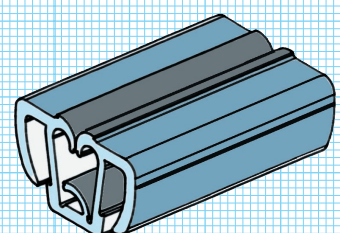
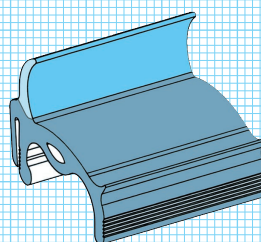
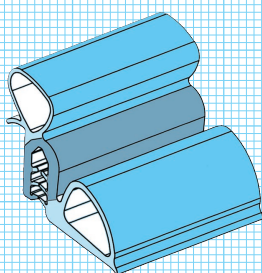
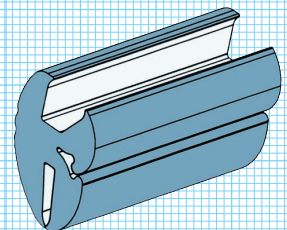
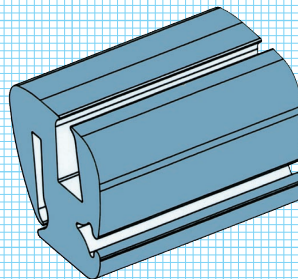
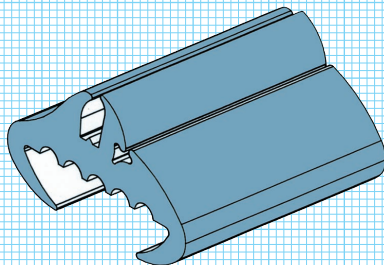
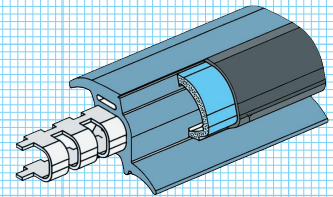
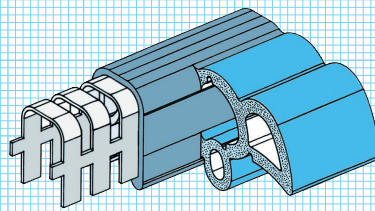
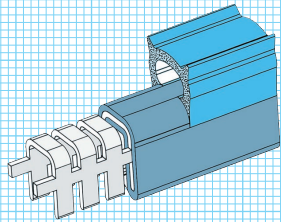




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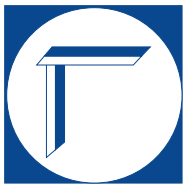
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Local Court Wuppertal HRA 16765

Personal Liabile Companion: Technoprofil Breidenbach + Blau

Verwaltungs GmbH, Wuppertal, Local Court Wuppertal, HRB 5753,

Business Manager: Hanno Breidenbach, Dieter Blau



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# Technical Profiles

## Directory

**Edge Protectors and Sealing Sections** a  
made of PVC, EPDM, NBR, CR, NR, SBR in different colours

**Glazing Sections and Fillers** b  
made of EPDM, NBR, CR, SBR in different colours

**Mounting Tools** c

**Crested Holders** d

**Profiled Holders and Door Gaskets** e

**Microcellular Rubber Sections** f  
made of EPDM, CR, NBR, NR in different colours  
with normal and reinforced skins

**Moulded Rubber Parts** g

**Automotive Windows** h  
Fixed Windows, Sliding Windows, Crank-Operated Windows  
Surfaces protected by high quality powder coating or paint  
in RAL colors

**Glass** i  
Single Pane Safety Glass, Insulating Glass, Laminated Glass

**Properties Of Technical Rubbers (Elastomers)** j

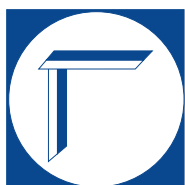


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**Edge guards** are used wherever metal edges must be blunted or covered. Additional machining is not required. The edge guards also have a decorative effect and are flexible. The U-shaped metal clamps embedded in PVC ensure that the edge guards fit securely, even when the metal edge to be covered is curved inward or outward. The guard is simply pressed into position by hand. Tools, adhesives or other connections are not required. Edge guards are available in different shapes, sizes, colours and finishes, depending on the intended use.

**Combination sealing sections** are PVC edge guards with bonded-on foam rubber sections. Foam rubber sections are made of high-quality synthetic rubbers and are characterized by high resistance to ageing and good elasticity.

**Rubber sealing sections** are flexible edge guards of soft rubber with embedded metal strips. The sections are made of foam rubber in the sealing area and of soft rubber in the finishing area. The two materials are extrusion-vulcanized and bonded. Oil-resistant are available on request.

**Tolerances:**

**Foam rubber sections**                      **DIN 7715 E 3**

**Soft rubber sections**                      **DIN 7715 E 2**

**PVC sections**                                **DIN 16 941**

**Tolerances for cut lengths as agreed.**

**Form supplied**

Cut lengths, enclosed frames (corner-vulcanized) and rings. The flange duct can be filled with plastic sealants (as specified) on request.

Ask for our quotation.

**Custom-designs:**

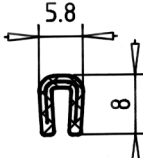
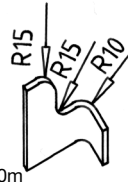
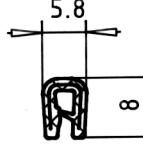
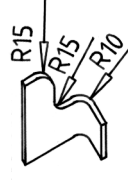
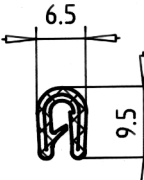
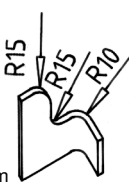
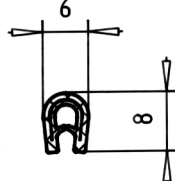

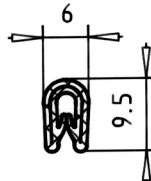
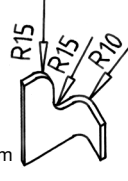
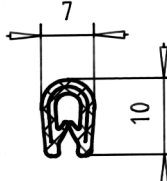

If the cross-sections illustrated here do not suit your requirements, the appropriate section can be custom-designed for you.

We shall gladly advise you and draw up a suitable design for you. The section illustrated in „a“ can be flocked or covered with velvet material on request.



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## PVC - Edge Protectors with embedded Steel Base Strip

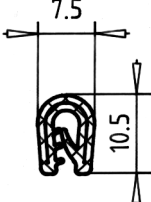

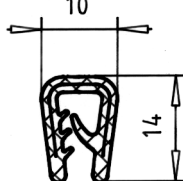

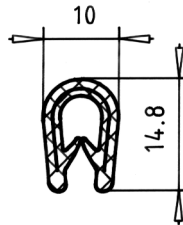

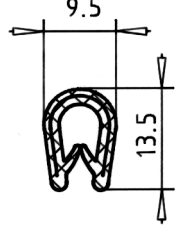

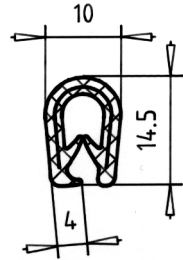
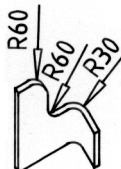
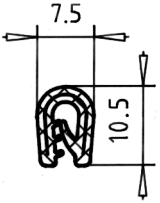

 <p><b>161 9 510 *</b> Clamping range 2,0mm PVC brown with embedded steel base strip Scale 1:1 60,0g/m MOQ: 100m</p> 	 <p><b>161 0 460 *</b> Clamping range 0,8 - 1,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 52,9g/m MOQ: 100m</p> 	 <p><b>161 0 620 *</b> Clamping range 1,0 - 2,5mm 2 compon. PVC whitegrey with embedded steel base strip Scale 1:1 73,3g/m MOQ: 100m</p> 
 <p><b>161 0 465 *</b> Clamping range 2,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 52,0g/m MOQ: 100m</p> 	<p><b>161 0 450 *</b> Clamping range 0,8 - 1,0mm 2 compon. PVC white with embedded steel base strip Scale 1:1 70,5g/m MOQ: 100m</p> <p><b>161 0 520 *</b> Clamping range 0,8 - 1,0mm 2 compon. PVC grey with embedded steel base strip Scale 1:1 68,9g/m MOQ: 100m</p>	<p><b>161 0 825 *</b> Clamping range 1,0 - 2,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 69,0g/m MOQ: 100m</p> <p><b>161 0 470 *</b> Clamping range 1,0 - 2,5mm 2 compon. PVC silvergrey with embedded steel base strip Scale 1:1 69,9g/m MOQ: 100m</p> <p><b>161 9 483 *</b> Clamping range 1,0 - 2,5mm 2 compon. PVC yellow with embedded steel base strip Scale 1:1 74,3g/m MOQ: 3000m</p>
 <p><b>161 0 440 *</b> Clamping range 0,8 - 1,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 77,0g/m MOQ: 100m</p> 	 <p><b>161 0 823 *</b> Clamping range 1,0 - 3,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 86,5g/m MOQ: 100m</p> 	<p><b>161 9 634</b> Clamping range 1,0 - 2,5mm 2 compon. PVC black with embedded steel base strip Scale 1:1 70,0g/m MOQ: 100m</p>

Sections on request available in different colours. Enclosed frames and rings can also be produced!  
All sections drawn to size (scale 1:1). Additional sections planned. Subject to design changes reserved!  
(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock



## PVC - Edge Protectors with embedded Steel Base Strip

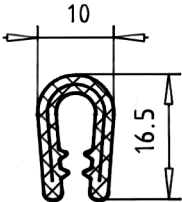

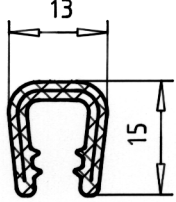

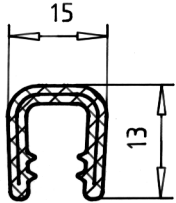
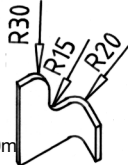
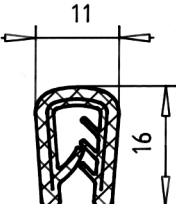
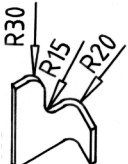
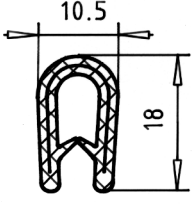

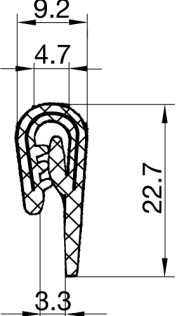
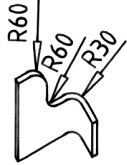
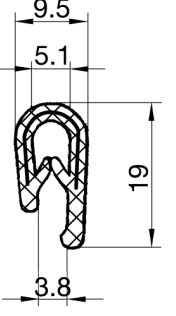

 <p><b>161 9 512</b> Clamping range 1,0 - 2,0mm 2 compon. PVC yellow with embedded steel base strip Scale 1:1 88,5g/m MOQ: 3000m</p> 	 <p><b>161 0 327 *</b> Clamping range 3,5mm 2 compon. PVC black with embedded steel base strip Scale 1:1 160,0g/m MOQ: 100m</p> 	 <p><b>161 0 326 *</b> Clamping range 1,0 - 4,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 145,7g/m MOQ: 100m</p> 
 <p><b>161 0 329 *</b> Clamping range 3,5mm PVC black with embedded steel base strip Scale 1:1 140,0g/m MOQ: 100m</p> 	 <p><b>161 9 274 *</b> Clamping range 2,0 - 3,5mm weich PVC black with embedded steel base strip Scale 1:1 142g/m MOQ: 100m</p> 	<p><b>161 0 720 *</b> Clamping range 1,0 - 4,0mm 2 compon. PVC anthrazit with embedded steel base strip Scale 1:1 146,0g/m MOQ: 100m</p> <p><b>161 0 920 *</b> Clamping range 1,0 - 4,0mm 2 compon. PVC lightgrey with embedded steel base strip Scale 1:1 146,3g/m MOQ: 100m</p>
 <p><b>161 0 824 *</b> Clamping range 1,0 - 3,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 89,1g/m MOQ: 100m</p> 		

Sections on request available in different colours. Enclosed frames and rings can also be produced!  
All sections drawn to size (scale 1:1). Additional sections planned. Subject to design changes reserved!  
(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock



## PVC - Edge Protectors with embedded Steel Base Strip

 <p><b>161 0 135 *</b> Clamping range 4,0 - 6,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 161,7g/m MOQ: 100m</p> 	 <p><b>161 0 360 *</b> Clamping range 6,0 - 8,0mm 2 compon. PVC black with embedded steel base strip Scale 1:1 174,5g/m MOQ: 100m</p> 	 <p><b>161 9 508 *</b> Clamping range 10,0mm 2 compon. PVC lightgrey with embedded steel base strip Scale 1:1 174,0g/m MOQ: 100m</p> 
 <p><b>161 0 325 *</b> Clamping range 1,0 - 4,5mm 2 compon. PVC black with embedded steel base strip Scale 1:1 205,8g/m MOQ: 100m</p> 	<p><b>161 0 740 *</b> Clamping range 6,0 - 8,0mm 2 compon. PVC lightgrey with embedded steel base strip Scale 1:1 174,5g/m MOQ: 100m</p>	
 <p><b>161 0 130 *</b> Clamping range 1,0 - 4,5mm 2 compon. PVC black with embedded steel base strip Scale 1:1 180,0g/m MOQ: 100m</p> <p><b>161 0 134</b> Clamping range 1,0 - 4,5mm 2 compon. PVC lightgrey with embedded steel base strip Scale 1:1 180,0g/m MOQ: 200m</p> 	 <p><b>161 9 629</b> Clamping range 1,0 - 2,5mm PVC black with embedded steel base strip Scale 1:1 179,0g/m MOQ: on request</p> 	 <p><b>161 9 630</b> Clamping range 1,0 - 2,5mm PVC black with embedded steel base strip Scale 1:1 185,0g/m MOQ: on request</p> 

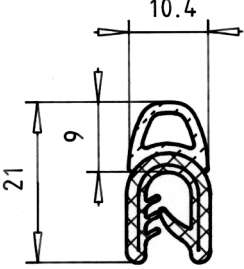

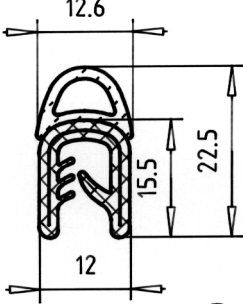

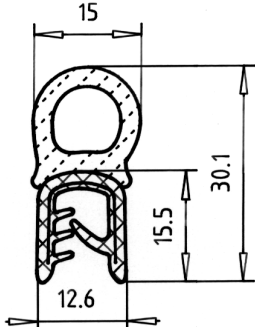
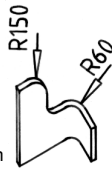
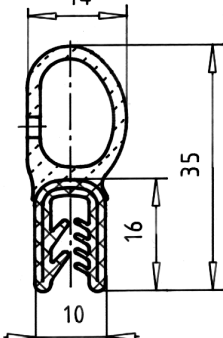
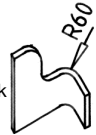
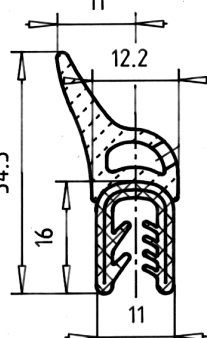

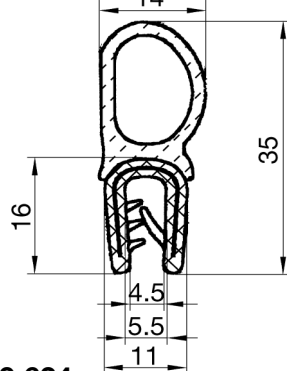

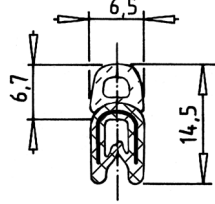
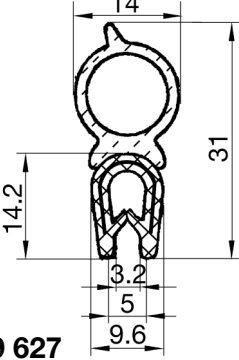

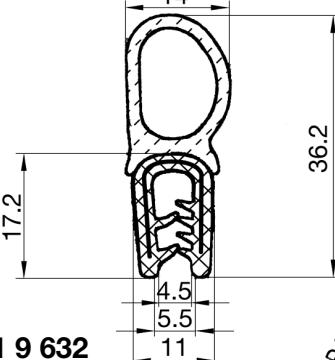
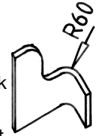
Sections on request available in different colours. Enclosed frames and rings can also be produced!  
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(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock





## PVC - Sealing Section with embedded Steel Base Strip or Wire Carrier bonded to EPDM-Foam-Rubber

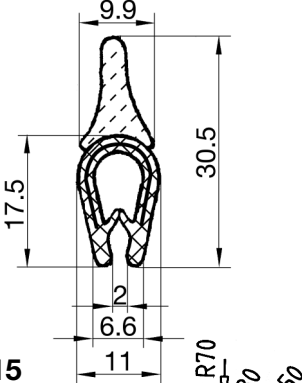
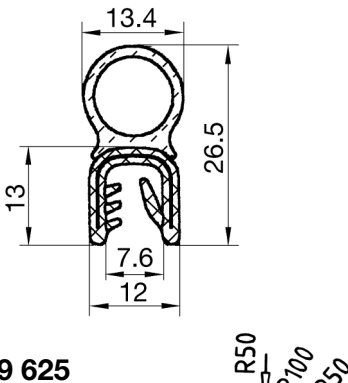
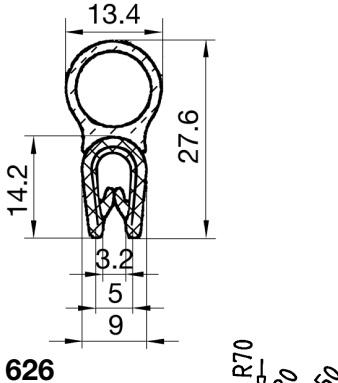
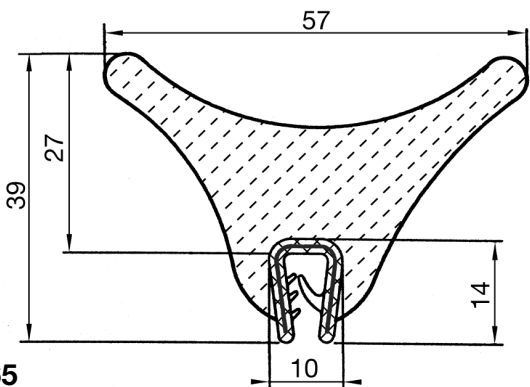
 <p><b>161 0 840 *</b> Clamping range 1,5 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 160,0g/m MOQ: 100m</p> 	 <p><b>161 9 561</b> Clamping range 3,5 - 7mm black 2 comp. PVC with bonded foam-rubber with embedded steel base strip Scale 1:1 195,5g/m MOQ: 5500m</p> 	 <p><b>161 9 558</b> Clamping range 4 - 7mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 150,6g/m MOQ: 6000m</p> 
 <p><b>161 0 843 *</b> Clamping range 2,0 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 272,0g/m MOQ: 100m</p> 	 <p><b>161 9 127 *</b> Clamping range 1,5 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 291,7g/m MOQ: 100m</p> 	 <p><b>161 9 624</b> Clamping range 2,0 - 4,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 272,0g/m MOQ: on request</p> 
 <p><b>161 0 960</b> Clamping range 1,0 - 2,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 100,0g/m MOQ: 100m</p>	 <p><b>161 9 627</b> Clamping range 1,0 - 2,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 280,0g/m MOQ: on request</p> 	 <p><b>161 9 632</b> Clamping range 1,0 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 272,0g/m MOQ: on request</p> 

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All sections drawn to size (scale 1:1). Additional sections planned. Subject to design changes reserved!  
(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock



## PVC - Sealing Section with embedded Steel Base Strip or Wire Carrier bonded to EPDM-Foam-Rubber

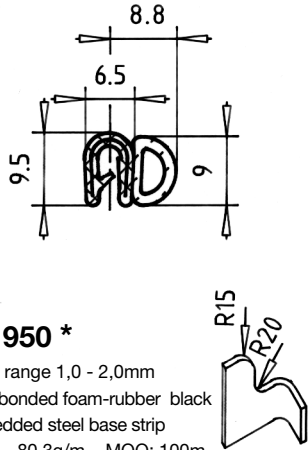
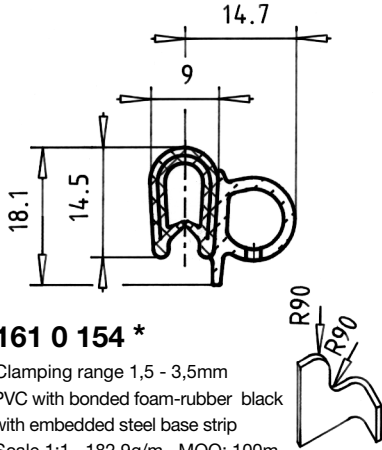
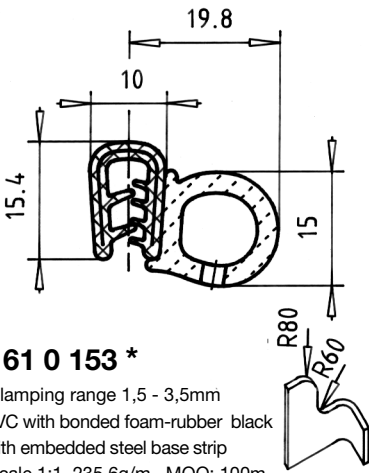
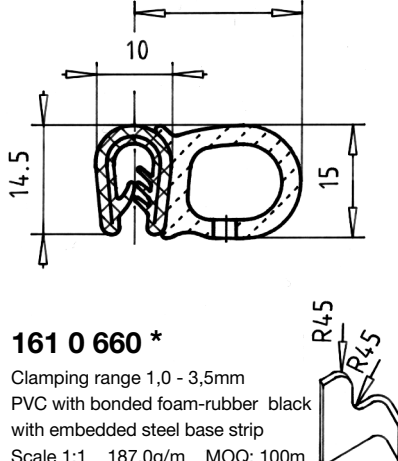
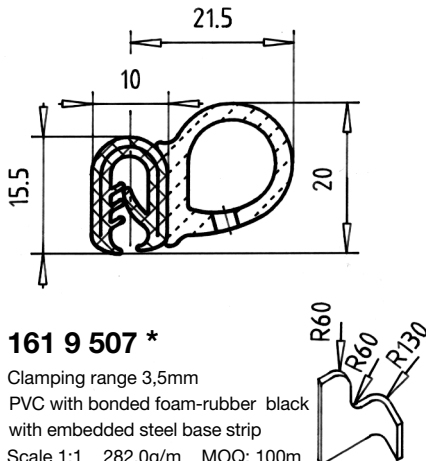
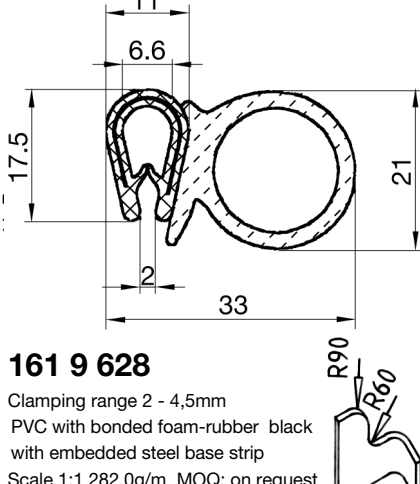
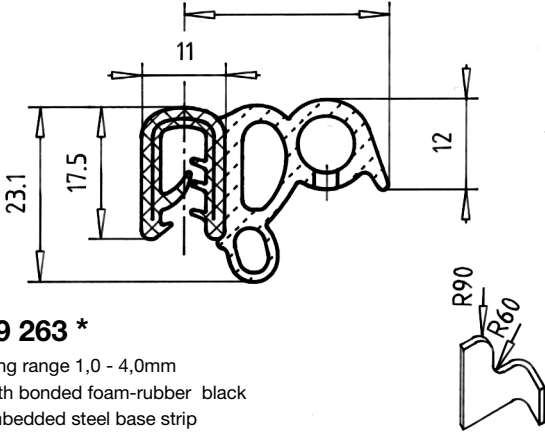
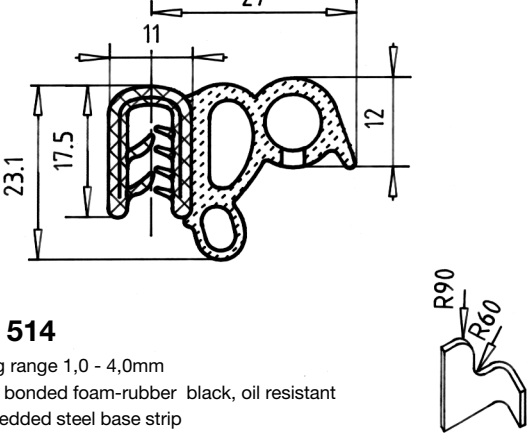
 <p><b>161 9 615</b> Clamping range 2,0 - 5,5mm PVC with bonded foam-rubber black with embedded wire carrier Scale 1:1 180,0g/m MOQ: on request</p>	 <p><b>161 9 625</b> Clamping range 5,0 - 7,0mm black 2 comp. PVC with bonded foam-rubber with embedded steel base strip Scale 1:1 280,0g/m MOQ: on request</p>	 <p><b>161 9 626</b> Clamping range 2,0 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 270,0g/m MOQ: on request</p>
 <p><b>170 9 865</b> Clamping range 1,0 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 240,0g/m MOQ: on request</p>		

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\* Available from stock



## PVC - Sealing Section with embedded Steel Base Strip or Wire Carrier bonded to EPDM-Foam-Rubber

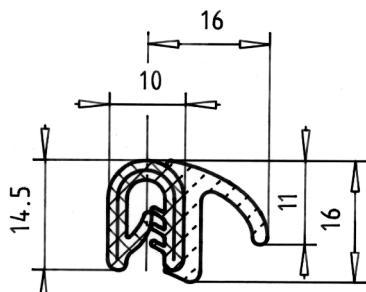

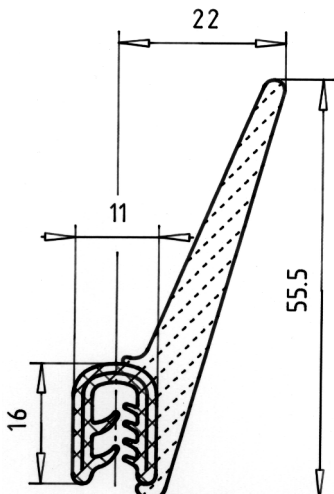
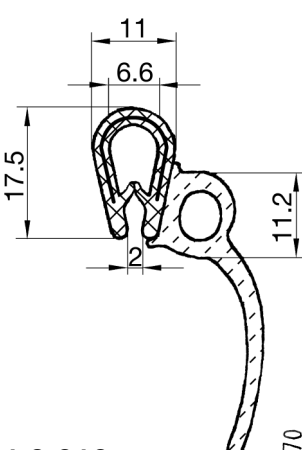
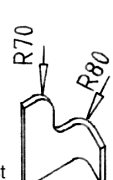
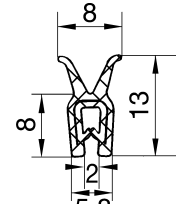
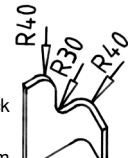

