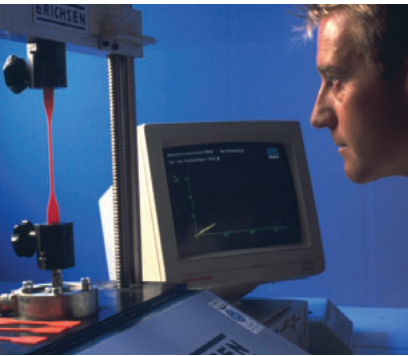




*When it comes  
to silicone*

SILICONE EXTRUSIONS

## QUALITY IN SILICONE



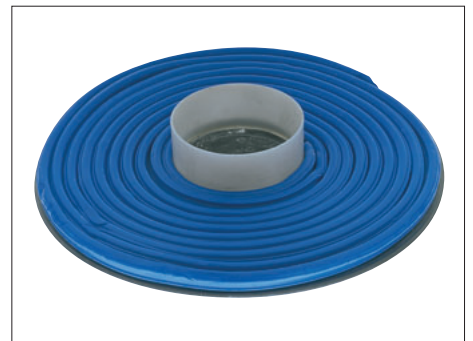
Expertise. Innovation. Flexibility. These are the three properties which have made BIW a leading company for all aspects of the production of top quality hoses, profiles and seals made of silicone.

Success in the market is a result of a consistent quality policy with continuous improvement as an integral component of the management strategy. This includes both on-going managerial optimisation and regular organisational and technical verification and improvement of all steps in the process chain.

Thanks to its many years of know-how with elastomers together with the necessary flexibility, BIW is in a position to react promptly to new market requirements at all times. The rapid changes and differing demands made by customers present BIW's experts with new challenges every day, which they gladly take up. This guarantees that the company is always up-to-date and that customers are provided with state-of-the-art technology.

Regardless whether standard articles or special products are concerned, BIW provides customers with products and solutions which are tailor-made to their every requirements.

Modern machinery and up-to-date material and production know-how, together with highly motivated and excellently trained staff, are the vital ingredients in BIW's production process. The whole process chain from the raw material through to the finished end product is actually performed "in-house" in order to assure a constantly high standard of quality throughout all stages of the production process. These factors combine to produce a crucial advantage over competitors. BIW's special production expertise has made the company a reliable problem-solving partner for customers who are satisfied in every respect.



## SILICONE – A SPECIAL ELASTOMER

The special thing about silicone is that it is a high-temperature vulcanising synthetic rubber (HTV) based on the element silicon (Si), which is the basic component in silicone chemistry. Silicon, the second most frequent element on earth, occurs only in the form of compounds such as silicon dioxide and as silicates. Synthesis then produces polysiloxane which can be put to commercial use. The silicon-oxygen chains are supplemented by organic groups containing carbon to produce silicone polymers.

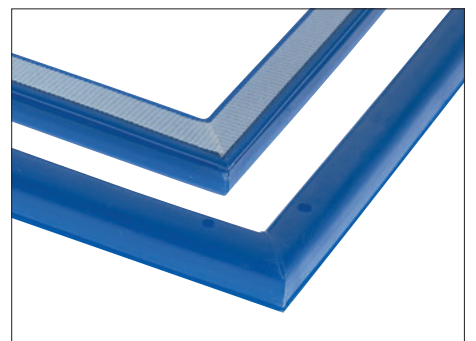
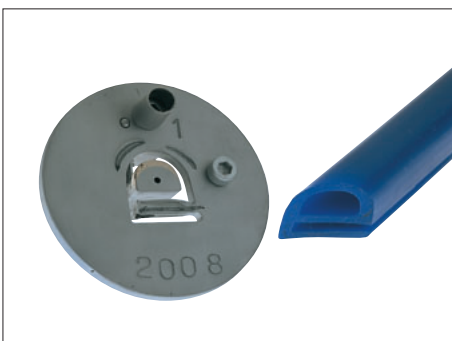
This unique structure is extremely stable, resulting in the excellent physical and chemical properties of silicone elastomers. It is above all the outstanding temperature properties giving silicone an application range from  $-80^{\circ}\text{C}$  to  $+300^{\circ}\text{C}$  which distinguishes it clearly from other rubbers.

The basic materials or "bases" used at BIW are specially selected to guarantee the product properties. When part of the methyl groups are replaced deliberately by vinyl groups, the fundamental properties of these different bases (MVQ) are already pre-defined. The technical designation MVQ is frequently used on the market, with silicon itself being abbreviated as Q because this is a quaternary group with linkage partners at four points.

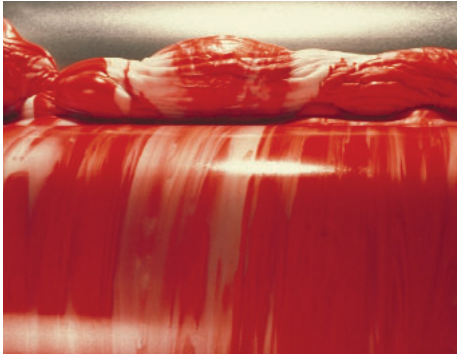
"In-house" compounding on the basis of BIW's specialist know-how makes it possible to fulfil special customised requirements by using specific additives, fillers and stabilisers. In addition, practically all colours of the RAL colour chart can be matched from colourless transparent (natural) via translucent through to opaque.

The outstanding rubber elastic properties in terms of both expansion and compression behaviour make silicone the ideal sealing material for BIW's customers.

Two alternative vulcanisation methods are used for further processing of the compounds produced at BIW, depending on the final use: peroxide vulcanisation for technical applications, and addition curing based on platinum catalysts for the strictest requirements in food production and medical technology. Silicone does not need any other vulcanisation chemicals or organic plasticisers such as those used in other rubbers.



## IT'S THE COMPOUND THAT COUNTS



BIW's special know-how is in the production of top quality silicone compounds as the basis for the final products. This comes from a wealth of experience and intensive development work in the field of elastomer technology, where BIW sets innovative development standards time and again.

