0,2	30°	15	0,8	5°	561258
10	22	17	15		40	0,3	25°	15	0,8	6°	561205

The references kept in stock are written in bold.

1 kg ≈ 1 daN

d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
10	22	19	15		40	0,3	25°	15	0,8	6°	561206
	22	23	20		55	0,03	20°	35	0,4	1°	861112
	22	24	18		90	0,2	20°	15	0,4	2°	561112
	22	30	25		100	0,2	20°	40	1,5	3°	561207
	22	33	30		110	0,03	20°	70	0,6	1°	861114
	22	34	30		55	0,1	30°	35	0,3	3°	861607
	24	22	18		50	0,4	25°	25	0,2	5°	561209
	24	24	18	BL	70	1,3	30°	25	0,8	3°	561445
	27	22	17		65	0,5	30°	25	1,5	3°	561613
	28	26	20	BL	80	0,6	30°	25	1,5	3°	561150
28	27	20	BL	80	0,5	20°	30	1	5°	561424	
28	32	26	BL	110	0,4	30°	40	0,8	2°	561518	
11,3	19,85	30,2	25,4		45	0,05	10°	35	0,3	2°	561103
12	25	23	20		55	0,04	20°	25	0,2	3°	861118
	25	28	25		100	0,2	20°	40	1	4°	561212
	25	34	30		120	0,2	20°	50	0,8	3°	561213
	25	38	35	BL	145	0,04	20°	95	0,4	1°	864105
	25	44	35		145	0,04	20°	95	0,4	1°	861197
	25	54	50		550	0,3	15°	45	0,6	1°	561250
	26	24	20		35	0,06	30°	20	0,4	7°	861611
	26	34	32		80	0,07	30°	50	0,4	3°	861613
	28	28	25		50	0,07	30°	25	0,4	7°	861614
	28	38	32		120	0,25	20°	60	1,5	3°	561446
	28	49	45		130	0,2	30°	60	1,6	4°	561224
	30	30	24		110	0,5	35°	40	1,5	6°	561302
	30	30	24	BL	110	0,5	25°	40	1,5	3°	561341
	30	30	24	BL	70	0,1	5°	25	0,6	4°	864801
30	42	36	BL	210	0,55	30°	35	1,1	2°	561395	
32	40	24		190	0,55	20°	30	1	2°	560034	
53	46,5	34		140	1,5	50°	50	2	6°	561122	
12,04	41,27	76,03	52		100	1	40°	50	2	4°	561677
14	27	25	17		60	0,2	20°	30	1,1	3°	561120
	27	28	25		120	0,2	20°	50	1,8	4°	561227
	27	28	25		90	0,04	20°	45	0,4	3°	861128
	27	33	25		150	0,15	20°	40	1	3°	561747
	27	45	40	BL	120	0,2	25°	80	1,5	2°	561269
	27	49	45		250	0,04	20°	165	0,7	1°	861132
	27	54	50	BL	280	0,04	20°	185	0,5	1°	864109
	27	58	50		350	0,1	20°	80	1	1°	561748
	28	44	40		250	0,1	15°	80	0,7	1°	561458
	28	54	50	BL	250	0,1	15°	70	0,7	1°	561617
	29	44	32		120	0,2	20°	50	2,5	2°	561594
	30	28	25		120	0,7	30°	45	1,1	5°	561303
	30	28	25		50	0,08	30°	25	0,4	7°	861618
	30	30	25	BL	80	0,2	25°	50	1,2	5°	561377
	30	30	25		120	0,3	25°	55	1,2	5°	561304
	30	30	25		50	0,08	30°	25	0,4	7°	861619
	30	42	38		150	0,2	30°	70	1,9	3°	561305
	30	42	38		100	0,08	30°	65	0,4	3°	861620
	32	33	30		130	0,4	25°	60	2	4°	561307
32	46	38	BL	170	0,3	25°	80	2	2°	561492	
32	48	40	BL	250	0,1	15°	100	0,5	2°	561340	
32	54	46	BL	190	0,08	25°	125	0,6	2°	864403	
32	70	65		300	0,2	30°	200	1,1	1°	561309	
14,3	30,2	69,8	63,5		370	0,1	20°	190	0,9	1°	861251
16	28,1	34	25		30	0,05	20°	15	0,4	1°	861834
	30	30	25		200	0,2	5°	35	0,5	1°	561348
	32	26	20		70	0,05	20°	35	0,3	2°	861136
	32	28	22		120	0,2	20°	50	2	5°	561313
	32	28	25		140	0,2	20°	50	1,6	5°	561312

The references kept in stock are written in bold.