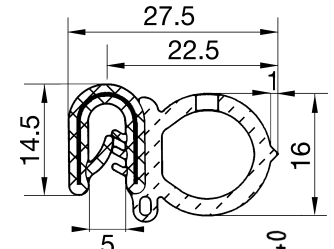

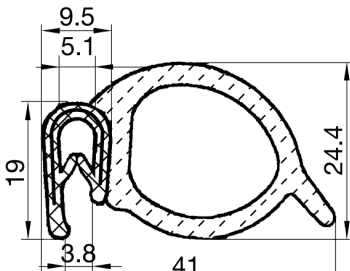
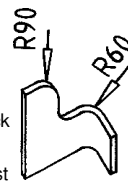
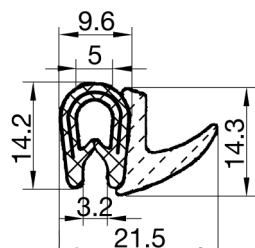

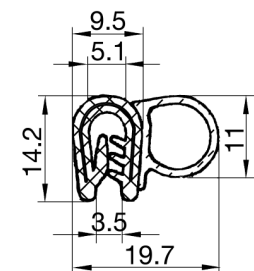

 <p><b>161 0 950 *</b> Clamping range 1,0 - 2,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 80,3g/m MOQ: 100m</p>	 <p><b>161 0 154 *</b> Clamping range 1,5 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 182,9g/m MOQ: 100m</p>	 <p><b>161 0 153 *</b> Clamping range 1,5 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 235,6g/m MOQ: 100m</p>
 <p><b>161 0 660 *</b> Clamping range 1,0 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 187,0g/m MOQ: 100m</p>	 <p><b>161 9 507 *</b> Clamping range 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 282,0g/m MOQ: 100m</p>	 <p><b>161 9 628</b> Clamping range 2 - 4,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 282,0g/m MOQ: on request</p>
 <p><b>161 9 263 *</b> Clamping range 1,0 - 4,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 274,8g/m MOQ: 100m</p>	 <p><b>161 9 514</b> Clamping range 1,0 - 4,0mm PVC with bonded foam-rubber black, oil resistant with embedded steel base strip Scale 1:1 345,8g/m MOQ: 3000m</p>	

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\* Available from stock



## PVC - Sealing Section with embedded Steel Base Strip or Wire Carrier bonded to EPDM-Foam-Rubber

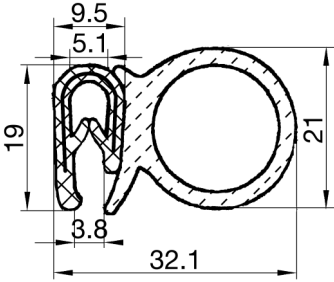
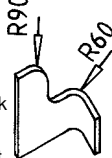
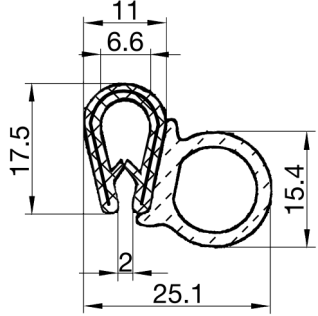

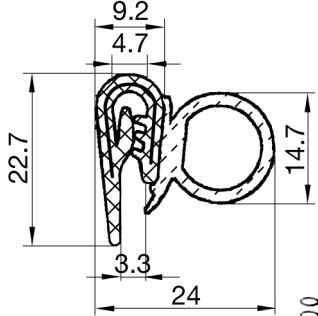

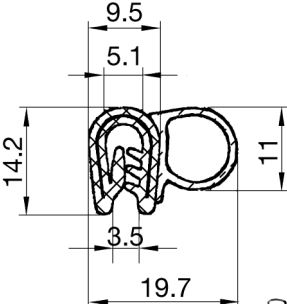

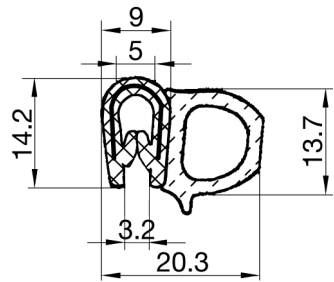

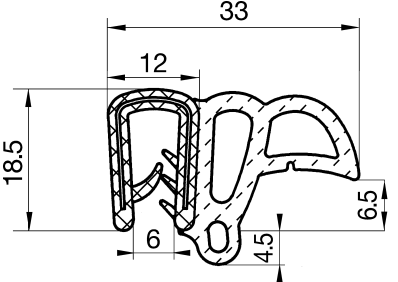

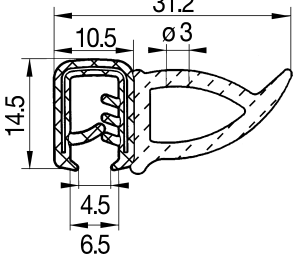

 <p><b>161 0 641 *</b> Clamping range 1,0 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 180,0g/m MOQ: 100m</p> 	 <p><b>161 0 550 *</b> Clamping range 2,0 - 4,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 333,6g/m MOQ: 100m</p>	 <p><b>161 9 616</b> Clamping range 2,0 - 5,5mm PVC with bonded foam-rubber black with embedded wire carrier Scale 1:1 210,0g/m MOQ: on request</p> 
 <p><b>161 9 396 *</b> Clamping range 1,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 150,0g/m MOQ: 200m</p> 	<p><b>161 9 663 *</b> Clamping range 1,0 - 2,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 333,6g/m MOQ: 100m</p> 	 <p><b>161 9 447 *</b> Clamping range 1,0 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 260,0g/m MOQ: 100m</p> 
 <p><b>161 9 612</b> Clamping range 2,0 - 4,5mm PVC with bonded foam-rubber black with embedded wire carrier M 1:1 290,0g/m MA: on request</p> 	 <p><b>161 9 617</b> Clamping range 1,0 - 4,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 200,0g/m MOQ: on request</p> 	 <p><b>161 9 599</b> Clamping range 2,0 - 4,0mm PVC with bonded foam-rubber black with embedded wire carrier Scale 1:1 210,0g/m MOQ: 100m</p> 

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## PVC - Sealing Section with embedded Steel Base Strip or Wire Carrier bonded to EPDM-Foam-Rubber

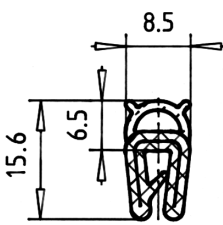

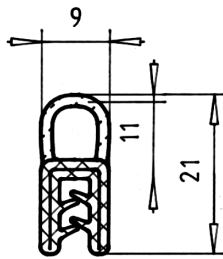

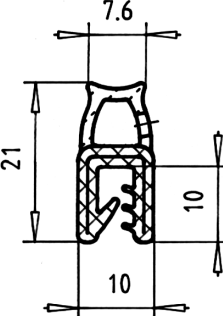

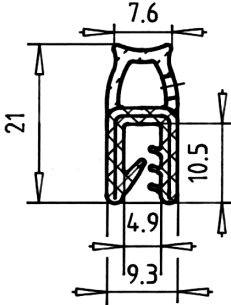
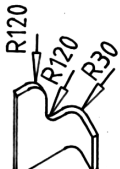
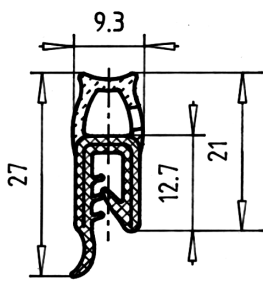
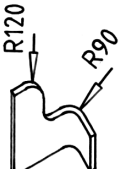
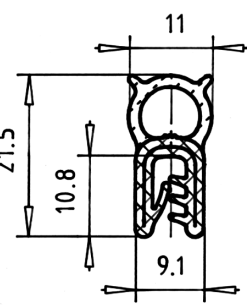

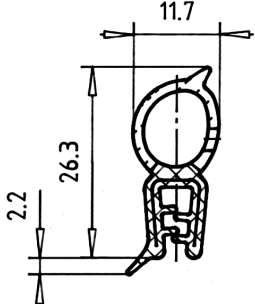
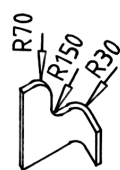
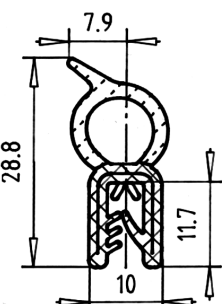

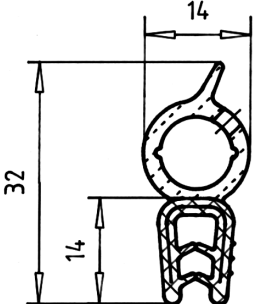

 <p><b>161 9 613</b> Clamping range 2,0 - 4,5mm PVC with bonded foam-rubber black with embedded wire carrier Scale 1:1 285,0g/m MOQ: on request</p> 	 <p><b>161 9 614</b> Clamping range 1 - 4,5mm PVC with bonded foam-rubber black with embedded wire carrier Scale 1:1 235,0/m MOQ: on request</p> 	 <p><b>161 9 622</b> Clamping range 0,5 - 2,5mm black 2 Komp. PVC with bonded foam-rubber with embedded steel base strip Scale 1:1 245,0g/m MOQ: on request</p> 
 <p><b>161 9 623</b> Clamping range 2 - 3,5mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 205,5g/m MOQ: on request</p> 	 <p><b>161 9 631</b> Clamping range 1,0 - 3,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 225,0g/m MOQ: on request</p> 	 <p><b>161 9 633</b> Clamping range 4,0 - 7,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 295,0g/m MOQ: 100m</p> 
 <p><b>161 9 643</b> Clamping range 3,0 - 5,0mm PVC with bonded foam-rubber black with embedded steel base strip Scale 1:1 255,0g/m MOQ: 100m</p> 		

Sections on request available in different colours. Enclosed frames and rings can also be produced!  
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(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock



## Rubber - Sealing Sections with embedded Steel Base Strip or Wire Carrier with vulcanized Foam-Rubber

 <p><b>161 0 845 *</b> Clamping range 0,8 - 2,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 115,0g/m MOQ: 100m</p> 	 <p><b>161 0 841 *</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 181,0g/m MOQ: 100m</p> 	 <p><b>161 0 842 *</b> Clamping range 2,0 - 4,0mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 118,6g/m MOQ: 100m</p> 
 <p><b>161 9 161 *</b> Clamping range 2,0 - 4,0mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 157,8g/m MOQ: 100m</p> 	 <p><b>161 9 534</b> Clamping range 1,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 126,8g/m MOQ: 2000m</p> 	 <p><b>161 0 846 *</b> Clamping range 1,0 - 3,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 152,5g/m MOQ: 100m</p> 
 <p><b>161 9 013 *</b> Clamping range 1,0 - 2,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 178,0g/m MOQ: 100m</p> 	 <p><b>161 9 199 *</b> Clamping range 2,0 - 4,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 231,2g/m MOQ: 100m</p> 	 <p><b>161 9 100 *</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 218,1g/m MOQ: 100m</p> 

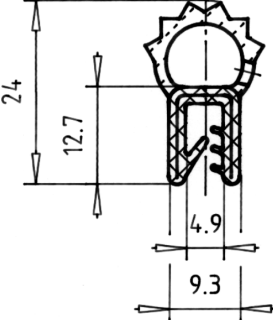

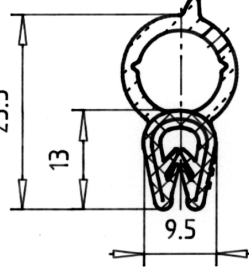

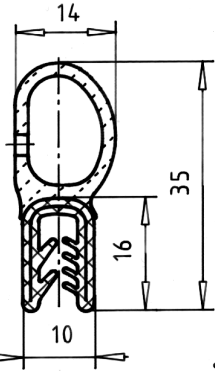
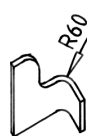
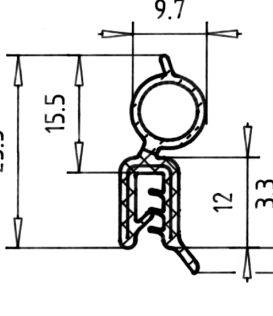

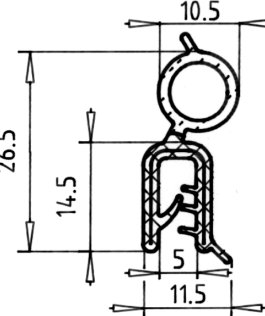

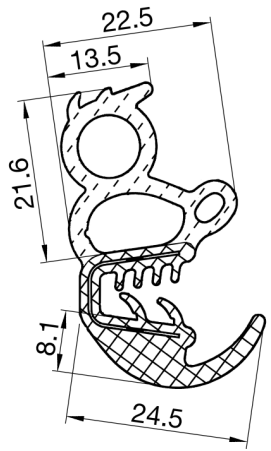

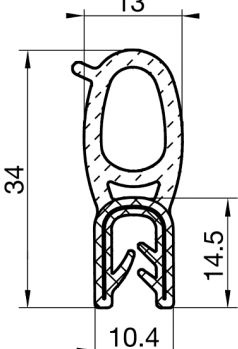
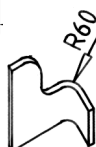
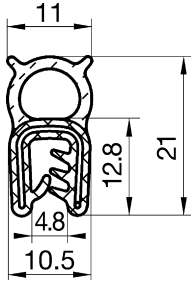

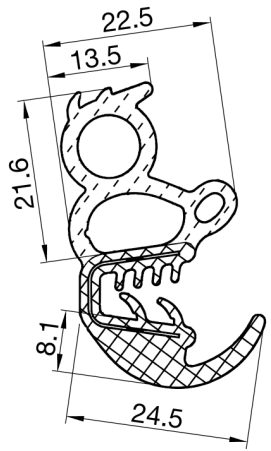

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(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock





## Rubber - Sealing Sections with embedded Steel Base Strip or Wire Carrier with vulcanized Foam-Rubber

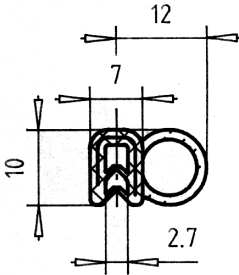

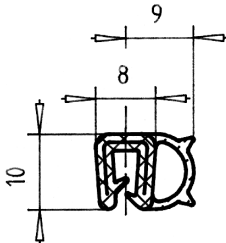

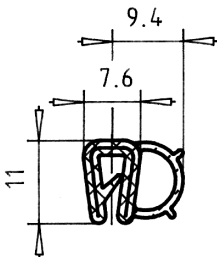

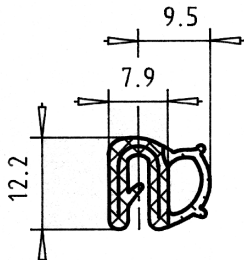

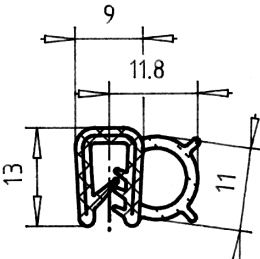

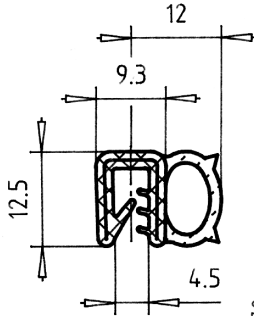

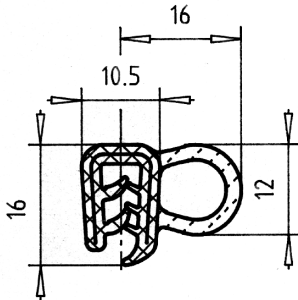

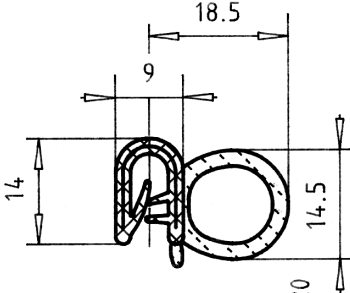

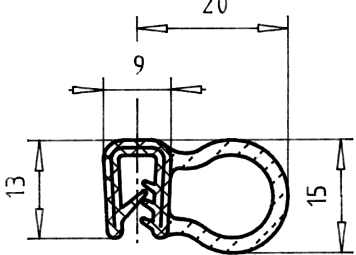

 <p><b>161 9 122</b> Clamping range 1,0 - 2,0mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 133,0g/m MOQ: 100m</p> 	 <p><b>161 9 104 *</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 203,0g/m MOQ: 4800m</p> 	 <p><b>161 0 847 *</b> Clamping range 1,0 - 3,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 266,5g/m MOQ: 100m</p> 
 <p><b>161 9 001</b> Clamping range 1,0 - 2,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 169,0g/m MOQ: on request</p> 	 <p><b>161 9 540 *</b> Clamping range 1,5 - 3,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 196,0g/m MOQ: 100m</p> 	 <p><b>161 9 516</b> Clamping range 2,5 - 6,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 274,3g/m MOQ: on request</p> 
 <p><b>161 9 578</b> Clamping range 2,0 - 5,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 200,0g/m MOQ: on request</p> 	 <p><b>161 9 581</b> Clamping range 2,0 - 5,0mm NBR / Moosg. black with embedded wire carrier Scale 1:1 152,0g/m MOQ: 200m</p> 	 <p><b>161 9 516</b> Clamping range 2,5 - 6,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 274,3g/m MOQ: on request</p> 

Sections on request available in different colours. Enclosed frames and rings can also be produced!  
All sections drawn to size (scale 1:1). Additional sections planned. Subject to design changes reserved!  
(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock



## Rubber - Sealing Sections with embedded Steel Base Strip or Wire Carrier with vulcanized Foam-Rubber

 <p><b>161 9 170</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 101,6g/m MOQ: 100m</p> 	 <p><b>161 9 322</b> Clamping range 1,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 82,2g/m MOQ: 100m</p> 	 <p><b>161 0 160 *</b> Clamping range 0,8 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 120,0g/m MOQ: 100m</p> 
 <p><b>161 0 158 *</b> Clamping range 2,8mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 120,9g/m MOQ: 500m</p> 	 <p><b>161 0 844 *</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 130,6g/m MOQ: 100m</p> 	 <p><b>161 9 140 *</b> Clamping range 1,0 - 3,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 140,2g/m MOQ: 100m</p> 
 <p><b>161 9 410 *</b> Clamping range 1,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 158,0g/m MOQ: 3000m</p> 	 <p><b>161 0 159 *</b> Clamping range 1,5 - 3,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 200,0g/m MOQ: 100m</p> 	 <p><b>161 0 161 *</b> Clamping range 1,0 - 3,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 180,0g/m MOQ: 100m</p> 

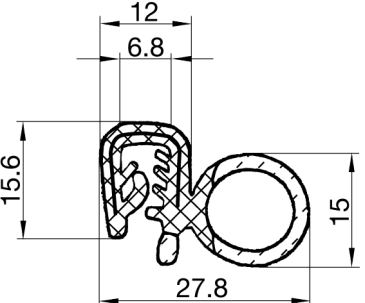

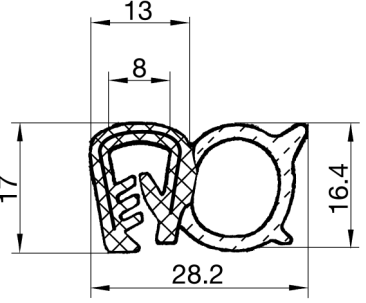

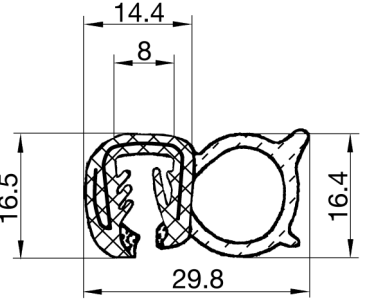

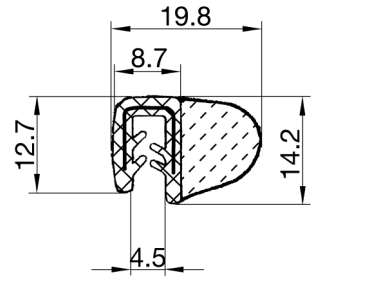

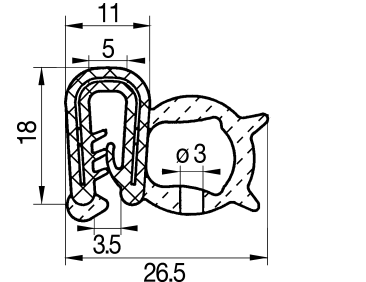

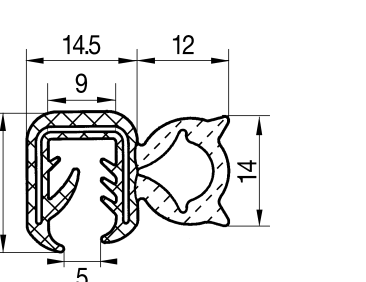

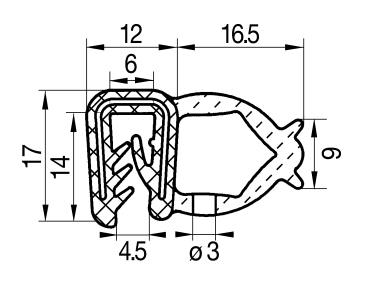

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\* Available from stock





## Rubber - Sealing Sections with embedded Steel Base Strip or Wire Carrier with vulcanized Foam-Rubber

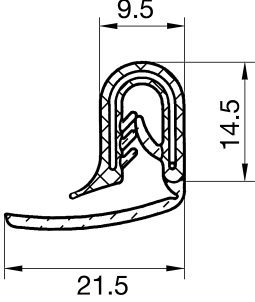

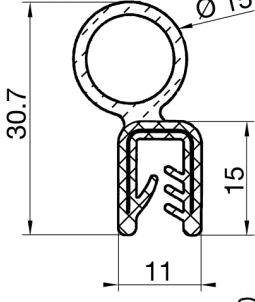

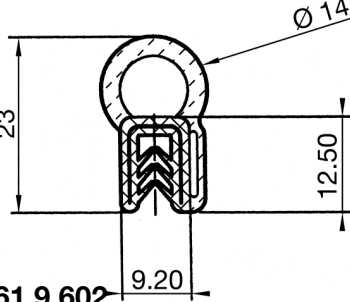

 <p><b>161 9 618</b> Clamping range 3,0 - 5,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 265,0g/m MOQ: on request</p> 	 <p><b>161 9 619</b> Clamping range 3,5 - 6,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 270,0g/m MOQ: on request</p> 	 <p><b>161 9 620</b> Clamping range 3,0 - 6,6mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 270,0g/m MOQ: on request</p> 
 <p><b>161 9 621</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 220,0g/m MOQ: on request</p> 	 <p><b>161 9 645</b> Clamping range 1,5 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 320,0g/m MOQ: 100m</p> 	 <p><b>161 9 647</b> Clamping range 5,0 - 8,0mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 280,0g/m MOQ: 100m</p> 
 <p><b>161 9 648</b> Clamping range 2,5 - 4,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 250,0g/m MOQ: 100m</p> 		

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## Rubber - Sealing Sections with embedded Steel Base Strip or Wire Carrier with vulcanized Foam-Rubber

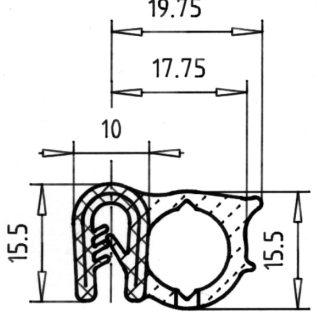

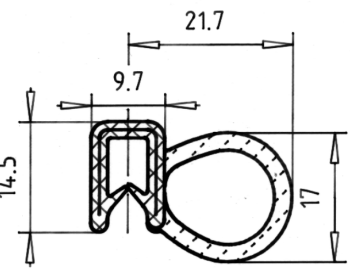
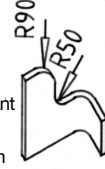
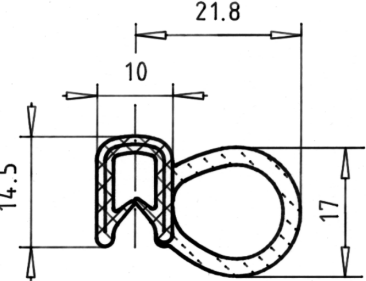

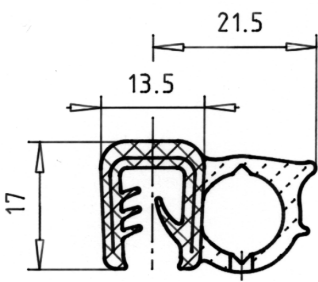

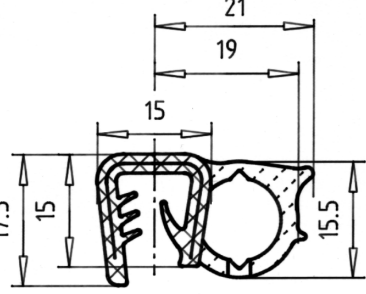

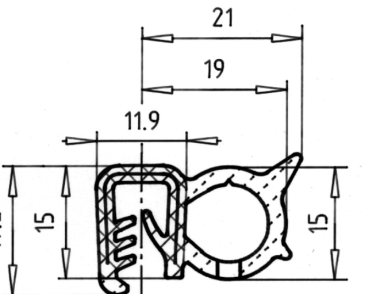

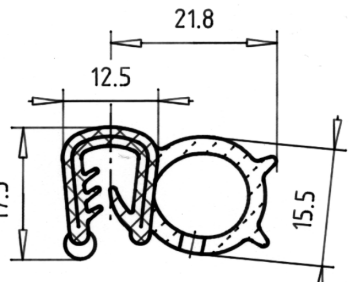

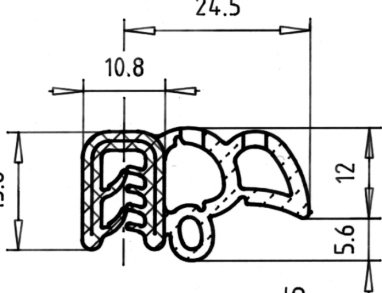

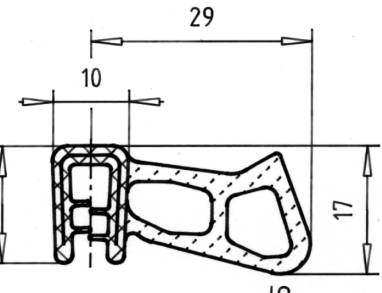

 <p><b>161 9 649</b> Clamping range 2,0 - 4,5mm Rubber / Foam-Rubber grey with embedded wire carrier Scale 1:1 210,0g/m MOQ: on request</p> 	 <p><b>161 9 583</b> Clamping range 3,0 - 6,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 220,0g/m MOQ: 100m</p> 	 <p><b>161 9 602</b> Klemmbereich 1,5 - 3,5mm Rubber / Foam-Rubber black with embedded wire carrier dielectric strength min. 2,5 KV Scale 1:1 220,0g/m MOQ: 2000m</p> 

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## Rubber - Sealing Sections with embedded Steel Base Strip or Wire Carrier with vulcanized Foam-Rubber