Thanks to in-house compounding, additional components (additives) can be introduced to the basic silicone to produce material blends which are then refined in strainers. The result: first-class silicone compounds with a wide range of colours, degrees of hardness and quality. More than 2,000 recipes have been developed up to now. These compounds ensure that the final products show the various chemical, phy-

sical and physiological properties. The compounds are then extruded. In the end, the resulting hoses, profiles and seals show the following qualities, depending on the specific recipes required for the articles (selection):



## Properties of BIW silicone extrusions

		Typical	Special	Remarks
<b>Density</b> DIN 53479 A	g/cm <sup>3</sup>	1,08 - 1,22	up to 1,75	High density for filled compounds Standard 1,18 g/cm <sup>3</sup>
<b>Hardness</b> DIN 53505	Shore A	30 - 80	15, 20, 90	15, 20 und 90 Shore A as solutions to special problems
<b>Tensile strength</b> DIN 53504	N/mm <sup>2</sup>	5 - 12	> 11	Similar values across the whole material spectrum
<b>Elongation at break</b> DIN 53504	%	300 - 600	up to 900	Outstanding values with platinum catalysed systems and peroxide types with special tensile strength
<b>Tear strength</b> ASTM D 624 B	N/mm	5 - 25	up to 45	Outstanding values with platinum catalysed types and special peroxide types
<b>Rebound resilience</b> DIN 53512	%	25 - 50	up to 75	Interesting variable for special applications
<b>Compression set</b> DIN 53517 22h/175°C	%	30 - 60	< 30	The compression set is highly dependent on the temperature of use
<b>Dielectric strength</b> VDE 0303	kV/mm	18 - 20	up to 36	Special types available for high-voltage applications
<b>Surface resistance</b> VDE 0303	Ohm	10 <sup>12</sup> - 10 <sup>13</sup>	-	To be observed for surface treatment
<b>Specific contact resistance</b> VDE 0303	Ohm · cm	10 <sup>15</sup> - 10 <sup>15</sup>	-	Insulating (standard)
<b>Electrical conductivity</b> VDE 0303	Ohm · cm	2 - 12	up to 1000	Electrical conductive types and compounds (for "special" values)
<b>Abrasion resistance or abrasion</b> DIN 53516	mm <sup>3</sup>	50 - 100	< 50	Abrasion resistance is good for unfilled compounds with high tear propagation strength
<b>Thermal conductivity</b> DIN 52612 100°C	W m <sup>-1</sup> K <sup>-1</sup>	0,2 - 0,3	0,8 - 1,2	Special thermally conductive compounds required for high values
<b>Coefficient of expansion</b> <b>Linear shrinkage</b>	K <sup>-1</sup> %	2 - 4 · 10 <sup>-4</sup> 2 - 4	-	Expansion coefficient and shrinkage depend on the filler level, and decrease with increasing density
<b>Gas permeability</b> air at 20°C DIN 53536 air at 80°C	cm <sup>2</sup> s <sup>-1</sup> bar <sup>-1</sup>	1.600 · 10 <sup>-9</sup> 3.700 · 10 <sup>-9</sup>	- -	The gas permeability of silicone is 30 – 400 times higher than in other elastomers, and increases with temperature
<b>(High) Temperature resistance</b> no significant changes	°C	up to +200	up to +300	High temperature resistance by using special additives, up to 200°C all colours, up to 250°C redbrown, up to 300°C opaque & greyblue
<b>Cold flexibility</b> does not turn brittle	°C	down to -60	down to -80	High cold flexibility possible by using special silicone types, milky transparent or pale colours
<b>Resistance to chemical</b>	The chemical resistance depends to a great extent on the crosslink density and the type and quantity of used filler. Watery solutions of weak lyes, acids and salts and polar liquids are not critical for silicone. On the other hand, non-polar liquids can cause relatively large swelling (cf. also resistances list on our web-site, <a href="http://www.biw.de">www.biw.de</a> )			
<b>Water vapour resistance</b>	Silicone shows excellent resistance to boiling water and steam (increase in volume <1%) but shows non-uniform behaviour at temperatures above 135°C. Highly elastic types (high rebound resilience, low compression set) are more suitable; special water vapour-resistant types show a decrease in elongation by a quarter of the original value after approx. 2 months at 160°C.			
<b>Weathering/ageing</b> <b>Ozone- and UV-resistance</b>	Even after years of exposure to the elements, the properties of silicone only undergo minimum change. Additives are not required for improved weathering resistance. Silicone also shows excellent resistance to ozone and UV influence without any significant ageing over years.			



## EXTRUSION



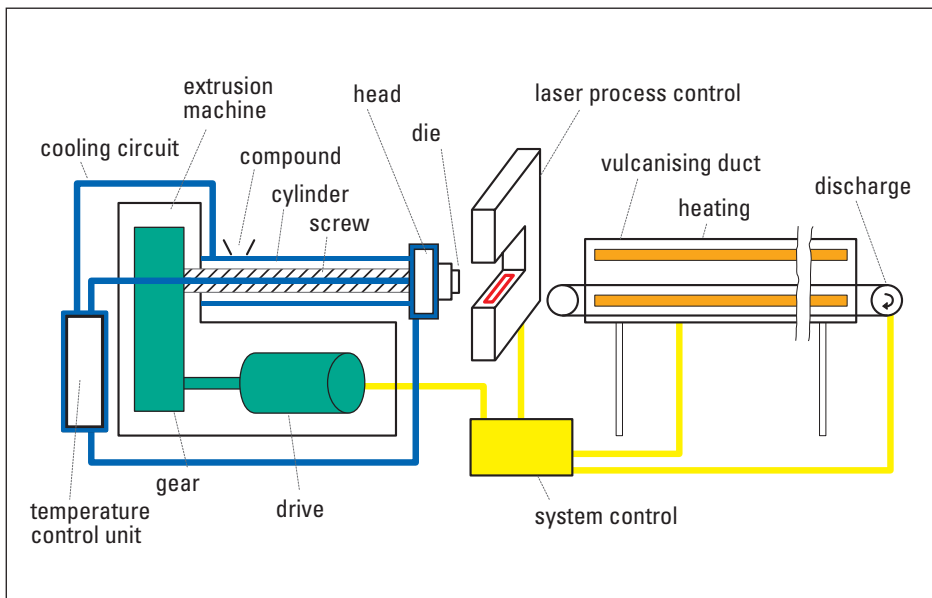
The silicone compounds then undergo the extrusion process, in which the tool (die) creates the actual contour. Vulcanisation follows in a heating section without external pressure (pressureless vulcanisation) with platinum catalyst for addition curing or with peroxide curing.

