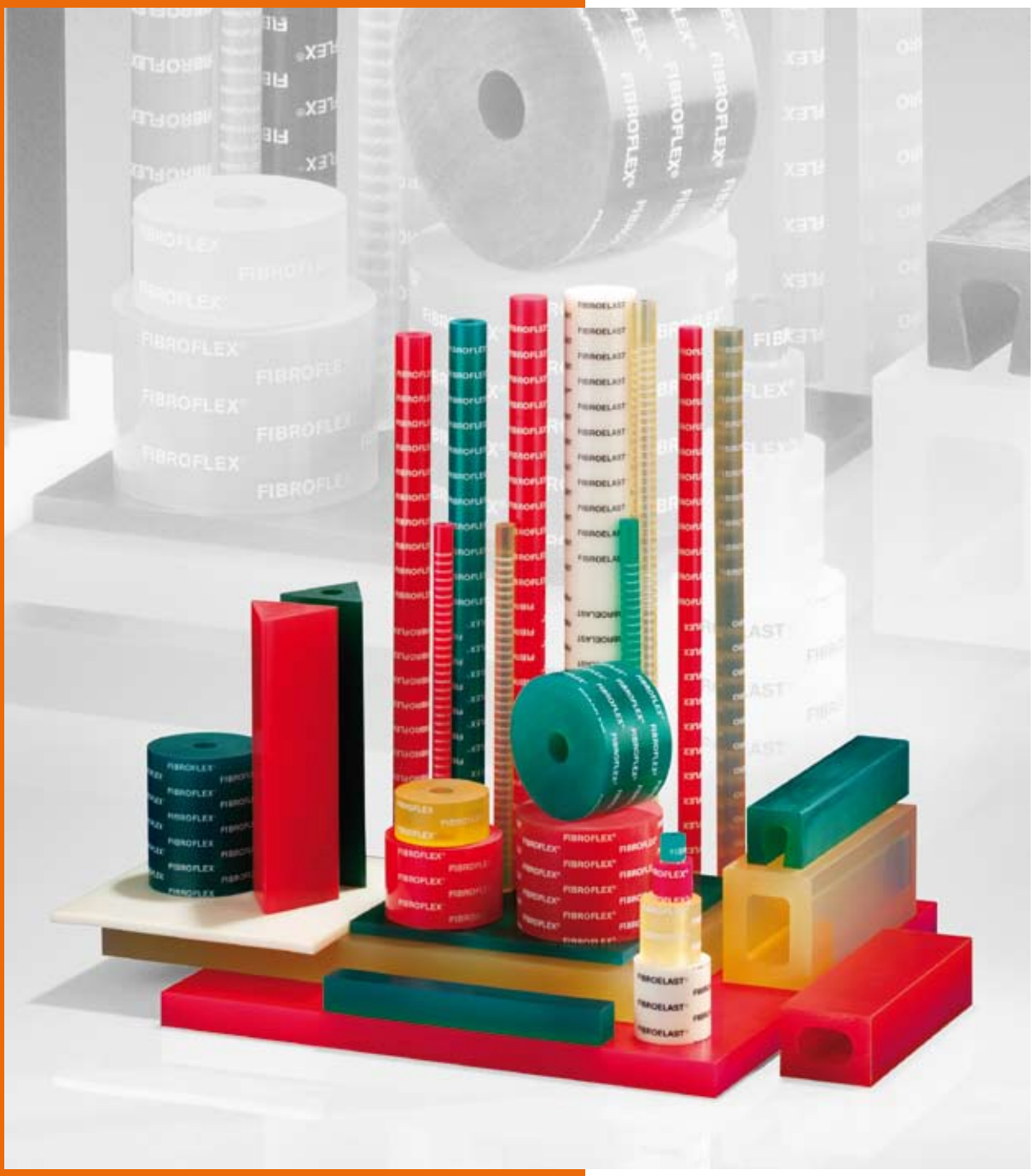


Elastomer
– Bars
– Sheets
– Sections

FIBROFLEX® Forming Elastomers

The occurence of small batch lots in the press shop generally makes the more expensive dies of conventional design unadvisable – and it is in this sector in particular that FIBROFLEX® Forming Elastomers can offer economical alternatives.

Over many years in the past, rubber was used for metal forming work, mostly with indifferent results because of insufficient mechanical resilience and susceptibility to damage by workshop lubricants.

FIBROFLEX®, a polyurethane elastomer of very special properties, represents a synthetic material of significant advantages over all coventional rubber substances. It provides:

- highest resistance to rupturing
- outstanding elastic properties
- extensive life span when used correctly
- good thermal resilience
- inertness to all lubricants used in metal forming operations.

To the designer of forming- and shearing dies, FIBROFLEX® offers highly attractive solutions to many a tooling problem – as for instance the completion in one operation of intricate return flanges etc. Special mention ought to be made here of the specific suitability this elastomer exhibits in the forming of delicate surface-coated or surface-refined sheet metal.

The quite outstanding elastic properties of FIBROFLEX® have made it an almost indispensable material in toolrooms everywhere and also in many sectors of general engineering. Its numerous successful uses comprise bumper stops, strippers, ejector- and forming pads, spring elements as well as noise supression applications.

FIBROFLEX® Forming Elastomers, available in three Shore hardnesses to suit different conditions, are supplied in a comprehensive range of sections hollow and solid, also in sheet form of many dimensions.

Intended as suggestions for the solution of forming problems, a number of illustrated application examples are contained in this catalogue. Further detailled information on elastomer tooling can be found in our free publication “Elastomers in Sheet Metal Forming and the Toolroom”, which we shall gladly mail to interested customers.

FIBROFLEX*

accurate parts to customers specifications

*Polyurethan

Contents

Technical Data on FIBROFLEX®
Forming Elastomer

Physical Properties:

FIBROFLEX® Type	DIN	5	6	7
Shore-A-Hardness	53505	80	90	95
Density g/cm³	53479	1,07	1,11	1,14
max. deformation in %		35	30	25
Impact resistance value N/cm (ASTM D 470)		124	150	270
Elongation to tear in %	53504	490	430	380
Tearing strength in N/mm²	53504	34,4	38	44,8
Working temperature, max. °C		+70	+70	+70
Embrittlement temperature °C		below –68	below –68	below –63
Modulus of elasticity N/mm²		38	70	133
Electric puncture strength (per mm thickness)			400 Volt	
Rebound elasticity %	53512	58	42	40
At 100 % elongation MPa	53504	5,5	5,6	12,4
At 300 % elongation MPa	53504	10,3	15,2	29,6
Coefficient of friction of FIBROFLEX®			dry 0,35 any Shore hardness	
			wet 0,25 any Shore hardness	
Tensile strength MPa	53504	34	38	45
Elongation %	53504	490	430	380
Tear strength kN/m	53515	36	42	58
Abrasion resistance mm³	53516	48	32	41
Torsional stiffness at 24°C in MPa		17,9	17,9	19,8
Compressive Set				
70h/22°C in %	53517	not available	not available	not available
Compressive Set				
70h/22°C in % – Methode B –	53517	25	27	36
Resistance to Sea Water (saline) approximately 6 months				
Resistivity (direct current) at			24° C $4{,}8 \times 10^{11}$	
			70° C $3{,}8 \times 10^{10}$	
			100° C $2{,}3 \times 10^{10}$	
Coefficient of expansion			0 up to –36° C = $1{,}43^{-4}$	
			0 up to 24° C = $1{,}01^{-4}$	
			25 up to 100° C = $0{,}95^{-4}$	

Guide Lines for the Machining of FIBROFLEX®:

FIBROFLEX® Forming Elastomers can be machined on ordinary machine tools and with conventional cutters.
A keen cutting edge is mandatory.

FIBROFLEX® Type	5	6	7
Identification Colour	green	yellow	red
Shore-A-Hardness	80	90	95
Sawing		V_c = approx. 1600 m/min.	
Circular saw, carbide-tipped, coarse toothed			
Rake angle 25°–30°			
Clearance angle 12°–15°			
Drilling		V_c = approx. 30 m/min.	
Turning		V_c = approx. 140 m/min.	
Rake angle 25°			
Clearance angle 12°–15°			
Milling		V_c = approx. 100 m/min.	
Rake angle 25°			
Clearance angle 12°–15°			

Please note that we can supply form parts, required in larger quantities, in the ready-cast condition. Enquiries are invited.

V_c = cutting speed

Technical Data on FIBROFLEX® Forming Elastomers

Temperature Resistance

FIBROFLEX® can be used safely at temperatures up to +70 °C. FIBROFLEX® will retain most of its flexibility at temperatures as low as –62 °C. A gradual increase in rigidity sets in below –18 °C. Resistance to thermal shock is excellent.

Resistance to Oxygen and Ozone

No traceable influences are incurred at normal atmospheric concentrations.

Resistance to Aging

Aging shows no discernable effects in conditions of normal ambient temperatures and generally constant environmental surroundings.