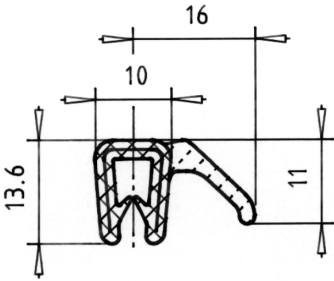

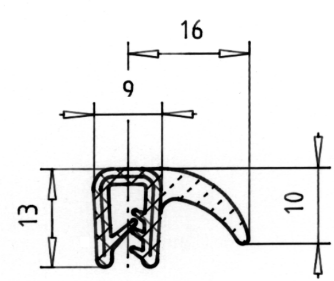

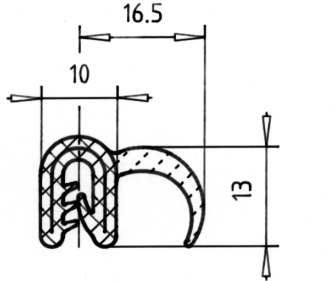

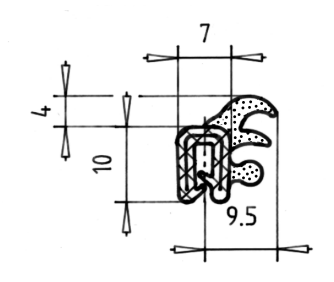

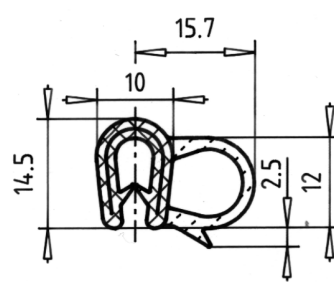

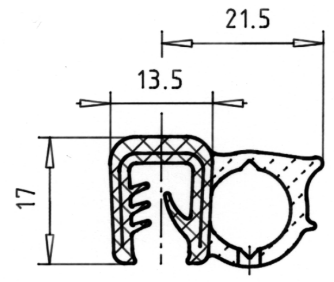

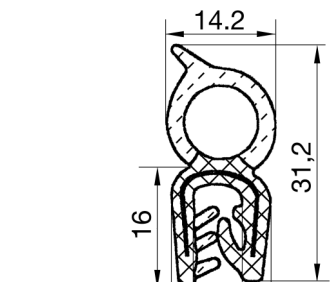

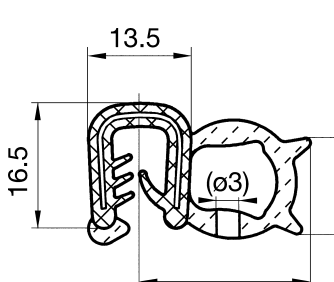
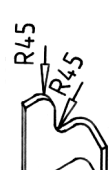
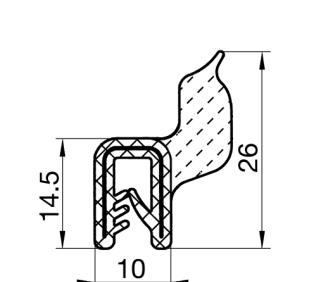

 <p><b>161 9 408 *</b> Clamping range 1,5 - 3,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 225,8g/m MOQ: 100m</p> 	 <p><b>161 9 344</b> Clamping range 1,5mm black Rubber/Foam-Rubber diesel oil resistant with embedded wire carrier Scale 1:1 213,8g/m MOQ: 5000m</p> 	 <p><b>161 0 152 *</b> Clamping range 2,0 - 4,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 245,2g/m MOQ: 100m</p> 
 <p><b>161 0 155 *</b> Clamping range 3,0 - 6,0mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 214,3g/m MOQ: 100m</p> 	 <p><b>161 9 489 *</b> Clamping range 5,0 - 9,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 255,4g/m MOQ: 100m</p> 	 <p><b>161 9 565</b> Clamping range 3,0 - 6,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 243,2g/m MOQ: 5000m</p> 
 <p><b>161 9 486 *</b> Clamping range 2,0 - 4,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 243,1g/m MOQ: 100m</p> 	 <p><b>161 9 533 *</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 289,0g/m MOQ: 100m</p> 	 <p><b>161 9 083</b> Clamping range 1,0 - 2,0mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 243,0g/m MOQ: 1800m</p> 

Sections on request available in different colours. Enclosed frames and rings can also be produced!  
All sections drawn to size (scale 1:1). Additional sections planned. Subject to design changes reserved!  
(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock



## Rubber - Sealing Sections with embedded Steel Base Strip or Wire Carrier with vulcanized Foam-Rubber

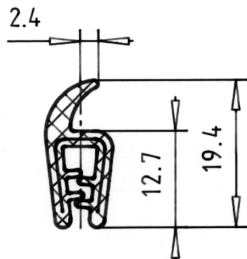

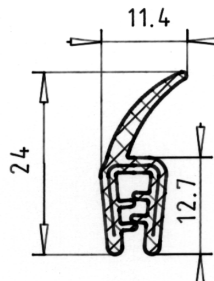

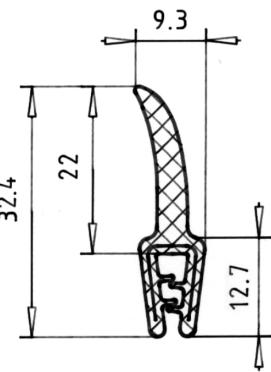

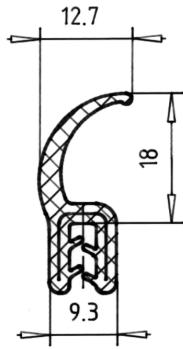
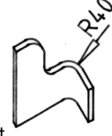
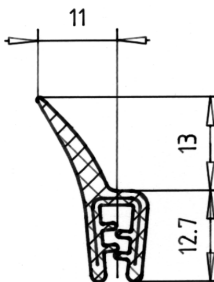

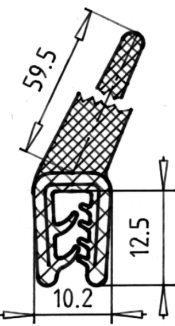

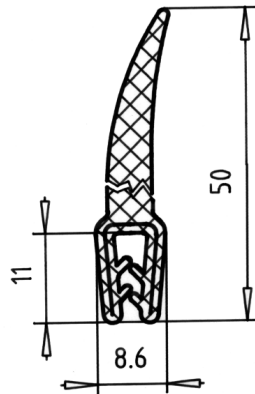

 <p><b>161 0 642 *</b> Clamping range 1,0 - 2,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 135,2g/m MOQ: 100m</p> 	 <p><b>161 0 644 *</b> Clamping range 1,0 - 3,5mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 142,8g/m MOQ: 100m</p> 	 <p><b>161 9 403</b> Clamping range 2,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 215,0g/m MOQ: on request</p> 
 <p><b>161 9 369</b> Clamping range 1,8mm Rubber / Foam-Rubber black with embedded wire carrier Scale 1:1 95,0g/m MOQ: 100m</p> 	 <p><b>161 9 355 *</b> Clamping range 1,0 - 3,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 172,5g/m MOQ: 100m</p> 	 <p><b>161 9 652</b> Clamping range 3,0 - 6,0mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 274,3g/m MOQ: 100m</p> 
 <p><b>161 9 639</b> Clamping range 2 - 5,5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 230,0g/m MOQ: on request</p> 	 <p><b>161 9 607</b> Clamping range 4,5 - 8mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 300,0g/m MOQ: 100m</p> 	 <p><b>161 9 577</b> Clamping range 2 - 5mm Rubber / Foam-Rubber black with embedded steel base strip Scale 1:1 260,0g/m MOQ: on request</p> 

Sections on request available in different colours. Enclosed frames and rings can also be produced!  
All sections drawn to size (scale 1:1). Additional sections planned. Subject to design changes reserved!  
(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock

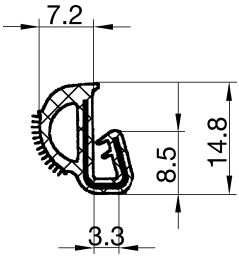
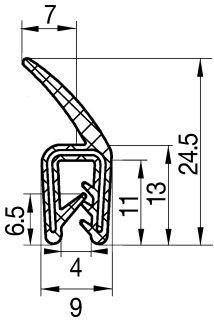


## Rubber - Sealing Sections of Solid Rubber with embedded Steel Base or Wire Carrier

 <p><b>161 0 650 *</b> Clamping range 1,0 - 2,0mm Rubber black with embedded steel base strip Scale 1:1 162,1g/m MOQ: 100m</p> 	 <p><b>161 0 530 *</b> Clamping range 1,0 - 2,0mm Rubber black with embedded steel base strip Scale 1:1 173,0g/m MOQ: 100m</p> 	 <p><b>161 0 350 *</b> Clamping range 0,5 - 2,0mm Rubber black with embedded steel base strip Scale 1:1 225,1g/m MOQ: 100m</p> 
 <p><b>161 9 346</b> Clamping range 0,5 - 2,0mm Silicone black with embedded wire carrier Scale 1:1 1791g/m MOQ: on request continuous-temperature-resistance of about + 180°</p> 	 <p><b>161 9 023</b> Clamping range 1,0 - 2,0mm Rubber black with embedded steel base strip Scale 1:1 178,0g/m MOQ: 1200m</p> 	<p><b>161 9 350</b> Clamping range 0,5 - 2,0mm NBR (oil resistant) black with embedded steel base strip Scale 1:1 220,0g/m MOQ: 1000m</p>
 <p><b>161 9 535</b> Clamping range 3,0mm 2 Komp. Rubber black with embedded steel base strip Scale 1:1 509,1g/m MOQ: 100m</p> 		 <p><b>161 9 002</b> Clamping range 0,5 - 2mm Rubber black wire carrier Scale 1:1 232,0g/m MOQ: on request</p> 



## Rubber - Sealing Sections of Solid Rubber with embedded Steel Base or Wire Carrier

 <p><b>161 9 604</b> Clamping range 1,0 - 3,0mm Rubber black with embedded steel base strip Scale 1:1 160,0g/m MOQ: 100m</p>	 <p><b>161 9 646</b> Clamping range 1,0 - 2,5mm Rubber black with stainless-steel-wire Scale 1:1 192,6g/m MOQ: on request</p>	

Sections on request available in different colours. Enclosed frames and rings can also be produced!  
All sections drawn to size (scale 1:1). Additional sections planned. Subject to design changes reserved!  
(MOQ = Minimum Order Quantity), Issue VII-04

\* Available from stock



# technoprofil

**The rubber glazing sections listed represent a sample from our standard range.  
Sections marked \* are available from stock.  
Custom-designs to your specifications or our proposals on request.  
Ask for further information and advice.**

## **Grades**

Our glazing sections are made of EPDM (APTK).  
EPDM is characterized by excellent resistance to weathering and ozone.  
Our grade does not react with paints and varnishes.  
Other grades, such as NBR for excellent resistance to oil, are available on request.

## **Tolerances**

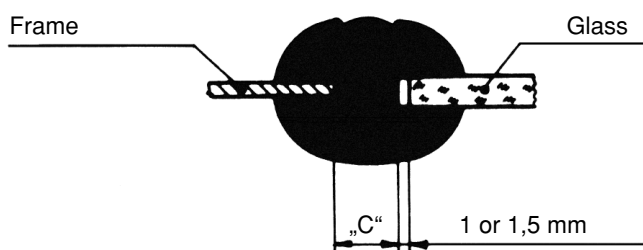
DIN 7715 E 2 for cut lengths; length tolerances as agreed.

## **Form supplied**

Cut lengths, bonded or vulcanized frames or rings.

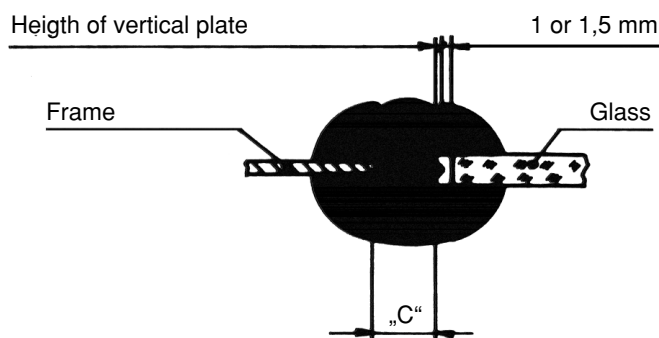


## Calculating the dimensions of the window panes



1. Strength of vertical plate until „C“ = 7 mm  
Window opening – 2 x strength of vertical plate „C“ – 2 x 1 mm

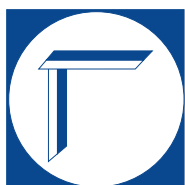
2. Strength of vertical plate over „C“ = 7 mm  
Window opening – 2 x strength of vertical plate „C“ – 2 x 1 mm



3. Strength of vertical plate until „C“ = 7 mm  
Window opening – 2 x strength of vertical plate „C“ –  
2 x heigth of vertical plate – 2 x 1 mm

4. Strength of vertical plate over „C“ = 7 mm  
Window opening – 2 x strength of vertical plate „C“ –  
2 x heigth of vertical plate – 2 x 1,5 mm





Glazing - Sections / Glass channel (A) on the top, metalwork groove at the bottom (B)

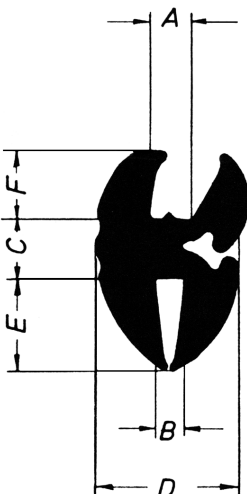
Type	Part-no.	Dimensions in mm						Bending radius mm	weight g/m	Unit: m	Fillerprofil No.
		A	B	C	D	E	F				
	101 0 100 <sup>*</sup>	3	1	4	11,6	4,5	6	35	140	50	104 0 100
	101 0 400 <sup>*</sup>	4	1,5	4	13,6	5	6	35	160	20	104 0 100
	101 0 500 <sup>*</sup>	4	1,5	7	16	7	7	80	300	20	104 0 200
	101 0 600 <sup>*</sup>	4	1,5	7,5	17,5	7,5	8	90	326,2	20	104 0 200
	101 0 700 <sup>*</sup>	4	2	7,3	18	11	8,7	100	398,1	15	104 0 200
	101 0 730 <sup>*</sup>	4	3	4	12,6	5	6	35	151,5	20	104 0 100
	101 0 800 <sup>*</sup>	4	3	7	16	7	7	80	256,9	20	104 0 200
	101 0 900 <sup>*</sup>	4	3	7,5	19	12,5	9,5	80	505,8	15	104 0 200
	101 9 107 <sup>*</sup>	4	4	7,5	18	7,5	8	70	340	25	104 0 200
	101 0 110 <sup>*</sup>	4,5	5	7	16	7	7	80	260	20	104 0 200
	101 0 940 <sup>*</sup>	5	2	5	14,6	6	6	40	173,9	20	104 0 200
	101 0 210 <sup>*</sup>	5	2	7,5	19	12,5	9,5	80	460	20	104 0 200
	101 0 930 <sup>*</sup>	5	3	7,5	18	7,5	8	70	346,2	15	104 0 200
	101 0 310 <sup>*</sup>	5	3	7,5	19	12,5	9,5	80	452,2	20	104 0 200
	101 0 410 <sup>*</sup>	5	5	7	18,4	9	8	80	317,6	20	104 0 200
	101 0 510 <sup>*</sup>	5,5	2	7,3	19	11	8,7	80	420	20	104 0 200
	101 0 610 <sup>*</sup>	6	1,5	7,5	19	12,5	9,5	80	480	15	104 0 200
	101 0 710 <sup>*</sup>	6	2,5	7	19	8	8	80	346,6	20	104 0 200
	101 0 810 <sup>*</sup>	6	3	7,5	19	12,5	9,5	80	386,6	20	104 0 200
	101 0 910 <sup>*</sup>	6	4	7,5	19	12,5	9,5	80	435,7	20	104 0 200
	101 0 240 <sup>*</sup>	6	10	7,5	22,7	12,5	9,5	100	505	15	104 0 200

o Oil resistant grades available using existing moulds, MOQ. on request! (MOQ = minimum order quantity m),  
Subject to design changes reserved! Issue VII-04

\* Available from stock, subject to prior sale. Without\* = MOQ. and delivery time on request



Glazing - Sections / Glass channel (A) on the top, metalwork groove at the bottom (B)

Type	Part-no.	Dimensions in mm						Bending radius	weight	Unit:	Fillerprofil No.
		A	B	C	D	E	F	mm	g/m	m	
	101 0 812	7	3,3	7,2	21,5	11,8	8,6	120	440	40	104 0 200
	101 0 740*	8	4	8,5	25	12,5	10	100	599,7	20	104 0 200
	101 9 034	14	4	11	29	11	12	100	758,9	14,5	104 0 200
	101 9 063	7,7	6	7,2	21,2	11,8	8,6	120	489	30	104 0 200
	101 9 064	4,5	6	7,2	21,2	11,8	8,6	120	490,3	30	104 0 200
	101 9 420	5	3	6,5	21	7,5	7	80	485	30	104 0 200

o Oil resistant grades available using existing moulds, MOQ. on request! (MOQ = minimum order quantity m),  
Subject to design changes reserved! Issue VII-04

\* Available from stock, subject to prior sale. Without\* = MOQ. and delivery time on request



Glazing - Sections / Glass channel (A) on the top, metalwork groove at the bottom (B)

Type	Part-no.	Bending radius  mm	weight  g/m	Minimum order quantity m	Fillerprofil No.
	101 0 440 *	100	418,5	100	104 0 200
	101 0 840 *	100	533,6	100	104 0 200
	101 0 620 *	80	480	on request	104 0 200
	101 0 531 *	120	640	on request	104 0 200 and/or 140 0 401

o Oil resistant grades available using existing moulds, MOQ. on request! (MOQ = minimum order quantity m),  
Subject to design changes reserved! Issue VII-04

\* Available from stock, subject to prior sale. Without\* = MOQ. and delivery time on request



Glazing - Sections / Glass channel (A) on the top, metalwork groove at the bottom (B)

Type	Part-no.	Bending radius	weight	Minimum order quantity m	Fillerprofil No.
	101 9 004	100	580	on request	104 0 200
	101 9 005	100	640	on request	104 0 200
	101 0 441	100	467,20	100	104 0 200
	101 9 088	100	390	on request	-

o Oil resistant grades available using existing moulds, MOQ. on request! (MOQ = minimum order quantity m),  
Subject to design changes reserved! Issue VII-04

\* Available from stock, subject to prior sale. Without\* = MOQ. and delivery time on request



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Glazing - Sections / Glass channel (A) on the top, metalwork groove at the bottom (B)

Type	Part-no.	Bending radius	weight	Minimum order quantity m	Fillerprofil No.
	101 9 049	100	1350	on request	2 x 104 0 200
	101 9 050	150	2690	on request	2 x 104 0 200
	101 9 053	80	400	on request	
	101 9 055	80	463	on request	2 x 104 0 200

o Oil resistant grades available using existing moulds, MOQ. on request! (MOQ = minimum order quantity m),  
Subject to design changes reserved! Issue VII-04

\* Available from stock, subject to prior sale. Without\* = MOQ. and delivery time on request



Glazing - Sections / Glass channel (A) on the top, metalwork groove at the bottom (B)

Type	Part-no.	Bending radius	weight	Minimum order quantity m	Fillerprofil No.
	101 9 020	100		on request	104 0 200
	101 9 068	100		on request	104 0 200
	101 9 073	—	1280	on request	104 0 200

o Oil resistant grades available using existing moulds, MOQ. on request! (MOQ = minimum order quantity m),  
Subject to design changes reserved! Issue VII-04

\* Available from stock, subject to prior sale. Without\* = MOQ. and delivery time on request



Glazing - Sections / Glass channel (A) on the top, metalwork groove at the bottom (B)

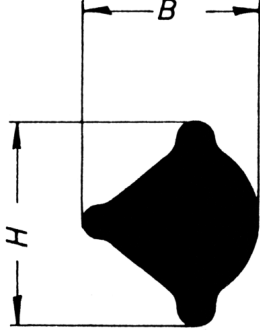
Type	Part-no.	Bending radius	weight	Minimum order quantity m	Fillerprofil No.
	101 0 442 *	100	605	on request	104 0 200

o Oil resistant grades available using existing moulds, MOQ. on request! (MOQ = minimum order quantity m),  
Subject to design changes reserved! Issue VII-04

\* Available from stock, subject to prior sale. Without\* = MOQ. and delivery time on request



## Filler - Section

Type	Part-no.	Dimensions in mm		Quality	Colour	weight g/m	Unit:	Hardness
		H	B					
	104 0 000*	5,5	4,5	EPDM	black	15,6	100	85
	146 0 420*	5,5	4,5	PVC	white	32	100	80
	104 0 100*	7	6	EPDM	black	25,8	100	85
	146 0 520*	7	6	PVC	ivory	32	on request	80
	146 0 620*	7	6	PVC	silver	32	100	80
	146 0 820*	7	5,5	PVC	white	32	100	80
	104 0 150*	8	7	EPDM	black	45	on request	85 – 90
	104 0 200*	9,5	7,5	EPDM	black	49,4	100	85
	146 9 002*	9,5	7,5	PVC	black	40	100	80
	146 0 920*	9,5	7,5	PVC	ivory	40	100	80
	146 0 030*	9,5	7,5	PVC	silver	40	100	80
	146 0 130*	9,5	7,5	PVC	red RAL 3003	40	100	80
	146 0 230*	9,5	7,5	PVC	white	40	100	80
	146 9 006	9	8	PVC	matt silver	40	on request	80
	146 9 010	11	7	TPE	black	50	on request	95

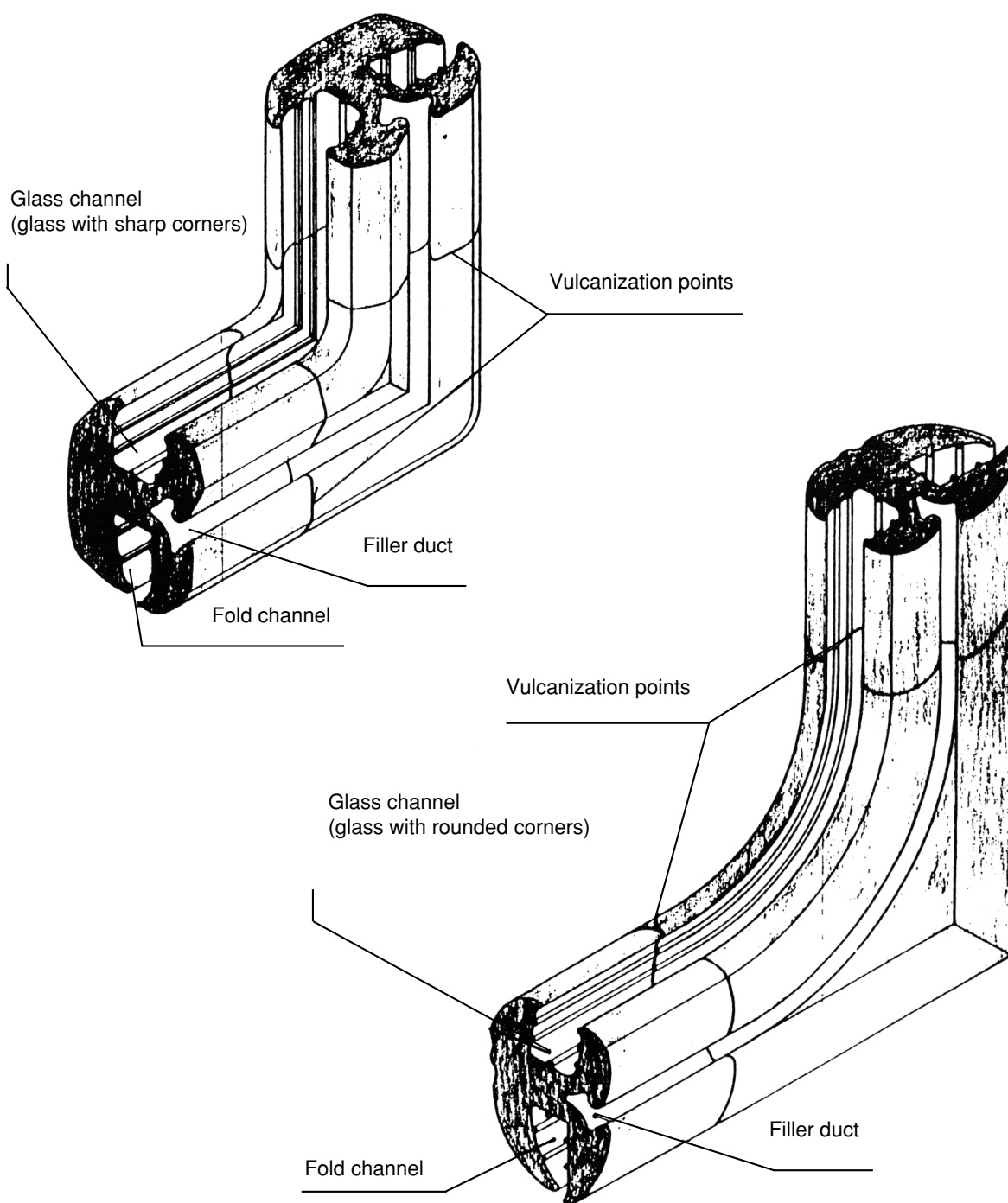
The PVC-Fillersurface is bright. Subject to design changes reserved!  
Issue VII-04

\* Available from stock, subject to prior sale.



