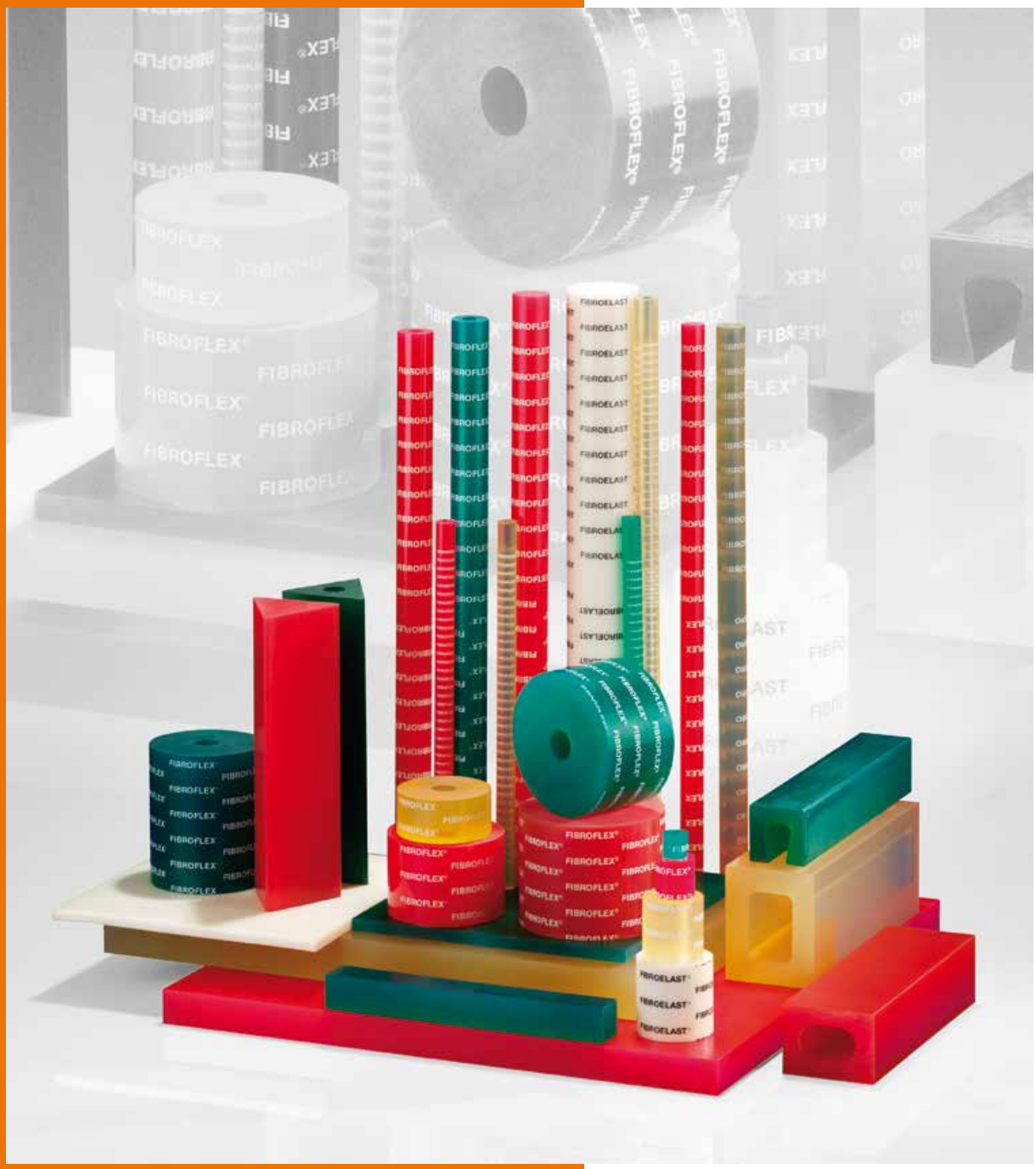


Elastomer

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

FIBRO

Contents

Contents

FIBRO

Technical data on FIBROFLEX® Forming elastomer

Physical properties:

FIBROFLEX®-Type		DIN	5	6	7
Shore-A-Hardness	Shore A	53505	80	90	95
Density Density	[g/cm³]	53479	1,07	1,11	1,13
Working temperature, max.	[°C]		-40 bis +70	-40 bis +70	-40 bis +70
Rebound elasticity	[%]	53512	63	45	38
Tensile stress					
At 100% elongation	[MPa]	53504	4,1	6,8	11,8
At 300% elongation	[MPa]	53504	8	15,2	30
Tensile strength	[N/mm²]	53504	36	38	49
Elongation at fracture	[%]	53504	450	400	360
Tear strength	[N/mm]	53515	21	29	50
Abrasion resistance	[mm³]	53516	70	50	41
Compressive Set					
70h/24°C	[%]	53517	21	26	30
Resistance to Sea Water (saline)			approximately 6 months		

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 Circular saw, carbide-tipped, coarse toothed Rake angle 25°–30° Clearance angle 12°–15°	vc= approx. 1600 m/min.		
Drilling	vc= approx. 30 m/min.		
Turning Rake angle 25° Clearance angle 12°–15°	v_c= approx. 140 m/min.		
Milling Rake angle 25° Clearance angle 12°– 15°	v_c= approx. 100 m/min.		

v_c = cutting speed

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

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

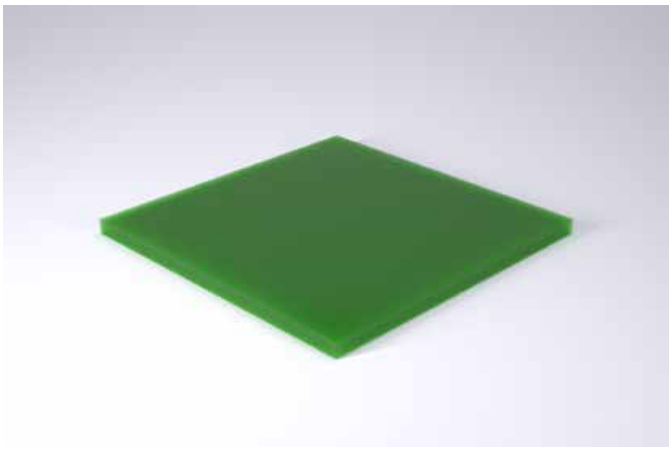
\+ resistant = can be used

O conditionally resistant = conditional use

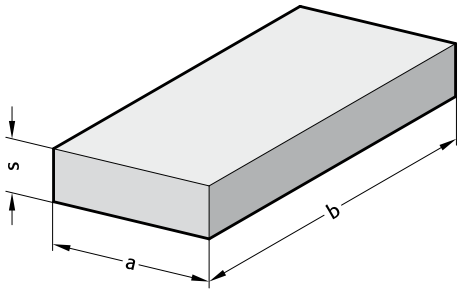
– not resistant = not recommended

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®-Plate



251.



Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

Ordering Code (example):

FIBROFLEX®-Plate		=251.	
Spring rate MAT	80 Shore A	=	5.
Thickness s	15 mm	=	015.
Length a	250 mm	=	0250.
Width b	250 mm	=	0250
Order No		=251.	5.015. 0250. 0250

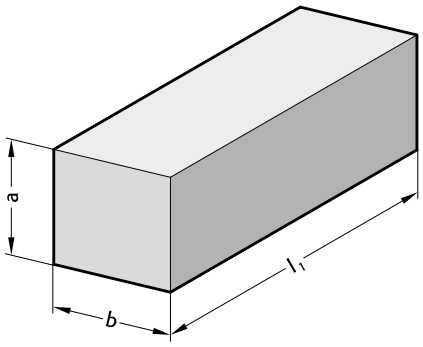
251. FIBROFLEX®-Plate

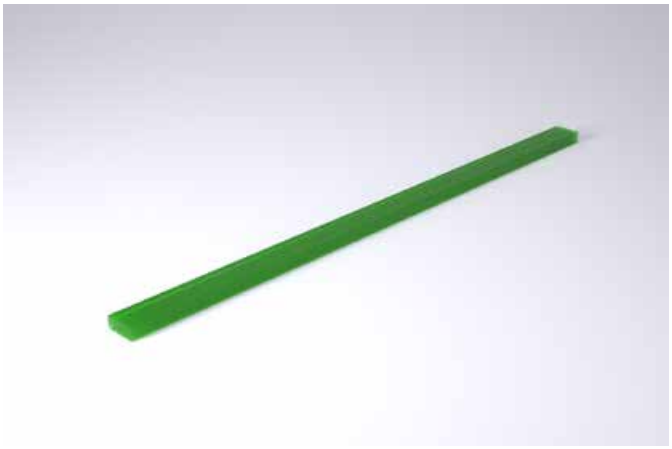
s	a x b 250 x 250	a x b 250 x 500	a x b 500 x 500	a x b 500 x 1000	a x b 1000 x 1000
1	●	●	●	●	
2	●	●	●	●	
3	●	●	●	●	
4	●	●	●	●	
5	●	●	●	●	
6	●	●	●	●	
7	●	●	●	●	
8	●	●	●	●	●
10	●	●	●	●	●
12	●	●	●	●	●
15	●	●	●	●	●
20	●	●	●	●	●
25	●	●	●	●	●
30	●	●	●	●	●
40	●	●	●	●	●
50	●	●	●	●	●
60	●	●	●	●	
70	●	●	●	●	
80	●	●	●	●	

subject to alterations

FIBROFLEX®-Square rod

252.





Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

Note:

1) Dimension b machined

Ordering Code (example):

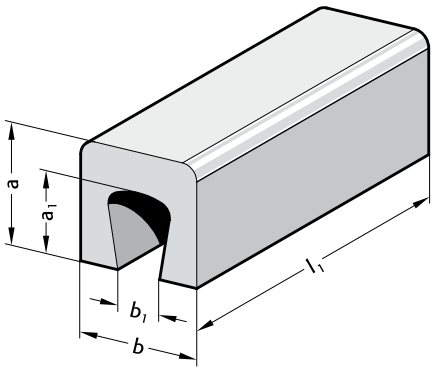
FIBROFLEX®-Square rod		=252.	
Spring rate MAT	80 Shore A	=	5.
Height a	20 mm	=	020.
Width b	50 mm	=	050.
Length l_1	1000 mm	=	1000
Order No		=252.5.020. 050. 1000	

252. FIBROFLEX®-Square rod

a	b		l_1 250	500	1000	a	b		l_1 250	500	1000
8	8	1)			●	22	22		●	●	●
8	15	1)			●	25	25	1)			●
8	25	1)			●	25	40	1)			●
8	50	1)			●	25	60	1)			●
10	10	1)			●	25	80	1)			●
10	15	1)			●	30	30		●	●	●
10	25	1)			●	40	40	1)			●
10	50	1)			●	40	60		●	●	●
12	12	1)			●	45	45		●	●	●
12	20	1)			●	50	50		●	●	●
12	30	1)			●	50	180		●	●	●
12	50	1)			●	60	60		●	●	●
15	15		●	●	●	60	80		●	●	●
15	25	1)			●	80	80		●	●	●
15	40	1)			●	80	100		●	●	●
15	50	1)			●	100	100		●	●	●
20	20	1)			●	100	125		●	●	●
20	30	1)			●	100	180		●	●	●
20	40	1)			●	125	125		●	●	●
20	50	1)			●						

FIBROFLEX®-U-Profil rod

250.



Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

Ordering Code (example):

FIBROFLEX®-U-Profil rod		=250.	
Spring rate MAT	80 Shore A	=	5.
Height a	75 mm	=	075.
Width b	100 mm	=	100.
Length l_1	250 mm	=	0250
Order No		=250.	5.075.100.0250

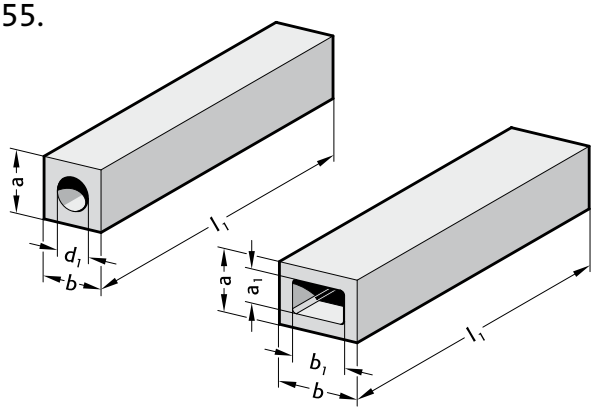
250. FIBROFLEX®-U-Profil rod

a	b	a_1	b_1	l_1	250	500
50	50	35	20		●	●
50	75	35	30		●	●
75	100	50	40		●	●
100	200	60	120		●	●

subject to alterations

FIBROFLEX®-Hollow square rod

255.



Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

Ordering Code (example):

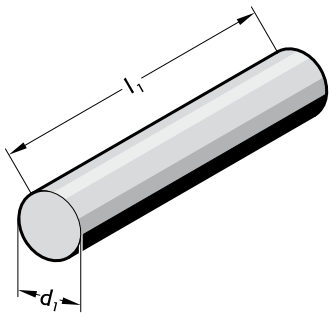
FIBROFLEX®-Hollow square rod		=255.	
Spring rate MAT	80 Shore A	=	5.
Height a	80 mm	=	080.
Width b	80 mm	=	080.
Length l_1	250 mm	=	0250
Order No		=255.5.080. 080. 0250	

255. FIBROFLEX®-Hollow square rod

a	b	a_1	b_1	d_1	l_1	250	500	1000
40	60	20	35	-		●	●	●
45	45	-	-	20		●	●	●
50	50	-	-	25		●	●	●
50	180	20	120	-		●	●	●
60	60	-	-	30		●	●	●
60	80	30	50	-		●	●	●
80	80	-	-	40		●	●	●
80	100	40	60	-		●	●	●
100	100	50	50	-		●	●	●
100	125	50	70	-		●	●	●
100	180	50	123	-		●	●	●
125	125	75	75	-		●	●	●

FIBROFLEX®-Round rod

253.



Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

Ordering Code (example):

FIBROFLEX®-Round rod			=253.
Spring rate MAT	80 Shore A	=	5.
External diameter d_1	3 mm	=	003
Order No			=253.5.003

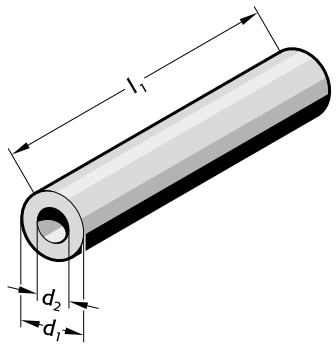
253. FIBROFLEX®-Round rod

d_1	l_1 330	500	1000
2	●		
3			●
4			●
5			●
6			●
7			●
8			●
10			●
12			●
16	●		
20		●	
25		●	
32		●	
40		●	
50		●	
63		●	
80		●	
100		●	
125		●	
140		●	
150		●	
160		●	
180		●	
200		●	

subject to alterations

FIBROFLEX®-Hollow round rod

254.



Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

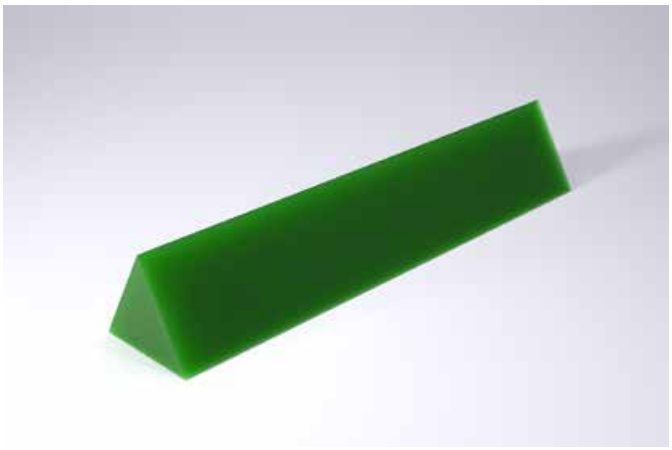
Ordering Code (example):

FIBROFLEX®-Hollow round rod			=254.
Spring rate MAT	80 Shore A	=	5.
External diameter d_1	80 mm	=	080
Order No			=254. 5.080

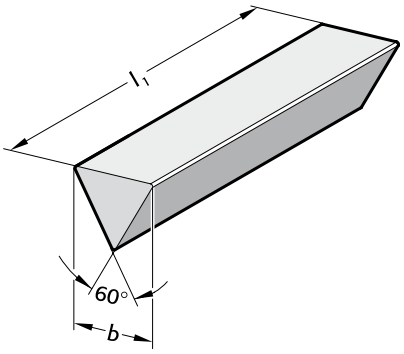
254. FIBROFLEX®-Hollow round rod

d_1	d_2	l_1 330	500
16	6.5	●	
20	8.5		●
25	10.5		●
32	13.5		●
40	13.5		●
50	17		●
63	17		●
80	21		●
100	21		●
125	27		●
140	50		●
150	50		●
160	50		●
180	50		●
200	50		●

FIBROFLEX®-Triangular rod (60°)



256.



Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

Ordering Code (example):

FIBROFLEX®-Triangular rod (60°)		=256.	
Spring rate MAT	80 Shore A	=	5.
Edge length b	50 mm	=	050.
Length l_1	250 mm	=	0250
Order No		=256.	5.050. 0250

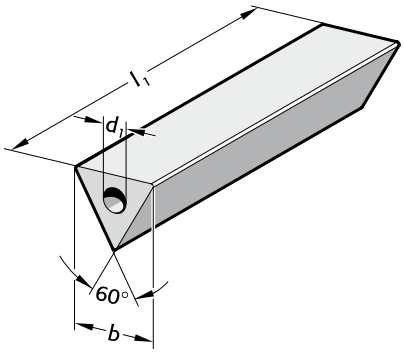
256. FIBROFLEX®-Triangular rod (60°)

b	l_1 250	500
35	●	●
50	●	●
80	●	●

subject to alterations

FIBROFLEX®-Hollow triangular rod (60°)

257.



Execution:

FIBROFLEX® is available 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 at the beginning of Chapter G.

Ordering Code (example):

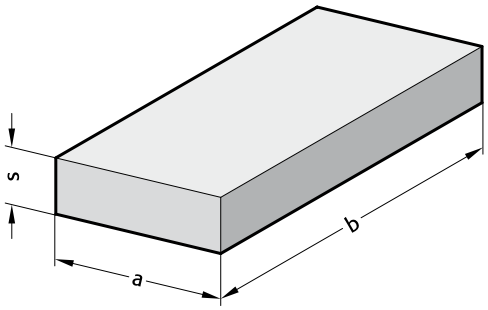
FIBROFLEX®-Hollow triangular rod (60°)		=257.	
Spring rate MAT	80 Shore A	=	5.
Edge length b	50 mm	=	050.
Length l_1	250 mm	=	0250
Order No		=257.5.050. 0250	

257. FIBROFLEX®-Hollow triangular rod (60°)

b	d_1	l_1	250	500
35	8		●	●
50	12		●	●
80	20		●	●

FIBROELAST®-Plate

2511.3.



Material:
Polyester-based polyurethane
Hardness 65 Shore A

Colour:
white

Note:
Other plate thicknesses available upon request.

Physical properties:
Shore hardness A: 65
100% modulus of elasticity: 2,4 [N/mm²]
300% modulus of elasticity: 4,6 [N/mm²]
Tensile strength: 26 [N/mm²]
Elongation: 550 [%]
Tear resistance: 46 [kN/m]

Permanent set (70°C): 45 [%]
Rebound elasticity: 58 [%]
Maximum deformation: 40 [%]

Ordering Code (example):

FIBROELAST®-Plate		=2511.3.	
Thickness s	6 mm	=	006.
Width a	500 mm	=	0500.
Length b	500 mm	=	0500
Order No		=2511.3.	006. 0500. 0500

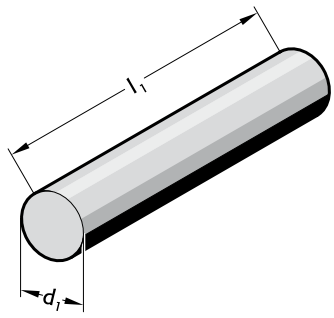
2511.3. FIBROELAST®-Plate

s	a x b 250 x 250	a x b 250 x 500	a x b 500 x 500	a x b 500 x 1000
1	●	●	●	●
2	●	●	●	●
3	●	●	●	●
4	●	●	●	●
5	●	●	●	●
6	●	●	●	●
7	●	●	●	●
8	●	●	●	●
10	●	●	●	●
12	●	●	●	●
15	●	●	●	●

subject to alterations

FIBROELAST®-Round rod

2531.4.



Material:
Polyester-based polyurethane
Hardness 70 Shore A

Colour:
white

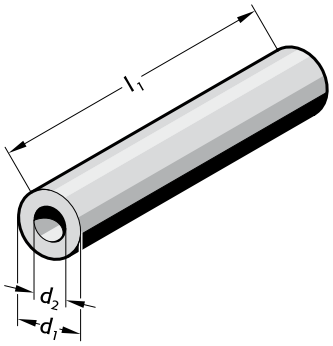
Physical properties:
Shore hardness A: 70
100% modulus of elasticity: 3,0 [N/mm²]
300% modulus of elasticity: 6,0 [N/mm²]
Tensile strength: 28 [N/mm²]
Elongation: 500 [%]
Tear resistance: 58 [kN/m]
Permanent set (70°C): 45 [%]
Rebound elasticity: 55 [%]
Maximum deformation: 40 [%]

2531.4. FIBROELAST®-Round rod

Order No	d_1	l_1
2531.4.016	16	330
2531.4.020	20	500
2531.4.025	25	500
2531.4.032	32	500
2531.4.040	40	500
2531.4.050	50	500
2531.4.063	63	500
2531.4.080	80	500
2531.4.100	100	500
2531.4.125	125	500

FIBROELAST®-Hollow round rod

2541.4.



Material:
Polyester-based polyurethane
Hardness 70 Shore A

Colour:
white

Note:
FIBROELAST®-Hollow round rods can also be used as springs.

Physical properties:
Shore hardness A: 70
100% modulus of elasticity: 3,0 [N/mm²]
300% modulus of elasticity: 6,0 [N/mm²]
Tensile strength: 28 [N/mm²]
Elongation: 500 [%]
Tear resistance: 58 [kN/m]
Permanent set (70°C): 45 [%]
Rebound elasticity: 55 [%]
Maximum deformation: 40 [%]

2541.4. FIBROELAST®-Hollow round rod

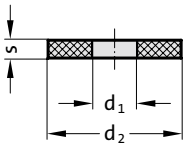
Order No	d_1	d_2	l_1
2541.4.016	16	6.5	330
2541.4.020	20	8.5	500
2541.4.025	25	10.5	500
2541.4.032	32	13.5	500
2541.4.040	40	13.5	500
2541.4.050	50	17	500
2541.4.063	63	17	500
2541.4.080	80	21	500
2541.4.100	100	21	500
2541.4.125	125	27	500

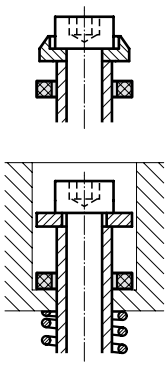
subject to alterations

Shock absorbing washer

2450.

Mounting example





Material:
Polyurethan (FIBROFLEX®)

Execution:
2450.6. (90 Shore A) available from stock
2450.5. (80 Shore A) and
2450.7. (95 Shore A) available upon request

2450. Shock absorbing washer

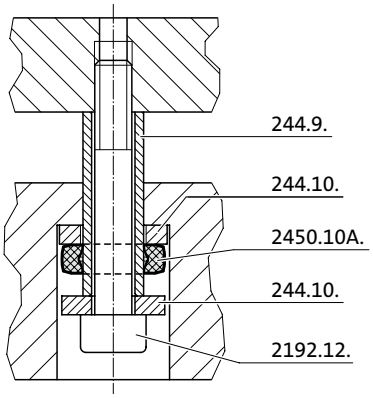
d_1	d_2	s	d_1	d_2	s	d_1	d_2	s
6.4	16	3	17	38	5	26	50	6
8.5	20	3	17	50	6	27	41	7
10.5	15	4	17	63	6	27	125	10
10.5	25	4	18	27	4	31	42	6
11	17	3	18	32	7	32	40	6
12	24	5	21	30	5	32	49	8
13	19	4	21	35	7	32	60	10
13	25	4	21	38	6	37	46	6
13.5	32	4	21	80	10	37	53	8
13.5	40	5	21	100	10	37	65	10
14	23	4	22	28	6	42	70	10
14	26	5	23.5	34	4			
15.5	23	4	25	32	6			
17	26	4	26	35	6			

Ordering Code (example):

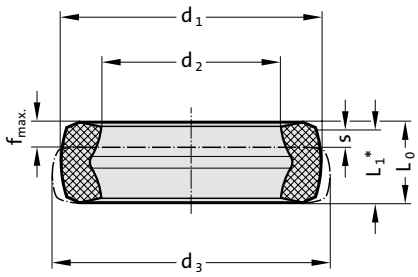
Shock absorbing washer		=2450.	
Shore A hardness MAT	80 Shore A	=	5.
Inside diameter d_1	23.5 mm	=	23.
External diameter d_2	34 mm	=	034.
Thickness s	4 mm	=	04
Order No		=2450.5.23.034.04	

Damper, light-duty

Mounting example



2450.10A.