At BIW, the extrudate is scanned in contactless control procedures between the extruder head, which is constantly cooled together with the screw and cylinder of the extruder, and the heating section. Laser gauges are used not only for permanent quality data registration and evaluation but also for direct process control. The use of state-

of-the-art control technology together with the wealth of know-how of BIW's experts has resulted in a self-regulating control loop in which the measured data from the laser scanning process are used directly as control parameters for the running speed of the extrusion screw. In turn, this ensures that the profiles have exactly the right shape and hoses the right dimensions, even in long series.

Together with classical elastomer extrusion, BIW also uses special processing methods for individual customised solutions:

### Example: extrusion



- Vertical extrusion: the vertical process is used to produce large-volume special hoses with diameters of up to 200 mm or profiles with a high dead weight and complicated contours, without belt impressions

- Foam extrusion: appropriate machinery and technology for multi-dimensional material expansion together with suitable blowing agent are used to produce silicone foam profiles in differing densities and compressibility classes

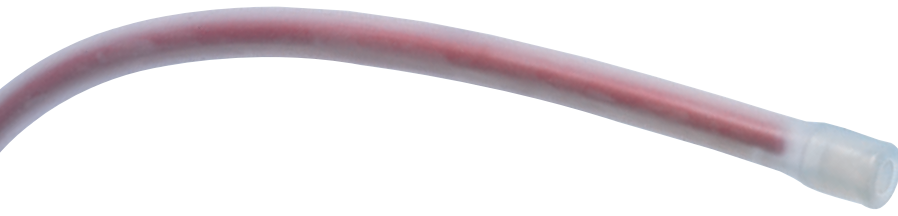
- Crosshead extrusion: screw and cylinder are arranged in a 90° angle to integrate textiles, metals or other materials as functional elements in silicone profiles
- Co-extrusion: up to 3 extruders can be combined to produce combinations of hard/soft profiles, multi-coloured profiles and combined foam/solid profiles

The in-house development team in BIW Technology Centre adopts the customer's own characteristic features insofar as corresponding solutions do not already exist. The standard pro-

gramme for example includes wear-proof "in-line" marking, together with in-process extrudate shaping (e.g. hose manifolds) or finished profiles (e.g. corner-vulcanised frames or profiles with notches or ventilation punchings).



## SILICONE HOSES, HOSE SECTIONS AND RINGS



Silicone hoses and hose sections are ideal for both electrical insulation and for conveying liquids and other media. The prime characteristics in favour of using these products usually include the outstanding chemical resistance together with the wide range of temperatures covered by silicone. Other important advantages of silicone hoses include the high transparency or full

range of colour possibilities which can be matched to samples or to the RAL colour chart, together with the large number of international standards covered by silicone so that it can be used in the domestic appliance industry, in the drinking water sector, in medical technology and in the pharmaceutical industry (see table).

### International standards for silicone products

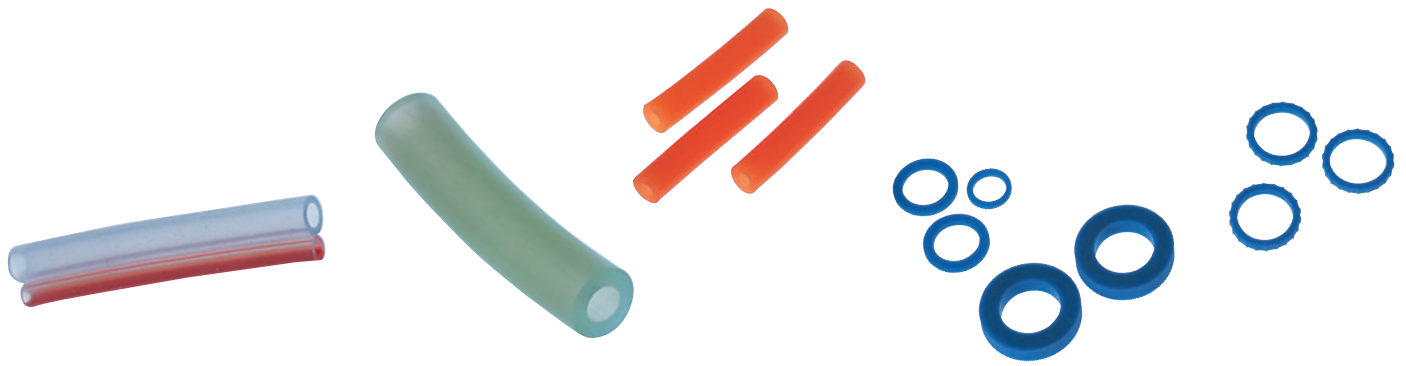
	<b>fulfilled for peroxide-vulcanised silicone products</b> <b>Shore hardness    Temperature class</b>	<b>fulfilled for platinum-catalysed, addition-vulcanised silicone products</b> <b>Shore hardness    Temperature class</b>
<b>BgVV XV Part A, "Silicone"</b>	20 - 70 Shore A    up to 300°C 80 & 90 Shore A    up to 200°C	40 - 70 Shore A    up to 280°C 80 Shore A    up to 180°C
<b>FDA-Code of Federal Regulation §177.2600</b>	20 - 70 Shore A    up to 300°C 80 & 90 Shore A    up to 200°C	40 - 70 Shore A    up to 280°C 80 Shore A    up to 180°C
<b>USP Class VI</b>	40 - 80 Shore A    up to 200°C	40 - 70 Shore A    up to 180°C
<b>BS 6920 WRAS (former WRc)</b>	30 - 80 Shore A    up to 200°C	40 - 80 Shore A    up to 180°C
<b>KTW-recommendation BGBl. 28</b>	40 - 80 Shore A    up to 200°C Class C, D1, D2	-
<b>UL 94</b>	20 - 90 Shore A    up to 200°C Class HB/V0* 60 Shore A    up to 200°C Class V0 Yellow Card for "Bases"	40 - 80 Shore A    up to 180°C Class HB/V0*
<b>ATS 1000 FAR 25853</b>	60 & 80 Shore A    up to 200°C	-
<b>DIN EN 549 DVGW</b>	60 Shore A    Hardness range H2 Temperature class E1 ( - 150°C) Nr. NE 5112 AN 0205	-

The standards stated here also apply to most of the coloured silicone products.

