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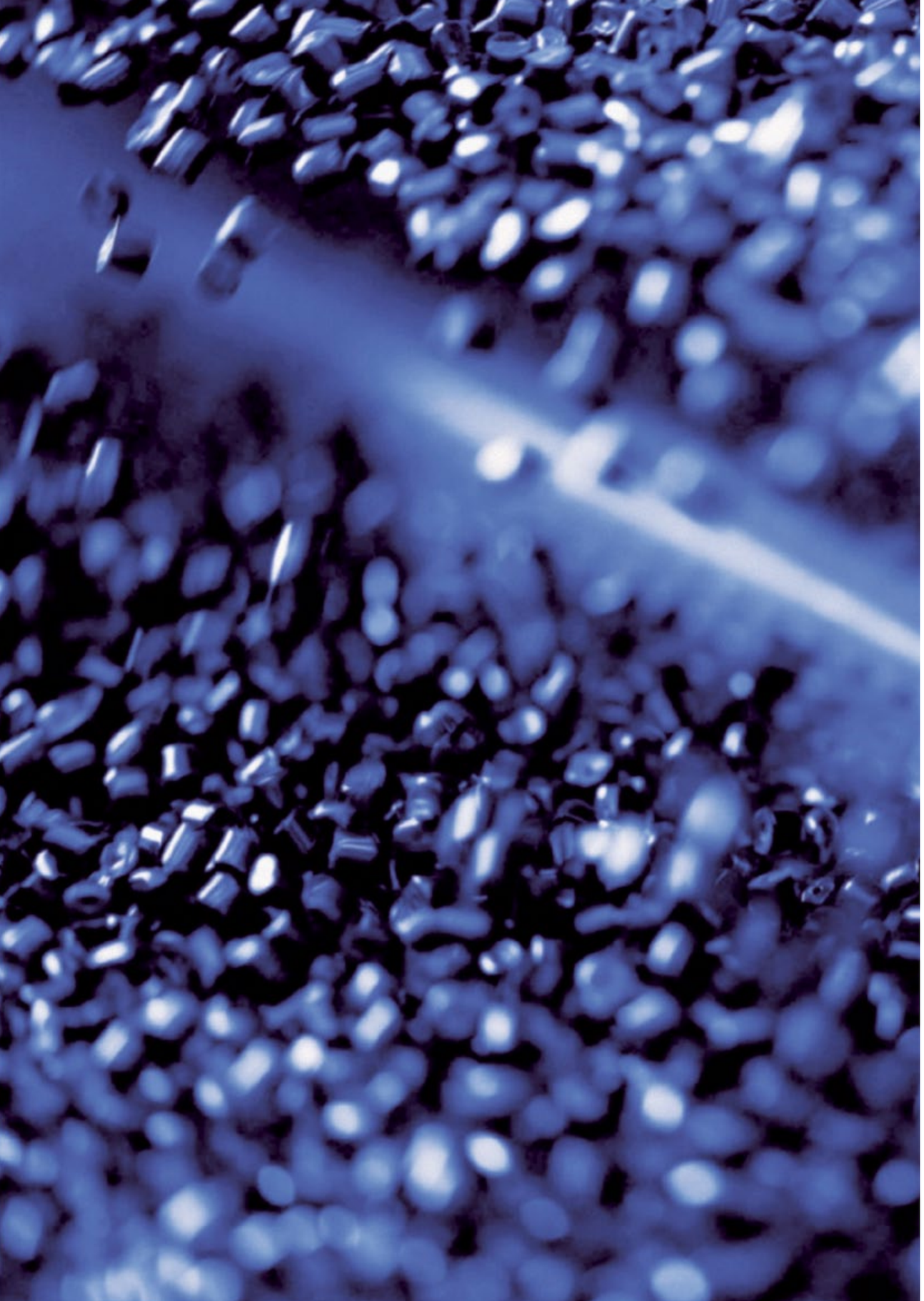
THERMOPLASTIC ELASTOMERS

So.F.TeR.



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All the figures reported in this publication are the result of tests and analyses carried out in our laboratories and are believed to be accurate and reliable.
Tests are performed at 23 °C unless otherwise specified.
Data may be subject to revision and are provided for general guidance only.
The user is responsible for carrying out all the tests necessary to verify the suitability of the material for the specific application. SO.F.TER. makes no warranties and assumes no liability in connection with any use of this information.