Description:

Dampers, light duty , made of co-polyester elastomer are found in the elevating units in progressive dies in the automotive and white goods industry. The increasing stresses on screws and bolts as well as noise emission are reduced by the light duty dampers.

Benefits:

- High absorption of force and energy
- Long service life and high level of operating safety
- Noise reduction
- High degree of effectiveness

Material:

Co-Polyester-Elastomer

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

Note:

Socket cap screw 2192.12. see Section C
Spacer tube 244.9. see Section F
Washer 244.10. see Section F

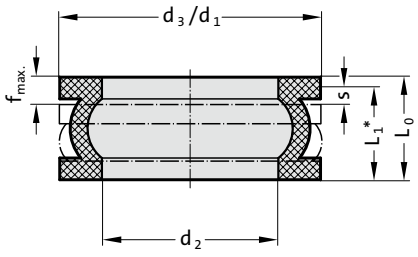
2450.10A. Damper, light-duty

Order No	d_1	d_2	d_3	L_0	L_1*	Stroke (s)	$F_{max.}$ in N	$f_{max.}$ in mm	W in Nm/stroke (s)**	W_h in Nm/h***	Socket cap screw
2450.10A.0236.0163.073	23.6	16.3	25.3	7.3	6.6	1.9	3000	2	3	7500	M10

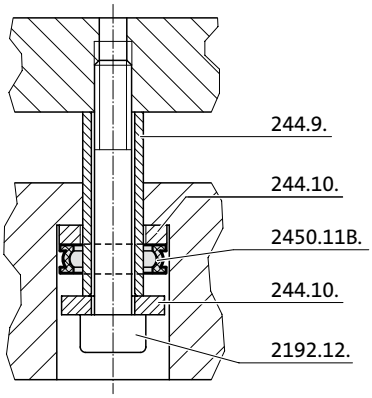
*Dimension L_1 is the slump which must be taken into account for the design.
**W = Total energy per stroke
***W_h = Total energy per hour

Damper, light-duty

2450.11B.



Mounting example



Description:

Dampers, light duty , made of co-polyester elastomer are found in the elevating units in progressive dies in the automotive and white goods industry. The increasing stresses on screws and bolts as well as noise emission are reduced by the light duty dampers.
The two-ply version of the flanged damper can also be used depending on the force or stroke without the use of an additional distance washer.

Benefits:

- High absorption of force and energy
- Long service life and high level of operating safety
- Noise reduction
- High degree of effectiveness

Material:

Co-Polyester-Elastomer

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

Note:

Socket cap screw 2192.12. see Section C
Spacer tube 244.9. see Section F
Washer 244.10. see Section F

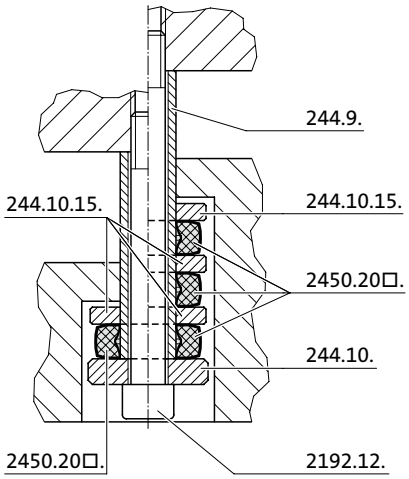
2450.11B. Damper, light-duty

Order No	d_1	d_2	d_3	L_0	L_1*	Stroke (s)	$F_{max.}$ in N	$f_{max.}$ in mm	W in Nm/stroke (s)**	W_h in Nm/h***	Socket cap screw
2450.11B.0300.0203.118	30	20.3	30.2	11.8	10.7	2.7	5000	2.9	8.6	20000	M12

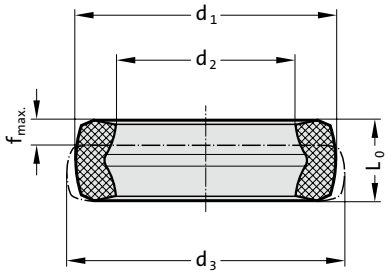
*Dimension L_1 is the slump which must be taken into account for the design.
**W = Total energy per stroke
***W_h = Total energy per hour

Damper, heavy-duty

Mounting example



2450.20□.



Description:

The co-polyester elastomer dampers, heavy-duty, are used as holddown dampers in the automotive and white goods industry. Increasing return stroke speeds and the related stresses on screws and bolts in moveable, suspended tool parts are absorbed by the hold-down dampers. Reduced noise emission is a further additional positive sideeffect.

Benefits:

- High absorption of force and energy
- Slight settlement
- Energy absorption between 5 Nm and 269 Nm
- Long service life and high level of operating safety
- Noise reduction
- High degree of effectiveness

Material:

Co-Polyester-Elastomer

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

Note:

Socket cap screw 2192.12. see Section C
Spacer tube 244.9. see Section F
Washer 244.10. see Section F

2450.20□. Damper, heavy-duty

Order No	d_1	d_2	d_3	L_0	$F_{max.}$ in N (static < 0,1)	$f_{max.}$ in mm	W in Nm/stroke (s)*	Socket cap screw
2450.20A.0264.0163.078	26.4	16.3	28.4	7.8	5500	2	5	M10
2450.20B.0321.0203.108	32.1	20.3	35.1	10.8	9000	4.4	14.2	M12
2450.20B.0458.0253.170	45.8	25.3	49.8	17	20000	4.9	44.6	M16
2450.20A.0546.0303.213	54.6	30.3	61.8	21.3	30000	7.6	81.9	M20
2450.20A.0618.0363.215	61.8	36.3	69.9	21.5	46000	8.2	126.5	M24
2450.20A.0785.0423.294	78.5	42.3	89	29.4	75000	11.4	269	M30

*Total energy per stroke

Damper, heavy-duty
Selection table multiple layering

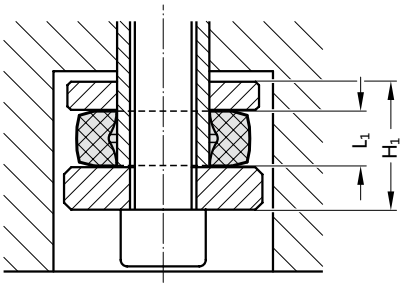
Simple layering

Order No.	L_1*	$F_{1\,max}$ in N (dynamic>0,1)	W_1 in Nm/stroke (s)**	W_{h1} in Nm/h***	H_1 total height	socket cap screw
2450.20A.0264.0163.078	7.1	4100	3.5	9000	17.1	M10
2450.20B.0321.0203.108	9.8	6600	12	30000	23.8	M12
2450.20B.0458.0253.170	15.3	14500	19	45000	31.3	M16
2450.20A.0546.0303.213	19	22500	47	67000	39	M20
2450.20A.0618.0363.215	19.5	37500	76	114000	39.5	M24
2450.20A.0785.0423.294	27	46000	143	152000	50	M30

* Dimension „L_1“ is the slump which must be taken into account for the design.

** Total energy per stroke

*** Total energy per hour



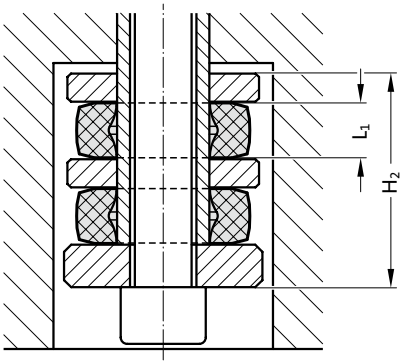
Double layering

Order No.	L_1*	$F_{2\,max}$ in N (dynamic>0,1)	W_2 in Nm/stroke (s)**	W_{h2} in Nm/h***	H_2 total height	socket cap screw
2450.20A.0546.0303.213	19	18000	78	107000	66	M20
2450.20A.0618.0363.215	19.5	35000	148	174000	67	M24
2450.20A.0785.0423.294	27	39000	233	272000	85	M30

* Dimension „L_1“ is the slump which must be taken into account for the design.