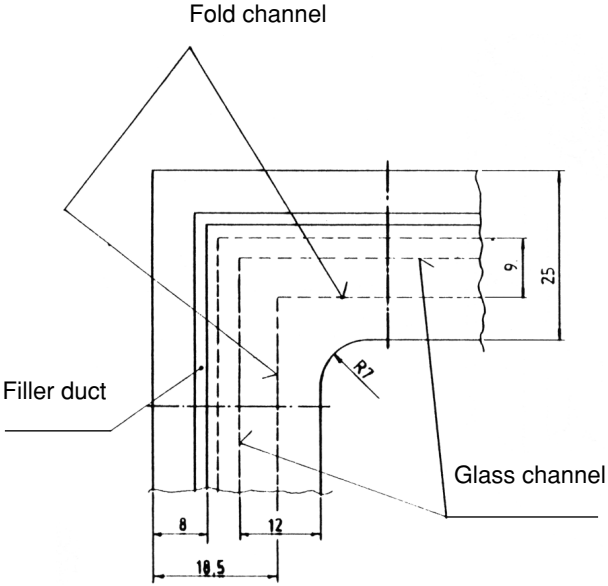
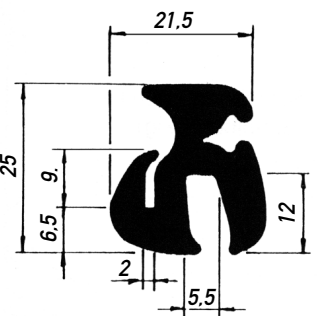
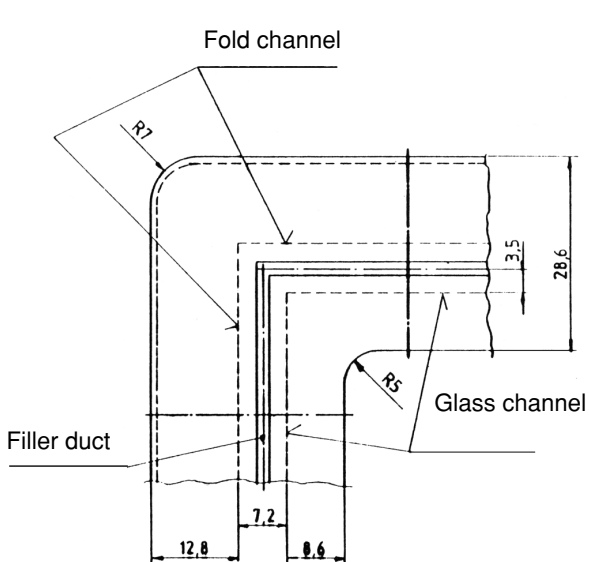
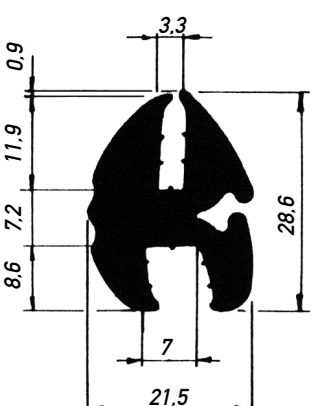


## Vulcanized corners for rubber clamping sections - examples





## Product overview - Vulcanized corners for rubber clamping sections

Art. No.	Vulcanized corner	Profile-section
101 7 440	 <p>Fold channel</p> <p>Filler duct</p> <p>Glass channel</p>	 <p>101 0 440</p>
101 7 812	 <p>Fold channel</p> <p>Filler duct</p> <p>Glass channel</p> <p>As well available than 65°-corner.</p>	 <p>101 0 812</p>

Additional sections planned. Subject to design changes.  
Issue VII-04



## Product overview - Vulcanized corners for rubber clamping sections

Art. No.	Vulcanized corner	Profile-section
101 7 063		
101 7 064		

Additional sections planned. Subject to design changes.  
Issue VII-04



## Product overview - Vulcanized corners for rubber clamping sections

Art. No.	Vulcanized corner	Profile-section
101 6 063		
101 6 064		

Additional sections planned. Subject to design changes.  
Issue VII-04



## Product overview - Vulcanized corners for rubber clamping sections

Art. No.	Vulcanized corner	Profile-section
101 7 068		
101 7 082		

Additional sections planned. Subject to design changes.  
Issue VII-04



## Product overview - Vulcanized corners for rubber clamping sections

Art. No.	Vulcanized corner	Profile-section
100 6 071		
100 7 071		

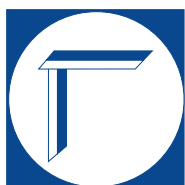
Additional sections planned. Subject to design changes.  
Issue VII-04



## Product overview - Vulcanized corners for rubber clamping sections

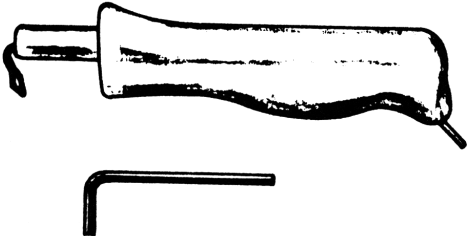

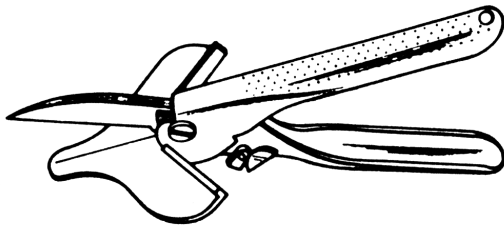
Art. No.	Vulcanized corner	Profile-section
101 7 073		<p>101 9 073</p>

Additional sections planned. Subject to design changes.



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## Tools

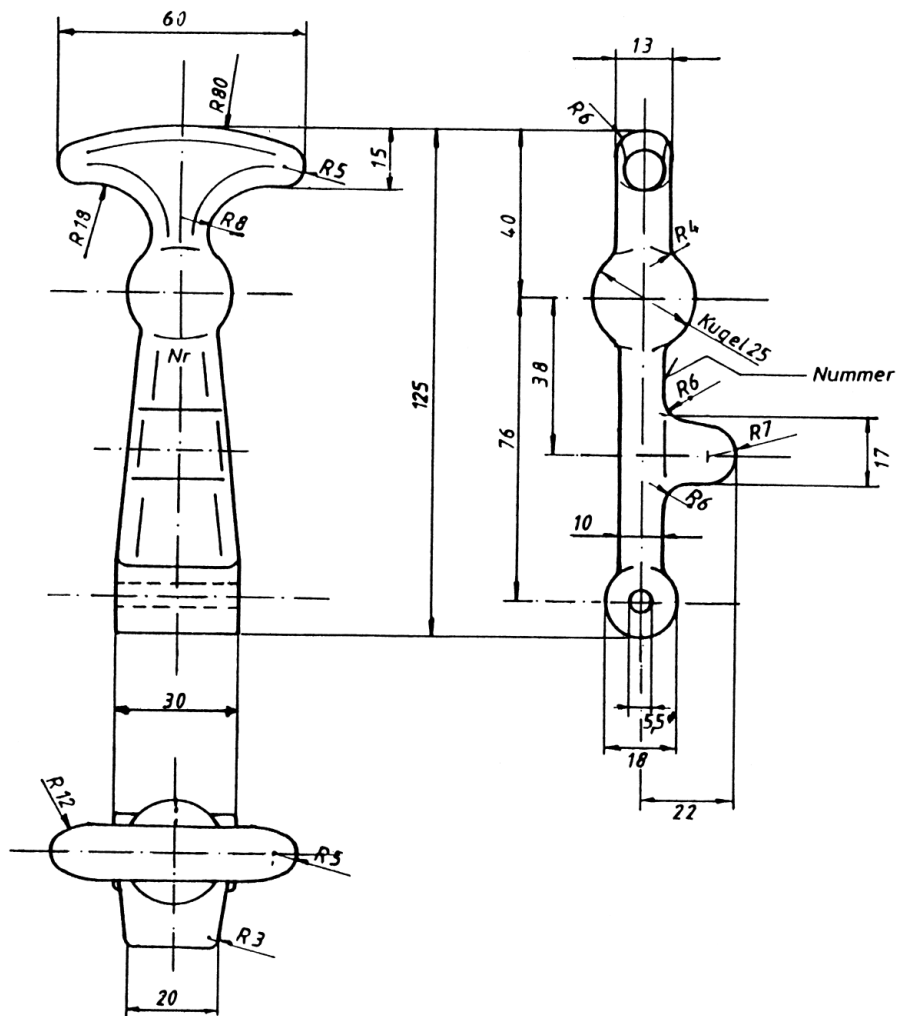
Type	Part-No.		Minimum order quantity (units)
	110 0 101* Filler-fitting tools, with eyelet No. 110 0 103	110 0 100* Complete tool in transparent bag	1
	110 0 102* Pane-fitting tool		
	110 0 103* eyelet for filler 104 0 200, 146 0 920, 146 0 030, 146 0 130, 146 0 230, 146 0 640		10
	110 0 104* eyelet for filler 104 0 100, 146 0 520, 146 0 620, 146 0 820		10
	110 0 105* eyelet for filler 104 0 000, 146 0 420,		10
	110 0 001* TECHNO all-purpose mitre cutter: essential whenever plastic or rubber sections or strips are to be mitred or squared. spare blades: 110 0 011* spare plate: 110 0 106*		1 1 1

\* Available from stock.





## Crested holders



Article-No. 170 9 532: 60 shore  
 Article-No. 170 9 533: complete with fitting  
 (pin, hook, bottom, washer, split pin)  
 Article-No. 170 9 502: 70 shore  
 Article-No. 170 9 504: complete with fitting

### Mounting-parts for crested holder

Artikel-Nr. 402 9 018 Pin  
 Artikel-Nr. 402 9 019 Hook  
 Artikel-Nr. 402 9 020 Bottom  
 Artikel-Nr. 402 9 021 Washer  
 Artikel-Nr. 402 9 022 Split pin (splint)



# technoprofil

## **Special - purpose sections**

### **Applications:**

Profiled cappings, profiled holders, spacers, door gaskets (for control cabinets), profiled buffers, joint-sealing sections, hinged sections, decorative fillers, frame sections, window gaskets with metal inlay, with or without flock-coating, window-sealing fillets with or without metal inlay, flocked

### **Grades:**

Rubber, plastic, aluminium, precise material designation on request.

### **Tolerances:**

DIN 7715 E 2 for rubber and DIN 16941 for PVC, tolerances for cut lengths specified on request.

### **From supplied:**

Cut lengths, frames, rings

### **Custom-designs:**

If the sections illustrated are not suitable for your particular application, an appropriate section can be customproduced for you.

Ask for further information and advice! We will draw up a suitable design for you.

We also can flock rubber profiles if needed!



## Profiled - Holders

Type	Part-no.	Quality	Colour	Minimum order quantity (m)	weight (g/m)
	100 0 000*	Rubber	black	100	40
	100 0 020*	Rubber	black	100	100
	100 0 100*	Rubber	black	100	60
	100 0 230*	Rubber	black	100	88
	100 0 260*	Rubber	black	100	190
	100 0 300*	Rubber	black	100	68
	100 0 400*	Rubber	black	100	52

Enclosed rings and frames can also be produced.  
Additional sections planned. Subject to design changes reserved!

Issue VII-04

\* Available from stock, subject to prior sale.



## Profiled - Holders

Type	Part-no.	Quality	Colour	Minimum order quantity (m)	weight (g/m)
	100 0 800*	Rubber	black	100	48
	100 0 410*	Rubber	black	100	76
	100 0 610	Rubber	black	100	84
	100 0 810*	Rubber	black	100	112



## Door gaskets

	Part-No.	H	h	B	No. of hollow-sections	Quality	Colour
	103 0 271*	19,5	11,5	11	1	Technolast	black
	103 0 571*	17	9,5	11	1	Technolast	black
	103 0 671*	21,5	13,5	11	2	Technolast	black
	103 0 771	27,5	19,5	11	3	Technolast	black

Type	Part-No.	Quality	Colour	Minimum order quantity (m)	weight (g/m)
	121 9 883	Foam-Rubber/ Rubber	black	on request	100
	103 9 154	Rubber/ Cellular-rubber	black	on request	140
	103 9 150	Rubber/ Cellular-rubber	black	on request	120

All sections drawn to size (scale 1:1)  
Additional sections planned. Subject to design changes reserved!

Issue VII-04

\* Available from stock, subject to prior sale.



## Mircocellular rubber sections

### Round, rectangular and semicircular sections

All microcellular rubber sections are supplied with a normal, unbroken skin.

Sections with reinforced skin, 0.5 mm thick, are available for special requirements, particularly with regard to chemical and mechanical stresses.

There are limitations as to the types with thin cell walls and/or cross-sections which can be produced with reinforced skin.

Microcellular rubber sections are also available with cord inlay so that precise lengths can be obtained. Here too, production capabilities are determined by the required cross-section. All microcellular rubber sections are available in production lengths of 1200 mm and longer. If required, they can also be supplied in cut lengths and as complete rings.

Normally, they are supplied in rolls of 20 m each and neatly bound. Open-cured sections are supplied in 50 m and 100 m rolls.

A large number of special sections are available. Please consult the illustrations. Minimum order quantities available on request.

### Grades:

a) We normally supply EPDM-grades.

EPDM is an elastomer, characterized by an excellent resistance to weather and ozone.

EPDM temperature resistance is comparable to that of chloroprene rubbers, the resistance to oil, grease and solvents comparable to that of natural rubber.

b) Microcellular sections of chloroprene rubber (Neoprene or Perbunan) are available for more stringent requirements in respect of resistance to oil and weathering.

c) Further we have the possibility to deliver in natural rubber.

### Colours:

All microcellular rubber sections are supplied in black. Other colours like light- or dark-grey are only available in exceptional instances and against appropriate surcharge.

### Tolerances:

The dimensions stated for the microcellular rubber sections do not include tolerances.

The sections are produced to DIN 7715 E 3.

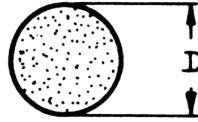
Extract from DIN 7715 E 3.

Nominal size	to 2,5	2,5 – 4	4 – 6,3	6,3 – 10	10 – 16	16 – 25	25 – 40
Class E 3	± 0,5	± 0,7	± 0,8	± 1	± 1,3	± 1,6	± 2



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## Round microcellular rubber sections



Dimensions in mm

Diameter D	Part-No.
2	121 0 289*
3	121 0 001*
4	121 0 002*
5	121 0 003*
6	121 0 004*
7	121 0 005*
8	121 0 006*
10	121 0 008*
12	121 0 010*
15	121 0 013*
20	121 0 018*
25	121 0 023*
30	121 0 022*

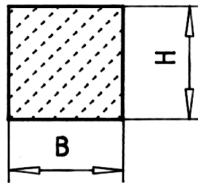
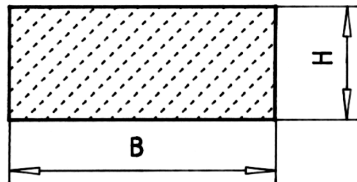
\* Available from stock, subject to prior sale.  
Minimum order quantity: 100 m.

Sections not marked\*: minimum order quantities and delivery periods specified on request.

Other dimensions: minimum order quantities and delivery periods specified on request.



## Rectangular microcellular rubber sections

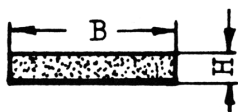


**Dimensions in mm**

All shown cross-sections also can be ordered in self-adhesive! Minimum quantities from 200 metres on. Delivery time on request.

Dimensions B x H	Part-No.	Dimensions B x H	Part-No.
2 x 15	121 0 041	8 x 10	121 0 095*
2 x 20	121 0 042*	8 x 12	121 0 096*
3 x 8	121 0 293*	8 x 15	121 0 098*
3 x 10	121 0 044*	8 x 16	121 0 099
3 x 12	121 0 294*	8 x 20	121 0 101*
3 x 15	121 0 045*	8 x 25	121 0 303*
3 x 20	121 0 046*	8 x 30	121 0 304*
3 x 25	121 0 295*	8 x 38	121 0 103
3 x 30	121 0 296*	8 x 40	121 0 305*
3 x 40	121 0 047*	8 x 50	121 0 306
4 x 6	121 0 051*	10 x 10	121 0 107*
4 x 8	121 0 053*	10 x 12	121 0 108*
4 x 10	121 0 054*	10 x 15	121 0 307*
4 x 12	121 0 055*	10 x 20	121 0 110*
4 x 15	121 0 057*	10 x 25	121 0 111*
4 x 18	121 0 058	10 x 30	121 0 112*
4 x 20	121 0 059*	10 x 40	121 0 114*
4 x 25	121 0 060*	10 x 50	121 0 308*
4 x 30	121 0 061*	12 x 12	121 0 116*
4 x 40	121 0 298*	12 x 20	121 0 309*
5 x 5	121 0 063*	12 x 25	121 0 310*
5 x 10	121 0 066*	12 x 30	121 0 118
5 x 12	121 0 067*	12 x 40	121 0 311*
5 x 15	121 0 069*	12 x 50	121 0 312
5 x 20	121 0 071*	15 x 15	121 0 119*
5 x 25	121 0 072*	15 x 20	121 0 120*
5 x 30	121 0 073*	15 x 25	121 0 122*
5 x 40	121 0 074*	15 x 30	121 0 313*
5 x 50	121 0 075*	15 x 40	121 0 314*
6 x 6	121 0 076*	15 x 50	121 0 315*
6 x 8	121 0 077*	20 x 20	121 0 128*
6 x 10	121 0 079*	20 x 25	121 0 316*
6 x 12	121 0 080*	20 x 30	121 0 129*
6 x 15	121 0 299*	20 x 40	121 0 130*
6 x 20	121 0 084*	20 x 50	121 0 317*
6 x 25	121 0 300*	25 x 25	121 0 318*
6 x 30	121 0 085*	25 x 30	121 0 319*
6 x 40	121 0 301*	25 x 40	121 0 132*
6 x 50	121 0 302	25 x 50	121 0 320*
7 x 10	121 0 088*	30 x 40	121 0 321*
7 x 20	121 0 091	30 x 50	121 0 322*
8 x 8	121 0 094*		





Self-adhesive foam rubber sections, closed-cell, black, 10 m rolls.  
Dimensional tolerances to DIN 7715 E 3

Dimensions H x B mm	Natural rubber without fibre reinforcement Part-No.	Natural rubber with fibre reinforcement Part-No.
3 x 10	123 0 312*	123 0 300*
4 x 10	123 0 316*	123 0 304*
5 x 10	123 0 320*	123 0 308*
3 x 15	123 0 313*	123 0 301*
4 x 15	123 0 317*	123 0 305*
5 x 15	123 0 321*	123 0 309*
3 x 20	123 0 314*	123 0 302*
4 x 20	123 0 318*	123 0 306*
5 x 20	123 0 322*	123 0 310*
3 x 30	123 0 315*	123 0 303*
4 x 30	123 0 319*	123 0 307*
5 x 30	123 0 323*	123 0 311*
Dimensions H x B mm	EPDM without fibre reinforcement Part-No.	EPDM with fibre reinforcement Part-No.
3 x 10	123 0 324*	123 0 336*
4 x 10	123 0 328*	123 0 340*
5 x 10	123 0 332*	123 0 344*
3 x 15	123 0 325*	123 0 337*
4 x 15	123 0 329*	123 0 341*
5 x 15	123 0 333*	123 0 345*
3 x 20	123 0 326*	123 0 338*
4 x 20	123 0 330*	123 0 342*
5 x 20	123 0 334*	123 0 346*
3 x 30	123 0 327*	123 0 339*
4 x 30	123 0 331*	123 0 343*
5 x 30	123 0 335*	123 0 347*

\* Available from stock. Other grades, dimensions and colour grey, delivery period and minimum order quantity on request.

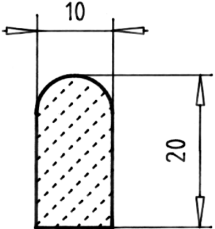
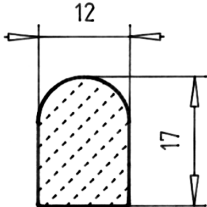
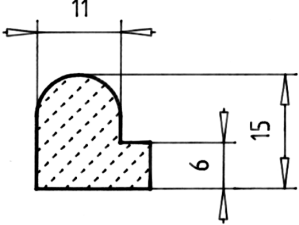
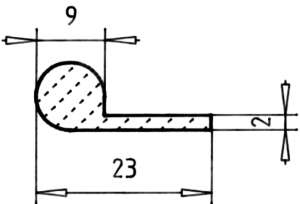
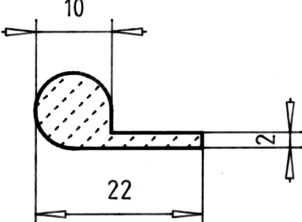
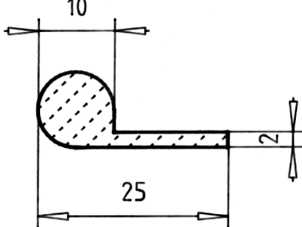
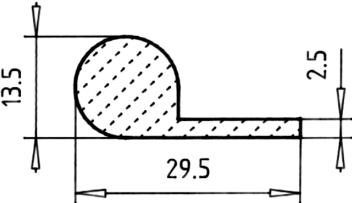
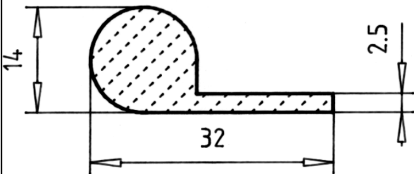
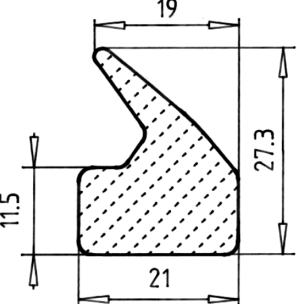


## Microcellular - Rubber - Sections

<p><b>121 0 339 *</b></p>	<p><b>121 0 336 *</b></p>	<p><b>121 0 341 *</b></p>
<p><b>121 0 327 *</b></p>	<p><b>121 0 325 *</b></p>	<p><b>121 0 334 *</b></p>
<p><b>121 0 323 *</b></p>	<p><b>121 0 326 *</b></p>	<p><b>121 9 326</b> (oil resistant)</p>
<p><b>121 0 229 *</b></p>	<p><b>121 0 230 *</b></p>	<p><b>121 0 340 *</b></p>



## Microcellular - Rubber - Sections

 <p><b>121 0 273 *</b></p>	 <p><b>121 0 272 *</b></p>	 <p><b>121 0 335 *</b></p>
 <p><b>121 0 324 *</b></p>	 <p><b>121 0 330 *</b></p>	 <p><b>121 0 328 *</b></p>
 <p><b>121 0 331 *</b></p>	 <p><b>121 0 332 *</b></p>	
 <p><b>121 0 172 *</b></p>		



## MOULDED RUBBER PARTS

Sophisticated technology in labs, testing and manufacture allows us to handle the most diverse customer specs and drawings.

We make moulded rubber parts using the following methods:

- Compression moulding (CM)
- Transfer moulding (TM)
- Injection moulding (IM + cold channel)

Choosing the most suitable manufacturing technology will ensure a gentle treatment of the material.

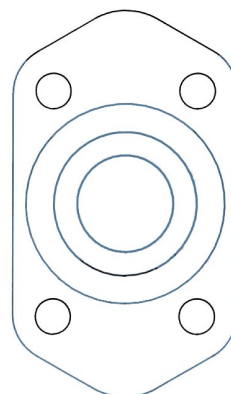
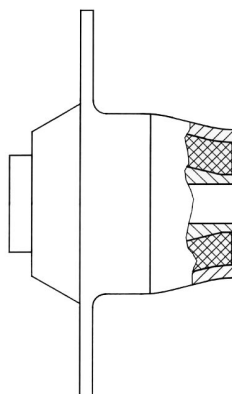
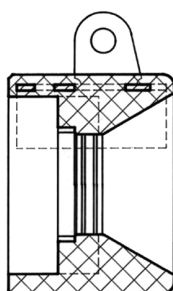
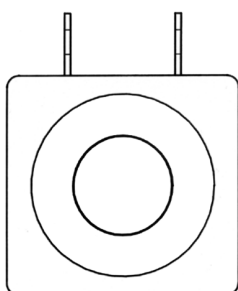
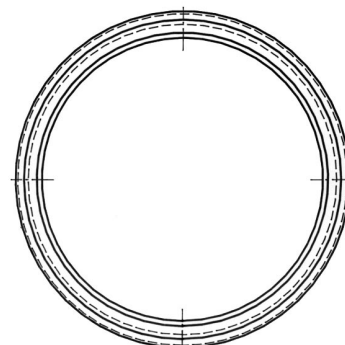
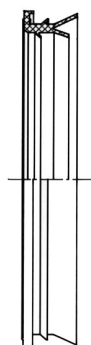
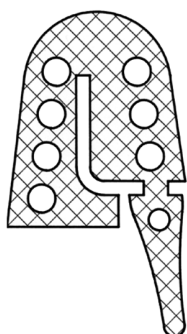
Choosing the right tool size saves money.

Large rubber parts can be made using injection-moulding machines with a capacity of up to 2.5 litres (**also rubber/metal compounds using common steel grades and stainless**).

We can handle the following types of rubber:

- Natural rubber (NR)
- Styrene-butadiene rubber (SBR)
- Chloroprene (neoprene) (CR)
- Nitrile rubber (NBR)
- Fluorocautchouc (FPM)
- Silicone (SI)

Our experienced consultants will gladly assist you.  
Request our technical support.



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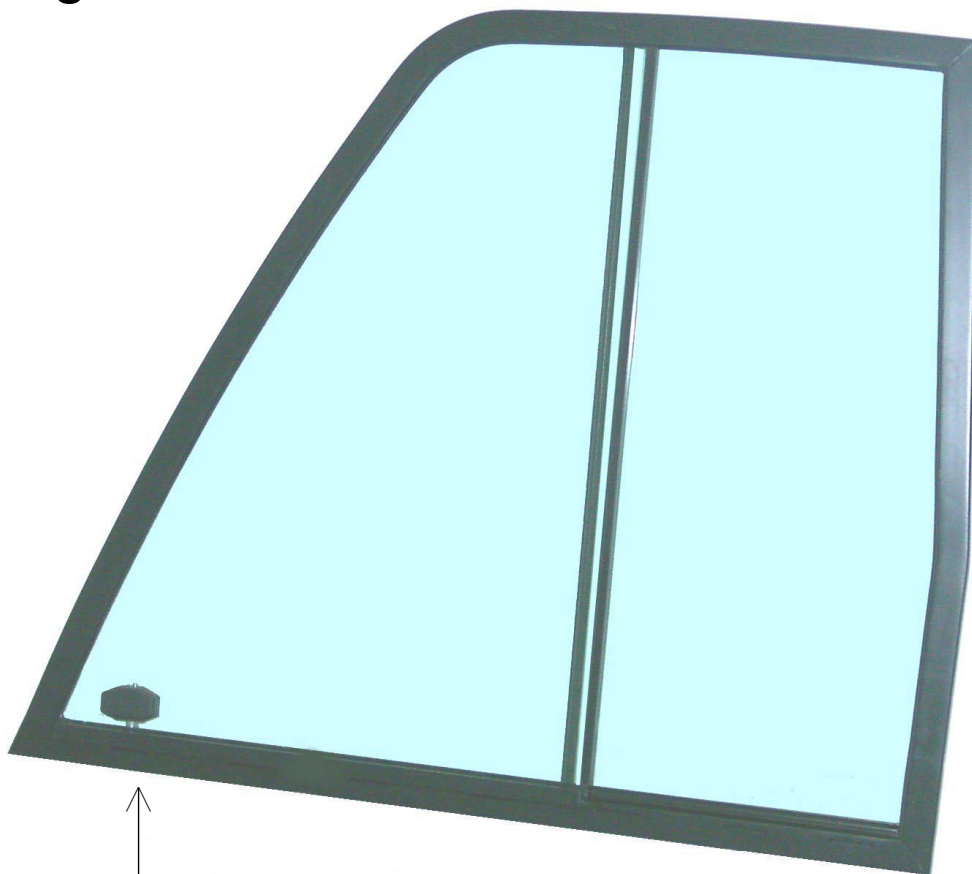


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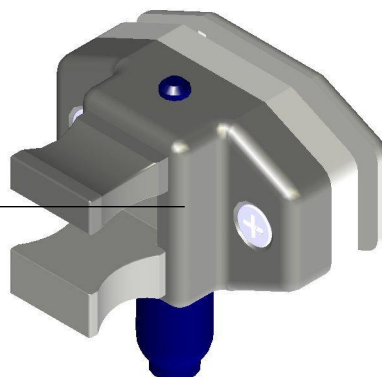
## Automotive Windows

Fixed Windows, Sliding Windows, Crank-Operated Windows  
Surfaces protected by high quality powder coating or paint  
in RAL colors

### Sliding Window



Detail







technoprofil

Single - Pane Safety Glass  
Insulating Glass  
Laminated Glass

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TINTED  
43R-000462  
AS1 M-4 DOT 496  
3.....