Special colours and other specifications on request. Status: 03.2003

\* Self-classification





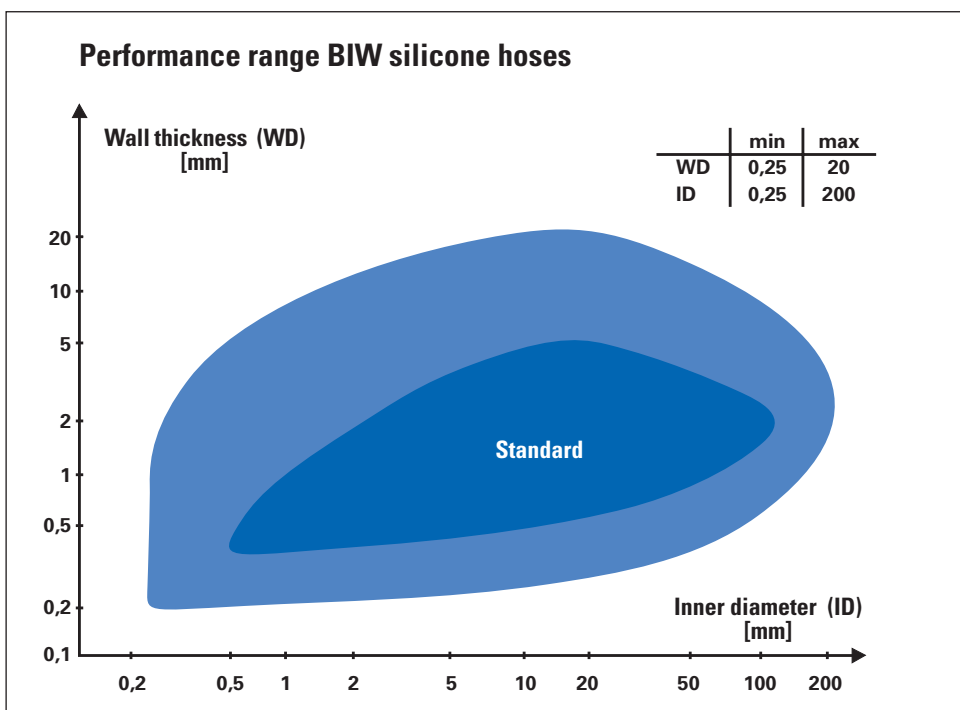
Together with classical applications in beverage vending machines and coffee machines, hoses made of plasticiser-free, physiologically and toxicologically harmless silicone are also assuming increasing importance on the sanitary sector. The fact that hoses can be sterilised is highly significant in the medical and pharmaceutical sectors, and the fact that they do not turn brittle even under high thermal and mechanical loads is another major advantage.

In addition to a broad range of standard transparent silicone hoses available ex stocks, BIW also offers a large number of hose solutions for specific applications:

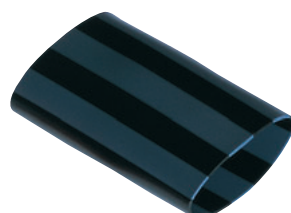
- Hose manifolds for constricted installation situations (e.g. coffee machines)
- Hand-made moulded hose pieces (e.g. industrial kitchen drain hoses)
- Cut-off hose sections (e.g. electrical insulating hoses)
- Multi-lumen and multi-channel hoses (e.g. dental air and water supply and suction systems)
- Sliced hose rings (e.g. lamp socket seals)
- Hose seals bonded to a ring (e.g. lamp and headlamp housing seals)
- Conductive hose cuffs (e.g. copying machine roller covers)
- Grooved or knobbed hose sections (e.g. transport rollers)

- Co-extruded combination hoses with conductive and insulating sections (e.g. medical sensors) or superimposed layers (e.g. high-voltage charge eliminators in the electrical industry)
- Crystal-clear platinum-vulcanised hoses (e.g. peristaltic pumps)
- Printed hoses (e.g. for exhaust applications)

It is always a good idea to get in touch with BIW's technical consultants for special applications, extraordinary atmospheric conditions, highly aggressive media or design queries. BIW will always find the right solution.



logarithmic scale



## SILICONE PROFILES, SQUARES AND ROUND CORDS

There are applications for silicone profiles in practically all areas of industry, where they are used primarily as seals in degrees of hardness between 20° and 90° Shore A.

Together with the classical applications in the electrical, heating and domestic appliance industry together with mechanical engineering, machine and plant construction, there are also a large number of applications in the aerospace industry (ATS100-approved silicone compounds), computer and switchboard manufacturing (EMI shields based on conductive compounds) or in window and facade construction where resistance to weathering, ozone and UV is crucial.

Silicone profiles can have practically any conceivable shape, from simple geometries (squares, round cords) through to complicated cross sections with hollow chambers in varying dimensions. BIW has already produced several thousand profile contours, all of which are available to the customer in the form of ready extrusion dies (see under: [www.biw.de](http://www.biw.de)).

Other characteristics in favour of silicone profiles include the fact that they are neutral to plastics and paints, can be given a light-fast colour matching exactly to customer colour samples or practically any of the colours in the RAL colour chart. The post curing process following on from extrusion ensures that all volatile components are evaporated out so that silicone profiles can also be used in medical technology and in contact with food products without any problems.

Given its unique elastomer properties, silicone is being increasingly used in the automotive industry (e.g. headlamp seals, ignition system protection). BIW's state-of-the-art production machinery is capable of producing profile widths of up to 250 mm. This means it is also possible to manufacture flat strips for rational, continual punching of punched seals.