1 kg ≈ 1 daN

d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
16	32	32	28	BL	130	0,05	20°	65	0,4	3°	861141
	32	54	50		330	0,05	20°	220	0,4	1°	861143
	32	54	50		330	0,05	20°	220	0,4	1°	864108
	32	59	55		400	0,05	20°	260	0,4	1°	861145
	32	66	60		450	0,05	20°	300	0,4	1°	861146
	32	76	70		500	0,1	20°	180	1,5	1°	561358
	36	38	35		90	0,1	30°	45	0,5	7°	861624
	36	43	35		90	0,1	30°	45	0,5	7°	861756
	40	40	32		200	0,8	30°	45	1,5	2°	561401
	40	40	32		95	0,6	5°	-	-	4°	861810
	40	50	32		135	0,6	5°	-	-	4°	861931
	40	54	50		250	0,5	35°	120	3	3°	561402
	52	34	30		70	1	40°	30	3,5	7°	561511
	52	48	40		90	1	40°	50	4	7°	561520
	18	34	33		30	BL	120	0,1	20°	60	1,1
34		33	30	150	0,05		20°	75	0,4	3°	861151
34		36	32	160	0,05		20°	80	0,4	3°	861152
34		54	50	600	0,3		12°	100	1	1°	561455
34		66	60	490	0,05		20°	320	1,5	1°	861153
34		71	65	540	0,05		20°	360	1,5	1°	861154
36		46	40	220	0,04		20°	145	0,4	1°	861156
42		38	35	100	0,1		30°	50	0,5	7°	861627
70		58	45	225	2,5		50°	100	4	5°	561543
20	38	42	38	BL	230	0,2	25°	75	1	3°	561384
	38	59	55		300	0,15	20°	50	1	2°	561335
	38	59	55		410	0,04	20°	270	1,5	1°	861160
	38	76	70		400	0,2	15°	200	1	1°	561337
	38	76	70		630	0,04	20°	420	1,5	1°	861162
	38	81	75		700	0,04	20°	465	1,5	1°	861163
	38	90	84		600	0,1	15°	200	1	1°	561382
	40	45	38		70	0,15	25°	35	0,6	2°	861830
	42	42	38		300	0,3	25°	90	1,5	4°	561404
	42	42	38		165	0,08	20°	80	0,5	3°	861165
	44	45	38		210	0,5	25°	90	3	4°	561440
	45,15	42	38		300	0,8	25°	60	1,6	2°	561451
	48	46	33		65	0,2	5°	-	-	4°	861934
	50	50	40		155	0,5	5°	25	0,7	4°	861817
	52	66	60		300	1	25°	150	3	5°	561521
22	40	45	40	BL	250	0,05	20°	130	0,4	3°	861166
	40	86	80		850	0,06	20°	560	1,5	1°	861167
24	42	50	45	BL	340	0,06	20°	170	0,4	3°	861169
	42	55	50		400	0,05	20°	200	0,4	3°	861170
	42	96	90		1 100	0,02	20°	730	1	1°	861171
	44	58	48		125	0,08	20°	60	0,8	3°	861831
	48	44	40		160	0,3	20°	110	1,5	2°	561411
	48	58	50		350	0,3	20°	120	2	2°	561400
	48	93	85		560	0,15	30°	370	0,7	3°	861634
	58	58	48		215	1	5°	-	-	4°	861818
	26	44	66		60	500	0,2	15°	160	1	1°
28	48	36	34	BL	315	0,05	20°	160	0,5	3°	861173
	48	55	50		420	0,05	20°	210	0,5	3°	861174
	48	66	60		400	0,15	20°	190	1,1	2°	561409
	48	66	60		540	0,06	20°	270	0,5	3°	861175
	48	118	110		1 500	0,07	20°	900	2	1°	861177
	52	108	100		800	0,1	30°	500	0,7	3°	861637
	66	66	56		500	1,5	40°	140	3,5	7°	561601
	66	66	56		350	1	5°	100	3	4°	861819
	66	76	70		850	1	30°	320	3	6°	561660
30	50	128	120	1 900	0,07	20°	1 000	2,5	1°	861178	
32	52	66	60	600	0,15	10°	260	2,2	1°	561503	
	52	66	60	600	0,06	20°	300	0,3	3°	861180	