Water Resistance

FIBROFLEX® exhibits outstanding long-term stability under exposure to water of up to +50 °C. Swelling and/or destructive influences remain absent.
This typical resistance against hydrolysis is characteristic for the specific molecular structure of the elastomer.
Water-Oil emulsions present no problems either.
These are clear advantages of FIBROFLEX® over other polyurethane elastomer structures.

Resistance to oil, chemicals, and solvents

FIBROFLEX® is presenting an excellent resistance to oil and solvents and is, particularly, suiting applications in connection with lubricating oil and fuel.
Typical data of chemical resistance are shown in the following table.

Table No 1 – Resistance to some Chemicals

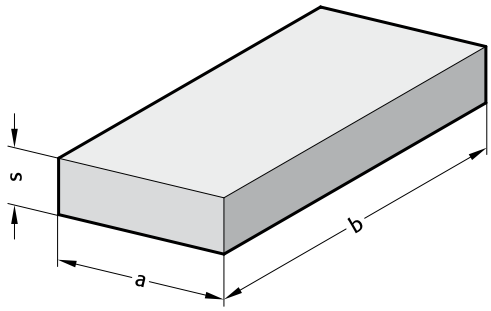
Diesel Fuel	○
Mineral Fats, acc. to additives	+ to –
Vegetabilic Fats	+
Animal Fats	+
Petrol (free of alcohols)	○
Mineral Oils – depending on additives	+
Paraffin	+ to –
Rape Seed Oil	+
Lubrificants on Mineral Oil Basis	○
Soap Emulsions	–
Vaseline	+
Water at +95 °C	–
Water at +20 °C	+ to ○

+	resistant = can be used
○	conditionally resistant = conditional use
–	not resistant = not recommended

Please note that blended oils and fats may have detrimental influence due to their various additives. In order to eliminate any risk, it is recommended ot test the elastomer under exposure to any specific oily and/or fatty substance. Such tests ought to be run for several weeks.

FIBROFLEX®-Sheets and Pads 251.
FIBROFLEX®-Square Sections 252.

251.



251.

Order No Part I	Part II	s	Part III a × b 250 × 250	a × b 250 × 500	a × b 500 × 500	a × b 500 × 1000	a × b 1000 × 1000
251.	.	1 – 7 increasing in steps of 1 mm	●	●	●	●	
	008.	8	●	●	●	●	●
	010.	10	●	●	●	●	●
	012.	12	●	●	●	●	●
	015.	15	●	●	●	●	●
	020.	20	●	●	●	●	●
	025.	25					
		30 – 80 increasing in steps of 10 mm					

Execution:

FIBROFLEX® is avail. in 3 Shore hardnesses:

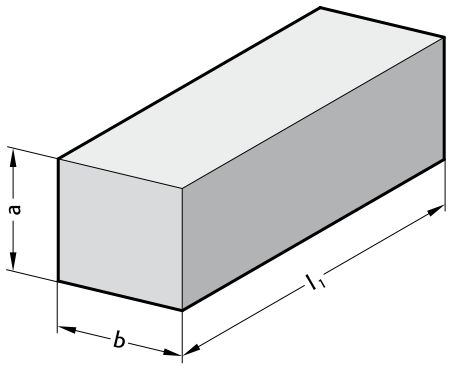
- .5. = 80 Shore A = colour: Green
- .6. = 90 Shore A = colour: Yellow
- .7. = 95 Shore A = colour: Red

Further technical data: see pages G 6 – G 7

Ordering Code (example):

FIBROFLEX® Sheet	= 251.
Hardness 95 Shore-A	= 7.
s = 1 mm	= 001.
a × b = 500 × 500 mm	= 0500.0500
Order No	= 251.7.001.0500.0500

252.



252.

Order No	a × b	250	500	1000		a × b	250	500	1000		a × b	250	500	1000
252.	008.008.▽			●	252.	020.020.▽			●	252.	060.080.	●	●	●
	008.015.▽			●		020.030.▽			●		080.080.	●	●	●
	008.025.▽			●		020.040.▽			●		080.100.	●	●	●
	008.050.▽			●		020.050.▽			●		100.100.	●	●	●
	010.010.▽			●		022.022.	●	●	●		100.125.	●	●	●
	010.015.▽			●		025.025.▽			●		100.180.	●	●	●
	010.025.▽			●		025.040.▽			●		125.125.	●	●	●
	010.050.▽			●		025.060.▽			●					
	012.012.▽			●		025.080.▽			●					
	012.020.▽			●		030.030.	●	●	●					
	012.030.▽			●		040.040.▽			●					
	012.050.▽			●		040.060.	●	●	●					
	015.015.	●	●	●		045.045.	●	●	●					
	015.025.▽			●		050.050.	●	●	●					
	015.040.▽			●		050.180.	●	●	●					
	015.050.▽			●		060.060.	●	●	●					

▽ = machine dimensional edge

Execution:

FIBROFLEX® is available in 3 Shorehardnesses:

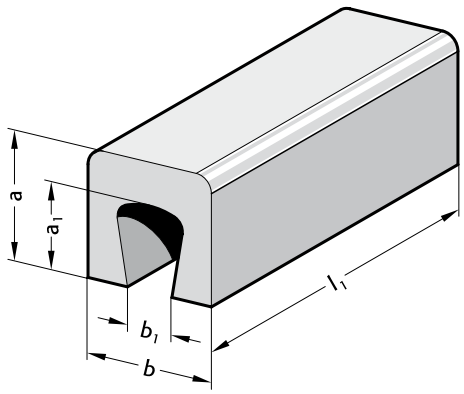
- .5. = 80 Shore A = colour: Green
- .6. = 90 Shore A = colour: Yellow
- .7. = 95 Shore A = colour: Red

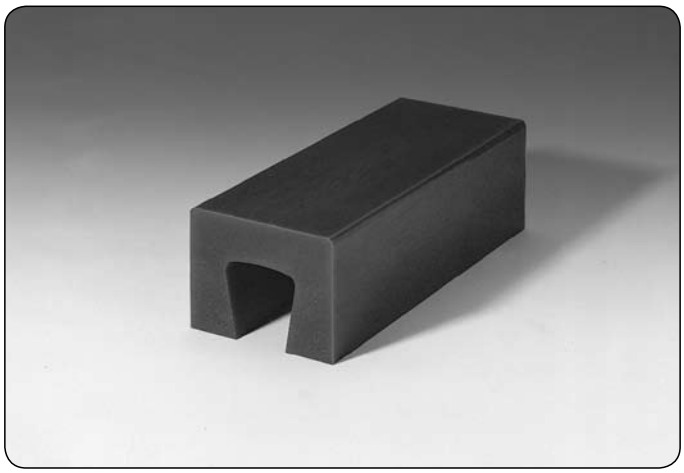
Further technical data : see pages G 6 – G 7

FIBRO

250. FIBROFLEX® Channel Sections
255. FIBROFLEX® Hollow Square Sections

250.





250.

Order No				Part III l_1	l_1
Part I	Part II	a × b	$a_1 \times b_1$	250	500
250.	.050.050.	50 × 50	35 × 20	●	●
	050.075.	50 × 75	35 × 30	●	●
	075.100.	75 × 100	50 × 40	●	●
	100.200.	100 × 200	60 × 120	●	●

Execution:

FIBROFLEX® is avail. in 3 Shore hardnesses:

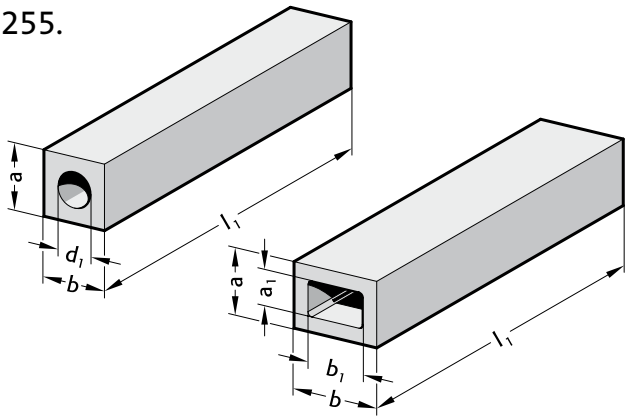
- .5. = 80 Shore A = colour: Green
- .6. = 90 Shore A = colour: Yellow
- .7. = 95 Shore A = colour: Red

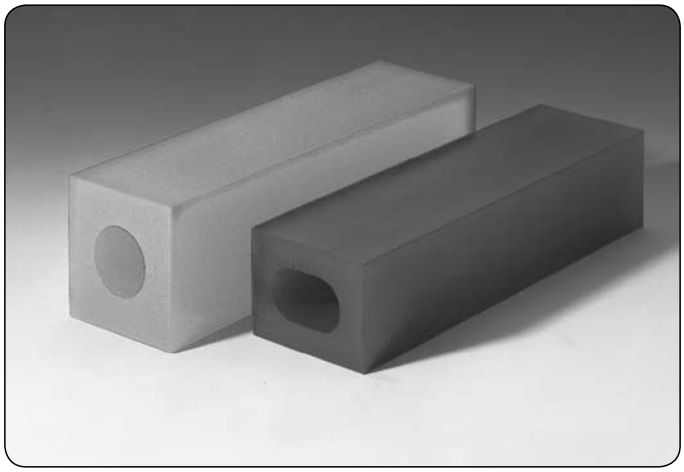
Further technical data: see pages G 6 – G 7

Ordering Code (example):

FIBROFLEX® Channel Section	= 250.
Hardness 90 Shore A	= 6.
a × b = 50 × 50 mm	= 050.050.
l_1 = 250 mm	= 0250
Order No	= 250.6.050.050.0250

255.