So.F.TeR.

Introduction

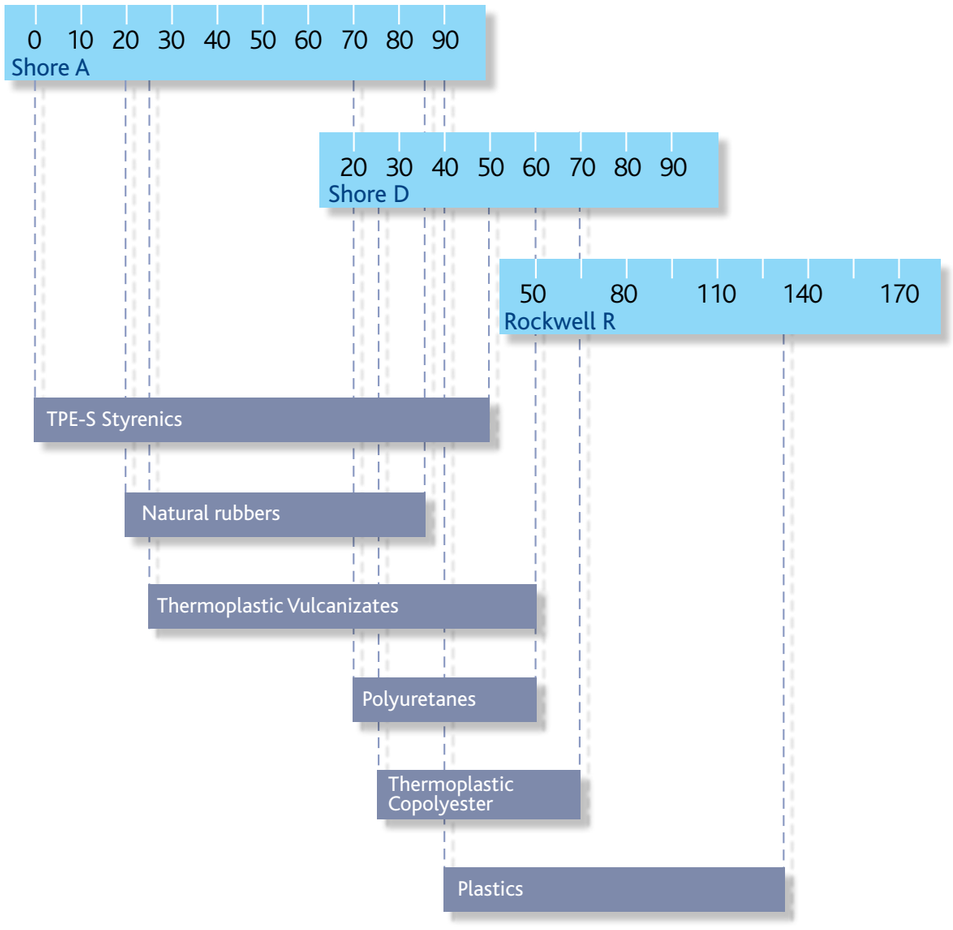
The term **elastomer** is generically used to mean natural or synthetic materials that have the chemico-physical properties of the caoutchouc, or natural rubber. The most distinctive characteristic of elastomers is the ability to withstand large elastic elongation (i.e. 200%) and return to the original dimension when the stress is released.

A **Thermoplastic Elastomer (TPE)** combines the rubber-like properties of a thermoset elastomer and the processing characteristics of a thermoplastic.

This is possible because TPE is composed of two phases: a soft phase, which provides elastic properties, and a hard phase which represents the thermoplastic segment and provides both processing ease and full recyclability to the material.

Thermoplastic Elastomers can be modelled into the desired shapes by means of the classic processing technologies used for plastic materials: the most common are injection moulding, extrusion and blow moulding.