The references kept in stock are written in bold.

1 kg ≈ 1 daN

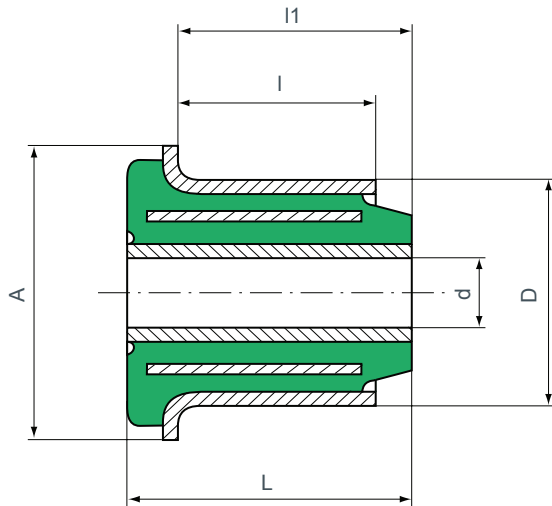
d (mm)	D (mm)	L (mm)	l (mm)	Obs	RADIAL		TORSION	AXIAL		CONICAL	Reference
					Static Load (daN)	Deflection (mm)	Max angle (degrees)	Static Load (daN)	Deflection (mm)	Max angle (degrees)	
32	56	55	50	SP	310	0,08	30°	150	0,7	7°	861638
	56	116	108		1 000	0,1	30°	650	0,7	3°	861639
	70	76	70		1100	1,1	25°	190	2,3	2°	561703
34	50	45	39,5	SP	200	0,2	6°	100	2,5	1°	561141
36	58	130	120		1 900	0,08	20°	1 000	1	1°	861182
	60	60	55	400	0,15	30°	200	0,7	7°	861640	
38	64	76	70	SP	900	0,07	20°	450	0,5	3°	861183
	64	135	125		2 400	0,1	20°	1 300	1,5	1°	861184
	66	60	55		450	0,1	30°	220	0,7	7°	861642
42	78	66	60	SP	680	0,07	30°	340	1	7°	862601
	78	86	80		1 000	0,5	10°	200	1,6	1°	561701
	78	86	80		1270	0,08	20°	630	0,8	3°	862101
	78	140	130		2 000	0,6	20°	400	2	1°	561702
	78	140	130		2 800	0,1	20°	1 500	2	1°	862102
44,45	76,2	63	60	SP	1 400	0,1	15°	-	-	3°	862111
					700	0,1	30°	100	0,2	3°	862140
46	80	86	80	SP	1 500	0,1	15°	-	-	3°	862137
	86	110	100		1 400	0,15	20°	700	1,5	1°	862422
50	80	83	79	SP	1 500	0,2	15°	150	0,7	1°	862614
56	93	250	170	SP	2 600	0,6	15°	1 400	2	0,3°	561901
58	93	132	117	SP	2 000	0,2	15°	200	1,2	2°	862444
	95	90	83		1 600	0,3	15°	-	-	3°	862646
60	105	87	90	SP	2 000	0,2	15°	200	1,2	2°	862435
	110	182	170		4 000	0,2	15°	400	0,8	1°	862510
	140	182	170		5 400	0,3	15°	360	2	1°	862512
62	105	120	110	SP	2 500	0,2	15°	250	0,8	1°	862421
68	105	120	110	SP	2 500	0,2	15°	250	0,8	1°	561657
70	120	120	115	SP	3 000	0,3	15°	300	0,9	1°	862434
	120	182	170		4 500	0,2	15°	450	0,8	1°	862480
80	120	120	110	SP	3 000	0,2	15°	300	0,8	1°	561658
	140	98	98		3 000	0,6	10°	1 800	2	2°	561009
	140	98	98		3 000	0,3	8°	-	-	2°	561043
	140	98	98		2 300	0,2	10°	-	-	1°	862481
	140	182	170		5 400	0,1	15°	540	0,8	1°	862414
90	145	170	145	SP	5 500	0,25	15°	550	0,8	1°	862627
95	170	105	105	SP	1 500	2,3	10°	-	-	5°	561956
110	175	205	190	SP	7 500	0,15	12°	750	0,9	1°	862513
	160	190	170		6 000	0,1	12°	600	0,7	1°	561928
120	160	190	170	SP	4 000	0,1	12°	400	0,6	1°	561938
125	160	185	184	SP	4 300	0,1	12°	430	0,4	1°	561913
138	192	130	124	SP	5 500	1	10°	-	-	3°	862810
150	185	210	209	SP	5 500	0,1	10°	550	0,4	1°	561916
	185	240	239		6 500	0,1	10°	650	0,5	1°	561925
170	210	270	269	SP	8 000	0,1	10°	800	0,4	1°	561184
190	230	270	258	SP	8 500	0,1	10°	850	0,4	1°	561003
210	260	300	290	SP	10 500	0,1	10°	1 000	0,4	1°	561989