255.

Order No					Part III l_1		
Part I	Part II	a × b	$a_1 \times b_1$	d_1	250	500	1000
255.	.040.060.	40 × 60	20 × 35		●	●	●
	045.045.	45 × 45		20	●	●	●
	050.050.	50 × 50		25	●	●	●
	050.180.	50 × 180	20 × 120		●	●	●
	060.060.	60 × 60		30	●	●	●
	060.080.	60 × 80	30 × 50		●	●	●
	080.080.	80 × 80		40	●	●	●
	080.100.	80 × 100	40 × 60		●	●	●
	100.100.	100 × 100	50 × 50		●	●	●
	100.125.	100 × 125	50 × 70		●	●	●
	100.180.	100 × 180	50 × 123		●	●	●
	125.125.	125 × 125	75 × 75		●	●	●

Execution:

FIBROFLEX® is avail. in 3 Shore hardnesses:

- .5. = 80 Shore A = colour: Green
- .6. = 90 Shore A = colour: Yellow
- .7. = 95 Shore A = colour: Red

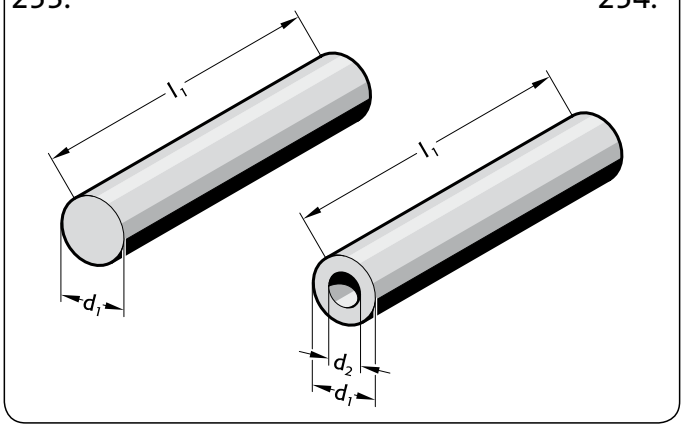
Further technical data: see pages G 6 – G 7

Ordering Code (example):

FIBROFLEX® Hollow Square Section	= 255.
Hardness 80 Shore A	= 5.
a × b = 50 × 50 mm	= 050.050.
l_1 = 500 mm	= 0500
Order No	= 255.5.050.050.0500

FIBROFLEX®-Round Sections 253.
FIBROFLEX®-Hollow Round Sections 254.

253. 254.



253.

Order No			Part III l_1		
Part I	Part II	d_1	330	500	1000
253.□.	002	2	●		
	003	3			●
	004	4			●
	005	5			●
	006	6			●
	007	7			●
	008	8			●
	010	10			●
	012	12			●
	016	16	●		
	020	20		●	
	025	25		●	
	032	32		●	
	040	40		●	
	050	50		●	
	063	63		●	
	080	80		●	
	100	100		●	
	125	125		●	
	140	140		●	
	150	150		●	
	160	160		●	
	180	180		●	
	200	200		●	

Ordering Code (example):

FIBROFLEX® Round Section	=	253.
Hardness 95 Shore-A	=	7.
d_1 = 40 mm	=	040
Order No	=	253.7.040

254.

Order No				Part III l_1	
Part I	Part II	d_1	d_2	330	500
254.□.	016	16	6,5	●	
	020	20	8,5		●
	025	25	10,5		●
	032	32	13,5		●
	040	40	13,5		●
	050	50	17,0		●
	063	63	17,0		●
	080	80	21,0		●
	100	100	21,0		●
	125	125	27,0		●
	140	140	50,0		●
	150	150	50,0		●
	160	160	50,0		●
	180	180	50,0		●
	200	200	50,0		●

Ordering Code (example):

FIBROFLEX® Hollow Round Section	=	254.
Hardness 90 Shore-A	=	6.
d_1 = 50 mm	=	050
Order No	=	254.6.050

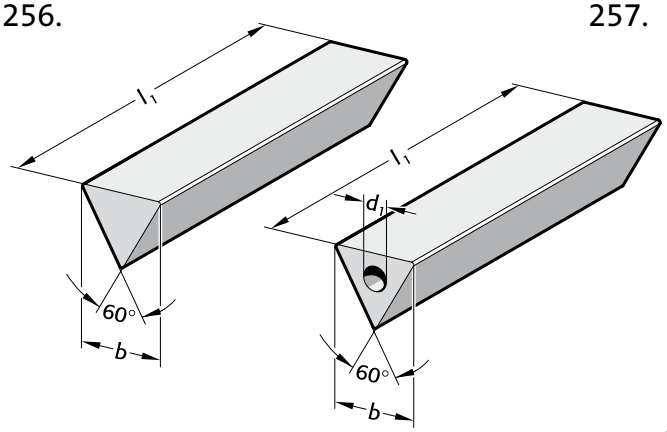
Execution:

FIBROFLEX® is avail. in 3 Shore hardnesses:
□□□.5. = 80 Shore A = colour: Green
□□□.6. = 90 Shore A = colour: Yellow
□□□.7. = 95 Shore A = colour: Red
Further technical data: see pages G 6 – G 7

FIBRO

256. FIBROFLEX® Triangular-Sections
257. FIBROFLEX® Hollow Triangular-Sections

256. 257.



256.

Order No			Part III	
			l_1	l_1
Part I	Part II	b	250	500
256.□.	035.	35	●	●
	050.	50	●	●
	080.	80	●	●

Ordering Code (example):

FIBROFLEX® Equilateral Triangle-Section	=	256.
Hardness 90 Shore-A	=	6.
size b = 35 mm	=	035.
l_1 = 500 mm	=	0500
Order No	=	256.6.035.0500

257.

Order No				Part III	
				l_1	l_1
Part I	Part II	b	d_1	250	500
257.□.	035.	35	8	●	●
	050.	50	12	●	●
	080.	80	20	●	●

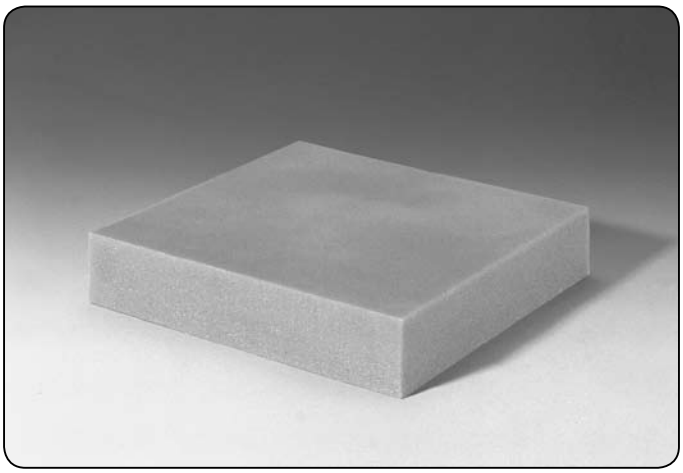
Ordering Code (example):

FIBROFLEX® Equilateral Hollow Triangle-Section	=	257.
Hardness 90 Shore-A	=	6.
size b = 50 mm	=	050.
l_1 = 250 mm	=	0250
Order No	=	257.6.050.0250

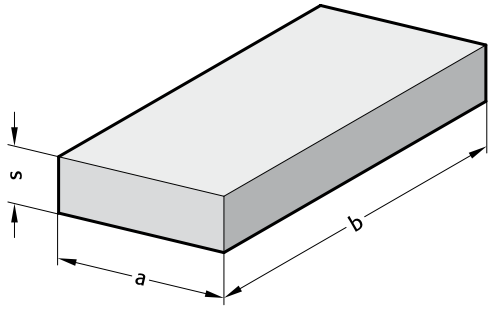
Execution:

FIBROFLEX® is avail. in 3 Shore hardnesses:
□□□.5. = 80 Shore A = colour: Green
□□□.6. = 90 Shore A = colour: Yellow
□□□.7. = 95 Shore A = colour: Red
Further technical data: see pages G 6 – G 7

FIBROELAST® Sheets 2511.3.