Thermoplastics hardness range



TPE comparison chart

	*PIBIFLEX®	FORPRENE®	LAPRENE®	SOFPRENE T®	FORFLEX®
Polymer					
base polymer	TPC	TPV	TPE-S (SEBS)	TPE-S (SBS)	TPO
Processing technology					
injection moulding	•	•	•	•	•
extrusion	•	•	•	•	•
blow moulding	•	•			•
rotational moulding/slush	•		•		
Technical characteristics					
hardness range	25D ÷ 70D	20A ÷ 60D	2A ÷ 60D	25A ÷ 40D	65A ÷ 60D
low temperature limit	-45 °C	-40 °C	-50 °C	-50 °C	-40 °C
high temperature limit (continuous)	150 °C	130 °C	100 - 120 °C	60 °C	70 °C
Adhesion on polymers					
adhesion (standard grades)	PC, PC/PBT, PC/ABS, PBT, EVA, TPU	PP	PP	PP	PP
adhesion (special grades)	SEBS		ABS, PC, PC/ABS, ASA, PETG, PMMA, SMMA	PS	
Ageing					
UV ageing, weather resistance	☺	☺	☺	☹	😐
Chemical resistance					
hydrocarbons	😐	😐	☹	☹	😐
oils	☺	😐	☹	☹	😐
greases	☺	😐	☹	☹	😐
aqueous fluids	😐	☺	☺	☺	☺
detergents	😐	☺	☺	☹	😐
acids	😐	☺	☺	☹	☺
bases	😐	☺	☺	☹	☺
salt solutions	☺	☺	☺	☺	☺
Special Grades					
flame retardant grades	•	•	•		
traslucent grades		•	•	•	•
low fogging grades	•	•	•		•
non staining grades	•	•	•	•	•
food contact grades	•	•	•	•	•
Main Applications					
	AUTOMOTIVE	AUTOMOTIVE	BUILDING, APPLIANCES	FURNISHING	BUILDING
	INDUSTRIAL	APPLIANCES	SPORTS &LEISURE	HOUSEWARE	INDUSTRIAL
	SPORTS	BUILDING	AUTOMOTIVE		AUTOMOTIVE

*For more information about Pibiflex® see dedicated brochure.

Chemical structure

Forprene® is a Thermoplastic Elastomer and more precisely it is a **Vulcanised Thermoplastic Elastomer** (TPV). It is made of an elastomeric phase (dynamically vulcanised EPDM) which is deeply dispersed in a polyolefinic thermoplastic matrix, whose combination determines a real plasto-elastomeric alloy characterised by high performances and extremely easy processability. The thermoplastic matrix allows Forprene® to be processed in an easy, unexpensive way by means of traditional technologies used for thermoplastic materials, and to be fully recyclable, while its elastomeric phase features typically rubber-like specifications such as elastic recovery and softness.

Characteristics

- Wide hardness range from 20 ShA to 60 ShD
- Service temperature ranging from -40 °C to 130 °C
- Typical density < 1 g/cm^3
- High elastic recovery within a wide temperature range
- Excellent resistance to UV ageing, ozone and weathering
- Excellent resistance to several chemical agents, i.e. bases, acids, alcohols, detergents, water solutions, solvents etc.
- High fatigue resistance
- High thermal and electric insulation values
- Good abrasion resistance
- Specific rheology for each type of process
- Excellent colorability for some grades

Special grades featuring the following specifications are also available:

- Flame resistance (UL 94-V0)
- Additional protection against heat and UV ageing
- Protection against copper
- Low fogging value
- Low friction coefficient
- High abrasion resistance
- RAL-GZ 716/1 approval, Class IV (building industry)
- KOMO approval (building industry, grade compliant with the Norm BRL 2020 about "TPE pipe joint seals for non-pressure waste water")

Application

Automotive
Air ducts, pipe grommets, weatherseals, glass encapsulation, belt line seals, air vents, buttons, mats, suspension bellows

Building
Extruded seals for doors and windows, simple or co-moulded hydraulic seals

Household appliances
Anti-vibration mounts, inlet pipes and exhaust manifolds, seals, drum suspension bushes, shock absorbers

Tools
Handles and grips

Electrical equipment
Sheaths for condensers, plugs and loose sockets, special cables requiring good electrical insulation properties, UV-resistance, good thermal resistance and low specific gravity

Miscellaneous
Wheels, drive belts, high/low pressure pipes, mats for motor scooters, O-rings