The references kept in stock are written in bold.

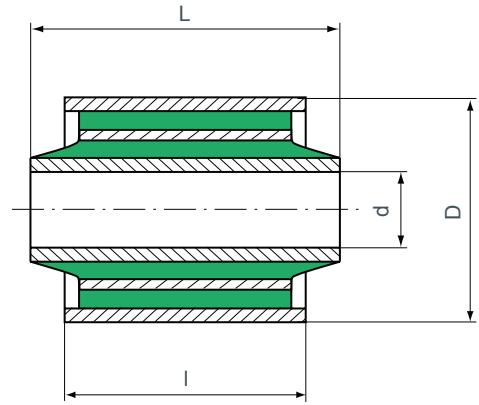
1 kg ≈ 1 daN



LAMINATED BUSHES



Shape 1



Shape 2

DIMENSIONS

d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l ₁ (mm)	Shape	Reference
12	34	-	48	30	-	2	560033
14	35	-	58,3	43	-	2	561040
14	40	55	27,4	16,3	17	1	531427
16	40	-	46	32	-	2	560062
20	38	-	60	59	-	2	579071

CARACTÉRISTIQUES TECHNIQUES

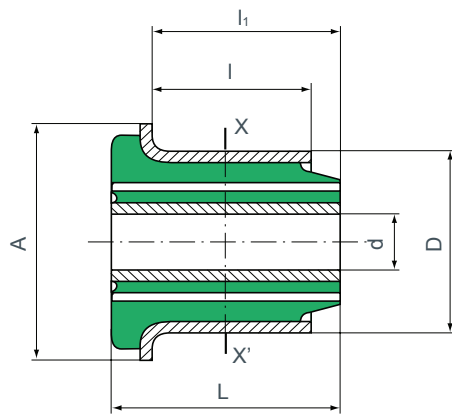
Reference	Maximum Radial Load		Axial static load (daN)	Torsion	
	Static (daN)	Dynamic (daN)		Max Angle	Approx. torque N.m.
531427*	400	-	130	20°	80
560062	900	-	40	15°	20
560033	750	-	40	20°	10
561040	850	-	50	20°	50
579071	10 500	15 000	-	6°	54

* The axial load is measured on the side of the lateral stop.

