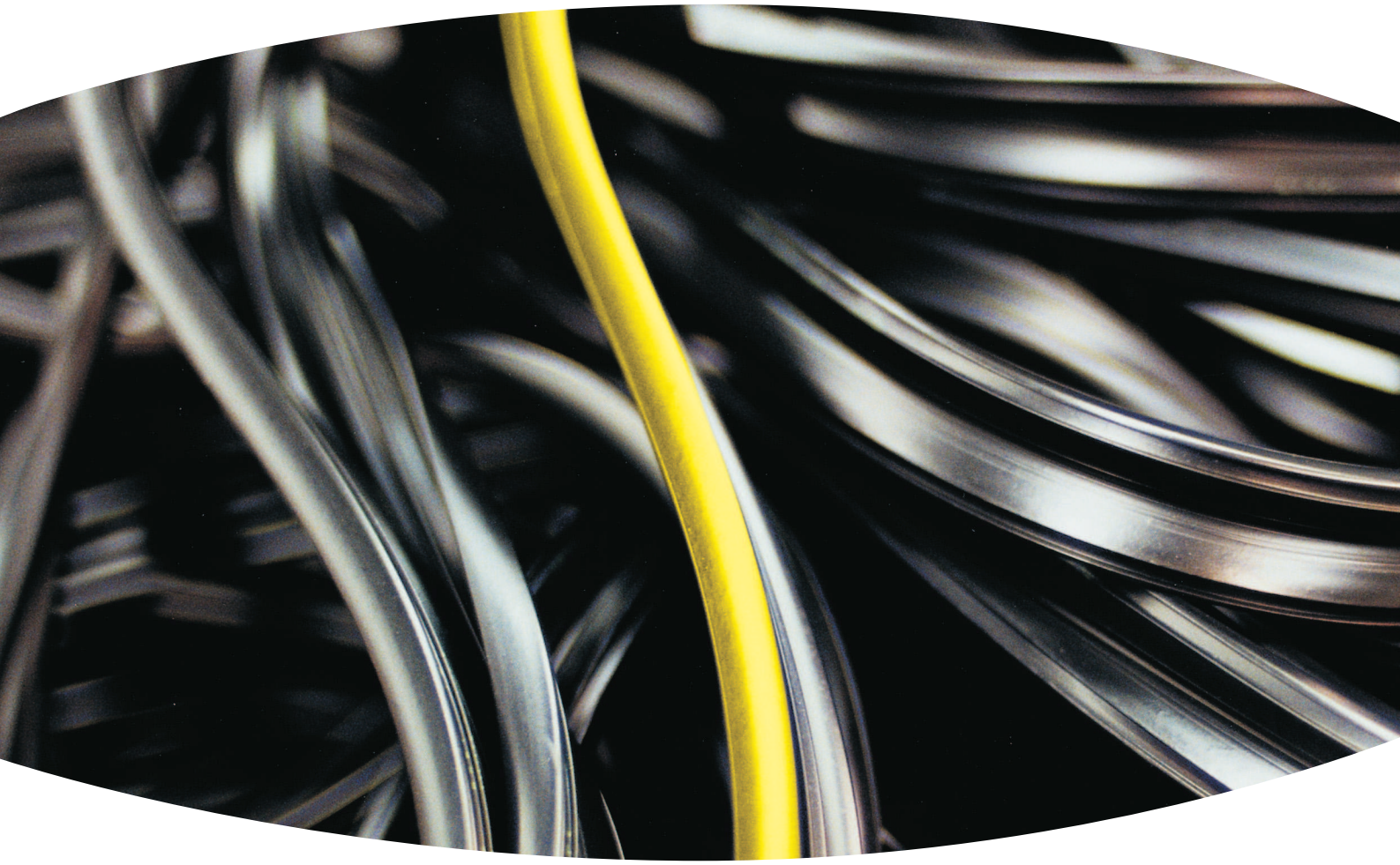
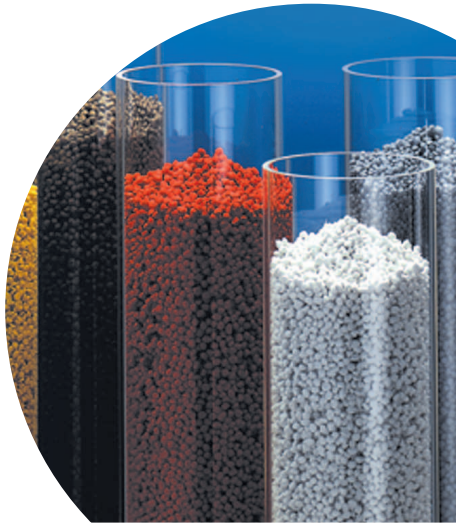
TRELLEBORG



Trelleborg Sealing Profiles

Material Choice for Sealing Profiles



Experienced and Innovative

The watertight difference

Trelleborg Sealing Profiles
Our factories are run professionally and inspected in accordance with ISO 9001 and ISO 14001. Our products and systems are tested in line with applicable standards as well as certified by independent laboratories and authorities in compliance with local building regulations in all markets we supply.