** Total energy per stroke

*** Total energy per hour



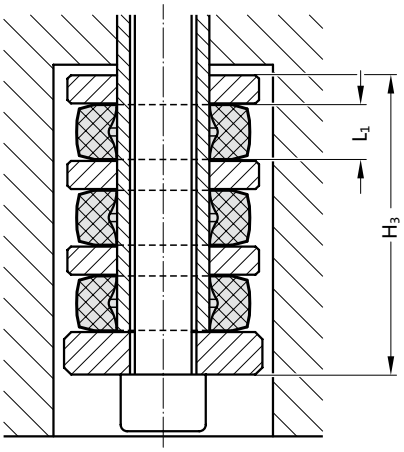
Threefold layering

Order No.	L_1*	$F_{3\,max}$ in N (dynamic>0,1)	W_3 in Nm/stroke (s)**	W_{h3} in Nm/h***	H_3 total height	socket cap screw
2450.20A.0546.0303.213	19	16000	100	127000	93	M20
2450.20A.0618.0363.215	19.5	28000	176	194000	94.5	M24
2450.20A.0785.0423.294	27	29000	255	281000	120	M30

* Dimension „L_1“ is the slump which must be taken into account for the design.

** Total energy per stroke

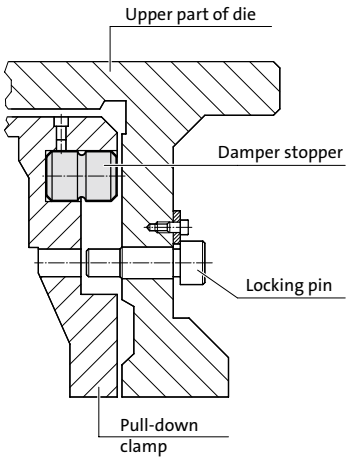
*** Total energy per hour



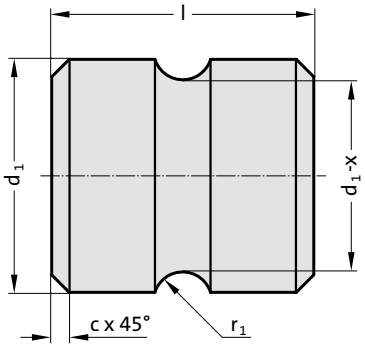
FIBRO

Damper stopper

Mounting example



2451.10D.



Description:

Damper stopper made of co-polyester elastomer dampen the recoil on the locking and unlocking pins in the manufacturing of jigs. Damper stoppers are used in the automotive and white goods industry. Damper stoppers sit inside the pull-down clamps and are radially stressed. The number and size depends on the weight and the velocity of the pull-down clamps.

Benefits:

- High absorption of force and energy
- Slight settlement
- UV protection
- Long service life and high level of operating safety
- Noise reduction
- High degree of eff ectiveness

Material:

Co-polyester elastomer, black

Technical data:

Surroundings: Resistant to microbes, seawater, chemicals.
No absorption of water and no swelling.
Grease and oil resistant.
Approved temperature range: -40°C to +90°C (-40°F to +194°F)

2451.10D. Damper stopper

Order No	Size	d_1	Cut-in depth d_1-x	Cut-in radius r_1	c	l
2451.10D.040.060	B	40	8	7	3	60
2451.10D.050.070	C	50	10	8	4	70
2451.10D.063.080	D	63	12	9	5	80
2451.10D.080.090	E	80	14	10	6	90

Number and size (B, C, D, E) of damper stoppers for cushioning

	Pull-down clamp speed m/s												
Pull-down clamp weight kg	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3
100	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	3 x B	4 x B	4 x B	4 x B	4 x B
250	3 x B	3 x B	3 x B	3 x B	3 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B
500	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x C	4 x C	4 x C
750	4 x B	4 x B	4 x B	4 x B	4 x B	4 x B	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C
1000	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x D	4 x D
1250	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x D	4 x D	4 x D	4 x D	4 x D
1500	4 x C	4 x C	4 x C	4 x C	4 x C	4 x C	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E
1750	4 x C	4 x C	4 x C	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E
2000	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E
2500	4 x D	4 x D	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E
3000	4 x D	4 x D	4 x D	4 x D	4 x E	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E	6 x E
3500	4 x D	4 x E	4 x E	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E	8 x E	8 x E	10 x E
4000	4 x E	4 x E	4 x E	4 x E	4 x E	6 x E	6 x E	6 x E	8 x E	8 x E	10 x E	10 x E	10 x E
4500	6 x E	6 x E	6 x E	6 x E	6 x E	8 x E	10 x E	10 x E	10 x E	10 x E	10 x E	10 x E	10 x E
5000	6 x E	6 x E	8 x E	8 x E	8 x E	10 x E	10 x E	10 x E	10 x E	---	---	---	---

subject to alterations

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 para-mount 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.

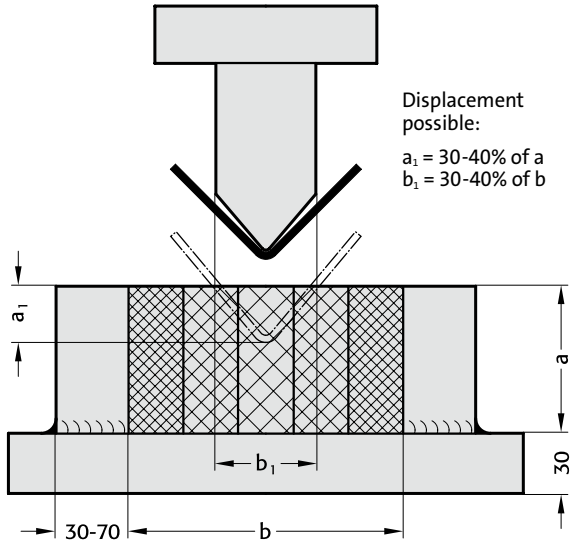
Hydraulic presses with their characteristic slow pressure rise are eminently suitable for elastomer tooling because this feature matches the somewhat delayed deformation behaviour of FIBROFLEX®.
For the same reason, mechanical presses may give a certain amount of trouble because of overloading.

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

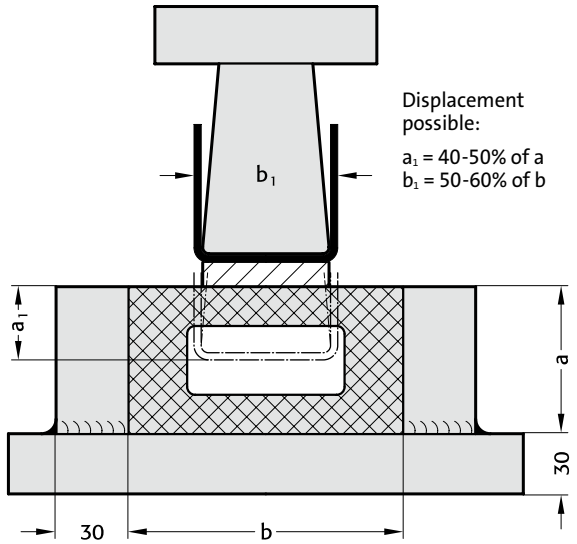
One of the easiest elastomer-forming operations is that of Vee-bending off a solid punch and into a die cushion of stacked FIBROFLEX® pads.

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.

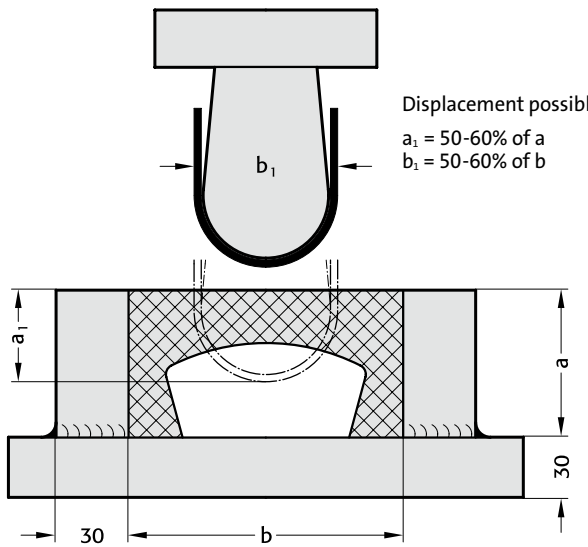
Where solid sections or sheet is used as a cushion, wear of the elastomer material can be reduced through creation of an additional displacement space at the bottom of the cushion retainer box, similar to Fig. 11, where gib inserts are placed along the corners.