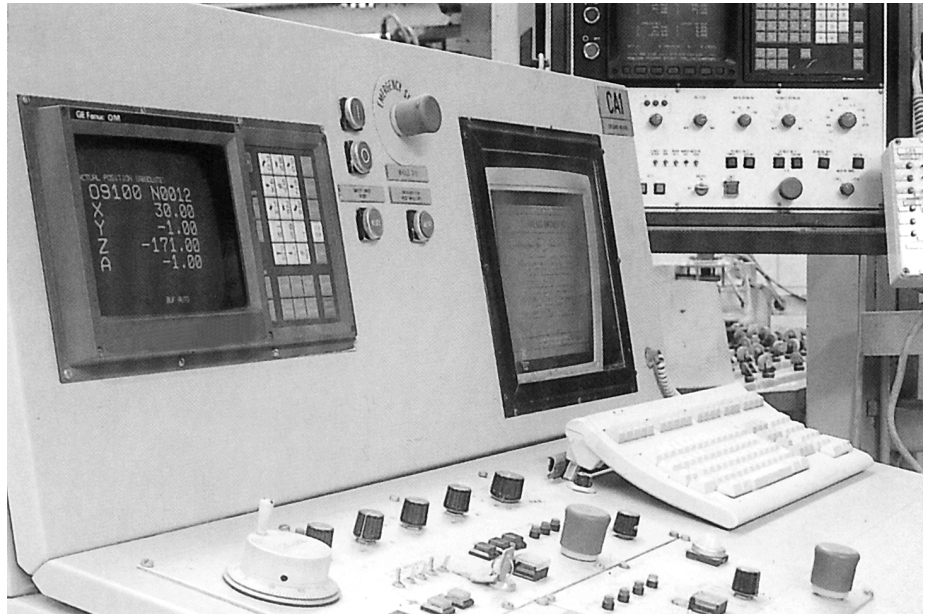




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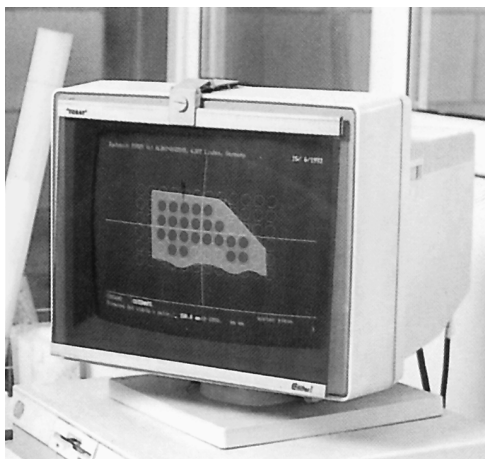
## Technology

The latest technological innovations have enabled the installation of the most modern computer controlled machines. The high standard required by our clients is therefore always met regardless of the length and type of production process.



## Flexibility of the Production

The design of the production sequence and the numerous different tools enables the production to be converted to the manufacture of different models at any time and allows us to react to the requirements of the market with short notice.



## Development of Products

Our technical department, equipped with a highly advanced CAD-CAM system, is devised to help clients and to find new solutions to the manufacture of new products.

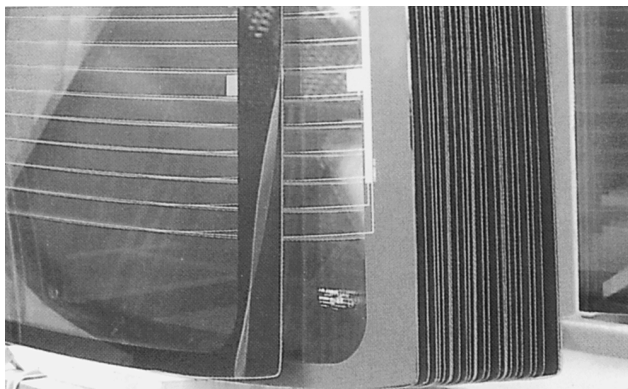


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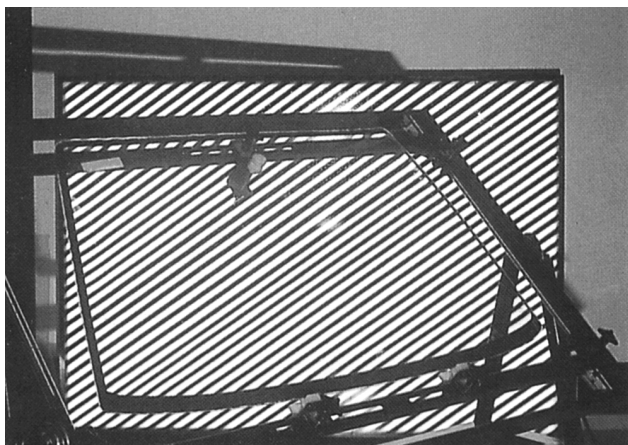
## Types of Products

Every type of glass product for all kinds of road vehicles can be supplied, whether its a windscreen, a heated rear window or a side window regardless. Other product categories include products for rail vehicles and ships.



## Screen Printing

Many glass types are decorated with screen print or screen printed for advertising and for functional reasons.



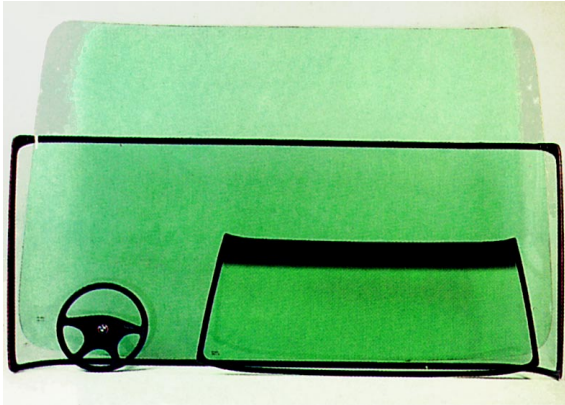
## Quality Control

The most modern laboratory and testing equipment implemented by qualified and highly motivated employees guarantee that all products are manufactured according to European or US standards (R 43 and ANSI-DOT).





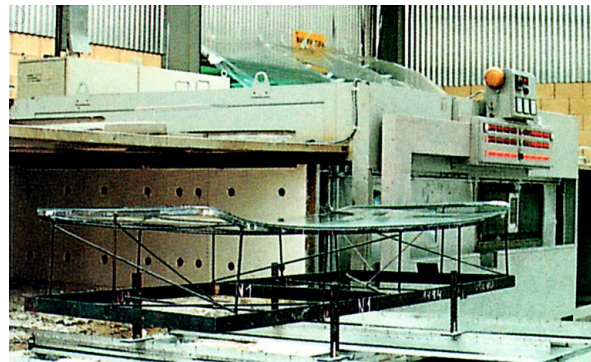
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## Extra Large Wind-screens

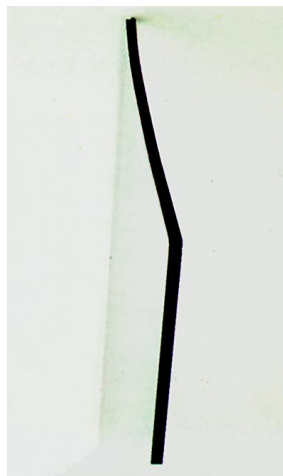
The production units are equipped to produce windscreens as large as 3 x 2 m.

The size of the windscreen places no restriction on the type of screen print that can be supplied.



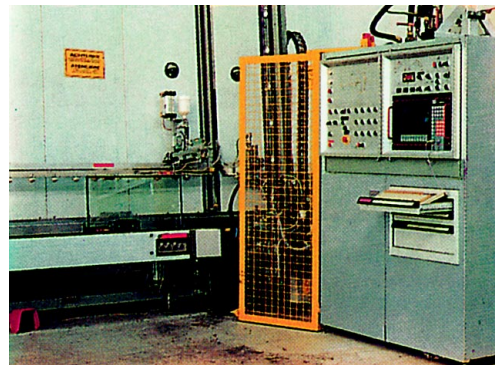
## Insulated Glass

It is additionally possible to produce curved insulating glass for use as: vehicle glazing (busses, road vehicles etc.) machine construction and casing of appliances special glass (multiple layer composite glass)



## Special Glass

The production units enable combinations of different composite glass (in different thickness of each layer).





## Properties of technical rubbers (elastomers)

### Contents

1. Structure of the elastomers
2. Rubber blend (rubber components)
3. Summary of rubber grades
4. Newly developed elastomer grades
5. Elastomer damage due to environmental influences
6. Elastomers - selection/overview
7. Hardness measurement of rubber parts
8. Chemical resistance of elastomers
9. Radiation resistance/gas permeability/guideline values
10. Dimensional tolerances for soft rubber mouldings
11. Sectional rubber shapes
12. Static pressure and tensile loads
13. Connecting joints and corners on/of rubber sections
14. Guidelines for storing soft rubber sections
15. Means of securing rubber sections

### Structure of the elastomers

Rubber is a material with high elasticity and high resilience. It is known as an elastomer when used for technical applications. Elastomers are manufactured on the basis of natural or synthetic rubber. The rubber blend contains various additives. It is vulcanized by heating, the typical rubber properties, such as elasticity, abrasion, high elongation at tear, etc. being obtained by vulcanizing the elastomer grades.

Elastomers are based on the molecular structure of polymer chemistry. Individual units (monomers or moieties) are combined into polymer chains or macromolecules. The chains are loosely meshed and cross-linked in three dimensions. The effect of heat and the addition of sulphur cause these points to be linked up during the vulcanization process which also gives the elastomers their elasticity. The elastomer can be deformed within the elastic zone as often as desired without changing the initial form in any way. The elastomer resumes its original shape as soon as the deformation force is no longer applied. Permanent deformation only occurs if the elastic range is exceeded.

However, elastomers tend to harden at low temperatures and soften at higher temperatures. There is no viscous flow when the specified service temperature is exceeded. The elastomer retains its shape until it begins to disintegrate and lose its structure.



## Rubber blend (rubber components)

The composition of the rubber blend depends on the intended use. The rubber grade and corresponding additives are similarly selected on this basis. The mechanical strength and the resistance to chemicals, temperature and ageing are determined by the appropriate choice of rubber grade. Other properties, e.g. harder low-temperature flexibility or coloration, are obtained by using appropriate additives. The following components are most commonly included in a rubber blend:

by weight %	Component parts
Approx. 56	Rubber
Approx. 28	Fillers
Approx. 8,3	Plasticizers
Approx. 2,7	Zinc oxide
Approx. 1,5	Processing auxiliaries
Approx. 1,1	Antioxidante
Approx. 1,1	Accelaerators
Approx. 0,6	Sulphur
Approx. 0,6	Stearic acid
Approx. 0,1	Retarders

## Summary of rubber grades

### NR (Natural rubber)

Natural rubber is produced from the latex obtained from rubber trees. Sulphur is the most commonly used vulcanizing agent. Depending on their hardness, soft rubber grades contain between 0.5 % and 8 % sulphur. Unlike many synthetic rubbers, NR displays particularly good elastic properties and is primarily used for parts subject to dynamic loads.

International designation:	NR
Temperature resistance:	- 40 to + 80 °C
Short-term peak temperature:	+ 130 °C
Ozone resistance:	Moderate
Resistance to weathering:	Good
Tensile strength and elongation:	Excellent
Elasticity:	Very good
Abrasion:	Good
Notch impact resistance:	Excellent



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<b>Resistance to:</b>	Oil:	Not suitable
	Petrol:	Not suitable
	Benzenel:	Not suitable
	Water:	Good
	Acids:	Good
	Alkalis:	Good
<b>Forms available:</b>	Hardness range:	35 - 90 Shore A
	Colours:	All standard colours, preferably black, other colours on request
	Injection mouldings:	Yes
	Other mouldings:	Yes
<b>Special features:</b>	NR can basically be coloured in any shade, including light shades. However, durable colourfastness cannot be guaranteed, especially in outdoor applications, and it is therefore advisable not to use coloured or light blends.	

**Suitability for use with food:** Certain light blends may be used with foods.

## IIR (Butyl rubber)

Butyl rubber is obtained by copolymerizing isobutylene with a small proportion of isoprene and vulcanized with sculphur. IIR cannot be mixed with other rubber grades. The good resistance to ageing and weathering decreases as the isoprene content increases.

<b>Resistance to:</b>	International designation:	II R
	Temperature resistance:	- 30 to + 120 °C
	Short-term peaktemperature:	+ 180 °C
	Ozone resistance:	Excellent
	Resistanc to weathering:	Excellent
	Tensile strength and elongation:	Good
	Elasticity:	Moderate
	Abrasion:	Moderate
	Notch impact resistance:	Good
	Oil:	Moderate
	Petrol:	Not suitable
	Benzene:	Not suitable
	Water:	Excellent
	Acids:	Excellent
	Alkalis:	Excellent
<b>Forms available:</b>	Hardness range:	35 – 85 Shore A
	Colours:	All standard colours, preferably black, other colours on request
	Injection mouldings:	Yes
	Other mouldings:	Yes
<b>Special features:</b>	Extremely bw gas permeability (approx. 10 times lower than for NR) Easy to colour. Very good dielectric properties.	

**Suitability for use with food:** Not suitable



## SBR (Styrene butadiene rubber)

SBR is quantitatively one of the most important synthetic rubbers with properties similar to those of natural rubber. SBR is based on butadiene rubber and contains between 10 % and 35 % styrene. The properties of SBR come closer to those of the thermoplastic PS (impact-resistant polystyrene) as the styrene content increases. SBR is frequently mixed with natural rubber.

International designation:	SBR
Temperature resistance:	- 40 to + 80 °C
Short-term peak temperature:	+ 130 °C
Ozone resistance:	Moderate
Resistance to weathering:	Good
Tensile strength and elongation:	Excellent
Elasticity:	Very good
Abrasion:	Good
Notch impact resistance:	Good

<b>Resistance to:</b>	Oil:	Not suitable
	Petrol:	Not suitable
	Benzene:	Not suitable
	Water:	Good
	Acids:	Good
	Alkalis:	Good

<b>Forms available:</b>	Hardness range:	35 – 95 Shore A
	Colours:	All standard colours, preferably black, other colours on request
	Injection:	Yes
	Other mouldings:	Yes
	Cellular:	Yes

<b>Special features:</b>	SBR can basically be coloured in any shade, including light shades, although the mechanical strength will suffer in consequence. SBR has slightly better resistance to abrasion, high temperature and again than NR, although its elasticity is less favourable.
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**Suitability for use with food:** Certain blends may be used with foods.



## NBR (Nitril rubber)

NBR is a copolymer based on acrylonitrile and butadiene. A higher acrylonitrile content improves the resistance to mineral oils and fuels but simultaneously impairs the elasticity, low-temperature flexibility and gas permeability. The structure of NBR is similar to that of SBR, although its resistance to mineral oils and fuels is vastly better.

International designation:	NBR
Temperature resistance:	- 30 to + 100 °C
Short-term peak temperature:	+ 150 °C
Ozone resistance:	Moderate
Resistance to weathering:	Moderate
Tensile strength and elongation:	Good
Elasticity:	Good
Abrasion:	Good
Notch impact resistance:	Good

<b>Resistance to:</b>	Oil:	Excellent
	Petrol:	Excellent
	Benzene:	Moderate
	Water:	Good
	Acids:	Moderate
	Alkalis:	Moderate

<b>Forms available:</b>	Hardness:	30 – 95 Shore A
	Colours:	Dark colours, preferably black, other colours on request
	Injection mouldings:	Yes
	Other mouldings:	Yes

<b>Special features:</b>	The abrasion of NBR can be improved by adding PVC. NBR can be mixed with NR, BR and SBR. Light vulcanized products are possible. Peroxide can be used for vulcanization instead of sulphur. NBR is also manufactured in the form of microcellular rubber.
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**Suitability for use with food:** Certain blends may be used with foods



## CR (Chloroprene rubber)

A commonly found synthetic rubber. CR has numerous very good properties. Various vulcanization systems can be used in its manufacture, although the different vulcanization system also lead to different results, such as in the resistance to oil, high temperatures or weathering. Individual properties can be enhanced, depending on the manner in which the vulcanization method is applied.

International designation:	CR
Temperature resistance:	- 30 to + 100 °C
Short-term peaktemperature:	+ 150 °C
Ozone resistance:	Excellent
Resistance to weathering:	Excellent
Tensile strength and elongation:	Good
Elasticity:	Good
Abrasion:	Good
Notch impact resistance:	Good

<b>Resistance to:</b>	Oil:	Good
	Petrol:	Moderate
	Benzene:	Not suitable
	Water:	Good
	Acids:	Good
	Alkalis:	Excellent

<b>Forms available:</b>	Hardness:	40 – 90 Shore A
	Colours:	Dark colours, preferably black, other colours on request
	Injection mouldings:	Yes
	Other mouldings:	Yes

**Suitability for use with food:** Certain blends may be used with foods.



## CSM (Chlorsulphonated polyethylene rubber)

Chlorsulphonated polyethylene is based on sulphochlorination of polyethylene. The end product is an elastic, vulcanizable rubber with exceptionally good properties for use in outdoor applications. CSM displays excellent resistance to ozone and weathering and can be coloured in all conceivable shades (including pastel shades). Coloured CSM sections used in outdoor applications display little or no change in colour, bleaching, discoloration or darkening, even after prolonged exposure to direct sunlight. This material is thus eminently suitable for use in buildings and facades, as well as in vehicles of every type.

International designation:	CSM
Temperature resistance:	- 20 to + 120 °C
Short-term peak temperature:	+ 175 °C
Ozone resistance:	Excellent
Resistance to sunlight:	Excellent (even for light grades)
Resistance to weathering:	Excellent
Tensile strength and elongation:	Good
Elasticity:	Good
Abrasion:	Good to moderate
Notch impact resistance:	Good

<b>Resistance to:</b>	Oil:	Good
	Petrol:	Good to moderate
	Benzene:	Swells strongly
	Water:	Good to moderate
	Acids:	Excellent
	Alkalis:	Good

<b>Forms available:</b>	Hardness range:	50 – 85 Shore A
	Colours:	Black to white
	Injection mouldings:	Yes
	Other mouldings:	Yes

<b>Suitability for use with food:</b>	Not permitted
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## EPDM (Ethylene propylene terpolymers)

EPDM was developed roughly 15 years ago and is a genuine alternative to neoprene for numerous types of outdoor applications. EPDM displays exceptionally good resistance to oxygen, ozone and other weathering influences, including higher atmospheric pollution combined with moisture (acid rain). Resistant to UV light.

Trade names:	NORDEL, KELTAN
International designation:	EPDM
Temperature resistance:	- 40 to + 120 °C
Short-term peak temperature:	+ 160 °C
Ozone resistance:	Excellent
Resistance to weathering:	Excellent
Tensile strength and elongation:	Good
Elasticity:	Good
Abrasion:	Good
Notch impact resistance:	Good

<b>Resistance to:</b>	Oil:	Moderate
	Petrol:	Not suitable
	Benzene:	Not suitable
	Water:	Good
	Acids:	Excellent
	Alkalis:	Excellent

<b>Forms available:</b>	Hardness range:	40 – 85 Shore A
	Colours:	All standard colours, preferably black, other colours on request
	Injection mouldings:	Yes
	Other mouldings:	Yes

<b>Suitability for use with food:</b>	Moderate to good
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## FKM (Fluoro rubber)

FKM rubbers are high-quality copolymers of fluorinated hydrocarbons. FKM is one of the most expensive grades with correspondingly good properties including some of the best known for elastomers. Outstanding chemical and thermal resistance make it possible to use this material for exceptional applications.

Trade names:	VITON , FLUOREL, TECNOFLON
International designation:	FKM
Temperature resistance:	- 20 to + 200 °C
Short-term peak temperature:	+ 350 °C
Ozone resistance:	Excellent
Resistance to sunlight:	Excellent
Resistance to weathering:	Excellent
Tensile strength and elongation:	Good
Elasticity:	Moderate
Abrasion:	Moderate
Notch impact resistance:	Moderate to good

<b>Resistance to:</b>	Oil:	Good
	Petrol:	Excellent
	Benzene:	Good
	Water:	Good
	Acids:	Excellent
	Alkalis:	Good

<b>Forms available:</b>	Hardness range:	65 – 90 Shore A
	Colours:	Black
	Injection mouldings:	Yes
	Other mouldings:	Yes

<b>Special features:</b>	FKM 5 not available in light colours. This material can only be bonded within limits. Can be used at temperatures up to + 250 °C, although the long-term serviceability suffers in consequences.
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<b>Suitability for use with food:</b>	Not permitted.
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## MQ/MVQ (Methyl silicone rubber)

Methyl vinyl silicone grades have enhanced properties and are a further development of the basic MQ grades. The low-temperature flexibility of MVQ has been significantly improved as a result of modification with phenyl groups. The resultant MPQ or MPVQ grades are used less commonly on account of their tendency to swell. In addition to these silicone rubbers, which can be hot-vulcanized with peroxides, this class also include vulcanizable types which are primarily used as joint filler, pastes, adhesives, grouting compounds, etc. Silicone rubber is characterized by exceptionally good resistance to temperature (continuous service temperature - 60 to + 2000 °C), although the general physical values are lower than those of good rubber grades. While the physical values of normal rubbers decline constantly with rising temperature, the high-temperature values for silicone rubber are only marginally lower than those measured at room temperature. Silicone does not conduct electricity, making this material suitable for numerous applications in the electrical engineering industry (in the event of a short-circuit, normal rubber grades produce electrically conductive carbon black; silicone rubber parts on the other hand, burn to produce non-conductive silicic acid).

Trade names:	SILASTIC, SILOPREN, RHODORSIL
International designation:	MQ, MVQ
Temperature resistance:	- 60 to + 200 °C
Short-term peak temperature:	+ 250 °C
Ozone resistance:	Excellent
Resistance to sunlight:	Excellent
Resistance to weathering:	Excellent
Tensile strength and elongation:	Low
Elasticity:	Good
Abrasion:	Moderate
Notch impact resistance:	Moderate

<b>Resistance to:</b>	Oil:	Good
	Petrol:	Not suitable
	Benzene:	Not suitable
	Water:	Moderate
	Acids:	Not suitable
	Alkalis:	Not suitable

<b>Forms available:</b>	Hardness range:	30 – 75 Shore A
	Colours:	Transparent to black
	Injection mouldings:	Yes
	Other mouldings:	Yes

**Special features:** Silicone rubber is transparent but can also be coloured.

**Suitability for use with food:** Very good.

## FMQ (Fluorosilicone rubber)

Fluorosilicone rubber may be considered a further development of MQ/MVQ. FMQ displays considerably better chemical resistance to mineral oil and solvents, but lower flexibility in the presence of hot air and low temperatures.



## **Elastomer damage due to environmental influences**

External influences have a much greater effect on the basic properties of rubber products than on those of any other material. The correct choice of elastomer grade and consideration of suitable design measures are therefore of decisive importance in determining the service life and correct functioning of a rubber section or rubber moulding.

Exposure to oxygen, light, heat, ozone, radiation, moisture or corrosive chemical media can cause rubber to age much more rapidly. Mechanical stresses also have a negative effect.

### **Visible signs of ageing include the following:**

- Increasingly dull surface
- Visible swelling
- Formation of cracks in the surface

### **Measurable signs of ageing include the following:**

- Changes in the elastic properties (damping, resilience, etc.)
- Lower elongation and tear strength
- Permanent deformations
- Hardening or softening
- Change in weight due to swelling or extrusion

## Elastomers - Selection/Overview (guideline values at + 23 °C)



TECHNOPROFIL

ISO design- nation	Rubber grade	Trade- names	Spec. dens. g/cm <sup>3</sup>	Hard- ness Shore A	Min. a. Max. service temp. °C	Mech. proper- ties	Abrasion resis- tance	Elasticity	Resistance to weathering/ ozone	Resistance to mineral oil	Flam- resis- tance
NR	Natural- rubber		1,2	35 – 90	- 40 to + 80	Good to very good	Good to very good	Very good	Low	Low	Burns
SBR	Styrene- butadiene- rubber	BUNA-S PLIOFLEX	1,2	35 – 95	- 40 to + 80 (+100)	Moderate to good	Very good	Good	Low	Low	Burns
IIR	Butyl rubber	BUTYL POLYSAR	1,2	35 – 85	- 30 to + 120 (+130)	Moderate to good	Moderate	Low	Very good	Low	Burns
NBR	Nitrile rubber	PERBUNAN HYCAR BUNA-N BUTACIL	1,20 – 1,5	30 – 95	- 30 to + 100 (+120)	Moderate to good	Good	Good	Low	Good to very good	Burns
CR	Chloroprene rubber	NEOPRENE BUTACLOR	1,35	40 – 90	- 30 to + 100 (+120)	Good	Good	Good	Very good	Good to moderate	Burns within limits
CSM	Chlorosul- phonated poly- ethylene rubber	HYPALON	1,5	50 – 85	- 20 to + 120	Good	Good to moderate	Good	Very good	Moderate to good	Burns within limits
EPDM	Ethylene propylene terpolymers	KELTAN NORDEL VISTALON EPCAR	1,2	40 – 85	- 40 to + 120	Good	Good	Good	Very good	Moderate	Burns
FKM	Fluoro rubber	VITON FLUOREL TECNOFLON	1,9	65 – 90	- 20 to + 200 (+250)	Moderate to good	Moderate	Moderate	Very good	Very good	Self-extin- guishing
MQ/MVQ	Methyl silicone rubber	SILASTIC SILOPREN RHODORSIL	1,1	30 – 75	- 60 to + 200	Moderate	Moderate	Good	Very good	Moderate to good	Burns
FMO	Fluoro silicone rubber		1,5	30 – 75	- 55 to + 175 (+200)	Moderate	Moderate	Good	Very good	Good	Burns within limits



## Hardness measurement

The hardness of rubber parts is normally measured in Shore as defined in DIN 53 505. Standard specimens or finished products are used for the measurements.

### Testing the Shore hardness

This method indicates the resistance to penetration by a defined blunt cone (using scale A) or by a pointed cone (using scale D) when a defined force is applied. The penetration depth is read off on a scale with 100 units (e.g. 10 Shore A is very soft, 90 Shore A is almost hard). Scale A should be used for soft rubber and scale D for hardness values of approx. 95 Shore and higher. The Shore hardness is the most frequently applied method. The standard specimen has smooth, even test surfaces with a diameter of 30 mm and a thickness of 6 mm. The test is carried out using a test stand with a level steel plate; the indenter is applied to the specimen and the Shore hardness read off after 3 seconds. Tests on standard specimens should always be given preference over tests on finished products, as accurate results can only be obtained with standard specimens. The hardness of softer grades can also be tested as specified in standard IRHD, Section Soft, DIN 53 519.

Shore A  
DIN 53505

... 10 40 80 90

Shore D  
DIN 53505

30 90 ...

IRHD  
Section Soft,  
DIN 53519,  
ball dia. 5 mm

... 10 40

IRHD  
Section normal,  
DIN 53519  
ball dia. 2,5 mm

... 35 40 98 ...

Ball indentation test  
as per DIN 53456

... 1,0 48

The diagram gives some indication of the application limits for the various methods of testing the hardness, but it should not be used for conversion.



## Chemical resistance of elastomers:

Guideline values at + 23 °C

### Notes:

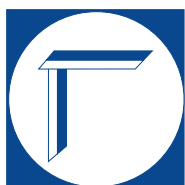
The resistance values listed here are intended merely as guidelines for general information. They cannot be applied to all service conditions. The values may vary considerably, depending on such factors as higher temperatures, high concentrations, duration of exposure, high continuous mechanical stresses, dynamic loads, exposure to light and sunlight or additional effects, particularly since the nature and quantities of the constituent parts also exert a certain influence.

It is therefore essential to develop a rubber blend „tailor made“ in accordance with the prevailing conditions for specific cases.

No liability is assumed for the general guideline values published here. The figures were determined for normal concentrations at room temperature.

The elastomer designation are as defined in ISO R 1629.