Experience
The Trelleborg Group is one of the world's leading corporate groups involved in the development of polymer-based products. The group employs over 20.000 staff.

New ways of thinking
Not content with decades of experience in our business, we are continually working on more advanced developments. We know that the best results are achieved through close collaboration with our business partners.

Extensive range
Trelleborg Sealing Profiles offers a portfolio of products from the various Trelleborg production sites. We provide our customers with the best possible sealing system, from a single source.

The wide variety
Of materials currently available, for permanently elastic seals, having to comply with diverse functional requirements means that producers, users, achitects, structural engineers, and the construction specialists need detailed expertise. This brochure is intended to help you choose the right material. Our trained technicians will be pleased to offer help and advice, so please feel free to contact them.

Material requirements for sealing profiles

Seals must maintain their elasticity, resisting external influences such as different ambient temperatures, moisture, as well as ultra-violet and ozone degradation. They should be compatible with bonding materials and adjoining surfaces, i.e. they must be suitable for bonding requirements and not contaminate adjoining surfaces through migration. Fire resistance may also be a consideration. The effect of environmental conditions e.g. surface rust, soot, pollen and other contaminates must not impair the sealing function. There are also specific requirements regarding the closing pressure/force as well as the short term and long term elastic recovery.

A cost effective installation and low maintenance are also required. The EN standards cited are specifically oriented to application and performance requirements, in contrast to the previous national standards which were predominately material specific.

Definition:
According to DIN EN 12365-1, 3.12, sealing profiles are strips, mostly made from flexible material, which close gaps and spaces between doors, windows and related products.

They are pre shaped, elastic profiles for tension-free and tight installation for glazing and for sealing in the rebate area of windows and doors.

The basic requirements for sealing profiles		
Building physics	**properties**	**Cost-effectiveness**
Windproofness	Weatherproof	Calculable procurement costs
Water penetration protection	Pressure resistant	Maintenance free
Condensation protection	Dimensional stable	High durability
Sound insulation	UV resistant	Easy installation
Protection against cold and heat	Environment compatible	Resource conserving
Fire safety		

Material types

Application properties

A distinction is made between the following three types of materials for sealing profiles:	
EPDM	Cross-linked through vulcanisation, no flow
TPE	Physically or chemically cross-linked, rubber elastic, thermoplastic character
Silicone	Cross-linked through vulcanisation, silicone rubber-based, extremely stable thermally

The materials compared	EPDM	TPE	Silicone
UV resistance	very good for black good for light colours	very good for all colours	very good for all colours
Welding work	no	yes	no
Corner moulding	yes	no	yes
Application temperature range	- 40 to + 150° C *	- 45 to + 80° C	- 60 to + 200° C
Colours	black RAL 9005 silver grey RAL 7001 light grey RAL 7035 papyrus white RAL 9010	any	any
Cornering circumference response	generally good	must be notched	less good
minimum wall thicknesses	0.8 mm	0.5 mm	0.5 mm
Resistance to chemicals	good (restriction for organic solvents, e.g fuel)	good	very good
Paint compatibility (wood)	depends on compound used	very good	very good
Cyanoacrylate Adhesion	very good	restricted	poor
Application with adhesive tape	good	limited	good
Recycling	thermal	good	thermal
Deformation due to packaging	minor problems	only certain packaging possible	minor problems
Co-extrusion	2-components possible	3-components possible	very difficult
Colour options	black and grey shades possible colour dependent on recipe	can be almost freely set	can be almost freely set

* higher temperatures also possible short-term

Elastomers

or rubbers

Elastomers (rubber)

Elastomers are cross-linked (vulcanised) rubbers with rubber-elastic properties.

The properties of elastomers primarily result from the basic features of the cross-linked rubbers. By adding active fillers such as carbon dust and silicic acid, plasticisers, anti-aging agents, activators, processing agents, accelerators and cross-linking agents, the property profile of elastomers can be adapted to the relevant application.

In applications for windows, doors and facades, elastomers based on EPDM (ethylene propylene diene monomer) rubbers are used most frequently.

These materials are distinguished by very good elastic recovery and good resistance to environmental influences (ultraviolet and ozone degradation and diverse chemicals). EPDM can be used in temperatures ranging from -40 (short-term) to +150° C.

In particular, an attractive price-performance ratio makes these materials suitable for varied applications. Materials of hardness grades in the range from 50° to 90° Shore, foamed in different densities, as well as for highly diverse special applications (fire safety, special material compatibilities..) are available.