2511.3.



2511.3.

Order No Part I	Part II	s	Part III a × b 250 × 250	a × b 250 × 500	a × b 500 × 500	a × b 500 × 1000
2511.3.	.	1 – 7	●	●	●	●
		increasing in steps of 1 mm				
	008.	8	●	●	●	●
	010.	10	●	●	●	●
	012.	12	●	●	●	●
	015.	15	●	●	●	●

Ordering Code (example):

FIBROELAST® Sheet	= 2511.
Hardness 65 Shore A	= 3.
s = 15 mm	= 015.
a = 250 mm	= 0250.
b = 500 mm	= 0500
Order No	= 2511.3.015.0250.0500

Material:

Polyester-based polyurethane

Hardness 65 Shore A

Colour:

White

Note:

Other sheet thicknesses available upon request.

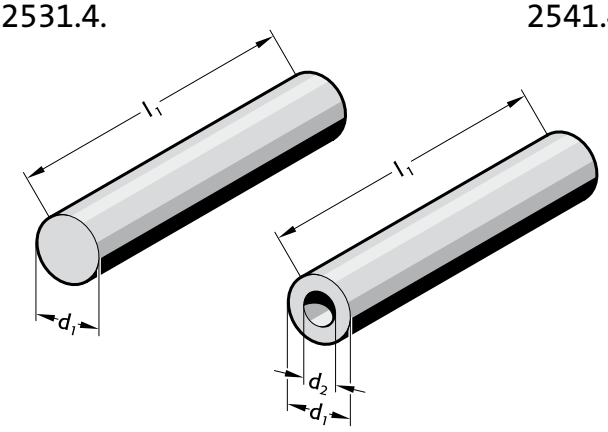
Physical properties:

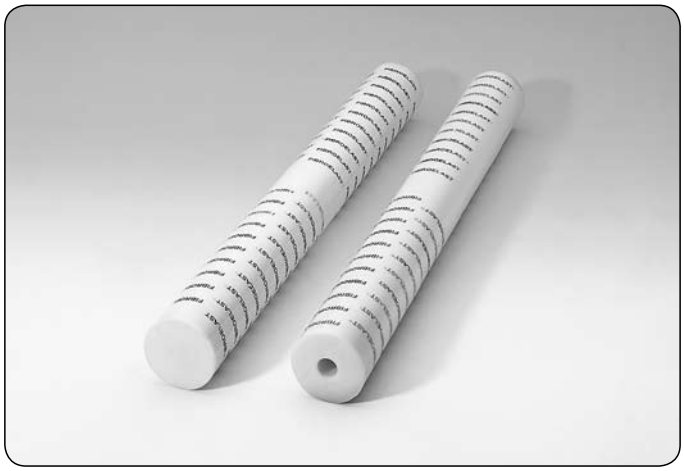
Shore hardness A	65
100% modulus of elasticity (MN/m²)	2,4
300% modulus of elasticity (MN/m²)	4,6
Tensile strength (MN/m²)	26
Elongation (%)	550
Tear resistance (kN/m)	46
Permanent set (%)70°C	45
Rebound elasticity (%)	58
Maximum deformation (%)	40

FIBRO

2531.4. FIBROELAST®-Round Sections
2541.4. FIBROELAST®-Hollow Round Sections

2531.4. 2541.4.





2531.4.

Order No			l1	
Part I	Part II	d1	330	500
2531.4.	016	16	●	
	020	20		●
	025	25		●
	032	32		●
	040	40		●
	050	50		●
	063	63		●
	080	80		●
	100	100		●
	125	125		●

Ordering Code (example):

FIBROELAST® Round Section	= 2531.
Hardness 70 Shore A	= 4.
d1 = 40 mm	= 040
Order No	= 2531.4.040

2541.4.

Order No				l1	
Part I	Part II	d1	d2	330	500
2541.4.	016	16	6,5	●	
	020	20	8,5		●
	025	25	10,5		●
	032	32	13,5		●
	040	40	13,5		●
	050	50	17,0		●
	063	63	17,0		●
	080	80	21,0		●
	100	100	21,0		●
	125	125	27,0		●

Ordering Code (example):

FIBROELAST® Hollow Round Section	= 2541.
Hardness 70 Shore A	= 4.
d1 = 40 mm	= 040
Order No	= 2541.4.040

Material:

Polyester-based polyurethane

Hardness 70 Shore A

Colour:

White

Note:

FIBROELAST® hollow round sections can also be used as springs. See page F58.

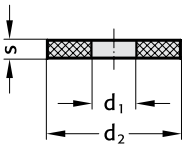
Physical properties:

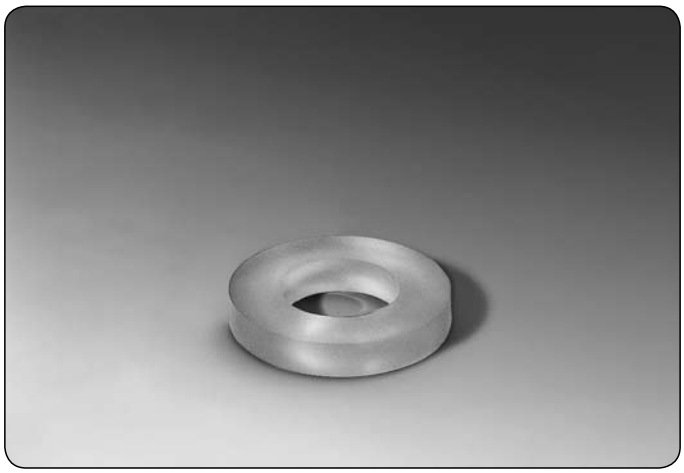
Shore hardness A	70
100% modulus of elasticity (MN/m²)	3,0
300% modulus of elasticity (MN/m²)	6,0
Tensile strength (MN/m²)	28
Elongation (%)	550
Tear resistance (kN/m)	58
Permanent set (%) 70°C	45
Rebound elasticity (%)	55
Maximum deformation (%)	40

FIBRO

2450. Shock Absorbing Washers

2450.





2450.

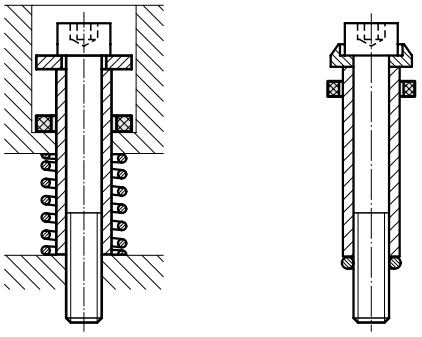
d_1	d_2	s
6,4	16	3
10,5	15	4
11	17	3
13	19	4
8,5	20	3
14	23	4
15,5	23	4
12	24	5
10,5	25	4
13	25	4
14	26	5
17	26	4
18	27	4
22	28	6
21	30	5
13,5	32	4
25	32	6
18	32	7
23,5	34	4
21	35	7
26	35	6
17	38	5
21	38	6
13,5	40	5
32	40	6
27	41	7
31	42	6
37	46	6
32	49	8
17	50	6
26	50	6
37	53	8
32	60	10
17	63	6
37	65	10
42	70	10
21	80	10
21	100	10
27	125	10

Ordering Code (example):

Shore A 80 = .5
90 = .6
95 = .7

Shock Absorbing Washer	= 2450.
Shore A hardness of 90 = 6.	= 6.
d_1 = 21 mm	= 21.
d_2 = 80 mm	= 080.
s = 10 mm	= 10
Order No	= 2450.6.21.080.10

Mounting Example:



Execution:

2450.6. (90 Shore A) available ex stock.
80 and 95 Shore A available upon request.

Recommendations for Blanking, Forming and Embossing operations with FIBROFLEX® Elastomer

Blanking, forming and embossing with FIBROFLEX® Tooling Elastomer holds quite particular attraction for small to medium batches where, in comparison with conventional tooling, time and cost can be saved in the toolroom.

Conventional dies always depend on the highly accurate relationship between punch and matrix. This does not apply to elastomer dies. Only one part – punch or matrix – will be required. The "opposite member" is provided by the elastomer cushion. This means that elastomer dies are usually made very quickly and therefore cost less. Moreover they afford great flexibility in regard of component modification at a later stage.

Whereas the foregoing considerations left the choice of an alternative solution, presswork with surface-coated or surface-refined material usually does not: with any operational blemishes firmly ruled out, more often than not the "soft touch" of a FIBROFLEX® die is the only answer.

FIBROFLEX® Blanking Dies

In the actual working cycle of en elastomer blanking die, the ram force is initially absorbed by the resistance of the deforming elastomer cushion. As the limit of deformability is reached, shearing and stock breakaway must have taken place. As a general rule it can be stated that stock of high ductility has a detrimental effect on elastomer blanking. The brittler materials on the other hand, such as spring steels, lamination quality strip and certain aluminium alloys are blanked in elastomer dies on quite a large scale. Soft materials like deep drawing steel etc. are unsuitable for the process.