ISO-designation	Elastomer
NR	Natural rubber
IIR	Butyl rubber
SBR	Styrene butadiene rubber
NBR	Nitrile rubber
CR	Chloroprene rubber
CSM	Chlorsulphonated polyethylene rubber
EPDM	Ethylene propylene terpolymers
COIECO	Epichlorhydrine ethylene oxide copolymer
FKM	Fluoro rubber
MO/MVQ	Methyl silicone rubber
FMQ	Fluorosilicone
PNR	Polynorbornen



## Assessments in table:

1 = Resistant (little or no effect)

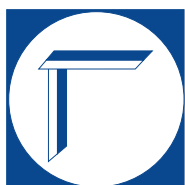
2 = Resistant within limits (moderate effect)

3 = Not resistant (strong effect)

4 = Beginning to dissolve (slight swelling or dissolution)

Resistant to:	NR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Exhaust gases containing carbon monoxide	1	1	1	1	1	1	1	1	1	1
Acetaldehyde (ethanal)	3	3	2	4	3	2	2	3	2	4
Acetone (dimethyl ketone, propanone)	2	2	1	4	2	3	1	3	4	4
Acetophenone	3	4	1	4	4	4	1	3	4	4
Acetyl chloride	–	–	–	–	4	4	–	–	1	1
Acetylene gas	1	1	1	1	2	2	1	2	1	1
Acetylene tetrachloride (tetrachloroethylene)	4	4	4	4	4	4	4	4	4	2
Acrylonitrile	4	3	3	4	2	3	4	3	4	4
Adipic acid, aqueous	1	1	1	1	1	1	1	–	1	1
Ethyl acrylate	–	–	2	3	4	–	3	3	4	3
Ethanal (acetaldehyde)	3	3	2	4	3	2	2	3	2	4
Ethanol (ethyl alcohol, spirit)	1	1	1	2	1	1	1	2	1	2
Ether (diethyl ether)	4	4	3	4	3	3	3	4	3	4
Ethyl acetate (acetic ester)	4	4	3	3	3	3	2	3	4	4
Ethyl (acrylate)	–	–	2	3	4	–	3	3	4	3
Ethyl ether (ether, diethyl ether)	4	4	3	4	3	3	3	4	3	4
Ethyl alcohol (ethanol, spirit)	1	1	1	2	1	1	1	2	1	2
Ethyl benzene	4	4	4	4	4	4	4	4	2	1
Ethyl cellulose	2	2	2	–	2	2	2	3	4	4
Ethyl chloroacetat (chloroacetic ester)	3	2	2	2	2	1	2	4	4	1
Ethyl chloride (chloro ethane)	3	3	1	1	2	3	1	4	1	1
Ethylene bromide	4	4	3	3	3	3	4	4	3	2
Ethylene chlorohydrin (chloroethanol)	2	2	2	3	2	2	2	3	2	1
Ethylene chloride (1,2-dichlorethane)	4	4	4	3	4	4	3	3	4	2
Ethylene diamine (1,2-diaminoethane)	2	2	1	2	2	2	1	3	3	3
Ehtylene glycol (glycol, 1,2-ethanediol)	1	1	1	1	1	2	1	1	2	1
Ethyleneoxide (-20 °C)	1	1	2	4	4	4	2	3	4	4
Ethylene formiate	4	4	2	4	2	2	2	–	1	1
Ethylene mercaptan	4	4	4	4	4	4	4	4	–	1
Ethylene hexanol (isooctyl alcohol, 2-ethyl-1-hexanol)	1	1	1	1	1	1	1	2	1	1
Ethyl oxalate	1	1	1	4	3	–	1	–	2	1
Ethyl penlchlorobenzene	4	4	4	3	4	4	4	–	2	1
Ethyl silicate	2	2	1	1	1	2	1	–	1	1
Caustic potash (potassium hydroxide, potash lye)	2	2	1	2	1	1	1	3	3	2
Caustic soda (sodium hydroxide, soda lye)	1	1	1	2	1	1	1	3	3	2
Battery acid	3	3	1	3	3	1	1	4	4	2
Alcohol	1	1	1	2	1	1	1	2	1	2
Allyl alcohol (2-propene 1-ol)	2	1	1	1	1	1	1	4	4	4
Allyl chloride (3-chloro-1-propene)	4	4	4	4	4	–	4	1	–	–
Aluminium acetate, aqueous	1	2	1	2	2	3	1	4	4	3





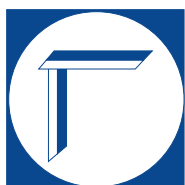
Resistant to:	NR	SBR	IR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Aluminium chloride	1	1	1	1	1	1	1	2	1	1
Aluminium fluoride	2	1	1	1	1	1	1	2	1	1
Aluminum hydroxide	1	1	1	1	1	1	1	1	–	1
Aluminium nitrate	1	1	1	1	1	1	1	2	–	1
Aluminium phosphate, aqueous	1	1	1	1	1	1	1	1	1	1
Aluminium sulphate	1	2	1	1	1	1	1	1	1	1
Formic acid	1	1	1	2	1	1	1	2	3	3
Aminobenzenel (aniline)	3	3	2	3	3	3	2	3	3	1
Ammonia, aqueous (household ammonia)	1	1	1	2	1	1	1	2	2	3
Ammonia, anhydrous	1	1	1	2	1	2	1	3	4	4
Ammonium chloride (sal ammoniac)	1	1	1	1	1	1	1	–	–	1
Ammonium fluoride	1	1	1	1	1	1	1	1	1	1
Ammonium hydroxide (aqueous ammonia)	1	1	1	2	1	1	1	2	2	3
Ammonium carbonaet (sal volatile)	1	1	1	2	2	1	1	3	3	4
Ammonium nitrate (fertilizer)	2	1	1	2	2	1	1	2	1	2
Ammonium phosphate (fertilizer)	2	1	1	1	1	1	1	2	1	1
Ammonium sulfaet (fertilizer)	1	2	1	1	1	1	1	2	1	2
Ammonium sulphide	1	1	1	1	1	1	1	2	1	1
Amyl acetate (pentyl acetate)	2	3	1	4	4	4	1	4	4	4
Amyl alcohol (pentanol, pentyl alcohol)	2	2	1	2	1	1	1	4	1	2
Amyl borate	4	4	4	1	1	1	4	–	–	1
Amyl chloride (pentyl chloride, 1-chloro-pentane)	4	4	4	4	4	–	4	3	–	–
Amy Inapthaline	4	4	4	4	4	4	4	4	1	1
Aniline (aminobenzene)	3	3	2	3	3	3	2	2	1	1
Aniline hydrochloride	2	3	2	2	4	4	2	4	2	2
Anisole (methoxybenzenel, methyl phenyl ether)	3	3	4	3	3	4	4	4	4	4
Anone (cyclohexanone)	4	4	3	4	4	3	3	4	4	4
Antichlor (sodium thiosulphate, fixer)	2	2	1	2	1	1	1	1	1	1
Antimony trichloride	1	1	1	2	1	1	1	4	–	1
Argon gas	1	1	1	1	1	1	1	1	1	1
Arsenic acid	2	1	1	1	1	1	1	1	1	1
ASIM-oil No. 1	4	3	3	1	2	2	4	2	–	1
ASIM-oil No. 2	4	4	4	1	3	3	4	2	2	1
ASTM-oil No. 3	4	4	4	2	4	3	4	3	4	2
Barium chloride	1	1	1	1	1	1	1	1	1	1
Barium hydroxide	1	1	1	1	1	1	1	1	1	1
Barium carbonate	1	1	1	1	2	–	1	1	1	1
Barium sulphate (barite, heavy spar)	1	1	1	1	1	1	1	1	1	1
Barium sulphide	1	2	1	1	1	1	1	1	1	1
Cottonseed oil	4	4	3	1	2	2	1	1	1	1
Benzaldehyde (bitter almond oil)	–	4	1	4	4	4	1	4	4	4
Petrol, unleaded	4	4	4	1	2	2	4	4	1	1
Petrol, premium grade	4	4	4	2	2	2	4	4	1	1
Petrol/benzene/ethanol 50/30/20	4	4	4	3	3	4	4	4	2	2
Petrol/benzene 80/20 and 70/30	3	3	3	2	3	3	3	3	1	1



Resistant to:	NR	SBR	IR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Petrol/benzene 60/40 and 50/50	3	3	3	3	3	3	3	3	2	2
Benzoic acid	1	1	1	1	1	1	1	1	1	1
Benzene	4	4	4	4	4	4	4	4	2	2
Benzyl alcohol (phenyl carbinol)	4	4	2	4	2	2	2	2	1	1
Benzyl chloride (d-chlorotoluene)	3	3	4	4	4	4	4	3	1	1
Succinic acid	2	1	1	1	1	1	1	4	4	1
Beer	1	1	1	1	1	1	1	1	1	1
Bitumen	4	2	2	2	3	3	2	2	1	1
Hydrogen cyanide (hydrocyanic acid)	2	2	2	2	2	1	1	3	2	1
Leadacetate (sugaroflead)	1	3	1	2	2	2	1	4	4	1
Lead nitrate	1	1	1	1	1	1	1	2	–	–
Bleaching liquor with 12% active chlorine (sodium hypochlorite)	4	4	1	4	3	1	1	3	2	1
	–	–	–	–	–	–	–	–	–	–
Tetraethyl lead	4	4	4	2	3	3	4	3	2	1
Borax (sodium tetraborate)	2	2	1	2	1	1	1	2	2	1
Boric acid	1	1	1	1	1	1	1	1	1	1
Spirits (ethyl alcohol)	1	1	1	1	1	1	1	1	2	2
Brake fluid, ATE blue (glycol base)	1	1	1	3	2	2	1	1	1	4
Bromine, liquid	4	4	4	4	4	4	–	3	2	1
Bromine vapours	4	4	4	4	4	4	4	4	2	1
Bromine water, saturated	4	4	4	4	4	4	2	4	2	1
Hydrobromic acid, aqueous	3	4	1	4	2	1	1	4	4	1
Butadiene	4	4	3	4	3	3	4	3	2	2
Butane, gaseous	4	4	4	1	1	2	4	3	1	1
Butanal (butyric aldehyde)	3	3	2	3	3	3	2	3	4	4
Butanol (butyl alcohol)	1	1	2	1	1	1	2	2	1	1
Butanone (methyl ethyl ketone) MEK	4	4	1	2	4	4	1	4	4	4
Butanoic acid (butyric acid, methylpropanoic acid)	3	3	4	2	3	2	4	4	4	2
Butanetriol (triol), aqueous	1	1	1	1	1	1	1	1	1	1
Butter	4	4	2	1	2	2	1	1	1	1
Butyric acid	3	3	4	2	3	2	4	4	4	2
Butyl acetate	3	4	2	4	4	4	2	4	4	4
Butyl alcohol (butanol)	1	1	2	1	1	1	2	2	1	1
Butyl amine	4	4	4	3	4	4	4	2	4	4
Butyl benzoate	–	–	1	–	4	4	1	–	1	1
Butylene, liquid	4	4	4	2	3	3	4	3	2	1
Butylene glycol (2-butoxyethanol, butyl cellosolve)	1	1	1	1	1	1	1	1	1	1
Butyl oleate	4	4	2	2	4	4	2	–	2	1
Butyl stearate	4	4	2	2	4	–	2	2	2	1
Butyl phenol	4	4	4	4	4	4	4	4	–	2
Butyric aldehyde (butanal)	3	3	2	3	3	3	2	3	4	4
Calcium acetate	2	2	1	2	1	1	1	–	4	4
Calcium bisulphite	2	2	1	2	2	2	2	2	1	1
Calcium carbonate (chalk)	1	1	1	1	1	1	1	1	–	1
Calcium chloride, aqueous	1	1	1	1	1	1	1	1	1	1



Resistant to:	NR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Calcium hydroxide, aqueous (milk of lime)	1	1	1	1	1	1	1	1	1	1
Calcium hypochlorite, aqueous	4	4	1	3	3	1	1	2	1	1
Calcium nitrate, aqueous	1	1	1	1	1	1	1	2	1	1
Calcium phosphate, aqueous	1	1	1	1	1	1	1	1	1	1
Camphor	3	3	3	1	2	2	3	4	4	2
Carbamate	4	4	2	3	2	2	2	–	1	1
Cellosolve (ethylene glycol)	4	4	2	–	–	2	2	–	–	3
Cellulose acetate (acetylated cellulose)	2	2	1	1	3	2	2	1	–	4
Cetyl alcohol (1-hexadecanol)	–	–	–	1	1	–	1	–	–	–
Chlorine, liquid	4	4	3	3	4	2	3	3	2	1
Chlorethanol (chloroethyl alcohol, ethylene chlorohydrin)	2	2	2	3	2	2	2	3	2	1
Chloracetone	–	–	–	–	–	–	–	–	–	–
Chloramine	2	2	1	4	2	2	1	3	4	4
Chlorobenzene (monochlorobenzene)	1	1	1	1	1	1	1	3	3	4
Chlorobromomethane (methylene chlorobromide)	4	4	4	4	4	4	4	4	2	1
Chlorobutadiene	4	4	4	4	4	–	4	4	2	1
Chlorine dioxide	4	4	3	4	4	3	3	3	2	1
Chloroacetic acid (ethyl chloroacetate)	4	4	3	4	4	3	3	3	2	1
Chlorine gas, dry	3	2	2	2	2	1	2	4	4	1
Chlorinated lime	3	3	2	3	2	2	1	4	1	1
Methyl chloride	4	4	1	3	3	1	1	2	1	1
Chloronaphthalene	4	4	3	4	4	4	3	4	2	1
Chloroform (trichloromethane)	4	4	4	4	4	4	4	4	2	1
Chloroethene (trichloroethane, methyl chloroform)	4	4	4	4	4	4	4	3	2	2
Chloric acid	4	4	4	4	4	4	4	4	2	1
Chlorsulphonic acid	3	3	1	3	2	1	1	4	4	1
Chlortoluene	4	4	4	4	4	4	4	4	4	3
Chlorine water, saturated	4	4	4	4	4	4	4	4	2	1
Hydrochloric acid gas	4	4	2	4	4	3	2	4	3	1
Chromic acid	4	4	1	3	2	1	1	4	4	1
Chromosulphuric acid	4	4	3	4	4	2	2	3	3	1
Clophen A	3	3	4	3	3	1	4	4	4	1
Citrus 015	3	3	3	2	2	3	3	1	1	1
Crotonaldehyde	3	3	2	2	2	2	–	2	–	1
Cumene	1	1	1	1	1	1	1	4	4	1
Potassium cyanide	4	4	4	4	4	4	4	4	2	1
Hydrocyanic acid (hydrogen cyanide)	1	1	1	1	1	1	1	1	1	1
Cyclohexane (hexamethylene hecahydrobenzene)	2	2	2	2	2	1	1	3	2	1
Cyclohexanol (hexaline, anol)	4	4	4	1	4	4	4	3	1	1
Cyclohexanone (anone)	2	3	3	2	1	1	3	–	1	1
Cyclohexyl amine	4	4	3	4	4	3	3	4	4	4
Cymol	3	3	3	3	3	2	3	4	4	3
Dekcalin (decahydronaphthalene) (decane)	4	4	4	2	4	4	4	4	2	1
Dextrin, aqueous	4	4	–	2	4	4	4	3	1	1
	1	1	1	1	1	1	1	1	1	1



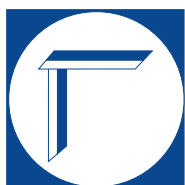
Resistant to:	NR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Diacetone alcohol (pyranton, dial) DA	2	2	1	4	1	1	1	1	3	4
Diethyl amine	2	2	2	3	3	3	2	2	4	4
Diethyl ether (ether)	4	4	3	4	3	3	3	4	–	4
Diethyl benzene	4	4	4	4	4	4	4	4	1	1
Diethyl sebacate	4	4	2	4	4	4	2	2	2	2
Dibenzyl elther	4	4	2	4	4	4	2	2	–	1
Dibenzyl sebacate	4	4	1	4	4	4	1	4	4	1
Diebutyl ether (butyl ether)	4	4	4	3	4	4	3	4	–	1
Dibutyl phthalate	4	4	3	4	4	4	2	2	3	2
Dibutyl sebacate	4	4	2	4	4	4	2	2	2	2
Dichloroethane (ethylene chloride)	4	4	4	3	4	4	3	3	4	2
Dichlororethylene (ethylene dichloride, vinylidene chloride)	4	4	4	2	3	4	4	4	–	2
Dichlorobenzene	4	4	4	4	4	4	4	4	1	1
Dichloroacetic methyl ester	3	3	2	3	3	2	2	3	3	3
Dichlorobutylene	3	3	3	3	3	3	3	4	4	2
Dichloroisopropyl ether	4	4	3	4	4	4	3	4	3	3
Dichloromethane	4	4	4	4	4	4	4	4	3	3
Dicyclohexamine	4	4	4	3	4	4	4	4	3	4
Diesel oil	4	4	4	1	2	4	4	4	1	1
Diglycol	1	1	1	2	1	1	1	4	4	1
Diisobutylene	4	4	4	1	3	3	4	4	4	1
Diisobuty lketone	3	3	2	4	4	4	2	4	4	4
Dilsopropyl benzene	4	4	4	4	4	4	4	–	2	1
Disopropyl ketone	–	–	1	4	4	3	1	–	4	4
Dimethyl amine	4	4	3	4	4	3	2	4	4	4
Dimethyl ether	2	3	1	3	3	2	1	4	4	3
Dimethyl anne	4	4	4	4	4	–	2	–	4	4
Dimethyl formamide, DMF	2	3	2	3	2	2	1	1	2	3
Dimethyl hydrazine	–	–	1	2	2	1	1	4	4	4
Dimethyl ketone (acetone)	2	2	1	4	2	3	1	3	4	4
Dimethyl phthalate, DMP	4	4	2	4	4	4	2	–	2	2
Dinitrololuene	4	4	4	4	4	4	4	4	–	3
Diocetyl phthalate, DOP	4	4	2	4	4	4	2	2	2	2
Diocetyl sebacate	4	4	2	4	4	4	2	3	3	2
Dioxan	4	4	2	4	4	3	2	4	4	3
Dipentene	3	3	3	2	3	3	3	3	3	1
Diphenyl ether (diphenyl oxide)	4	4	4	4	4	4	4	3	2	2
Dipropylene glycol	4	4	3	4	4	4	3	4	4	4
Dodecyl alcohol	1	1	1	1	1	1	1	–	–	1
DOWIHERM A and E	4	4	4	3	3	4	3	3	2	1
Iron chionde aqueous	1	1	1	1	1	1	1	1	1	1
Iron nitrate, aqueous	1	1	1	1	1	1	1	2	1	1
Iron suphate (iron vitriol) aqueous	1	1	1	1	1	1	1	2	1	1
Glacial acetic acid (100 % acetic acid)	2	3	2	3	3	3	1	2	3	3
Natural gas	3	3	4	1	2	2	4	2	3	1



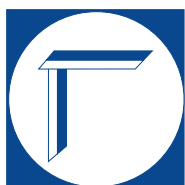
Resistant to:	NR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Peanut oil	4	4	3	1	2	2	2	1	1	1
Petroleum	4	4	4	2	4	4	4	3	2	1
Vinegar	1	2	1	2	1	1	1	1	3	3
Acetic ester (ethyl acetate)	4	4	3	3	3	3	2	3	4	4
Acetic acid, concentrated	3	4	3	4	4	4	1	1	4	4
Acetic anhydride (ethanoic anhydride)	2	3	2	3	2	2	2	2	4	4
Ethyl acetate (acetic ester)	4	4	3	3	3	3	2	3	4	4
Butyl acetate	3	4	2	4	4	4	2	4	4	4
Methyl acetate	4	4	2	4	2	4	2	4	4	4
Thinner	4	4	4	4	4	4	4	4	4	4
Fats mineral	3	3	3	1	2	2	3	2	1	1
Fats vegetable and animal	3	1	3	1	1	1	3	2	1	1
Fatty acids	4	4	4	2	2	4	4	2	1	1
Spruce turpentine	4	4	4	2	4	4	4	–	1	1
Boiled oil	4	4	4	2	3	4	4	–	2	1
Fluorine, dry	4	4	–	–	–	4	4	–	–	1
Fluorobenzene	4	4	4	4	4	4	4	4	2	1
Fluoroboric acid	2	2	3	2	2	2	2	–	–	4
Fluoroboric acid (hexafluorosilicic acid)	1	2	1	2	2	1	1	4	–	1
Hydrofluoric acid, diluted < 65%, cold	3	3	3	4	3	1	3	–	–	1
Hydrofluoric acid, diluted > 65%, hot	3	3	3	4	3	2	3	–	–	2
Formaldehyde (formalin, methanal)	1	1	1	2	2	1	1	1	–	1
Formamide	1	1	1	2	2	1	2	–	–	1
Photographic developer	1	1	1	1	1	1	1	4	4	1
Freon (Frigen) 11	3	3	4	2	2	2	4	3	2	2
Freon (Frigen) 12	3	2	2	1	1	2	2	4	3	2
Freon (Frigen) 13 B 1	1	1	1	1	1	1	1	4	3	1
Freon (Frigen) 14	–	–	–	1	1	1	1	4	–	1
Freon (Frigen) 21	4	4	4	4	2	4	4	4	–	4
Freon (Frigen) 22	1	1	1	3	1	1	1	4	4	4
Freon (Frigen) 31	2	2	1	4	1	2	1	3	–	4
Freon (Frigen) 32	1	1	1	1	1	1	1	3	–	3
Freon (Frigen) 112	4	4	4	2	2	2	4	4	–	1
Freon (Frigen) 113	3	2	3	1	1	1	4	4	4	2
Freon (Frigen) 114	1	1	1	1	1	1	1	4	2	1
Freon (Frigen) 114 B 2	4	3	4	2	1	1	4	–	–	2
Freon (Frigen) 115	1	1	1	1	1	1	1	3	–	1
Freon (Frigen) 142 b	2	1	1	1	1	1	1	4	–	4
Freon (Frigen) 152 a	1	1	1	1	1	3	1	–	–	4
Freon (Frigen) 218	1	1	1	1	1	1	1	–	–	1
Freon (Frigen) C 316	1	1	1	1	1	1	1	4	–	–
Freon (Frigen) C 318	1	1	1	1	1	1	1	4	–	1
Freon (Frigen) 502	1	1	–	2	1	–	1	3	–	2
Freon (Frigen) BF	4	4	4	2	2	2	4	4	–	1



Resistant to:	NIR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Freon (Frigen) MF	4	2	4	2	4	4	4	4	–	2
Freon (Frigen) TA	1	1	1	1	1	1	1	1	–	3
Freon (Frigen) TC	4	2	1	1	1	1	2	4	–	1
Freon (Frigen) IF	3	2	4	1	1	1	4	4	4	1
Freon (Frigen) TMC	2	3	2	2	2	2	2	3	–	1
Freon (Frigen) TP 35	1	1	1	1	1	1	1	1	–	1
Freon (Frigen) TWD 602	3	2	1	2	2	2	1	–	4	1
Fruit juices	1	1	1	1	1	1	1	1	1	1
Furfuryl alcohol (furfurol)	3	3	2	2	2	2	2	4	4	4
Fumaric acid	1	1	4	1	2	2	–	2	1	1
Furan	4	4	3	4	4	4	3	4	4	3
Gallic acid (trihydroxybenzoic acid)	1	2	2	2	2	2	2	1	1	1
Plating baths	4	4	2	4	4	3	4	2	2	1
Gasoline	4	4	4	3	4	4	4	4	1	1
Gelatine, aqueous	1	1	1	1	1	1	1	1	1	1
Tannic acid (tannin)	1	2	1	1	1	1	1	2	–	1
Transmission oil, mineral	4	4	4	1	2	2	4	2	1	1
Glucose (grape sugar)	1	1	1	1	1	1	1	1	1	1
Glycerine/glycerol	1	1	1	1	1	1	1	1	1	1
Glycerine nitrate (nitroglycerine)	4	3	1	2	2	1	1	–	3	1
Glycol (ethylene glycol)	1	1	1	1	1	2	1	1	2	1
Glycolic acid (hydroxyacetic acid)	1	1	1	1	1	1	1	1	1	1
Urea, aqueous	1	1	1	1	1	1	1	1	1	1
Heating oil, petroleum base	4	4	4	1	2	2	4	3	1	1
Heating oil, rock-coal or lignite base	4	4	4	1	3	3	4	3	1	1
Helium gas	1	1	1	1	1	1	1	1	1	1
Heptane	3	3	3	1	1	2	3	1	1	1
Hexachlorobutadiene	3	3	4	3	4	4	4	4	4	1
Hexachlorocyclohexane	3	3	4	–	4	4	4	4	4	1
Hexaldehyde	4	4	2	4	1	3	1	2	3	3
Hexane	4	4	4	1	3	2	3	2	1	1
Hexantriol	4	4	1	1	1	1	1	1	1	1
Hexene	4	4	4	2	2	2	4	3	1	1
Hexyl alcohol (hexanol)	1	1	3	1	2	2	4	2	1	1
Tung oil	4	4	4	1	2	2	4	4	2	1
Hydraulic fluid, group HSA (oil-in-water emulsion)	4	4	4	1	3	4	4	4	–	1
Hydraulic fluid, group HSB (water-in-oil emulsion)	4	4	4	1	3	4	4	4	–	1
Hydraulic fluid, group HSC (polyglycol base)	2	2	2	2	2	2	2	2	2	2
Hydraulic fluid, group HSDa (R) (phosphoric acid ester)	4	4	3	4	4	4	2	2	–	1
Hydraulic fluid, group HSDb (S) (phosphoric acid ester)	4	4	4	4	4	4	4	2	–	1

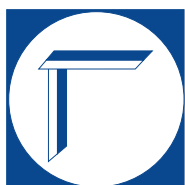


Resistant to:	NR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Hydraulic fluid, group HSDc (1) (phosphoric acid ester)	4	4	4	4	4	4	4	2	–	1
Hydraulic fluid, group H, HL, HLP (mineral oil base)	4	4	4	1	2	4	4	3	1	1
Hydrazine hydrate (diamide hydrate)	3	3	1	2	2	2	1	3	2	1
Hydroquinone (1, 4-dihydroxybenzene)	2	2	–	3	–	–	–	–	2	4
Hydroxyacetic acid (glycolic acid)	1	1	1	1	1	1	1	1	1	1
Hysroxylamine sulphate, aqueous	1	1	1	1	2	1	1	1	1	1
Isobutyl alcohol (isobutanol)	1	2	1	2	1	1	1	1	2	1
Isopropyl chloride	4	4	4	4	4	4	4	4	2	1
Isooctane	4	4	4	1	2	2	4	4	2	1
Isopropyl alcohol (isopropanol, persprite)	1	2	1	2	1	1	1	2	2	1
Isopropyl ether (isopropyl ether)	4	4	4	2	2	2	4	4	4	4
Isopropyl acetate	3	3	1	3	3	3	1	4	4	4
Liquid manure	1	1	1	1	1	1	1	1	1	1
Javel water (sodium hypochlorite)	3	3	2	2	2	2	2	2	2	1
Solution of iodine and potassium iodide, aqueous	1	1	1	2	1	1	1	2	2	1
Iodine pentafluoride	4	4	4	4	4	4	4	4	4	4
Iodoform (tri-iodomethane)	–	–	1	–	–	–	1	–	–	–
Tincture of iodine	1	1	2	1	2	1	2	2	2	1
Cacao butter	3	3	3	3	3	3	3	3	–	1
Aluminium potassium sulphate (alum), aqueous	1	1	1	2	1	1	1	2	–	1
Potassium acetate	1	3	1	2	2	4	1	4	4	4
Potassium bisulphate	1	1	1	1	1	1	1	2	2	1
Potassium borate	1	1	1	1	1	1	1	2	2	1
Potassium bromate	1	1	1	1	1	1	1	2	2	1
Potassium bromide	1	1	1	1	1	1	1	4	4	1
Potassium chlorate	2	2	1	3	1	1	1	4	4	1
Potassium chloride (sylvite)	1	1	1	1	1	1	1	1	1	1
Potassium chromate (chromium yellow)	1	2	1	2	1	3	1	4	4	1
Potassium dichromate	2	2	1	2	1	1	1	3	3	2
Potassium cyanide	2	2	1	1	1	1	1	1	1	1
Potassium hydroxide (caustic potash, potash lye)	2	2	1	2	1	1	1	3	3	2
Potassium iodide	2	1	1	1	1	1	1	1	1	1
Potassium carbonate (potash)	1	1	1	1	1	1	1	1	1	1
Potassium nitrate (nitrate of potash)	1	1	1	1	1	1	1	1	1	1
Potassium perchlorate	3	3	1	3	1	1	1	4	4	1
Potassium permanganate, aqueous	1	2	1	3	1	1	1	4	4	1
Potassium persulphate	1	2	1	3	1	1	1	4	4	1
Potassium sulphate	2	2	1	1	1	1	1	1	1	1
Milk of lime (calcium hydroxide)	1	1	1	1	1	1	1	1	1	1
Potassium sulphite	1	1	1	1	1	1	1	1	–	1
Carbolic acid (phenol)	4	4	2	4	4	3	2	4	2	1
Castor oil	1	1	2	1	1	1	2	1	1	1