Another broad application area consists of profile seals for high-temperature and exhaust situations. BIW silicone profiles are ideal as

- Furnace door seals
- Boiler closure seals
- Cooking appliances seals
- Heating appliance seals
- Electrical appliance seals
- Lid seals



By using specially developed material formulations, silicone profiles can be bonded to rings for use as pipe seals for exhaust systems in oil- and gas-fired heaters.

Clip seals are ideal for rapid mounting and simple, pure-grade waste sorting. These are produced with corresponding profile punchings for simple installation. After cutting to the right length, sealing frames of continuous extruded profiles are joined by BIW according to the following alternative methods:

- vulcanising
- bonding
- welding

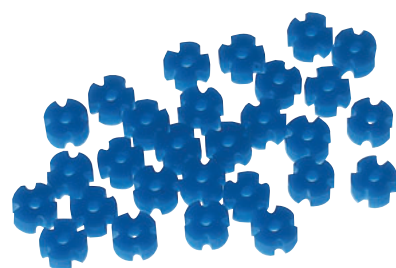
The best method for each individual case is selected according to the customer's requirements.

Specially optimised compounds are used in highly critical ambient conditions:

- steam-proof compounds
- platinum-vulcanised, high tensile-strength types
- electrically conductive silicone
- temperature-stabilised compounds

One of BIW's particular specialities consists of 2-component co-extrudates made of hard/soft or foam/solid combinations.

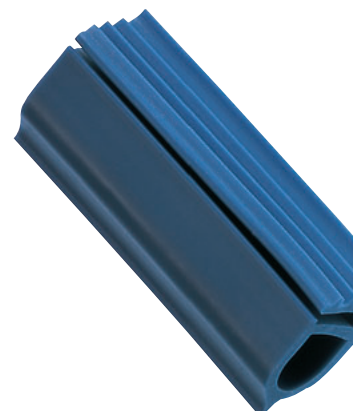
BIW has already successfully incorporated sensor or switching elements in silicone profiles, together with a large number of profiles with fibre, fabric or metal reinforcements.



### Available dimensions in the HTV extrusion programme:

<b>Silicone round cord</b>	SIR	Diameter 0,5 - 60 mm	
<b>Silicone square</b>	SIV	Width 0,5 - 250 mm	Height 0,3 - 40 mm
<b>Silicone profile</b>	SIP	on request, see profile catalogue under <a href="http://www.biw.de">www.biw.de</a>	

Tolerances usually as per DIN ISO 3302-1E2



# SILICONE PRESSURE HOSES



The unique combination of elastomer and textile processing technology under one roof puts BIW in a position to offer its customers a broad range of textile-reinforced pressure hoses for many different high-pressure or vacuum applications. The multi-stage production process combines an extruded silicone inner hose with a surrounding braid of the various different possible textiles and, on request, a coloured silicone coating or LSR fixing. This sandwich structure guarantees pressure resistances of up to more than 100 bar with multiple reinforcements with an additional intermediate silicone ply. Standard reinforcements consist of polyester monofilament (PES mono), polyester multifilament (PES MF), fibre-glass twine and yarns and aramide fibres. A specific selection of nominal widths with inner diameters from 3 mm (1/8 inch) to 50 mm (2 inch) is available ex stock.

Together with the four standard reinforcements, stainless steel, copper or other metal wires can also be braided in, for example as heating or control leads.

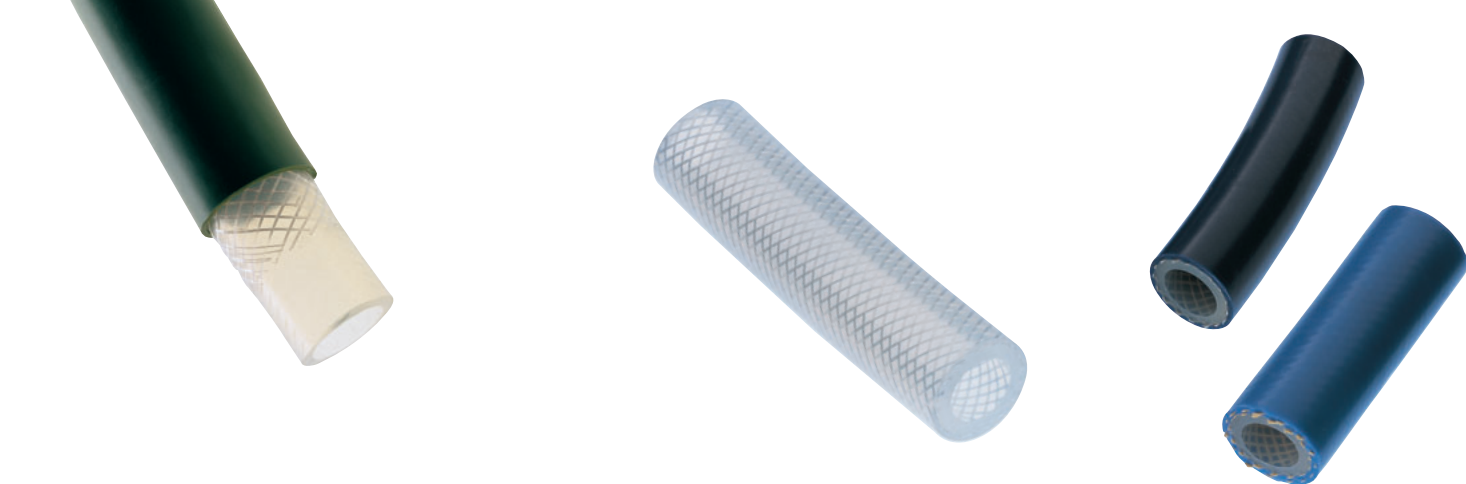
Silicone pressure hoses are used in the following areas:

- Medical technology (e.g. dialysis machines)
- Plant construction (e.g. coolant pipes)
- Machine construction (e.g. suction and filling hoses)
- Industrial kitchen technology (e.g. hot water and steam cooking hoses)
- Food industry (e.g. transport lines conforming with food product requirements)
- Emergency supply systems (e.g. temperature-adjusted respiration hoses)
- Bio-technology (e.g. permeable fermentation pipes)
- Wastewater technology (e.g. gassing hoses)
- Aerospace engineering (e.g. temperature-resistant compressed air pipes)
- Communications engineering (e.g. protection hoses for cold light carriers)