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.

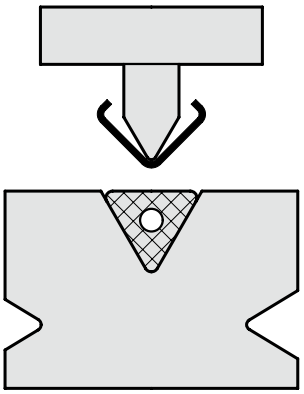
In order to achieve good results, the use of hollow FIBROFLEX® sections or of channels becomes almost mandatory. This is illustrated in Figs. 7 and 12. Another alternative consists of machined form cushions in accordance with Fig. 13.

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.

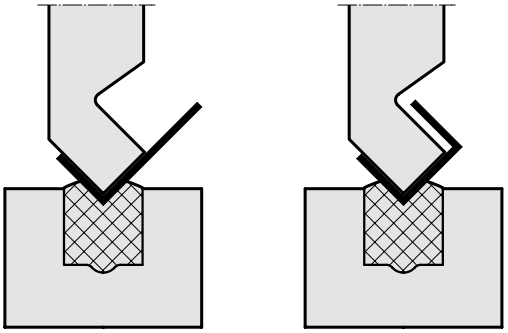
Application examples of forming operations with FIBROFLEX® Elastomers

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

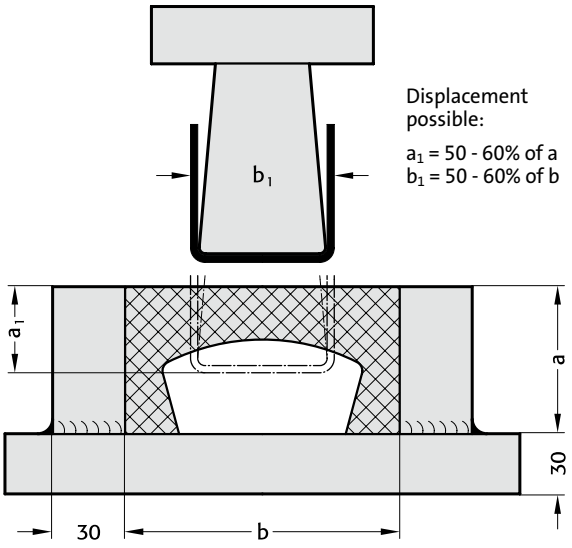


Fig. 11

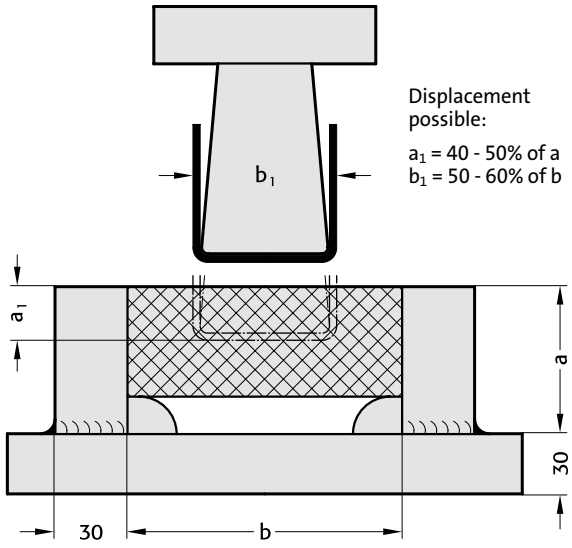


Fig. 12

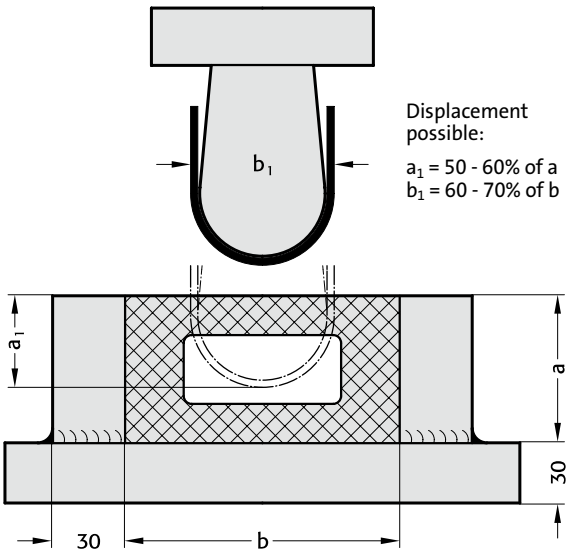
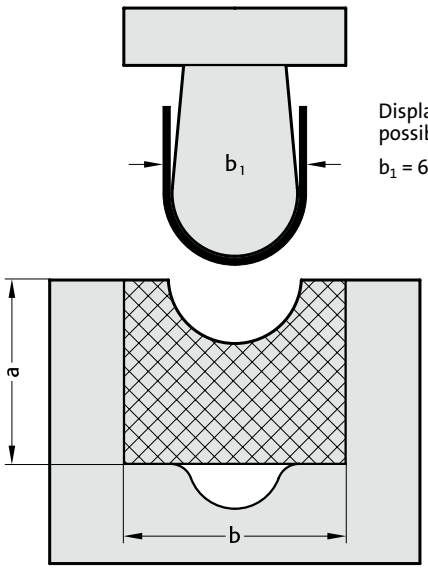


Fig. 13



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

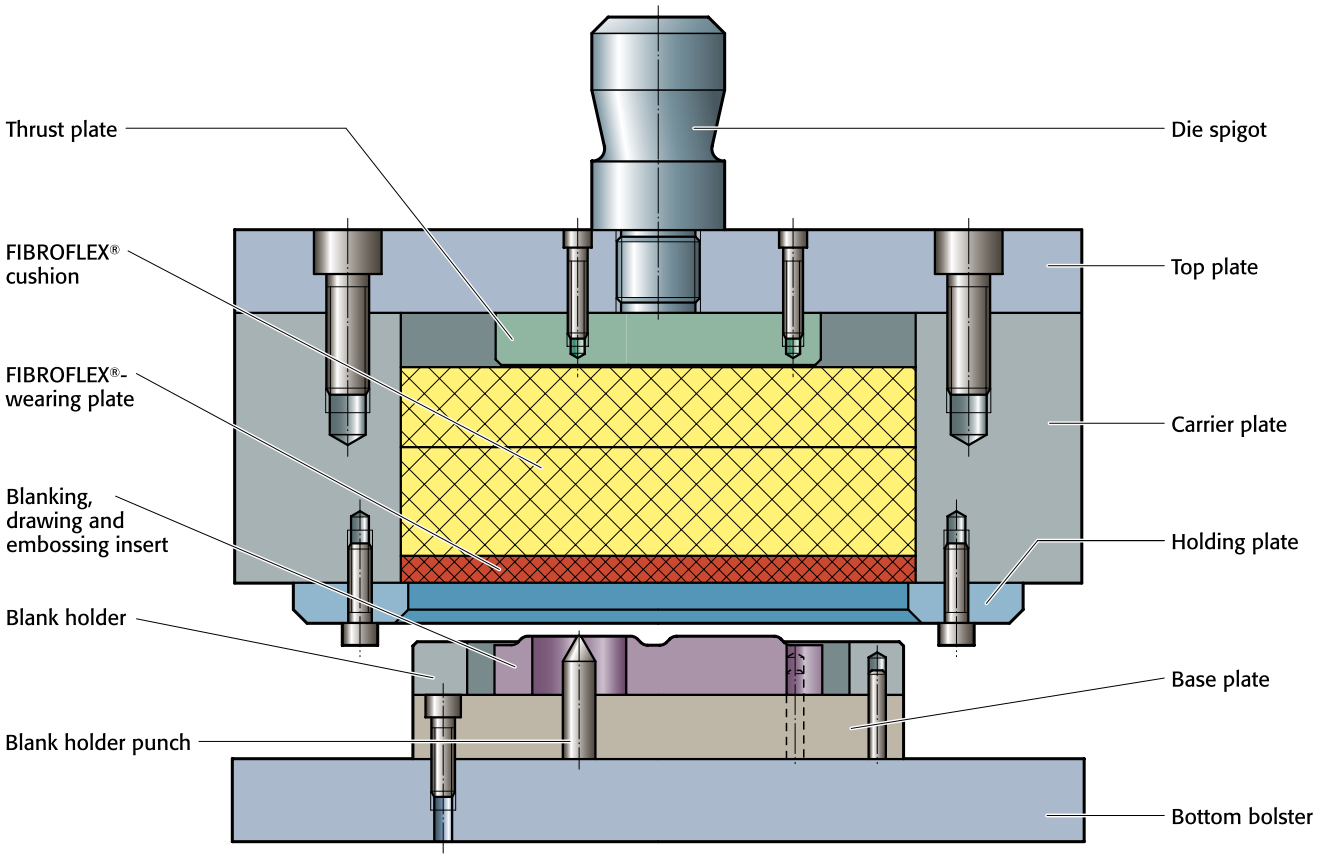
When FIBROFLEX® matrices are used for blanking, embossing and forming the machine must be able to accommodate the displacement.