<b>Resistant to:</b>	NIR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Kerosene (aviation fuel)	4	4	4	1	3	3	4	4	1	1
Pine oil	4	4	4	2	4	4	4	–	1	1
Silicic acid (fluorosilicic)	1	2	1	2	2	1	1	4	–	1
Neatsfoot oil	4	4	2	1	–	–	2	2	1	1
Oxalic acid (ethanedioic, aqueous)	2	2	1	2	2	2	1	2	1	1
Bone oil	3	3	2	1	3	3	3	3	2	1
Cobalt chloride, aqueous	1	1	1	1	1	1	1	1	1	1
Aqua regia	3	3	3	3	3	2	3	3	3	2
Carbon dioxide, moist	2	2	2	1	2	1	2	1	1	1
Carbonmonoxide, dry	2	2	1	1	1	1	1	1	2	1
Carbonic acid	1	1	1	1	1	1	1	1	1	1
Carbon disulphide	4	4	4	3	4	4	4	4	1	1
Carbon tetrachloride	4	4	4	3	4	4	4	4	1	1
Cocnut oil	4	4	3	1	2	2	3	1	1	1
Greosol, aqueous	4	4	4	3	3	3	4	4	2	1
Creosol (wood tar)	4	4	4	1	4	4	4	4	1	1
Copper acetate, aqueous	2	3	1	2	2	2	1	4	3	3
Copper chloride, aqueous	1	1	1	1	1	1	1	1	1	1
Copper fluoride, aqueous	1	1	1	2	1	1	1	4	4	1
Copper nitrate, aqueous	1	1	1	2	1	3	1	4	4	1
Copper sulphate (copper vitriol)	2	2	1	1	1	4	1	1	1	1
Copper cyanide	1	1	1	1	1	3	1	1	1	1
Laughing gas (nitrogen oxide)	1	1	1	1	1	1	1	1	1	1
Lactam	3	3	2	3	2	2	2	3	3	3
Lanolin (wool fat)	2	2	3	1	2	2	3	2	1	1
Lyes dilute	2	2	1	2	2	1	1	2	1	2
Lauryl alcohol (dodecanol)	1	1	1	1	1	1	1	3	3	1
Lavender oil	4	4	4	2	3	3	4	3	2	1
Cod liver oil	4	4	4	1	1	1	4	1	1	1
Glue (bone glue)	1	1	1	1	1	1	1	1	1	1
Linseed oil	4	4	2	1	2	2	2	3	1	1
Town gas	3	3	3	1	2	1	3	1	1	1
Liquer	1	1	1	1	1	1	1	1	1	1
Linolic acid	–	–	4	2	4	4	4	2	–	–
Lithium bromide, aqueous	1	1	1	1	1	1	1	1	1	1
Lithium chloride, aqueous	1	1	1	1	1	1	1	1	1	1
Magnesium chloride, aqueous	1	1	1	1	1	1	1	1	1	1
Magnesium hydroxide	2	2	1	2	1	1	1	1	1	1
Magnesium sulphate (Epsom salts)	2	2	1	1	1	1	1	1	1	1
Maize oil	2	2	2	1	2	2	2	1	1	1
Maleic acid (ethylene dicarboxylic acid), aqueous	2	2	3	1	1	3	2	4	4	1
Margarine	4	4	4	1	2	4	4	1	1	1
Seawater	1	1	1	1	1	1	1	1	1	1
Molasses	1	1	1	1	1	1	1	1	1	1
Menthol	1	1	1	1	1	1	1	4	4	1





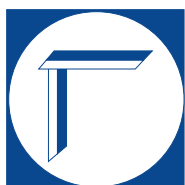
Resistant to:	NIR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Methanal (formaldehyde)	1	1	1	2	2	1	1	1	–	1
Methane gas (pit gas, natural gas)	4	4	4	1	2	2	4	4	2	1
Methanol (methyl alcohol, wood alcohol)	1	1	1	2	2	1	1	1	1	3
Methoxybutyl alcohol (methoxybutanol)	3	3	1	1	1	1	1	4	4	1
Methyl acetate	4	4	2	4	2	4	2	4	4	4
Methylacrylate	4	4	2	4	2	4	2	4	4	4
Methyl metahacrylate	4	4	3	4	3	4	3	4	4	3
Methyl alcohol (methanol)	1	1	1	1	1	1	1	1	1	3
Methyl amine (monomethyl amine)	1	2	1	3	1	1	1	4	4	3
Methyl ethyl ketone (butanone, ethyl methyl ketone)	4	4	1	4	4	4	1	4	4	4
MEK										
Methyl benzene (toluene)	4	4	4	4	4	4	4	4	2	1
Methyl bromide	4	4	4	4	4	4	4	4	2	1
Methyl butyl ketone	4	4	1	4	4	4	1	2	4	4
Methyl cellosolve (methyl glycol acetate)	3	3	1	4	3	2	2	2	–	3
Methyl chloride	4	4	3	4	4	4	3	4	2	1
Methyl chloroform (trichloroethane, chloroethene)	4	4	4	4	4	4	4	4	2	1
Methyl chloride	4	4	3	4	4	4	3	4	2	1
Methylene chloride (dichloromethane)	4	4	4	4	4	4	4	4	3	3
Methyl formiate	4	4	2	4	2	2	2	2	–	–
Methyl glycol acetate (methyl cellosolve)	3	3	1	4	3	2	2	2	–	3
Methyl isobutyl ketone (isopropyl acetone)	4	4	3	4	4	4	3	4	4	4
Methyl methacrylate	4	4	4	4	4	–	4	3	4	4
Methyl phenyl ether (anisole)	3	3	4	3	3	4	4	4	4	4
Methyl sulphuric acid, aqueous	4	4	2	4	2	1	1	4	3	1
Milk	1	1	1	1	1	1	1	1	1	1
Lactic acid, aqueous	1	1	1	1	1	1	1	1	1	1
Mineral oils	4	4	4	1	2	2	4	2	1	1
Monoelhanolamine	2	2	2	3	4	4	2	2	4	4
Monochlorobenzene (chlorobenzene)	4	4	4	4	4	4	4	1	–	3
Monochloroacetic acid	4	3	1	3	3	2	1	4	4	3
Morpholine (diethylene oximide)	4	4	1	3	1	1	1	4	4	4
Engine oil	4	4	4	1	4	2	4	2	1	1
Myristyl alcohol	1	1	1	1	1	1	1	4	4	1
Naphtha	4	4	4	3	3	4	4	4	2	1
Naphthalene (mineral oil)	4	4	4	3	3	4	4	4	4	1
Sodium acetate, aqueous	1	3	1	2	2	2	1	–	4	4
Sodium benzoate, aqueous	2	1	1	1	1	1	1	1	1	1
Sodium bicarbonate, aqueous	1	1	1	1	1	1	1	1	1	1
Sodium bisulphate, aqueous	1	1	1	1	1	1	1	1	1	1
Sodium bisulphite, aqueous	2	2	1	1	1	1	1	1	1	1
Sodium borate, aqueous	1	1	1	1	1	1	1	1	1	1
Sodium carbonate (soda)	1	1	1	1	1	1	1	1	1	1
Sodium chlorate, aqueous	3	2	1	2	1	1	1	4	4	1
Sodium chloride (table salt)	1	1	1	1	1	1	1	1	1	1



Resistant to:	NIR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Sodium chlorite, aqueous	4	4	1	4	4	1	1	–	–	1
Sodium cyanide	1	1	1	1	1	1	1	1	1	1
Sodium dichromate, aqueous	1	1	1	1	1	1	–	–	–	1
Sodium hydroxide (soda lye, caustic soda)	1	1	1	2	1	1	1	3	3	2
Sodium hypochlorite (bleaching liquor, Javel water)	3	3	2	2	2	2	2	2	2	1
Sodium metahphosphate	1	1	1	1	2	2	1	–	1	1
Sodium nitrate (Chile saltpetre)	2	2	1	2	1	1	1	4	–	1
Sodium nitrite	1	1	1	3	1	1	1	4	4	1
Sodium perborate	2	2	1	2	3	3	1	2	1	1
Sodium peroxide	2	2	1	2	2	2	1	4	1	1
Sodium phosphate	1	1	1	1	1	1	1	4	–	1
Sodium silicate, aqueous	1	1	1	1	1	1	1	4	4	1
Sodium sulphate (Glauber salt)	2	2	1	1	1	1	1	1	1	1
Sodium sulphide	2	2	1	1	1	1	1	1	1	1
Sodium tetraborate (borax)	2	2	1	2	1	1	1	2	2	1
Sodium thiosulphate (antichlor, fixer)	2	2	1	2	1	1	1	1	1	1
Soda lye (sodium hydroxide)	1	1	1	2	1	1	1	3	3	2
Neon gas	1	1	1	1	1	1	1	1	1	1
Nickel acetate aqueous	1	3	1	2	2	3	1	4	4	4
Nickel chloride	1	1	1	1	1	1	1	1	1	1
Nickel nitrate	1	1	1	1	1	–	1	1	–	1
Nickel sulphate	2	2	1	1	1	1	1	1	1	1
Nicotine acetate, aqueous	2	3	1	1	1	1	1	4	4	1
Nitrobenzene (essence of mirbane)	4	4	3	4	4	4	3	3	2	2
Nitro glycol, aqueous	2	2	1	4	2	2	1	4	4	1
Nitro glycerine (glycerine trinitrate)	2	3	1	2	2	1	1	–	3	1
Nitro methane	2	3	2	4	3	3	2	4	4	4
Nitro toluene	3	3	3	2	3	3	3	3	3	2
Nut oil	4	4	3	1	2	2	3	1	1	1
Octadecane	4	4	4	1	2	2	4	4	1	1
Octane	4	4	4	3	4	4	4	4	2	1
Octal (dioctyl phthalate) DOP	4	4	2	4	4	4	2	2	2	2
Octyl alcohol	2	2	1	2	1	1	1	2	2	1
Octyl cresol	4	4	4	2	4	4	4	4	4	2
Oleum (fuming sulphuric acid)	3	3	2	3	3	2	2	3	3	1
Oleic acid (oleic acid)	4	4	4	2	3	3	3	3	3	1
Oleyl alcohol	1	1	1	1	1	1	1	4	4	1
Olive oil	3	3	3	1	2	2	3	2	2	1
Oxalic acid (ethanedioic acid), aqueous	2	2	1	2	2	2	1	2	1	1
Ozone and air mixture	4	4	2	4	2	1	1	1	2	1
Palmitic acid	2	2	2	1	2	2	2	3	1	1
Paraffin oil	4	4	3	1	1	2	3	1	1	1
Paraffin wax, molten	4	4	4	1	1	1	1	1	1	1
Pecin	1	1	1	1	1	1	1	1	1	1
Pentachlorodiphenyl	3	3	3	3	3	3	3	4	4	1



<b>Resistance against:</b>	<b>NR</b>	<b>SBR</b>	<b>IIR</b>	<b>NBR</b>	<b>CR</b>	<b>CSM</b>	<b>EPDM</b>	<b>MQ</b>	<b>FMQ</b>	<b>FKM</b>
pentanol (pentyl alcohol, amyl alcohol)	2	2	1	2	1	1	1	4	1	2
perchlorethylene (tetrachlorethylene)	4	4	4	3	4	4	4	3	2	1
perchloric acid (perchloric acid)	3	3	2	3	2	2	2	4	2	1
petroleum ether	4	4	4	1	2	2	4	3	2	1
petroleum, kerosene	4	4	4	1	3	3	4	4	1	1
vegetable oil	4	4	3	1	2	2	3	1	1	1
phenol (phenylic acid)	4	4	2	4	4	3	2	4	2	1
phenylethylether	4	4	4	4	4	4	3	4	4	3
phenylhydrazine	2	2	3	4	3	3	3	4	4	1
phosgene, liquid	3	4	2	2	1	2	2	3	3	1
phosphine	1	-	1	3	1	1	1	4	4	1
phosphorus oxychloride	2	2	1	4	2	1	1	4	4	1
phosphoric acid 20%	2	3	1	2	2	1	1	3	2	1
phosphoric acid, konzentriert	4	4	2	3	3	3	4	4	2	1
phosphorus trichloride	4	4	1	4	4	4	1	3	1	1
phosphoreted hydrogen	1	3	1	4	2	1	1	-	-	1
phthalic acid aqueous	1	1	1	1	1	1	1	1	-	1
picric acid, aqueous	2	2	1	2	1	1	1	3	2	1
piperidine	4	4	4	4	4	4	4	4	4	4
propane, liquid	3	3	2	1	1	2	2	3	2	1
propionic carboxylic acid (butyric acid)	3	3	4	2	3	2	4	4	4	2
propanol (propyl alcohol)	1	1	1	1	1	1	1	1	1	1
potash, aqueous	2	2	1	2	2	1	1	2	2	1
acetone (acetan)	2	2	1	4	2	3	1	3	-	4
propionic acid	3	3	2	1	1	2	2	4	4	1
propylacetate	4	4	2	4	4	4	2	4	4	4
propyl alcohol	1	1	1	1	1	1	1	1	1	1
propylamine	4	4	4	4	4	4	4	4	4	4
propylene	4	4	4	4	4	4	4	4	2	1
propylenglycol	1	1	1	2	1	1	1	4	4	1
propylene oxide	4	4	2	4	4	4	2	4	4	4
propyl nitrate	4	4	2	4	4	4	2	4	4	4
pydraul E	4	4	1	4	4	4	2	2	1	1
pydraul C	4	4	4	4	4	4	4	2	2	1
pyranol	4	4	4	1	4	4	4	2	1	1
pyridine	4	4	2	4	4	4	2	3	3	3
pyrrole	3	3	3	4	4	4	4	2	2	4
mercury	1	1	1	1	1	1	1	1	1	1
mercurous chloride, aqueous	1	1	1	1	1	1	1	1	1	1
mercury nitrate	1	1	1	1	1	-	1	1	-	-
rapeseed oil	4	4	1	2	2	2	1	3	1	1
castor oil (castor oil)	1	1	2	1	1	1	2	1	1	1
crude oil	4	4	4	2	3	2	4	4	1	1
rspeseed oil	3	3	2	1	2	2	1	1	1	1
sagrotan	1	1	1	2	1	1	1	1	1	1



<b>Resistant to:</b>	<b>NR</b>	<b>SBR</b>	<b>IIR</b>	<b>NBR</b>	<b>CR</b>	<b>CSM</b>	<b>EPDM</b>	<b>MQ</b>	<b>FMQ</b>	<b>FKM</b>
Salicylic acid (o-hydroxybenzoic acid)	1	2	1	1	1	1	1	1	1	1
Nitric acid, aqueous, 10 %	4	4	2	4	2	1	2	4	4	2
Nitric acid, concentrated (aqua fontis), 65 %	4	4	3	4	3	2	3	4	4	2
Nitric acid, fuming	4	4	4	4	4	4	4	4	4	2
Hydrochloric acid, 10 %	2	2	1	2	1	1	1	3	2	1
Hydrochloric acid, concentrated	3	3	1	3	3	3	1	3	3	2
Sal ammoniac (ammonium chloride)	1	1	1	1	1	1	1	–	–	1
Oxygen	4	2	1	2	2	2	1	1	1	1
Lubricating oil (mineral oil base)	4	4	4	1	2	2	4	2	1	1
Black liquor	3	2	2	2	2	2	2	–	–	2
Sulphur, liquid, 60 °C	4	4	2	4	2	2	2	2	1	1
Sulphur chlore	4	4	4	4	4	4	4	4	1	1
Sulphurous acid	2	2	1	2	2	1	1	4	4	1
Sulphur dioxide	3	3	2	4	3	3	1	2	2	1
Sulphur hexafluoride	1	1	1	1	1	1	1	1	1	1
Carbon disulphide	4	4	4	3	4	4	4	4	1	1
Sulphuric acid, 10 %	2	2	1	3	2	1	1	3	3	1
Sulphuric acid, 60 %	4	4	2	4	3	1	3	4	–	1
Sulphuric acid, 95 %	4	4	4	4	4	3	3	4	–	1
Sulphur trioxide	3	4	2	3	4	4	2	2	2	1
Hydrogen sulphide	3	3	1	3	1	1	1	3	3	3
Soapy water (soap solution)	2	2	1	1	2	1	1	1	1	1
Silver nitrate (caustic silver)	1	1	1	2	1	1	1	1	1	1
Silicate ester	4	4	4	2	1	1	4	4	1	1
Silicone grease and oil	1	1	1	1	1	1	1	3	1	1
Skydrol 500	4	4	2	4	4	1	1	4	4	4
Skydrol 7000	4	4	1	4	4	1	1	4	4	2
Soda aqueous (sodium carbonate)	1	1	1	1	1	1	1	1	1	1
Soybean oil	4	4	3	1	2	2	3	1	1	1
Spirits	1	1	1	2	1	1	1	2	1	2
Starch, aqueous	1	1	1	1	1	1	1	1	1	1
Stearic acid	2	2	2	2	2	2	2	1	1	1
Nitrogen	1	1	1	1	1	1	1	1	1	1
Dinitrogen	4	4	3	4	4	4	3	3	3	4
Styrene (vinyl benzene, phenyl ethylene)	4	4	4	4	4	4	4	4	4	2
Spent sulphite liquors	2	2	2	2	2	2	2	4	2	1
Sulphuryl chloride	3	3	2	3	3	2	2	4	4	1
Tallow	3	3	1	1	1	1	1	4	4	1
Tannin (tannic acid)	1	2	1	1	2	2	1	2	–	1
Turpentine oil	4	4	4	2	4	4	4	4	2	1
Tar	4	4	4	3	3	3	4	2	1	1
Tetraethyl lead	4	4	4	2	3	3	4	3	2	1
Tetrabromoethane (acetylene tetrabromide)	4	4	4	4	4	4	4	4	2	1
Tetrachloroethane (acetylene tetrachloride)	4	4	4	4	4	4	4	4	4	2
Tetrachloroethylene (perchloroethylene)	4	4	4	3	4	4	4	3	2	1

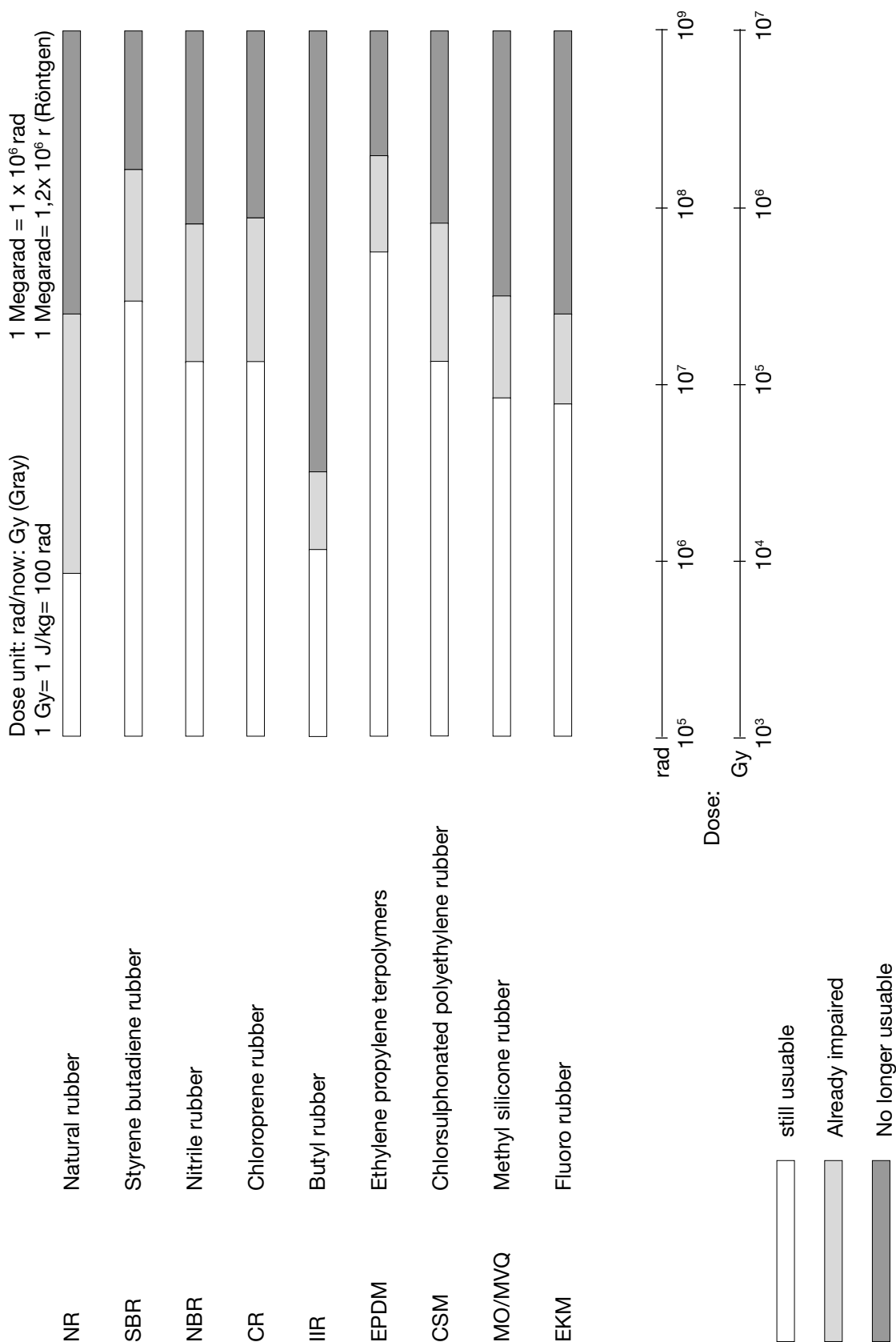


Resistant to:	NR	SBR	IIR	NBR	CR	CSM	EPDM	MQ	FMQ	FKM
Carbon tetrachloride (tetrachloromethane)	4	4	4	3	4	4	4	4	1	1
Tetrachlormethane (carbon tetrachloride)	4	4	4	3	4	4	4	4	1	1
Tetrahydrofuran (diethylene oxide, tetramethylene oxide)	4	4	2	3	3	3	2	4	4	4
Tetrahydronaphthalene (tetraline)	4	4	4	4	4	4	4	4	1	1
Thionyl chloride	4	4	2	4	4	2	2	4	4	1
Thiophene (thiofuran, thiol)	3	3	3	1	3	3	3	4	4	3
Animal fats	4	4	2	1	2	2	2	2	1	1
Ink	1	1	1	1	1	1	1	1	1	2
Titanium tetrachloride	4	4	4	3	4	4	4	4	2	1
Toluene (methyl benzene)	4	4	4	4	4	4	4	4	2	1
Grape sugar, aqueous	1	1	1	1	1	1	1	1	1	1
Transformer oil (petroleum base)	4	4	3	1	2	3	4	2	1	1
Triacetine (glycerine triacetate)	2	3	1	2	2	2	1	1	4	4
Triethanolamine (triethylolamide)	2	3	2	3	2	2	2	4	4	4
Triethyl amine	3	3	3	2	3	3	3	3	3	2
Tributyl mercaptan	4	4	4	4	4	4	4	–	–	1
Tributyl phosphate/triethyl phosphate	2	4	1	4	4	3	1	–	4	3
Trichloroethane (chloroethene)	4	4	4	4	4	4	4	4	2	1
Trichloroethylene	4	4	4	3	4	4	4	2	2	1
Trichloroacetic acid	2	3	2	3	3	3	2	3	3	3
Trichloromethane (Chloroform)	4	4	4	4	4	4	4	3	3	2
Trisopropyl benzene	4	4	4	1	4	–	4	4	–	1
Tricresyl phosphate	4	4	1	4	3	3	1	1	2	1
Trisodium phosphate	1	1	1	1	1	1	1	1	1	1
Trinitrotoluene	4	4	4	4	2	2	4	–	2	2
Trioctyl phosphate	4	4	1	4	4	4	1	3	2	2
Tripen	4	4	4	4	4	4	4	4	–	1
Turbine oil, mineral	4	4	4	1	2	3	4	2	1	1
Perchloric acid	3	3	2	3	2	2	2	4	2	1
Urine	1	1	1	1	1	1	1	1	1	1
Vaseline oil	4	4	4	1	2	2	1	2	2	1
Vinyl acetate	1	4	1	1	1	1	1	4	4	1
Vinyl chloride (monochloroethylene)	4	4	4	4	4	4	2	–	–	–
Vinylidene chloride (dichloroethylene)	4	4	4	2	3	4	4	4	–	2
Wax alcohol	3	–	3	1	1	3	3	–	–	1
Spermaceti	3	4	3	1	2	3	3	4	4	1
Washing liquors	2	2	1	1	1	1	1	1	1	1
Water/spring water, cold	1	1	1	1	1	1	1	1	1	1
Steam >100 °C	3	2	1	2	3	3	1	2	3	2
Water glas	1	1	1	1	1	1	1	1	1	1
Hydrogen gas	2	2	1	1	1	1	1	3	3	1
Hydrogen peroxide, dilute	2	2	1	2	1	1	1	1	1	1
Hydrogenperoxide, 90 %	3	3	3	3	3	3	3	1	1	1
Tartaric acid (dihydroxysuccinic acid, aqueous (wine))	1	1	1	1	1	1	1	1	1	1



## Radiation resistance

The following list shows the service limits of different elastomers, depending on the gamma radiation dose received.



## Guideline values, gas permeability

at 25 °C and 0 % relative humidity

Gas permeability constant  $P = \frac{\text{cm}^3 (\text{STP}) \text{ mm}}{\text{cm}^2 \text{ sec. cm Hg}}$

Considerable differences may occur, depending on the composition of the rubber blend.  
STP = standard temperature and pressure at 0 °C and 76 cm mercury pressure.

Elastomer grade	Guideline value of gas permeability = $P \times 10^{10}$				
	Nitrogen N <sub>2</sub>	Oxygen O <sub>2</sub>	Carbon dioxide CO <sub>2</sub>	Helium He	Hydrogen H <sub>2</sub>
NR	65	250	1300	300	500
SBR	65	170	1250	230	400
NBR	11	40	300	120	160
CR	12	40	250	45	140
IIR	3	13	50	70	75
EPDM	85	250	1100		
CSM	12	28	210	95	140
MQ/MVQ	2600	6000	21000		6000
FKM	4,4	15	80		

containing 27 % acrylonitrile



TECHNOPROFIL



## Dimensional tolerances for soft rubber mouldings

Standards DIN 7715, Part 2  
ISO 3302.2

Tolerance classes  
Class M 1 – Very fine  
Class M 2 – Fine  
Class M 3 – Average  
Class M 4 – Coarse

Within these classes, the moulding must be further differentiated according to type F and C dimensional deviations.

F = Dimensions due to the mould.

C = Dimensions due to mould dosing.