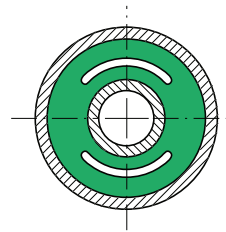
1 kg ≈ 1 daN



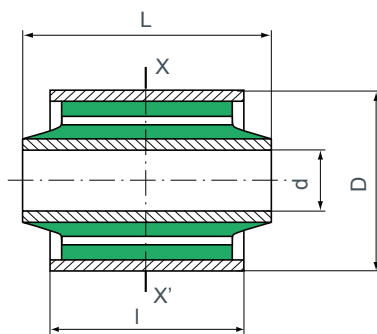
VOID BUSHES



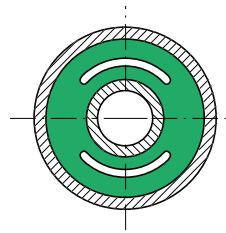
Section XX'



Shape 1



Section XX'



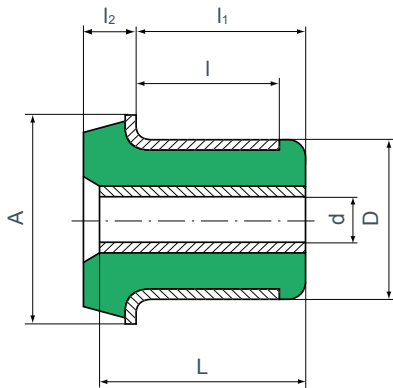
Shape 2

DIMENSIONS

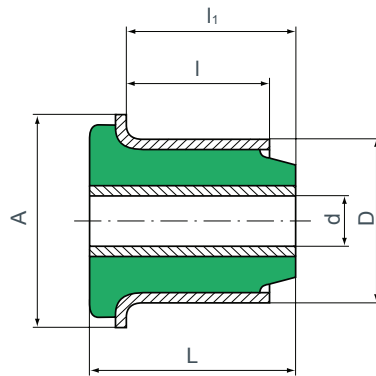
d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l ₁ (mm)	Shape	Reference
10,2	37	-	44,8	36	-	2	560218
10,2	37	-	54,3	36	-	2	560217
12	40	-	60	40	-	2	560065
12	43	60	41	26,5	32,5	1	531413
12,25	30	41	34,1	25,2	26,6	1	531363
12,25	30	41	34,1	25,2	26,6	1	531431



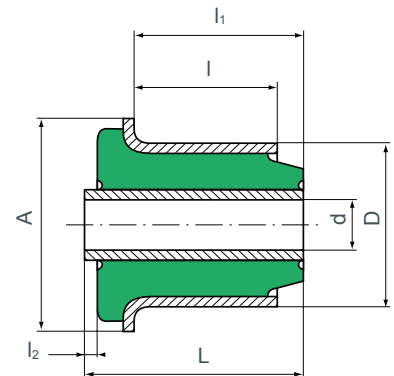
FLANGED BUSHES



Shape 1



Shape 2



Shape 3

FLANBLOC®

d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l ₁ (mm)	l ₂ (mm)	Maximum Radial Load		Dynamic axial load (daN)	Torsion		Shape	Ref.
							Static (daN)	Dynamic (daN)		Max angle	Approx. torque N.m.		
16	32	47	62	48	56,5	-	250	Overload coefficient : 3	430	30°	45	2	866016
-	32	47	89	48	83,5	-	250		430	30°	45	2	866012
-	36	46	41	28,8	34,7	9,5	60		56	30°	90	1	867001

1 kg ≈ 1 daN

SPECIAL S.C.

d (mm)	D (mm)	A (mm)	L (mm)	l (mm)	l ₁ (mm)	l ₂ (mm)	Maximum Radial Load		Dynamic axial load (daN)	Torsion		Shape	Ref.
							Static (daN)	Dynamic (daN)		Max angle	Approx. torque N.m.		
12	32	43	50	34	40	3	50	Overload coefficient : 3	160	35°	16	3	531300
16	40	50	50	32	40	-	150		120	20°	-	2	531411
-	40	51	83	52	76	1	200		-	20°	-	3	531417