Steel stock of up to 2–2,5 mm thickness can today be handled on FIBROFLEX® blanking dies, while highly accurate blanks of intricate contour can be processed from thin sheet of 0,2 to 0,01 mm thickness. It is here that the inherently uniform clamping pressure of the elastomer cushion proves its beneficial influence – as vindicated by achieveable part tolerances of ± 0,01 mm.

Metal Forming with FIBROFLEX®

Projects of metal forming with FIBROFLEX® must always be based on the rule that an elastomer can be displaced but cannot be compressed. Consequently it is of paramount importance to ensure that sufficient space is provided in an elastomer forming die for the accommodation of the displaced FIBROFLEX®

Press Selection

Due to the normally somewhat greater bulk of elastomer dies, the availability of ample die space in the press has to be assured.

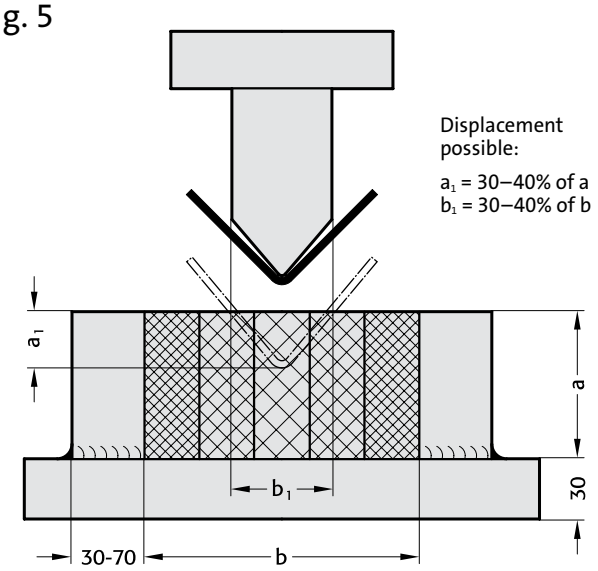
Hydraulic presses with their characteristic slow pressure rise are eminently suitable for elastomer tooling because this feature matches the somewhat delayed deformation behaviour of FIBROFLEX®.
For the same reason, mechanical presses may give a certain amount of trouble because of overloading.

Since no demands need be made on press accuracy, older machines can often be put to good use again with FIBROFLEX® tooling.

Provided applications follow these general guide lines, FIBROFLEX® Tooling Elastomer will prove its enormous resilience time and again – giving shape to workpieces without losing its own.

Application Examples of Forming Operations with FIBROFLEX® Elastomers

Fig. 5



Vee-Bending

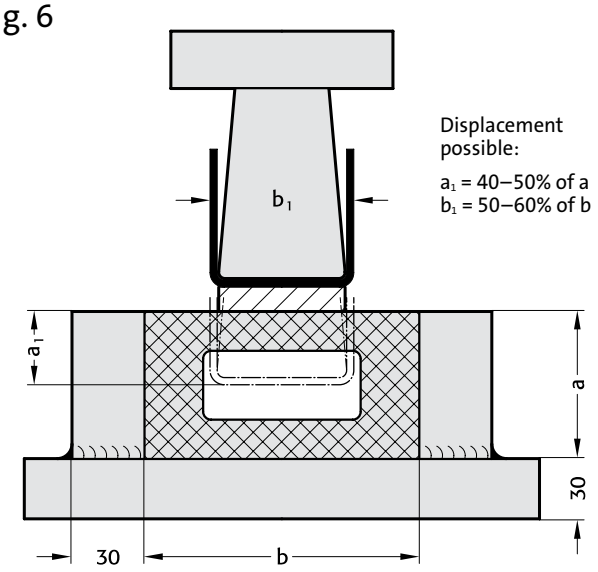
One of the easiest elastomer-forming operations is that of Vee-bending off a solid punch and into a die cushion of stacked FIBROFLEX® pads.

The necessary penetration of the punch and the amount of over-bending depend on the thickness, hardness and type of the material – and furthermore on the bending radius, the length of the free legs on the piece part, and lastly on the Shore hardness of the cushion.

Applicable to all kinds of bending operations is the general rule: the smaller the bending radius, the less will be the spring-back of the bend and the shallower is the required penetration of the punch.

Especially with larger batch quantities it is advisable to ensure all-round retention of the stacked elastomer cushion; it also pays to make punch and cushion identical in length.

Fig. 6



Bending of Vee- and U-Shapes

Bending of Vee- and U-shapes can be achieved either with stacked FIBROFLEX® pads of different hardness (Fig. 5), or with the aid of solid and hollow FIBROFLEX® Sections. These may consist of squares, channels or triangular sections.

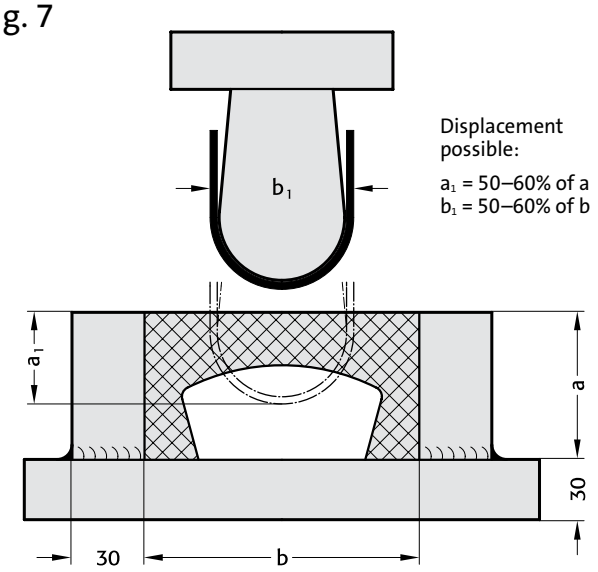
Where solid sections or sheet is used as a cushion, wear of the elastomer material can be reduced through creation of an additional displacement space at the bottom of the cushion retainer box, similar to Fig. 11, where gib inserts are placedalong the corners.

Hollow cushions, as well as those of a channel configuration, exhibit greater die life and are therefore the preferred choice for bending operations.

In the case of a U-shaped bend with straight bottom it may be advisable to insert a packing of 3–5 mm thickness, and of the same width as the flat bottom of the bend, underneath the cushion. This measure increases the forming pressure and helps to achieve a flat bottom on the workpiece.

The punch should be relieved on both sides in order to avail compensation possibilities for springback.

Fig. 7



U-Bends with large radius

U-bends with a large bottom radius are difficult to accomplish. Punch penetration must of need be large; springback can be quite considerable.

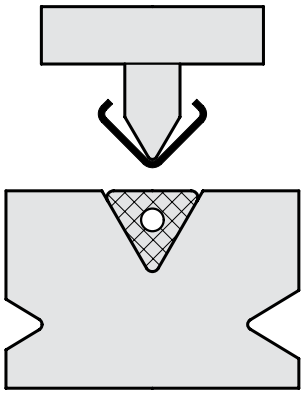
In order to achieve good results, the use of hollow FIBROFLEX® sections or of channels becomes almost mandatory. This is illustrated in Figs. 7 and 12. Another alternative consists of machined form cushions in accordance with Fig. 13.

The hollow space of the channel-shaped cushion has the effect of increasing the horizontal pressure component in the die; this also holds true for hollow die cushions.

In all cases is it necessary to ensure that the cushion retainer box is sufficiently rigid.

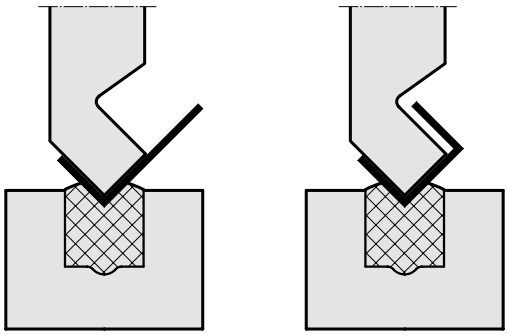
Application Examples of Forming Operations with FIBROFLEX® Elastomers

Fig. 8



FIBROFLEX® Triangular Sections are shaped to fit into the existing forming grooves of bending brake dies, thus eliminating die changes and/or the provision of a die cushion retainer box as required with square cushion configurations.