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



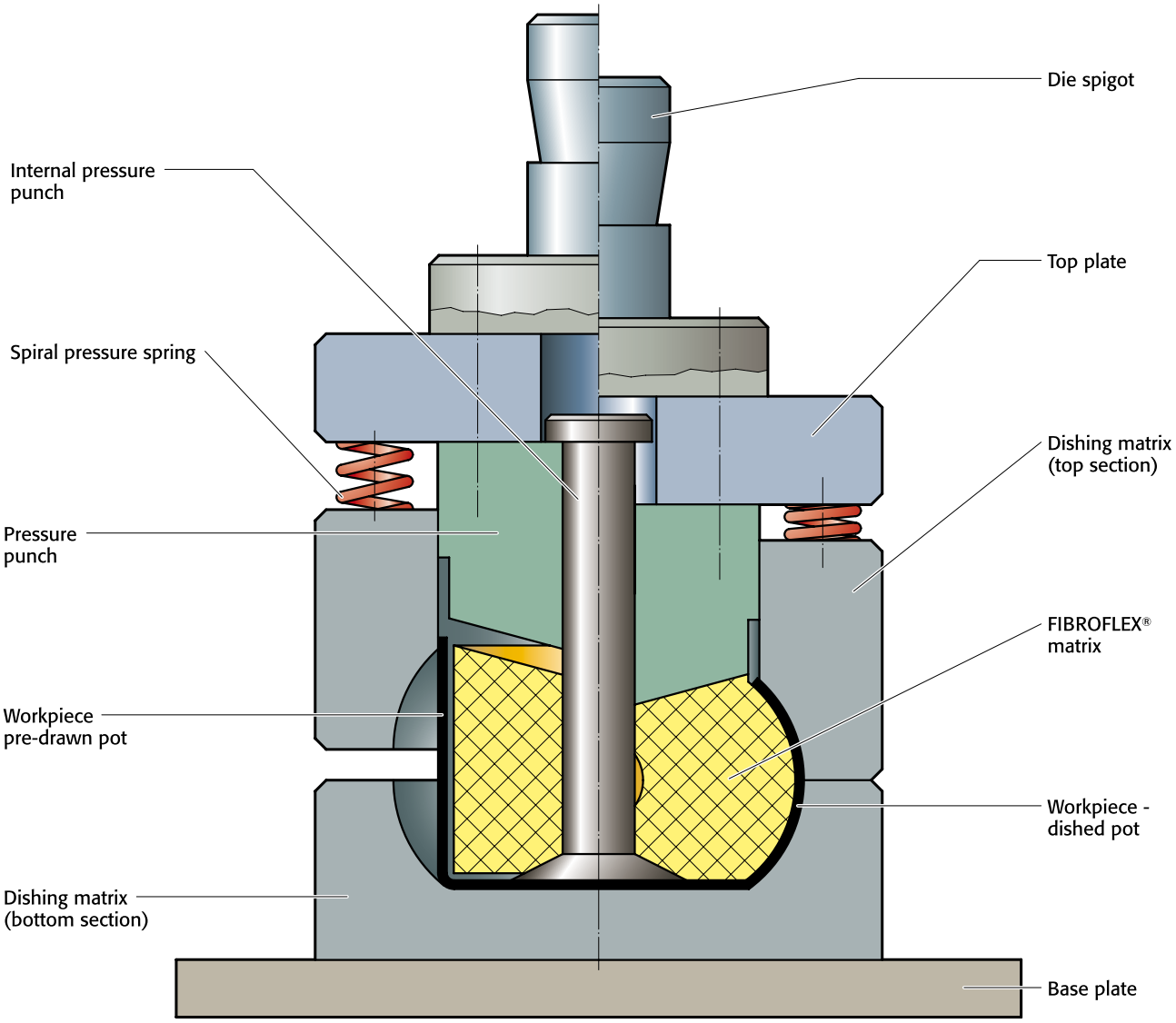
Combined blanking – embossing – punching

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



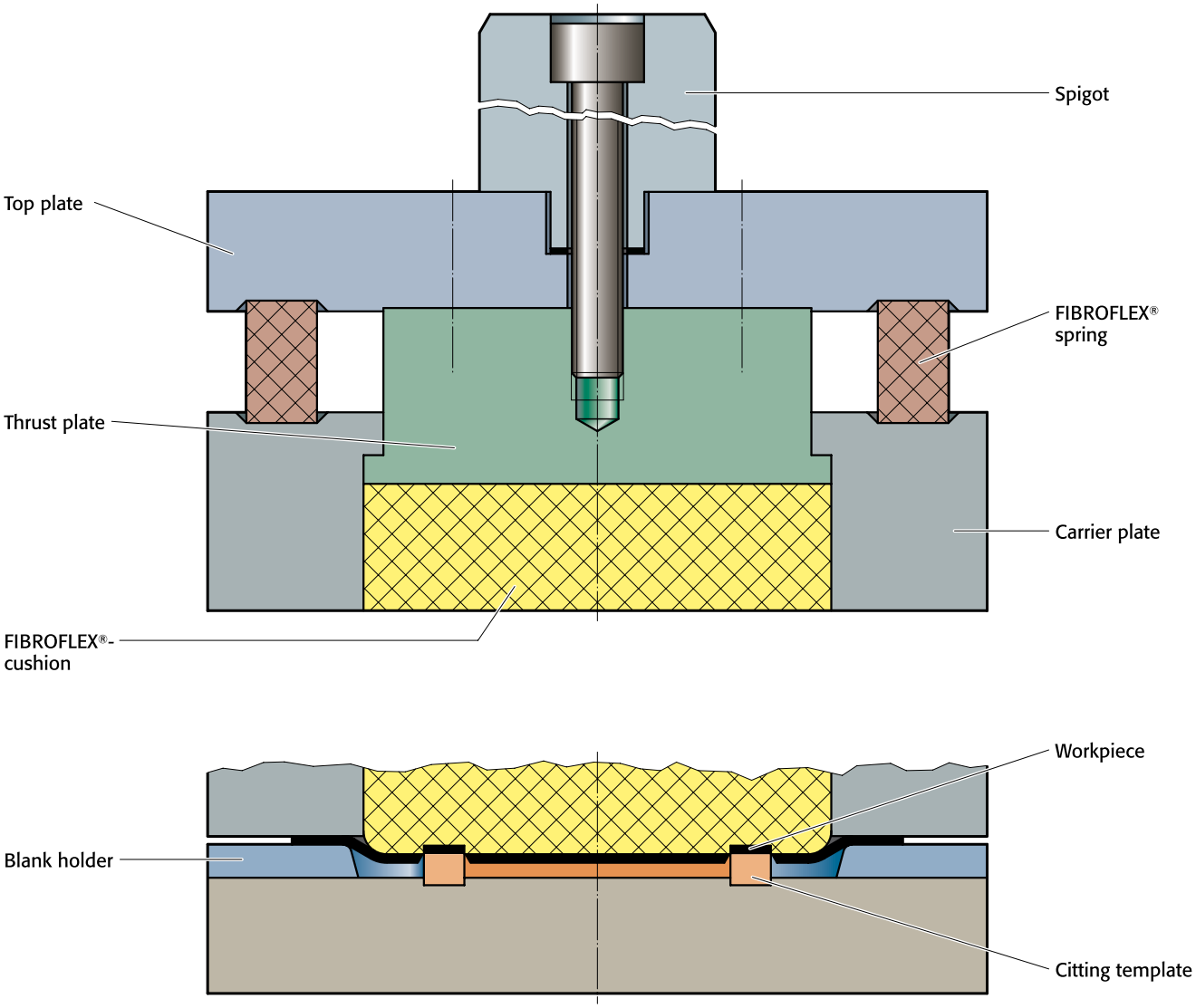
Bulging a pot

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.