1 kg ≈ 1 daN



PIVOT BUSHES

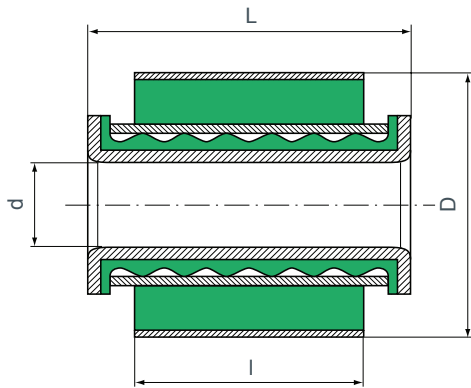


Fig. 1

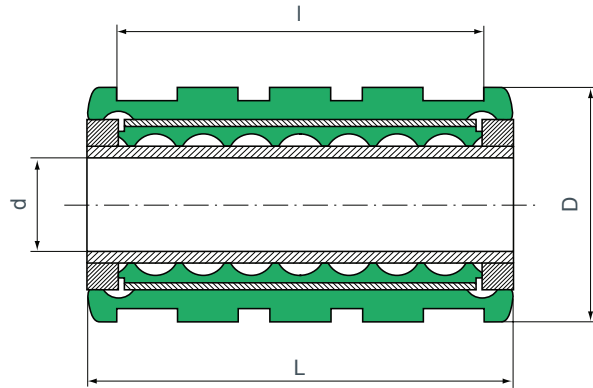


Fig. 2

FLUIDBLOC® AND TOURIFLEX®

These are high precision bushes; they are made of injected polyurethane and can resist oil, water, ozone, etc.

These “pivoting” bushes are characterised by their very low torsional resistance (0.1 to 0.2 N.m). They can ensure a complete rotation (360°), and have no requirements for maintenance because they have a permanent lubricant.

They don't need a high precision housing, and the load to remove the bushes is between 1500 and 1800 daN.

There are many applications, such as : leaf spring bushes for vehicles not exceeding 5 tons.

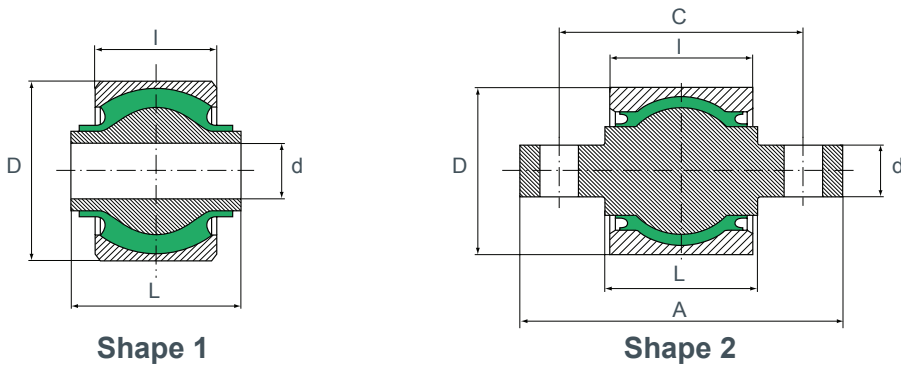
d (mm)	D (mm)	l (mm)	L (mm)	Maximum radial load static (daN)	Shape	Reference
16	36	60	70	900	2	566050
16	45	60	70	1 100	2	566051
AXE	140	214	304	7 000	-	568256
CARRÉ	70	60	76	1 000	1	568247
27	88	70	86	1 000	1	568248
36						