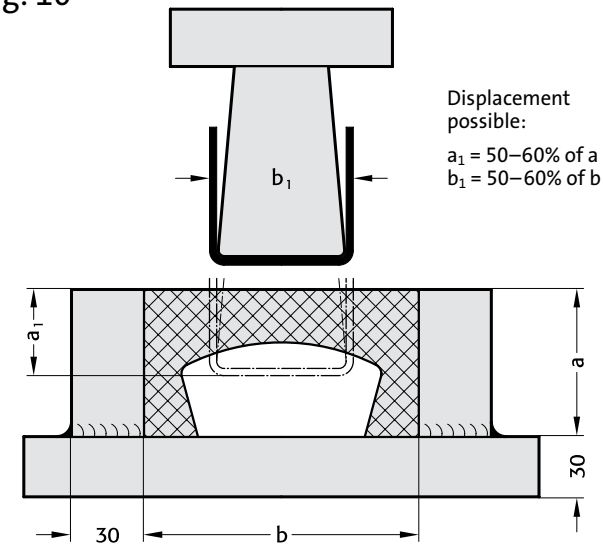
Fig. 9



Depending on stock specifications the bending of a channel section may either be done off a Vee-shaped punch as a voluntary choice – or it may become an absolute necessity.

Two operational sequences are required, and a goose-necked punch configuration is essential.

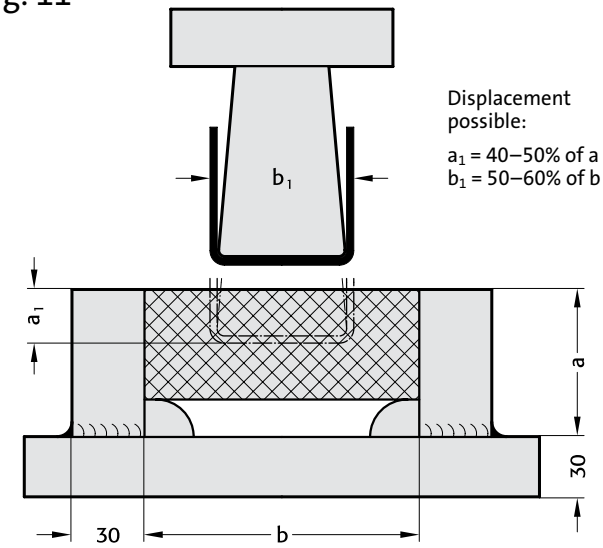
Fig. 10



Displacement possible:

a_1 = 50–60% of a
b_1 = 50–60% of b

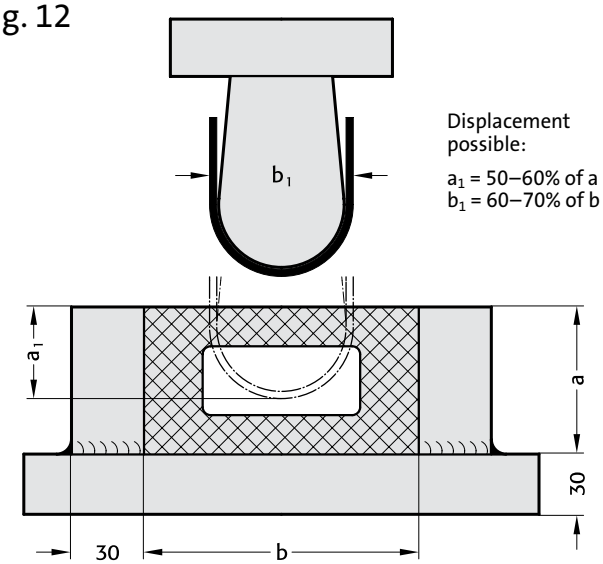
Fig. 11



Displacement possible:

a_1 = 40–50% of a
b_1 = 50–60% of b

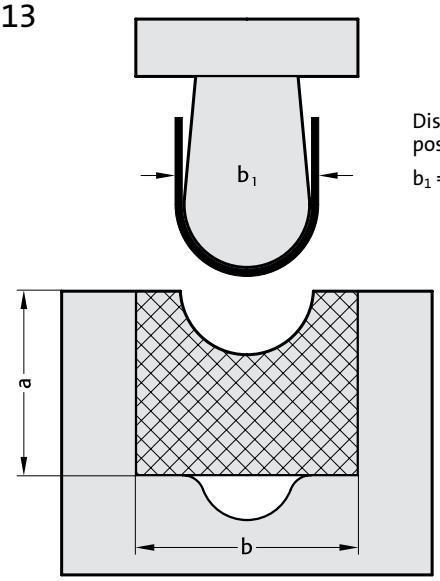
Fig. 12



Displacement possible:

a_1 = 50–60% of a
b_1 = 60–70% of b

Fig. 13



Displacement possible:

b_1 = 60–70% of b

Blanking and forming with FIBROFLEX®-Elastomers

Blanking and forming with FIBROFLEX®-Elastomers

Description

FIBROFLEX® forming materials for blanking, embossing and forming are eminently suitable for use in small and medium series production. The main advantage is the reduction in tooling costs compared with traditional productions methods.

This means that, even with considerable workpiece changes or with prototypes, you can respond quickly to changing market requirements and delivery times.

You can avoid scratching or damaging the icreasingly common coated an highly polished sheet metals by using the gentle touch of elastometers for the forming process.

Forming with FIBROFLEX®

When forming using elastometers, always remenber the golden rule: whatever the extent of the deformation, the elastic FIBROFLEX® forming material remains constant, i.e. it can be displaced, but not compressed. The design must allow the elastomer to “flow” into a relief gap – that is the secret of success.

Choice of Machine

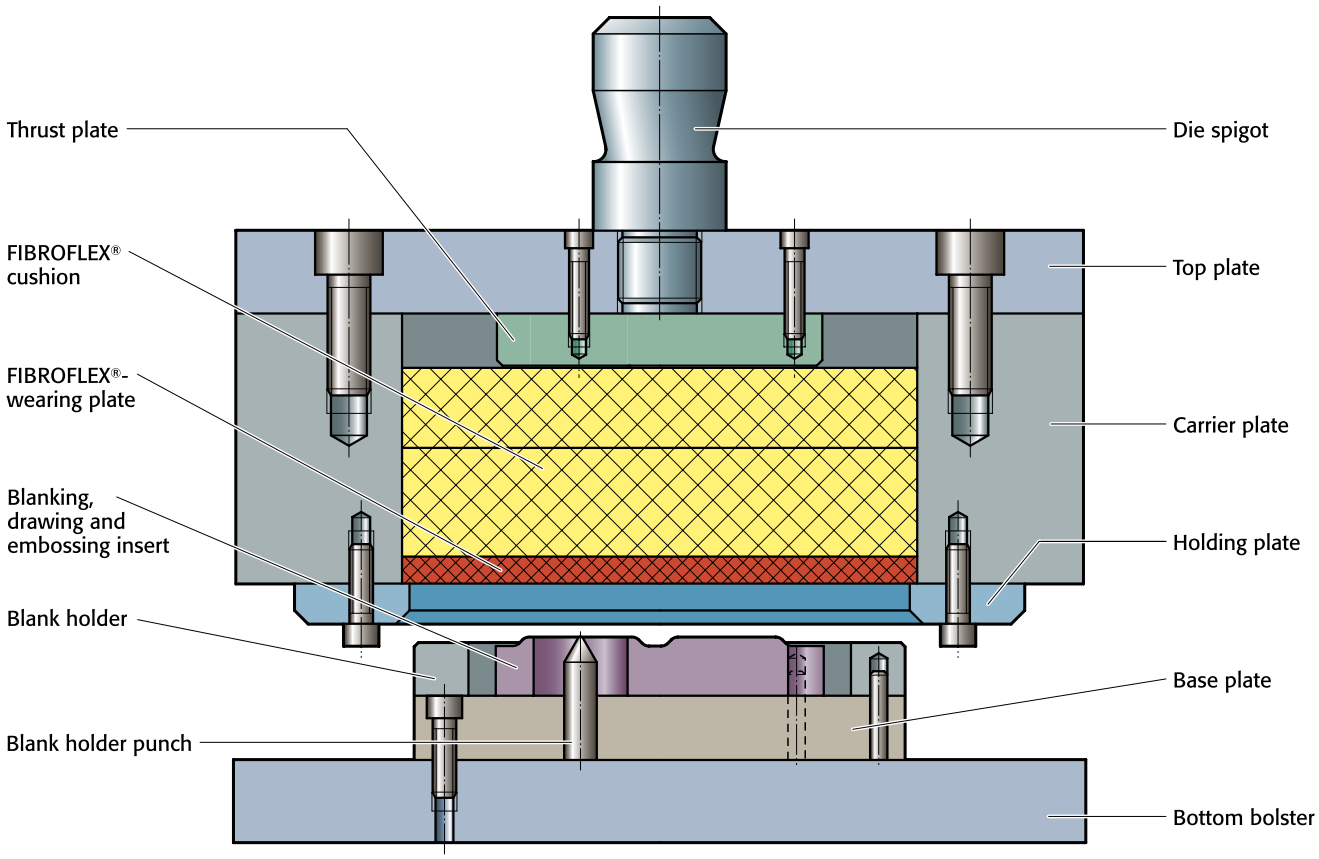
When FIBROFLEX® matrices are used for blanking, embossing and forming the machine must be able to accommodate the displacement.