Nominal size range	Class M 1		Class M 2		Class M 3		Class M 4	
	F ±	C ±	F ±	C ±	F ±	C ±	F ±	C ±
up to 6,3 Over 6,3 to 10 Over 10 to 16 Over 16 to 25 Over 25 to 40 Over 40 to 63 Over 63 to 100 Over 100 to 160	Permissible deviation in mm							
	0,10	0,10	0,15	0,20	0,25	0,4	0,5	0,5
	0,10	0,15	0,20	0,20	0,3	0,5	0,7	0,7
	0,15	0,20	0,20	0,25	0,4	0,6	0,8	0,8
	0,20	0,20	0,25	0,35	0,5	0,8	1,0	1,0
	0,20	0,25	0,35	0,40	0,6	1,0	1,3	1,3
	0,25	0,35	0,40	0,50	0,8	1,3	1,6	1,6
	0,35	0,40	0,50	0,70	1,0	1,6	2,0	2,0
	0,40	0,50	0,70	0,80	1,3	2,0	2,5	2,5
Over 160	Permissible deviation in %							
	0,3	*)	0,5	*)	0,8	*)	1,5	1,5
*) Values by agreement only								





## Dimensional tolerances for soft rubber injection mouldings

Standards: ISO 3302  
VSM 77046  
DIN 7715, Part 3

### Class 1(E 1/L 1):

Very close tolerances. For sections which must satisfy very stringent requirements in respect of dimensional

### Class 2 (E 2/L 2)

Average tolerances. For sections with generally normal dimensional accuracy.

### Class 3 (E 3/L 3):

Generous tolerances. For sections which do not have to satisfy any particular requirements with regard to dimensional accuracy. Microcellular rubber sections.

## Cross-sectional tolerances of pressureless cured sections (injection mouldings)

Nominal size in mm	Class E 1 +/- mm	Class E 2 +/- mm	Class E 3 +/- mm
0 – 2,5	0,20	0,35	0,50
2,5 – 4,0	0,25	0,40	0,70
4,0 – 6,3	0,35	0,50	0,80
6,3 – 10,0	0,40	0,70	1,00
10 – 16	0,50	0,80	1,30
16 – 25	0,70	1,00	1,60
25 – 40	0,80	1,30	2,00
40 – 63	1)	1,60	2,50
63 – 100	1)	2,00	3,20

1) = Tolerances as agreed between the business partners.



## Dimensional tolerances for soft rubber injection mouldings

### Length tolerances for cut sections

Nominal lenght in mm	Class L 1 +/-mm	Class L 2 +/-mm	Class L 3 +/-mm
0 – 40	0,7	1,0	1,6
40 – 63	0,8	1,3	2,0
63 – 100	1,0	1,6	2,5
100 – 160	1,3	2,0	3,2
160 – 250	1,6	2,5	4,0
250 – 400	2,0	3,2	5,0
400 – 630	2,5	4,0	6,3
630 – 1000	3,2	5,0	10,0
1000 – 1600	4,0	6,3	12,5
1600 – 2500	5,0	10,0	16,0
2500 – 4000	6,3	12,5	20,0
over 4000	0,16 %	0,32 %	0,50 %

Tolerances for assembled (bonded or vulcanized) sections

In the case of sectional frames:

Length tolerance: +/-0,8 %

### Tolerances for very short cut sections, such as washers, etc.

Nominal size or thickness in mm	Class EC 1 +/-mm	Class EC 2 +/-mm	Class EC 3 +/-mm
up to 1,0	0,10	0,15	0,20
1,0 – 1,6	0,10	0,20	0,25
1,6 – 2,5	0,15	0,20	0,35
2,5 – 4,0	0,20	0,25	0,40
4,0 – 6,3	0,20	0,35	0,50
6,3 – 10	0,25	0,40	0,70
10 – 16	0,35	0,50	0,80
16 – 25	0,40	0,70	1,00



# technoprofil

## Dimensional tolerances for extruded sections of soft PVC (moulding)

Standard: DIN 16941

Nominal size range	Permissible deviation for	
	Main dimension	Other dimensions
0,3 to 1	$\pm 0,1$	$\pm 0,2$
Over 1 to 3	$\pm 0,2$	$\pm 0,3$
Over 3 to 6	$\pm 0,3$	$\pm 0,5$
Over 6 to 10	$\pm 0,4$	$\pm 0,6$
Over 10 to 18	$\pm 0,5$	$\pm 0,8$
Over 18 to 24	$\pm 0,8$	$\pm 1,2$
Over 24 to 30	$\pm 1$	$\pm 1,5$
Over 30 to 50	$\pm 2$	$\pm 3,0$
Over 50 to 80	$\pm 3$	$\pm 4,5$



## Sectional rubber shapes

### Selection according to force/displacement relationship - guideline values for load and elongation

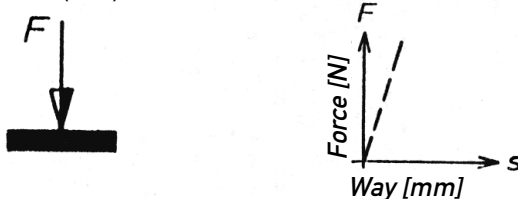
Rubber sections are used as seals in the majority of cases. A corresponding spring deflection is obtained by multiplying the contact surfaces. Since rubber cannot be compressed by the permissible deformation forces, the volume of the cross-section remains constant while the geometry changes. The deformation path is primarily determined by the hardness of the rubber, the form factor and the relationship between those not exposed to loads. Example: the deformation will be extremely small in the case of a low flat section with high form factor and correspondingly large in the cases of a 1:1 square section (low factor).

High deformation forces can only change the shape of a solid section of compact soft rubber to a very minor extent. The spring deflection necessary to achieve the desired deformation frequently cannot be obtained in rectangular sections (e.g. lid or frame seals). The only exception here is in the case of toroidal sealin sections in which the round cross-section permits a spring deflection of up to 20 %.



Section requires high deformation forces for little spring deflection.

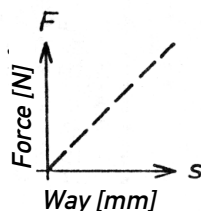
Force (N)/Path (mm)



One of the following sections must be selected if the available compression forces are not sufficient for a solid section:



Section requires relatively low deformation forces for large spring deflection.





# technoprofil

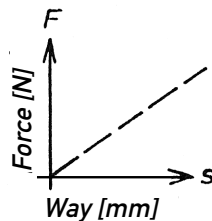
Example: Sections for grooves and joints, fenders und piping or door, window and refrigeratator seals.



A large spring deflection can be obtained, for instance with lip sections of soft rubber. The lip is designed so that it is thinner on the outer side than on the inside. The sealant effect can frequently be enhanced by the pressure difference built up when the lip is pressed into place. Twin lips arranged in opposition to one another act as double seals (e. g. fpr pressure ans vacuum), a multiple sealing effect being obtained by lips arranged in one direction (labyrinthine).



Section requires very low deformation forces for large spring deflection.  
Force (N)/Path (mm)



Examples: Window sections, door sections, frame sections, sealing sections



Microcellular rubber sections are usually designed with 60% closed pores, the remainder open. The outer skin is closed (extruded articles). Very large spring deflections can normally be obtained with minute deformation forces when microcellular rubber sections are involved. Unlike the case with homogeneous rubber sections (solid sections), the microcellular sections can be compressed in volume.

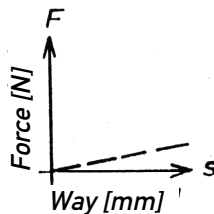
Microcellular rubber is made from both natural rubber and synthetic rubber. Only synthetic grades, such as neoprene, EPDM or silicone, are normally used for outdoor applications. In addition to the solid microcellular sections, it is also possible to produce hollow sections or lip sections, as well as combinations of both. Attention is additionally drawn in this context to the availability of two-component sections (microcellular and soft rubber in combination).



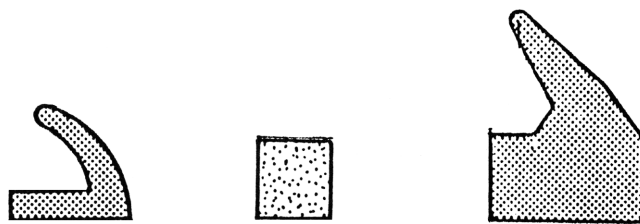
Example: Flat, rubber section with built-on micro-cellular tubing.



The section requires very low deformation forces for very large spring deflections.  
Force (N)/Path (mm)



Example: Sections for joints, sealing sections, lid sealing sections, etc.



## Static pressure loads

The soft rubber sealing sections must not be compressed excessively in order to prevent permanent deformation (i. e. the elasticity limits must not be exceeded).

The continuous static load on a solid soft rubber section of approx. 60 Shore A should not be allowed to exceed approx. 1 N/mm<sup>2</sup>. The maximum compressive set should not exceed 20 %.

## Static tensile loads

Premature ageing can be prevented, for instance, by ensuring that the rubber sections are not exposed to continuous tensile loads. If prestressed toroidal sealing sections or endless sections are snap-fitted into grooves, the prestress should not be allowed to exceed 5 %.

Joule effect: elastomer sections exposed to tensile stresses contract at higher temperatures, leading to an increase in the existing prestress.



## Connecting joints and corners of rubber sections

If soft rubber sections have to be mated as end-to-end or corner connections for assembly reasons, you should check whether adhesive bonding will suffice or whether a vulcanized bond is more appropriate.

Type of connection	Execution	Features
Butt joint	Bonded	moderate tear strength, usually adequate for grooved sections, etc.
Obliquely butt joint	Bonded	Higher tear strength
Butt joint	in mould vulcanized	High tear strength e. g. fpr endless rings subject to tensile stresses
Corner connection e. g. 30° or 90° mitre	Bonded	Moderate strength can be assembled on site
Corner connection e. g. 30° or 90° mitre	in mitre mould Vulcanized	High strength cannot be assembled on site

## Guidelines for storing soft rubber sections

If correctly stored, the elastomer parts will retain their characteristic properties for a long period of time. Incorrect storage impairs their serviceability due to premature ageing (e. g. hardening, discoloration, permanent deformation). Permanent deformations due to incorrect storage are one of the most frequent causes for complaint.

Soft rubber must never be subjected to compressive or tensile forces during storage. Fpr instance, tightly rolled sections should not be suspended from a nail, since the permanent tensile strain due to the sections own weight would cause a permanent deformation.

DIN 7716 contains all the information required with regard to storing, cleaning and servicing rubber products.



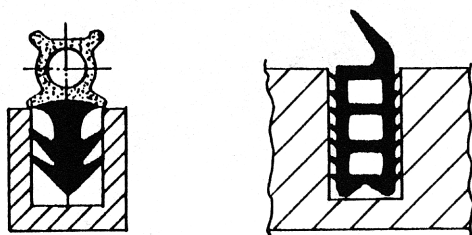
The following points are important for correct storage:

- Low temperature (+15 to + 25~ C)
- Relative humidity between 35 % and 65 %
- Keep wrapped to prevent exposure to light where possible
- Keep well away from direct sunlight
- Store in a room without spark-generating electrical equipment (formation of ozone)
- Keep away from sheeting, etc. containing plasticizers
- Keep away from copper
- Prevent contact between individual rubber parts
- Ensure that the bending radii of rolled sections are not too tight
- Do not stack the products too high
- Fine edge-protecting sections, etc. should be laid out straight

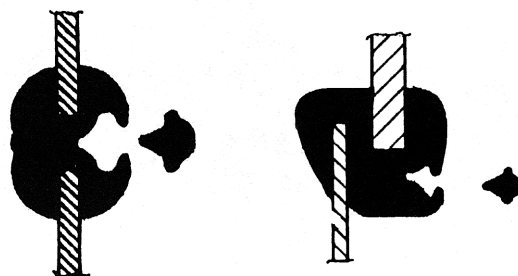
## Means of securing rubber sections

Correctly functioning sections should be installed as simply and carefully as possible, the nature of the fastening or anchorage depending on the requirements imposed on the connection.

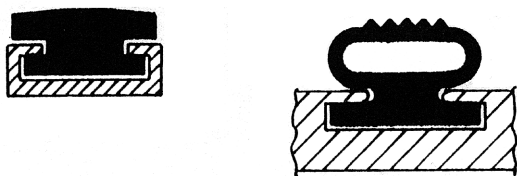
*Pressing into place*



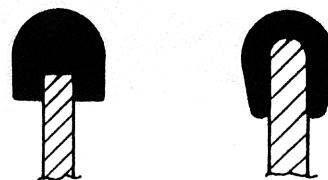
*Clamping into place*



*Drawing into place*



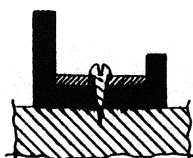
*Snap-fitting*



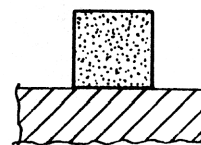
*Nailing into position*



*Screwing into position*



*Bonding*







## General Terms and Conditions of Delivery and Payment

### I. General Provisions

- 1.) Our terms and conditions of sale are exclusively valid; we do not recognise terms and conditions of the customer that contradict or deviate from our terms and conditions of sale, unless we have explicitly agreed to their validity in writing. Our terms and conditions also apply if we perform the delivery to the customer without any proviso and in the knowledge of contrary terms and conditions or those of the customer that deviate from our own.
- 2.) All agreements that are made between us and the customer for the purposes of implementing this contract have been recorded in writing in this contract.
- 3.) Our terms and conditions of delivery and payment are also only valid with respect to companies in the sense of § 310 Section 1 Official Federal Gazette.
- 4.) Our terms and conditions are valid for all future transactions with the customer.

### II. Credit Basis

A precondition for our obligation to deliver is the full creditworthiness of the customer, of which it assures us through completion of the contract. If after signing the contract, we receive information or circumstances arise, which would cause the assurance of a credit in the amount arising out of the contract to appear unsafe, we shall be entitled to demand payment in advance or surety or payment without taking account of contrary, previous agreements, and to refuse performance until receipt of payment or performance of security or to withdraw from the contract and/or demand payment of damages in lieu of non fulfilment. These rights apply to all of our outstanding accounts.

### III. Tender – Tender Documentation

- 1.) If the order is to qualify as a tender in accordance with § 145 Official Federal Gazette, we can accept same within two weeks.
- 2.) We reserve ownership rights and copyright in respect of photographs, drawings, calculations and other documents. This also applies to those written documents, which are designated as “confidential”. The customer requires our prior expressed written agreement before passing them on to third parties.

### IV. Prices and Terms and Conditions of Payment

- 1.) Prices are understood to be ex works exclusive of packaging, freight, carriage and insurance. Subcontractor work is to be delivered for us freight prepaid. Conditions deviating from this arrangement require our expressed written confirmation.
- 2.) Legally applicable VAT is not included in our prices; it will be invoiced separately on the day of invoicing in the amount stipulated by law.
- 3.) The deduction of a cash discount requires special written agreement.
- 4.) Unless otherwise specified in the contract confirmation, the purchase price is due for payment net (without deduction) within 30 days of the invoice date. Legal provisions apply in respect of the consequences of delayed payment.
- 5.) Remuneration for shares of costs for tools, which are necessary for the manufacture of the ordered goods, does not entitle the customer to any rights to the tools or tool.
- 6.) If we have undertaken to erect or assemble the goods and unless otherwise agreed, the customer shall, in addition to the agreed remuneration, bear all necessary ancillary costs such as travel expenses, costs for the transport of the hand tools and personal belongings as well as field allowances.
- 7.) The customer shall only be entitled to off-setting rights if its counter claims have been established by a court, are unchallenged or are recognised by us. Furthermore, the customer is only entitled to exercise a right of withholding insofar as its counter claim arises from the same contractual relationship.

### V. Delivery Time

- 1.) A precondition for the adherence to delivery dates for deliveries is the timely receipt of all documents, necessary permits and releases, especially plans, to be furnished by the customer, as well as adherence to the agreed terms and conditions of payment and other obligations by the customer. If these preconditions are not adhered to in good time, the deadlines shall be extended appropriately; this does not apply if we are responsible for the delay.
- 2.) If the customer comes into default in acceptance or culpably breaches other obligations to cooperate, we shall be entitled to demand compensation for damages suffered by us to that extent, including any extra expenses. We reserve the right to make more extensive claims.
- 3.) Insofar as the preconditions set out in Section 3) obtain, the risk of accidental destruction of or accidental deterioration in the goods shall pass to the customer at the moment in which the latter enters into default in acceptance or in payment.

- 4.) If non-compliance with deadlines is due to force majeure, e.g. Mobilisation, war, revolt or similar events, e.g. strike, lockout, the deadlines shall be extended by an appropriate period.
- 5.) If we are in delay, the customer can – insofar as it can credibly demonstrate that it has suffered damage as a result of same – demand compensation for each completed week of delay in the amount of 0.5%, but not exceeding 5% in total of the price for the portion of deliveries, which cannot be usefully operated due to the delay.
- 6.) Both compensation claims by the customer due to delayed delivery and compensation claims in lieu of performance, which go beyond the limits set out in No. 5), are excluded in all instances of delayed delivery, even after the elapsing of a delivery deadline set for us. This does not apply insofar as compulsory liability applies in cases of premeditation, gross negligence or due to injury of life, limb or health. The customer can only withdraw from the contract within the framework of the legal provisions insofar as we are responsible for the delay in delivery. A change in the burden of proof to the disadvantage of the customer is not associated with the above provisions.
- 7.) The customer is obligated to declare within an appropriate deadline and at our request whether it is withdrawing from the contract due to the delay or whether it insists on the delivery.
- 8.) If, at the request of the customer, the despatch or delivery is delayed by more than one month after notification of readiness for despatch, the customer can be billed for storage costs for each commenced month in the amount of 0.5% of the price of the objects to be delivered, but not exceeding a total of 5%. The contractual parties remain at liberty to furnish evidence of higher or lower storage costs.

### VI. Transfer of Risk

- 1.) Risk is also transferred to the customer as follows in the case of freight prepaid delivery:
  - a) In the case of deliveries without erection or assembly, if they have been brought for despatch or have been collected. At the request and expense of the customer, deliveries by us will be insured against the usual transport risks: the customer shall bear costs due in respect of same.
  - b) In the case of deliveries with erection or assembly on the day of transfer in the customer's own plant or, if agreed, following fault-free test operation.
- 2.) If despatch, erection, commencement, implementation of erection or assembly, acceptance in the customer's own plant or the test operation are delayed for reasons for which the customer is responsible, or the customer is in delay of receipt, risk shall duly be transferred to the customer.

### VII. Packaging Costs

- 1.) Transport and other packaging according to the specifications of the packaging ordinance shall not be taken back; with the exception of pallets. The customer is obligated to ensure disposal of packaging at its own expense.
- 2.) If they are in good condition, crates will be returned freight prepaid within four weeks, offset at 2/3 of the calculated value.

### VIII. Material Defects

- 1.) The customer is not entitled to refuse acceptance of deliveries due to inconsiderable deficiencies.
- 2.) All those parts or services, which within the period of limitation – irrespective of the operational period – display material defects, insofar as their cause already existed at the time of transfer of risk, are, at our discretion and free of charge, to be improved, delivered new or provided again.
- 3.) Material damage claims are subject to the statute of limitations after 12 months. This does not apply insofar as the law specifies longer deadlines, as well as in cases of violation of life, limb or health, in the event of premeditated or grossly negligent violation of duties on our part and in the case of malicious silence with regard to a defect. This does not affect legal provisions governing elapsing, impairment and re-commencement.
- 4.) A precondition to the customer's claims in respect of defects is that the customer has correctly fulfilled its obligations with respect to investigation and lodging of a complaint as stipulated under § 377 Official Federal Gazette.
- 5.) In the case of defect claims, payments may be withheld by the customer to an extent that is in appropriate proportion to the material defects that have occurred. The customer may only withhold payments if a claim is made in respect of a defect the justification of which cannot be in doubt. If the damage claim is erroneous, we shall be entitled to demand compensation from the customer for the extra expenses incurred by us.
- 6.) We must first be afforded the opportunity to fulfil our obligations within an appropriate deadline. Should this renewed effort to perform our duties fail, the customer can withdraw from the contract or reduce the price.



- 7.) Claims in respect of defects shall not obtain in the event of an inconsiderable deviation from the agreed finish, in the event of an inconsiderable infringement of usefulness, in the case of natural wear or damage, which occur after the transfer of risk as a result of incorrect or negligent handling, excessive loading, unsuitable operating equipment, deficient construction work, unsuitable construction foundation soil, or which occur due to special external influences, which are not preconditions according to the contract, as well as in the event of non-reproducible software errors. Similarly, if the customer or third parties carry out changes or repairs incorrectly, there shall be no defect claims in respect of same and consequences arising from same.
- 8.) Claims by the customer due to expenses, especially transport, travel, work and material costs, which are necessary for the purposes of improvement, are excluded, insofar as the expenses increased because the object of the delivery was subsequently brought to a location other than the premises of the customer, unless said transportation corresponded with its correct use.
- 9.) Recourse claims by the customer against us in accordance with § 478 Official Federal Gazette (Recourse by the entrepreneur) shall only obtain insofar as the customer has reached an agreement with its customer that does not exceed the provisions of legal claims in respect of defects. Furthermore No. 8 shall apply accordingly in respect of the scope of the customer's recourse claim against us in accordance with § 478 Section 2 Official Federal Gazette.
- 10.) Otherwise, Art. XI (Miscellaneous Claims for Damages) shall be valid for claims for damages. Farther reaching claims or claims other than those governed by this article by the customer against us and our agents in performance due to a defect are excluded.

#### IX. Industrial Property Rights

- 1.) If deliveries or services are performed in accordance with the customer's drawings or other specifications, the customer shall bear responsibility for ensuring that no industrial property rights of third parties are violated as a result of implementation of the contract.
- 2.) In the event of a claim by a third party due to breach of industrial property rights, the customer shall release us from all claims.
- 3.) Insofar as the customer has industrial property rights of its own, the customer cannot claim against us in respect of violation due to performance of the contract. We need only feel subject to a violation of the customer's industrial property rights through use of its drawings or other specifications at a time/or for implementation for purposes other than those in the interests of the customer, if the customer drew our specification attention to the existence of said industrial property rights with more detailed designations at the time of handing over of the drawings or on the occasion of identification of other specifications.
- 4.) Models, sample drawings, standards sheets as well as other information and documents, which the customer receives from us for the order or in connection with the order, remain our property. Physical and intellectual industrial property rights pertaining to these items (e.g. patents, brands, taste samples, licenses etc.) are similarly retained by us.  
The customer is obligated to maintain strict confidentiality, and may not possess said objects and rights without our expressed written permission.  
In the event of any contravention an immediate penalty will be due, which we can determine in accordance with reasonable discretion. Farther reaching rights on our part are not affected by this and are reserved by us.

#### X. Subsequent Impossibility of Performance; Modification of Contract

- 1.) Insofar as it is impossible to perform the delivery, the customer is entitled to demand compensation, unless we are not responsible for the subsequent impossibility of performance. However, the customer's claim for compensation is limited to 10% of the value of that part of the delivery that cannot be usefully operated due to subsequent impossibility of performance. This limitation does not apply insofar as compulsory liability is incurred in the event of premeditation, gross negligence or injury to life, limb or health; a change in the burden of proof to the disadvantage of the customer is not associated with this. This does not affect the customer's right to withdraw from the contract.
- 2.) Insofar as unforeseeable circumstances as defined in Art. V. No. 4. considerably change the commercial significance or content of the delivery or have a considerable impact on our plant, the contract will be appropriately modified in good faith. Insofar as this is not commercially justifiable, we shall be entitled to withdraw from the contract. If we wish to make use of this right of withdrawal, we must immediately notify the customer of this intention following recognition of the extent of the event, even if an extension to the delivery deadline was initially agreed with the customer.

#### XI. Miscellaneous Claims for Damages

- 1.) Claims for damages and expenses by the customer, irrespective of their legal reasons especially arising from the violation of duties relating to obligation and unauthorised actions, are excluded.

- 2.) This does not apply insofar as compulsory liability is incurred, e.g. in accordance with the Product Liability Act in the event of premeditation, gross negligence, injury to life, limb or health, and due to the violation of essential contractual obligations. The claim for damages for violation of essential contractual obligations is limited however to contractually typical, foreseeable damages, insofar as premeditation or gross negligence does not exist, or liability is incurred due to injury to life, limb or health. A change in the burden of proof to the disadvantage of the customer is not associated with the above provisions.
- 3.) Insofar as the customer is entitled to claims for damages and expenses in accordance with this agreement, said claims shall be subject to the statute of limitations when the limitation period as per Art. VIII No. 3 valid for material claims elapses. The legal period of limitations regulations shall apply in the case of claims for damages in accordance with the Product Liability Act.

#### XII. Securing of Retention of Ownership

- 1.) We retain ownership of the goods until all outstanding accounts held by us against the customer arising from the commercial relationship including future outstanding accounts also from contracts signed simultaneously or at a later date have been settled. This also applies if individual or all of our outstanding accounts were recorded in a current invoice and the balance has been drawn and recognised.
- 2.) The customer is only entitled to sell on the reserved goods through correct commercial trading if it hereby now assigns to us all outstanding accounts that arise for it with respect to customers or third parties as a result of selling the goods on. If reserved goods are sold unprocessed or after processing or in conjunction with objects, which are the exclusive property of the customer, the customer hereby now assigns to us the full amount of outstanding accounts arising from said further sale. If the reserved goods are sold by the customer – after processing/combination – together with goods that do not belong to us, the customer hereby now assigns the outstanding accounts arising from the further sale in the amount of the value of the reserved goods with all ancillary rights and priorities before the rest. We hereby accept said assignment. We are also entitled to call in these outstanding accounts after assignment. This does not affect our authorisation to collect the outstanding accounts; however we are obligated not to collect the outstanding accounts as long as the customer correctly fulfils its payment and other obligations.  
We can demand that the customer notify us of the assigned outstanding accounts and their debtors, give us all details necessary for collection, hand over the documentation necessary to do this and inform the debtors of the assignment.
- 3.) The customer performs handling and processing of the reserved goods for us without our incurring any obligations as a result. In the event of processing, combining, mixing or commixturing of the reserved goods with other goods that do not belong to us, we are entitled to joint ownership of the resultant, new item in the ratio of the value of the reserved goods to that of the other processed goods at the time of the processing, combining, mixing or commixturing. Should the customer acquire sole ownership of the new item, the contractual parties are in agreement that the customer shall accord us ownership of the new item in the ratio of the value of the processed and combined, mixed or commixtured reserved goods, and shall hold this in safe custody for us free of charge.
- 4.) If, in connection with the payment of the agreed price, an exchange liability on our part is justified by the customer, retention of ownership as well as the outstanding account arising from delivery of goods on which it is based shall not be extinguished before the exchange is redeemed by the customer as the drawee.
- 5.) If the value of the existing sureties exceeds the outstanding accounts to be secured by 20%, we shall at the customer's request be obligated to release them.
- 6.) In the event of levies of execution of other interventions by third parties, the customer must notify us of same immediately in writing, so that we can take legal proceedings in accordance with § 771 ZPO. Insofar as the third party is not in a position to reimburse us for the court and out-of-court costs associated with legal proceedings in accordance with § 771 ZPO, the customer shall be liable for the losses incurred by us.

#### XIII. Legal Validity of this Contract

In the event of individual provisions of this contract being legally invalid, the remaining sections of this contract shall remain legally valid. This does not apply if adherence to the contract would represent an unjustifiable hardship for a contractual party.

#### XIV. Place of Jurisdiction and Place of Fulfilment

- 1.) Insofar as the customer is a trader, our headquarters shall be the place of jurisdiction, but we are entitled to take legal proceedings against the customer in the jurisdiction of its place of residence.
- 2.) The law of the Federal Republic of Germany is applicable; the validity of UN commercial law is excluded.
- 3.) Unless otherwise stated in the order confirmation, our headquarters is the place of fulfilment.