## Properties of pressure hose reinforcements (Part 1)

Reinforcement	PES-MF	PES-Mono	Glassfibre	Aramide
Trade name	Trevira®			Twaron® Kevlar®
Description	Polyester-multifilament	Polyester-monofilament	E-Glass	Aramide fibre
Textile form	Yarn	Monofil	Twine	Yarn
Temperature resistance				
Standard	up to 160°C	up to 160°C	up to 180°C	up to 180°C
Optimised	ditto	ditto	up to 240°C	up to 240°C
Dimensions	up to NW 19	up to NW 25	up to NW 50	up to NW 50

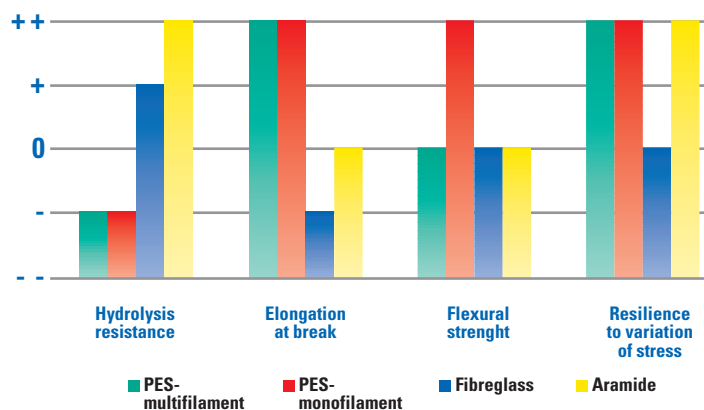
PES is the normal designation for polyester in the textile branch; the correct nomenclature is PET.  
Trevira®: copyright 2002 Trevira GmbH, Twaron®: Copyright TEIJIN TWARON BV; Kevlar® : Copyright 1995-2003 E.I du Pont de Nemours and Company



These hoses can be equipped with an electrically conductive inner, outer or intermediate ply in the co-extrusion procedure for discharging static electricity.

With its various braiding machines, BIW is capable of producing almost any designs and structures in terms of braiding angle, number of braids or identifying threads. Wide-meshed braiding is used with highly transparent silicone compounds for easy recognition of the flow media. For applications in the fittings and sanitary sector, BIW produces silicone hoses with closed, tight-meshed braids with a stainless steel wire surface. BIW uses a low friction coating surface treatment for better handling of the flexible silicone pressure hoses, result-

### Properties of pressure hose reinforcements (Part 2)



ing in a considerable increase in the surface life of such hose systems under the dynamic loads of everyday use. Thanks to the wide range of different variations and versions, BIW's development engineers can produce optimised

pressure hose constructions and material combinations specially adapted to each specific application, tested for suitability in the Technical Centre.

### Dimensions, bending radius and pressure resistance of BIW standard pressure hoses

Nominal width			Outer diameter	Wall thickness	Bending radius	Bursting pressure at 20°C **		Vacuum suitability
NW	+/- Tol.	NW	Standard *	Standard *	Standard *	Standard single reinforcement	Optimised double aramide reinforcement	Standard single reinforcement absolute pressure
[mm]	[mm]	[inch]	[mm]	[mm]	[mm]	[bar]	[bar]	[bar]
3	0,2	1/8	8	2,5	30	60	> 100	150
6	0,3	1/4	12	3	50	40	> 100	150
8	0,3	5/16	15	3,5	60	40	> 80	150
9,5	0,3	3/8	17	3,75	70	35	> 80	150
12,5	0,3	1/2	21	4,25	80	30	> 80	150
16	0,3	5/8	25	4,5	100	30	> 80	200
19	0,4	3/4	31	6	150	25	> 80	200
25	0,5	1	37	6	185	15	> 70	250
32	0,5	1 1/4	45	6,5	220	10	> 50	300
38	1,0	1 1/2	51	6,5	260	10	-	400
50	1,0	2	64	7	350	6	-	600

\* Individual optimisation on request.

\*\* and a suitable fitting technology.

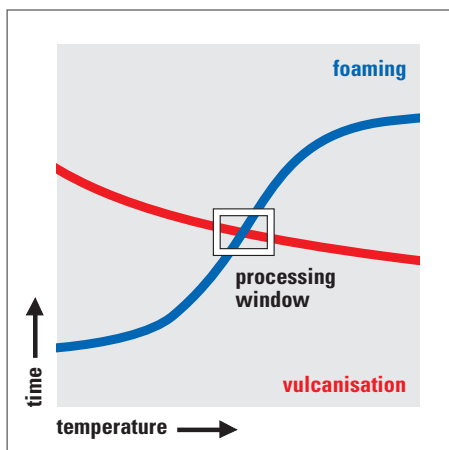


## SILICONE FOAM ARTICLES



BIW is one of the few manufacturers with the complex blowing agent technology required to produce silicone foam articles. The crucial factor here is to hit the narrow processing window in a reliable process which allows for the parallel procedures of pressureless vulcanisation and foaming in the extrusion procedure (see diagram).

These extrudates have a closed cell foam structure, resulting in excellent behaviour in a moist or liquid environment (moisture absorption <1.5 percentage in weight). Thanks to the right combination of compounding and process parameters, the cell structure can be varied within a broad range to produce silicone foams with differing physical and chemical properties, for example softness, density, temperature resistance, chemical resistance.



When foam profiles are used as seals, as a rule it is silicone's high compressibility and outstanding rebound resilience which are of crucial importance. Given the fact that density and usually subjective features such as "the feel" are traditionally used to assess silicone foams, BIW recommends classification based on ASTM 1056. This is supplemented by density and Shore hardness, which is not actually suitable in physical terms but still frequently used (see table).

In contrast to mechanically instable cold-vulcanised silicone materials, BIW only uses high tensile-strength, hot-vulcanised silicone bases which produce a fine pored, stable, closed cell structure.

Together with classical square, round cord and block profiles, hollow chamber profiles and complicated contours can also be produced from silicone foam.