Hydraulic presses are preferable to mechanical presses because of their gradual pressure build-up which suits the characteristics of the FIBROFLEX® forming material as it changes shape.

If a mechanical press is overloaded as it approaches bottom dead centre (which is also the cutting point), there is an risk of the press being damaged.

With FIBROFLEX® the machine is not subjected to any stresses, so even old machines can be used.

FIBROFLEX® Forming tool blanking – drawing – embossing



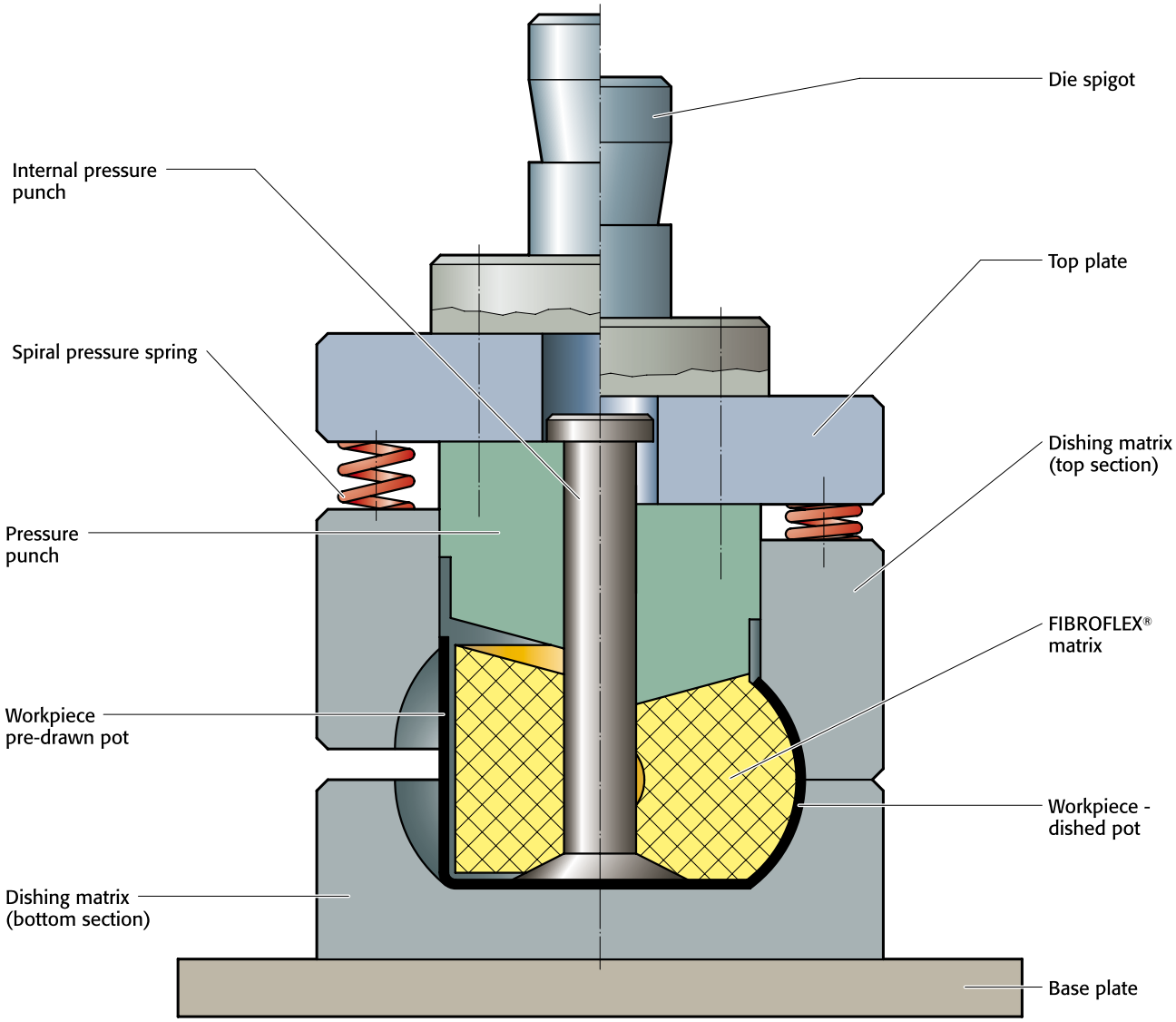
Combined blanking – embossing – punching

The workpiece is completed at one pass. The shape is determined by the combined blanking, hole cutting and embossing matrix blank holder punch, without a reverse shape mould on the cushion side.

The thrust plate in the carrier produces a concentration of pressure which produces a better result in the active tool range. The thrust plate also provides the necessary compensation for constant volume.

When producing workpieces of a different shape, only the tool elements in the lower section which produce the shape have to be exchanged.

FIBROFLEX® Forming tool dishing



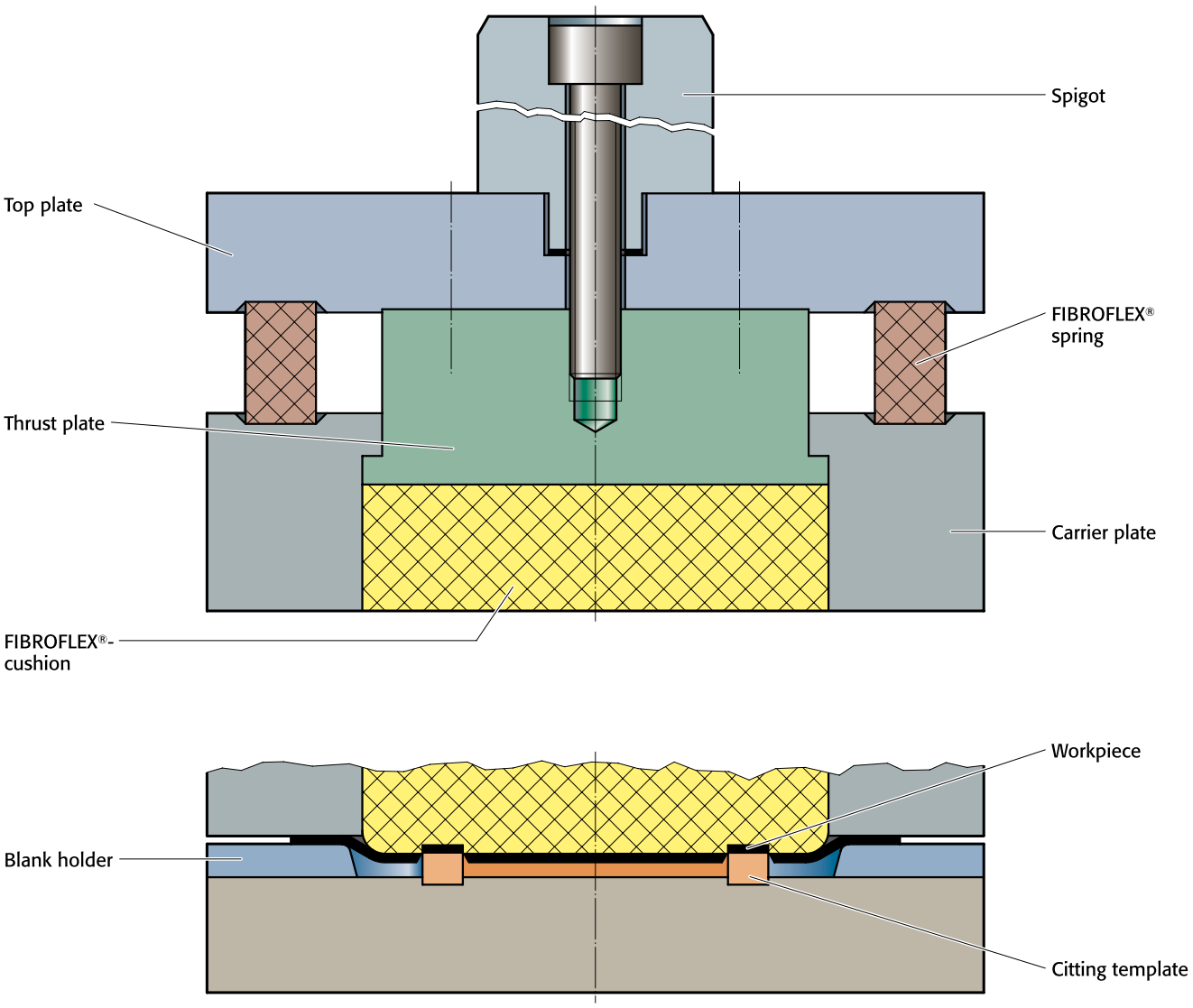
Bulging a pot

For flaring and bulging operations we recommend the use of FIBROFLEX® concave profiles wherever possible.

The wedge shape of the elastomer and the shape of the pressure and counter pressure punches both encourage the elastomer to deform in the required direction.

For bulging work it is worth taking into account the basic principle for FIBROFLEX®, namely that it maintains a constant volume. (Displaced volume equals bulging volume – see also description on page G17).