1 kg ≈ 1 daN



SPHERICAL BUSHES

SPHERIFLEX®

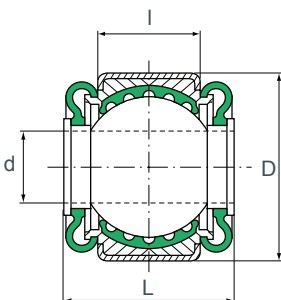


d (mm)	D (mm)	L (mm)	A (mm)	I (mm)	C (mm)	Radial Load		Torsion		Conical		Ref.
						Max (daN)	Stiffness daN/mm	Max (degrees)	Stiffness daN/mm	Max (degrees)	Stiffness daN/mm	
35	62	36	-	36	-	1 000	16 000	12	1 000	8	680	563075
24	64	58	-	30	-	800	22 000	12	220	10	220	563489
35	67	35(b)	-	36	-	1 000	16 000	12	1 000	8	680	563559
26	80	72(b)	-	56	-	3 800	55 000	10	2 200	8	1 900	563353
26	80	78(b)	-	56	-	3 800	55 000	10	2 200	8	1 900	563343
40(a)	80	49(b)	-	56	-	3 800	55 000	10	2 200	8	1 900	563354
36	85	80	-	66,5	-	3 800	30 000	12	2 150	6	1 650	563317
Axe	85	100	180	71	140	3 800	30 000	12	2 150	6	1 650	563425
Axe	88	75	144	66	-	3 800	30 000	12	2 150	6	1 650	563253
36	90	-	80	71	-	4 400	53 800	12	2 300	8	3 050	563316
Axe	90	90	170	68	130	4 000	50 000	12	2 150	10	2 800	563345
Axe	90	80	172	77	130	4 400	53 800	12	2 300	8	3 050	563300
Axe	90	90	170	77	130	4 400	53 800	12	2 300	8	3 050	563555
Axe	90	100	180	77	140	4 400	53 800	12	2 300	8	3 050	563426
44	100	114	-	87,5	-	7 000	60 000	12	1 500	8	2 000	563571
44	100,2	116	-	72,5	-	7 000	60 000	12	1 500	8	2 000	563605

(a) The internal diameter is shouldered (b) Length L not centered

1 kg ≈ 1 daN

FLUIDBLOC®

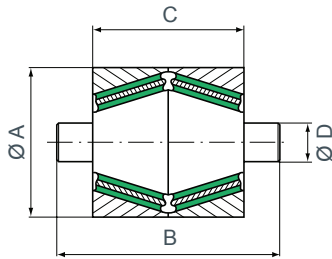


d (mm)	D (mm)	L (mm)	I (mm)	Radial static load (daN)	Axial static load (daN)	Sliding torque N.m.	Reference
24	64	58	36	850	100	1	568184

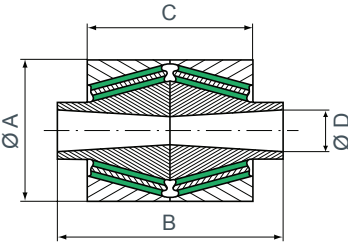
1 kg ≈ 1 daN



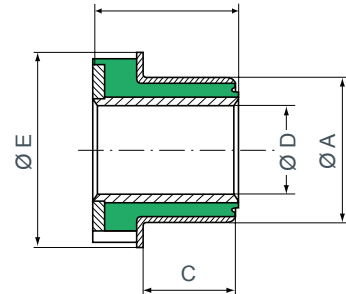
SPECIAL BUSHES



Shape 1



Shape 2



Shape 3

Reference	Shape	Ø A (mm)	B (mm)	C (mm)	Ø D (mm)	Ø E (mm)	Radial Stiffness KN/mm	Axial Stiffness KN/mm
563468	2	180	200	140	Ø 68	-	85	10
562908	1	140	254	160	50 x 56	-	85	17
562912	1	140	273	145	Ø 63	-	20	5
563533	2	185	190	150	Ø 70 cône	-	57,5	16,75
563550	2	185	190	150	Ø 68	-	57,5	16,75
563443	2	132	154	136	Ø 70	-	140	5
531293	3	110	55	42	Ø 50	86	17	8
531367	3	110	95	33	Ø 52	150	10	50
531330	3	122	72	54	Ø 70	162	40	30
563352	1	122	254	120	Ø 50	-	4	5

563264

Max radial load : 100 kN

561958

862624

Max radial load : 70 kN

Radial load / Movement