EPDM

The right choice of material is crucial for the application:

	EPDM standard compounds	EPDM fire safety compounds	EPDM bright compounds	EPDM cellular rubber compounds	Diverse special compounds
Shore hardness A	50 - 90° Shore	70° and 60° Shore	60° and 70° Shore	Density 0.5 - 0.7	60°, 70° and 80° Shore
Colours	black	black	sliver grey light grey pure white papyrus white	black	black
Special properties	standard qualities as per DIN 7863	for fire safety requirements etc. as per DIN 4102 as per DIN 5510	coloured alternative to the standard in black	closed-cell foamed EPDM optimised thermal conduction resistance	AGV-compatible (Plexiglas-compatible) qualities that can be cut for seal preliminary drawing-in with increased tear propagation resistance for corner circumferential use Degassing-reduced materials for use in solar collectors etc.
Preferred Application fields	windows, facades, doors, gates	rail vehicles fire safety elements	windows, doors and gates	extra thermally insulated window and facade systems, corner circumferential sealing systems	Glazing with synthetic glass solar collectors Contact areas with adhesive and sealing compounds of automated seal drawing-in

A material data sheet with the physical properties is available for each compound

TPE

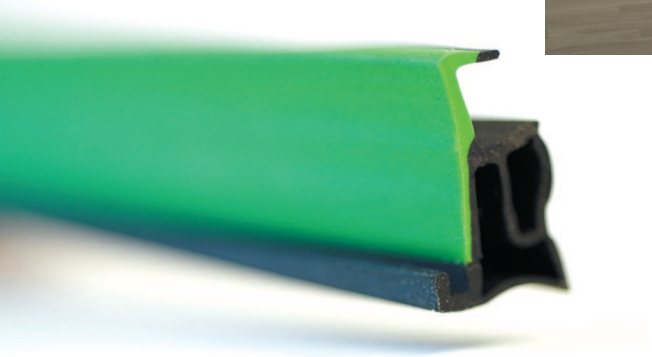
The Difference

TSPLAN
is a highly-modified thermoplastic vulcanised rubber (TPV) comprising EPDM and PP with very good properties in respect to compression set, thermal and ultraviolet stability as well as resistance to aging and elastic recovery. At the same time, compatibility with all conventional paint systems and acrylic paint systems is ensured.

TSPLAST
is a specially-modified thermoplastic material of the TPE family with SEBS/polyolefin basis and good properties for use in windows and doors. At the same time, compatibility with all conventional paint systems and acrylic paint systems is ensured.

TSPFLEX
is a highly-modified thermoplastic material with PVC-P basis, which has been specially developed for use in window and door areas.

TSPFOAM
is a highly-modified thermoplastic, foamed vulcanised rubber comprising EPDM and PP with very good properties in respect to compression set, thermal and ultraviolet stability as well as resistance to aging and elastic recovery.



Silicone

Silicone elastomers are especially resistant to heat, ozone and aging, and are also able to withstand many chemicals.

The mechanical properties (tear propagation resistance) tend to be below those of other elastomers, but are more or less constant over the entire temperature range from -60 to +200 °C.

To achieve optimum heat resistance and a low compression set, a secondary tempering will be necessary in many cases. Silicone materials are available for the hardness ranges Shore A 30-85.

Application fields:
Seals for refrigerators, cookers, drying cabinets, windows and cabin doors of aircraft, shaft packing, O-rings, safety switching mats, medical technology products, electrical insulators.

Material overview

Properties and values

The table provides a practical overview showing the essential properties and values of our materials:

	TSP-EPDM	TSP-LAN	TSP-LAST	TSP-FLEX	TSP-FOAM	TSP-Silicone
Hardness, Shore A	50 - 90	35 – 95	35 – 95	55 – 90	27 kPa*	50 - 80
Max. strength	7 - 12 N/mm²	11 N/mm²	10.6 N/mm²	10.4 N/mm²	2.12 N/mm²	7.5 N/mm²
Max. temperature	120 °C	80 °C	70 °C	65 °C	80 °C	200 °C
Low-temperature resistance	-60 °C	-45 °C	-30 °C	-20 °C	-45 °C	-60 °C
Paint compatibility						
Conventional paint systems (solvent based)	■	■	■	■	■	■
Acrylic paint systems (water dilutable)	■	■	■		■	■
	Standard qualities corresponding to DIN 7863, special qualities on request.	Special material TPV, EPDM/PP based, highly modified	**Thermoplastic special material TPE, SEBS based, specially modified**	**Thermoplastic special material, highly modified**	**Special material, EPDM (APTK) based, specially modified**	

Property \ Evaluation	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Abrasion strength				■	■				■	■			■	■	■			■	■	■				■	■	■				
Elastic recovery				■					■				■	■	■			■	■						■					■
Low-temperature resistance					■				■	■				■	■				■	■					■	■				■
Oxidation resistance					■					■				■	■				■	■					■	■				■
Weather resistance					■					■					■			■							■	■				■
UV resistance					■					■					■				■	■					■	■				■
Ozone resistance					■					■					■			■	■					■	■					■
Fire resistance		■						■	■				■						■	■				■			■			
Thermal aging					■				■	■				■	■				■					■	■				■	
Resistance to oils and petrol		■					■	■			■	■					■				■	■					■			

* not Shore A, but instead compression hardness according to DIN ISO 3386

1 = excellent, 2 = very good, 3 = good, 4 = less good, 5 = poor

seal
damp
protect

Why not see for yourself the advantages of working together with Trelleborg when seeking sealing solutions. Contact your Trelleborg representative or our sales partners. Visit us at www.trelleborg.com/sealingprofiles

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