FIBROFLEX®
Universal Blanking and Forming Carrier



FIBROFLEX® blanking matrices

When blanking with Elastomers, the workpiece materials, in contrast to the traditional blanking of workpiece materials, are subjected to their elastic limits, beyond which the material breaks.

The thickness of sheet steel which can be cut usting FIBROFLEX® is currently up to 2.5 mm.

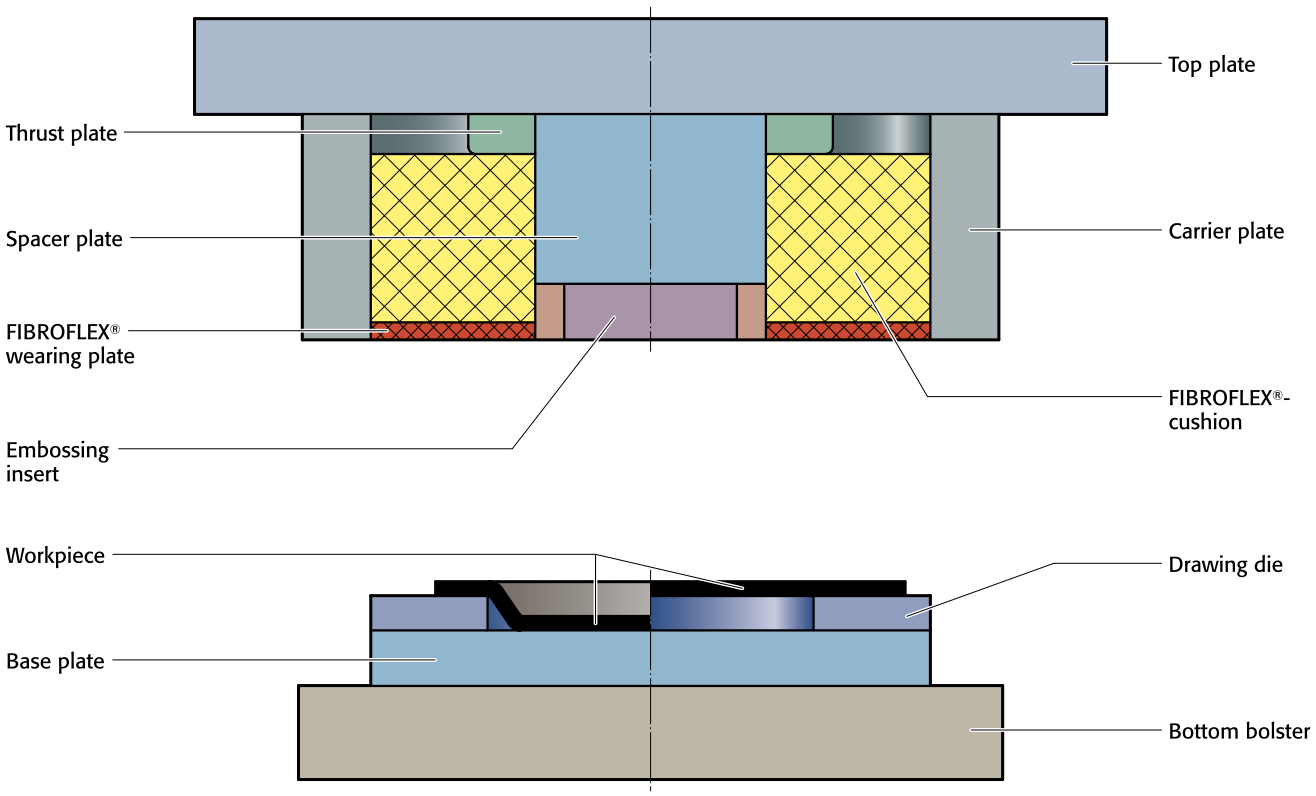
The even clamping pressure which is excellent for pressing also means that parts with intricate contours can be manufactured.

It is possible to achieve workpiece accuracy of ± 0,01 mm.

During the blanking process the press pressure first deforms the elastomer. As soon as the elastomer reaches the limits of its deformation the workpiece is cut.

The less the stretch of the sheet metal, the easier it can be cut using the elastomer blanking process. Spring band steels, electric sheets and sheet aluminium all cut well using this process. Deep-drawing sheet steel is unsuitable for the elastomer blanking process.

FIBROFLEX®
Forming tool drawing – embossing



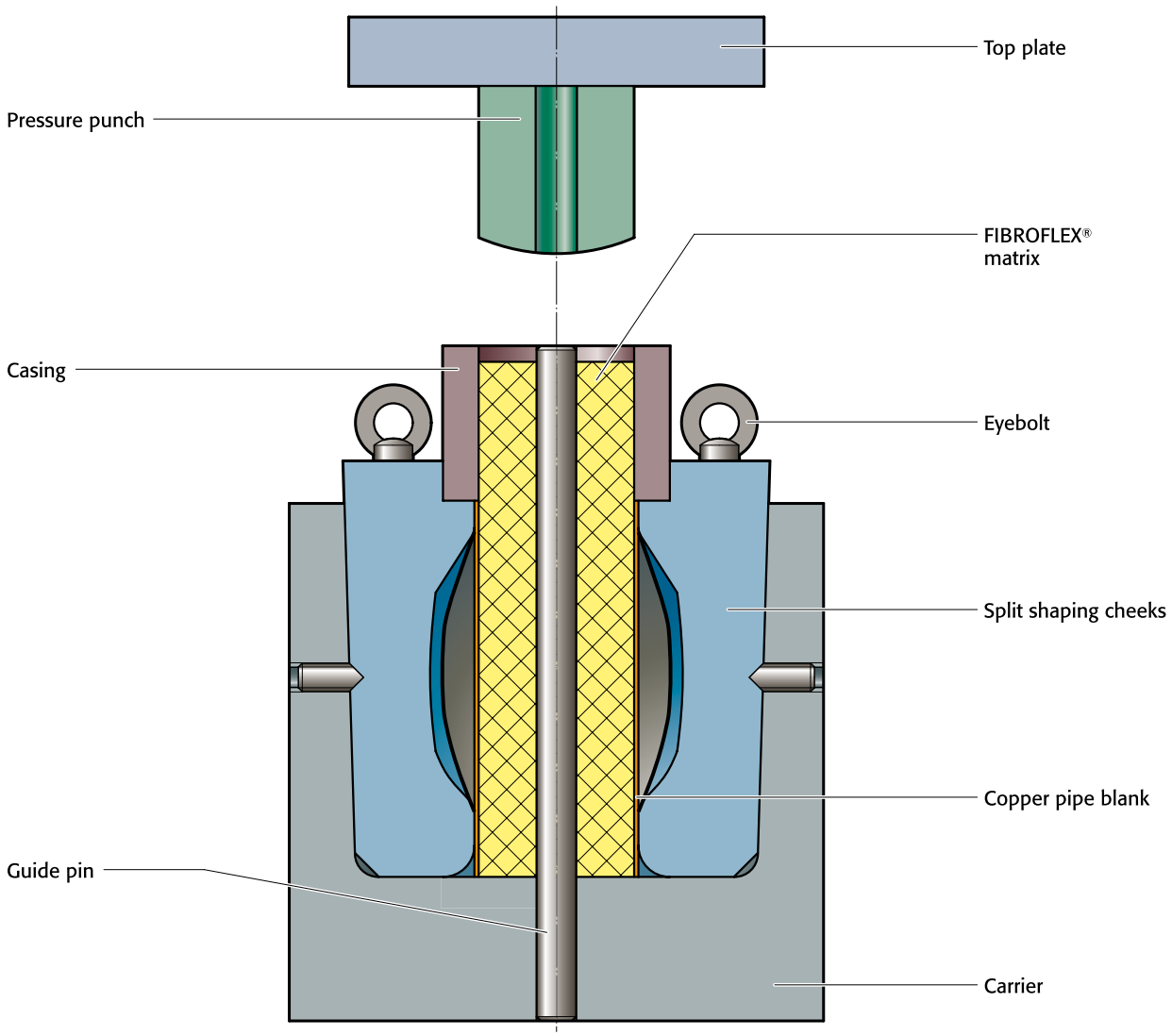
Drawing and embossing

The limits for flaring and bulging depend on the workpiece material, its thickness and hardness and also the height of the FIBROFLEX® cushion.

Maximum permissible deformation of the FIBROFLEX® cushion:

80 Shore A – 35%
90 Shore A – 30%
95 Shore A – 25%

FIBROFLEX®
Forming tool for flaring pipes



Flaring pipes

When flaring using FIBROFLEX®, split cheeks with a conical external surround are required to allow the workpiece to be released.

Depending on wall thickness, flaring ratios of 1.2 can be achieved. Above a workpiece diameter-to-length ratio of 2 : 1 it is advisable to use concave cushions with bolt guides.