Special formulations not only fulfil the technical qualities but can also be used in contact with food products, and fulfil the requirements of the FDA and BGVV.

Together with standard foam qualities which are available in a broad range of simple contours ex stock, BIW also pro-



## Silicone foam classification as per ASTM 1056, density and Shore A\*

ASTM class	Compression Set  22h / 100°C 50% compression [%]	Compression Deflection  Pressure at 25% compression [KPa]	Density as per DIN 53479 A  [g/cm <sup>3</sup> ]	Shore hardness as per DIN 53505  [Shore A]
2D0	< 80	< 15	< 0,28	< 5
2D1	< 80	15 - 35	0,25 - 0,30	3 - 6
2D2	< 60	35 - 65	0,30 - 0,40	7 - 13
2D3	< 60	65 - 90	0,35 - 0,50	10 - 15
2D4	< 60	90 - 120	0,40 - 0,60	13 - 18
2D5	< 60	120 - 170	> 0,4	> 15

The deformation behaviour should always be assessed depending on the geometry.

\* Individual properties on request.

cesses specially stabilised compounds with temperature resistance up to +280°C. These foam seals are ideal in furnace production, heaters and temperature cabinet construction as appliance or door seals. The silicone foam profiles offer outstanding thermal insulation together with noise insulation.

Silicone foam seals have become simply indispensable in industrial furnace production and as boiler seals in aggressive media and high temperature conditions. Depending on the application, special additives can optimise the seals further with specific chemical resistances.

For use in building technology (e.g. fire doors) or in the building trade (e.g. cable leadthroughs), BIW offers brick red fire safety foam tested to F 90 according to the IFBT. A self-extinguishing solution is also possible using basis components approved to UL 94-V0.

BIW's own toolmaking department and its extensive range of machinery, including various different punching techniques, allow for low-cost production of flat foam seals. These are punched in any required contours from continuously extruded flat strips.





Such two-dimensional foam seals have proven successful in various different industrial applications such as

- boiler and appliance seals in heater production or
- seals for cable connection bushings for telecommunications

BIW's conductive silicone foams are unique world-wide. They are used in special products for the electrical industry (capacitive switching elements), in the automotive industry (compensation elements in ignition systems) and in office communications (roller covers).

BIW produces thermally insulating, thick-walled foam hoses up to 100 mm inner diameter as required in plant construction as pipe insulation, in measuring technology as cable and lead protection, and also as transport roller covers.

The special blowing agent technology in pressureless vulcanisation during extrusion is and remains a special feature which solves a large number of sealing problems, particularly at the high temperatures occurring in current daily practice. BIW's expert know-how here produces individual customised solutions at comparatively low cost.



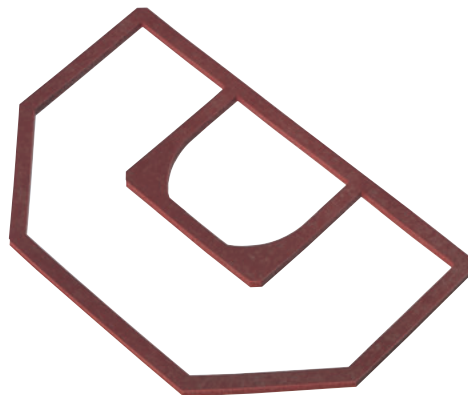
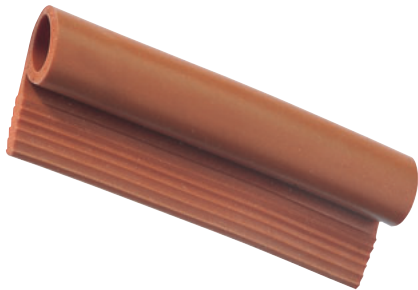
Thanks to the diversified variations and possibilities of making up continuously extruded silicone foam profiles, it is also possible to produce sealing frames; in addition, self-adhesive finishes to such profiles offer additional fixing and processing aids.



## Available dimensions in the BIW programme (all ASTM classes)

<b>Silicone foam round cord</b>	SSR	Diameter 1,5 - 50 mm		
<b>Silicon foam square</b>	SSV	Width 2 - 215 mm	Height 1 - 50 mm	
<b>Silicone foam hose</b>	SSS	Inner diameter 1,5 - 100 mm	Outer diameter 4 - 120 mm	Wall 1 - 20 mm
<b>Silicone foam profile</b>	SSP	on request, see profile catalogue under <a href="http://www.biw.de">www.biw.de</a>		

Tolerances usually +/- 10%.

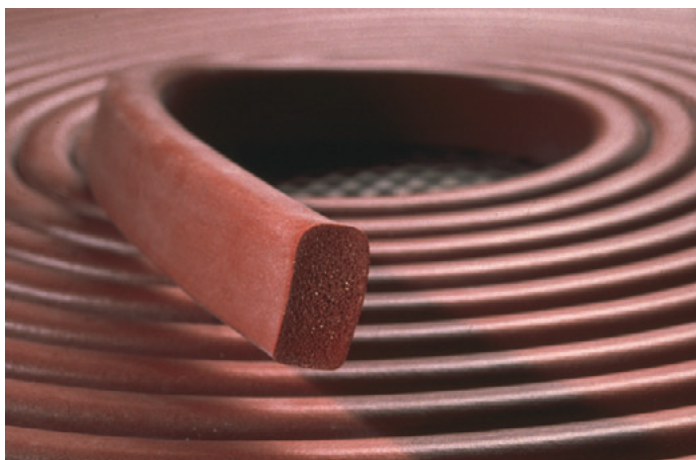


## Available silicone foam qualities in the BIW programme

Quality	Temperature resistance	ASTM 1056 classes	Colours
<b>Standard</b>	-60 bis 180°C	all classes	all colours
<b>Temperature-resistant</b>	up to 240°C	all classes	redbrown
<b>Highly temperature-resistant</b>	up to 280°C	all classes	opaque, greyblue
<b>Food product foam (BGVV, FDA)</b>	up to 180°C	2D2 - 2D5	all colours
<b>Temperature-resistant food contact foam (BGVV, FDA)</b>	up to 240°C	2D2 - 2D5	redbrown
<b>Improved resistance to chemical</b>	up to 280°C	2D1 - 2D5	pale grey pastel colours
<b>Self-extinguishing</b>	up to 280°C	2D2 - 2D5	opaque, pastel colours
<b>Self-extinguishing (UL94-V0 approved base components*)</b>	bis 180°C	2D2 - 2D5	brown
<b>Fire-proof construction foam (as per IFBT*)</b>	F 90 tested	2D4	brick red
<b>Electrically conductive, approx. 10<sup>3</sup> bis 10<sup>4</sup> Ohm · cm</b>	up to 180°C	2D2 - 2D3	black

Other qualities can be produced on request.