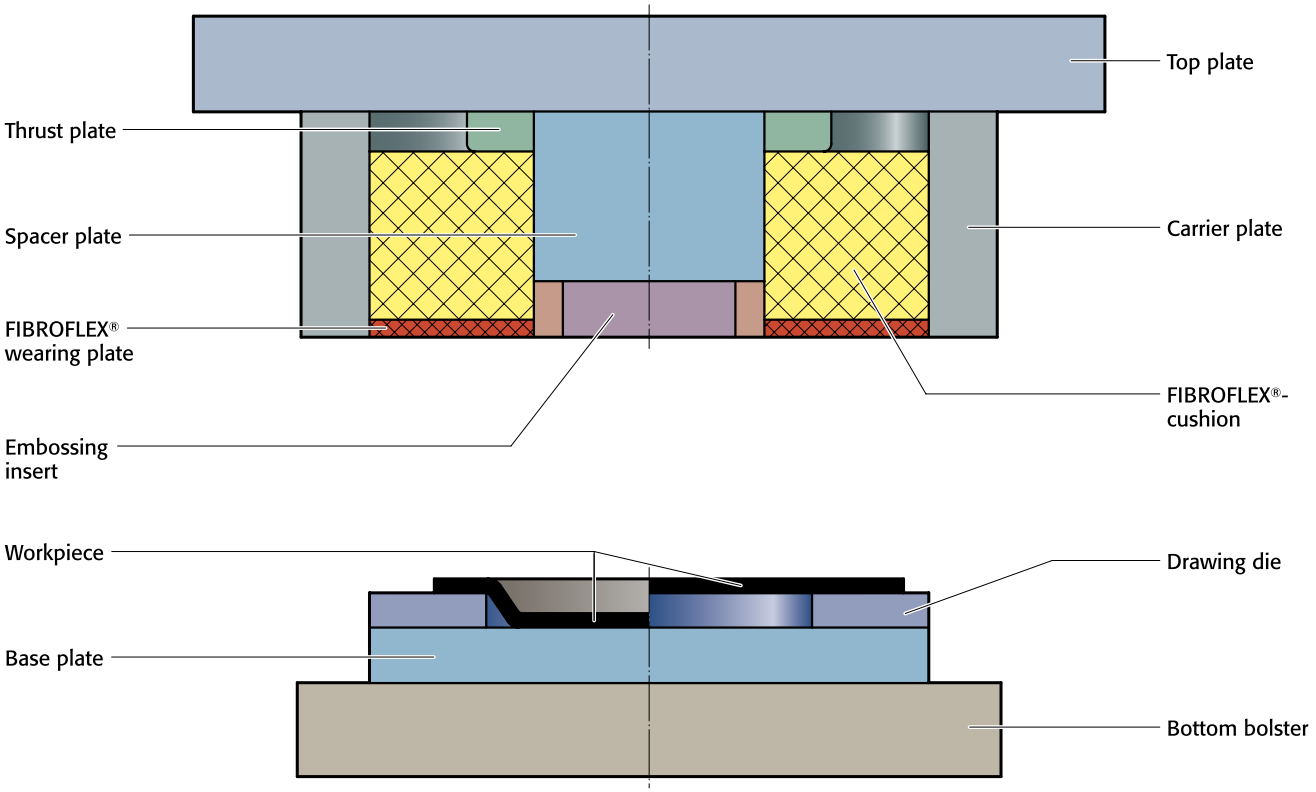
The even clamping pressure which is excellent for pressing also means that parts with intricate contours can be manufactured.

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

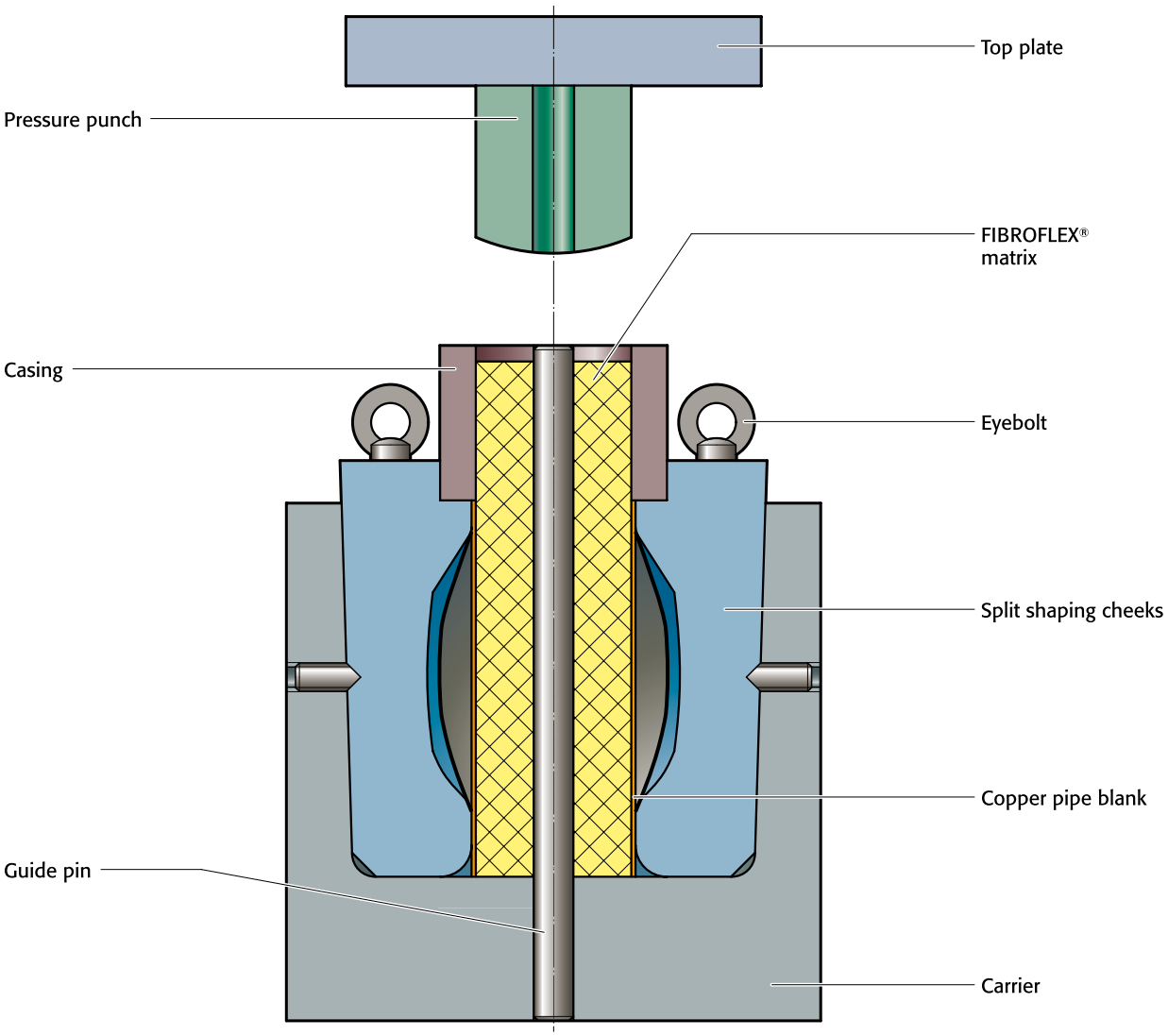
The limits for flaring and bulging depend on the workpiece material, its thickness and hardness and also the height of the FIBROFLEX® cushion.

Maximum permissible deformation of the FIBROFLEX® cushion:

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

subject to alterations

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.