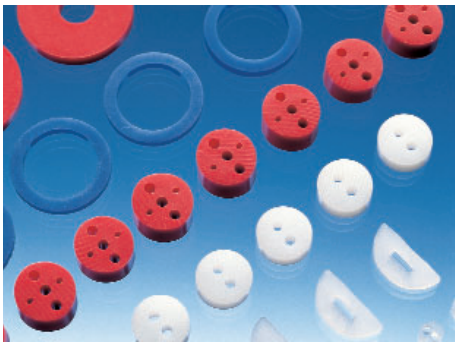
\* with "yellow card"



## SPECIAL SILICONE PRODUCTS

### Individual further processing

Individual further processing and finishing of silicone products is one of BIW's special strengths. The range extends from many different shortening techniques such as chopping, cutting with a circular knife or slicing from the spike through to punch cuts and notchings. In this way it is possible to produce hose rings with thicknesses of even only 0.5 mm by slicing on rotating shafts. Large sized multi-channel profiles are cut neatly to length without any compression using circular knife machines.



### Customised problem solutions

Depending on the application requirements, bore holes, diagonal cuts and other procedures can also be applied to finished extrudates in line with customer specifications. BIW as development supplier offers customised problem solutions.



### Hose manifolds and moulded hoses

BIW's specialities also include hose manifolds, moulded hoses produced by hand or in semi-automatic procedures and spiral hoses. One special example here is the electrically heated spiral hose for medical use in which the flow medium can be kept at a constant temperature. In this article, silicone is extrusion-coated around the electrical leads to produce the required profile; the spiral is then vulcanised to the actual respirator hose, thus stabilising it and prevent any buckling. The connection muffs are also heated, designed to customer specifications and moulded to the ends of the hose with liquid silicone (LSR) in the injection moulding process.



### Continuous printing

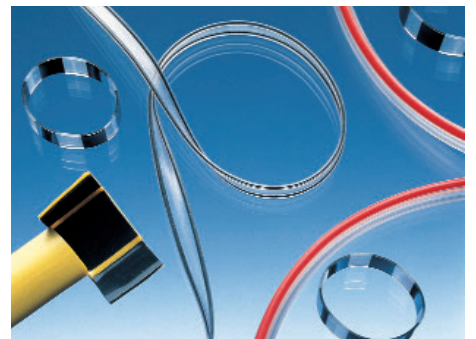
Continuous printing for practically wear-proof product marking is also available.

On request, individual logos or trademarks can be applied to silicone using specially adhering ink in the ink-jet process.



### Various colour and material components

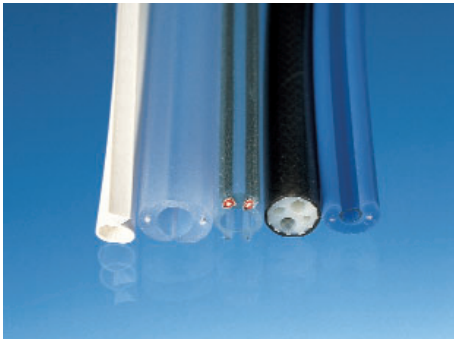
Co-extrusion is the process used to produce hard/soft combinations or even combine different colour and material components in one profile. Combination profiles of conductive and insulating silicone are one particular speciality produced by BIW. In this way, it is possible to extrude contact profiles in one single process.





### Combined profiles

BIW's crosshead extrusion machines are used to produce combined profiles (silicone/metal combinations), fabric-reinforced profiles (silicone belts) and seal profiles with stretching safeguard. Fabric-reinforced pressure hoses are yet another BIW speciality.



### Punched seals

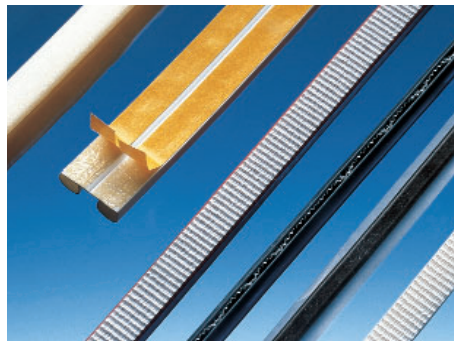
Many different two-dimensional seals can be punched from extruded flat strips. Such punched seals are used in many applications as a low-priced alternative to compression or injection moulding parts because this solution avoids having to invest in complex dies.



### Self-adhesive profiles

On request, profiles and flat tapes can be given a self-adhesive finish for fixing and as an installation aid. Different adhesives are used, depending on the ambient temperature and need for a lasting bond.

Self-adhesive silicone tapes from BIW's production process facilitate rapid, simple finishing by the customer in his own production facilities.



### Complete sealing frames

Foam or solid profiles with mitre cuts are finished at BIW with elastic high-temperature splices to produce complete sealing frames. Compression moulded and vulcanised corners ensure that the profile contour is reproduced exactly even in narrow radii so that the seal performs its proper function in the corners.

Round cords and profiles or hose sections rationally bonded to produce rings are a quickly and easily produced alternative to ready-moulded seals. BIW fits customised valve connections by direct vulcanisation into inflatable hose and profile seals. Alternatively, hose sections can be vulcanised on for pressurisation.



Our range of services includes special product markings and packaging, together with special assembly and system composition tasks.

Other specialities of the BIW production programme include silicone heat-shrink hose sections, ceramifying solid and foam profiles together with colouring in neon and luminous colours. There are no limits to the silicone range. BIW always has an open ear for all extraordinary, innovative questions – and can usually offer an answer too.



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