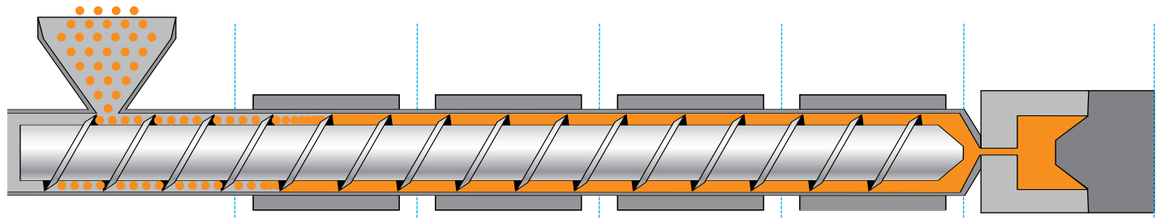
Storage conditions

Forprene® must be stored indoors in the original, unopened and undamaged packaging, away from direct sunlight, moisture and heat. We recommend to use the product within 6 months from the date of the Certificate of Analysis.

Processing conditions

Injection moulding	
drying	depending on the grades, for more information see the Technical Data Sheets
plasticizing screw	polyolefin type screw
screw L/D ratio	≥ 20
screw compression ratio	2.5:1 ÷ 3.5:1
plasticizing speed	high
injection speed	medium-high
injection pressure	medium
runners	having circular section and gradually decreasing flow-through diameter
injection points	Ø ≥ 0.7 mm we recommend not using injection points having a diameter <0.3 mm without prior selection of the appropriate grades, to be agreed with SO.F.TER. Technical Support
mould air vents	0.03 ÷ 0.05 mm
Shrinkage	
ShA 20 ÷ 60	2.5 ÷ 3.5 %
ShA 65 ÷ 85	2.0 ÷ 3.0 %
ShA 90 ÷ ShD 65	1.5 ÷ 2.0 %
Extrusion/Blow moulding	
drying	depending on the grades, for more information see the Technical Data Sheets
plasticizing screw	polyolefin type screw
screw L/D ratio	≥ 24
screw compression ratio	3:1
die land	<10 mm
breaker plate	60 Mesh

Indicative processing temperatures (°C)



Injection moulding	1st Zone	2nd Zone	3rd Zone	Nozzle	Mould
hardness < 55 ShA	150	160	170	175	20 - 40
hardness 55-85 ShA	180	190	190	200	20 - 40
hardness > 85 ShA	180	190	195	210	20 - 40

Extrusion / Blow moulding	1st Zone	2nd Zone	3rd Zone	Head	Die
hardness < 75 ShA	160	170	180	180	170
hardness > 75 ShA	170	180	185	195	185

Injection moulding, standard grades

			Forprene® 6NM.A35	Forprene® 6NM.A40	Forprene® 6NM.A45	Forprene® 6NM.A50	Forprene® 6NM.A55	Forprene® 6NM.A60	Forprene® 6NM.A65	Forprene® 6NM.A70	Forprene® 6NM.A75	Forprene® 6NM.A80	Forprene® 6NM.A85	Forprene® 6NM.A90	Forprene® 6NM.D40	Forprene® 6NM.D50
Physical properties	*Method*	*Unit*														
hardness 15"	ASTM D2240	Shore	A 37	A 42	A 47	A 52	A 57	A 62	A 67	A 72	A 77	A 82	A 86	A 91	D 41	D 51
density	ASTM D792	g/cm³	0.95	0.95	0.95	0.96	0.95	0.96	0.96	0.96	0.96	0.96	0.95	0.96	0.95	0.94
tensile strength	ASTM D412-C	MPa	3.0	3.4	3.7	4.0	4.3	4.5	6.0	6.5	6.8	8.5	9.0	12.0	17.0	20.8
elongation at break	ASTM D412-C	%	460	470	500	490	480	490	500	520	540	580	600	600	630	650
modulus 100%	ASTM D412-C	MPa	0.9	1.1	1.3	1.6	1.6	1.9	2.2	2.6	3.0	3.6	4.4	5.2	8.1	12.2
tear strength	ASTM D 624-C	kN/m	14	16	17	18	20	22	26	29	32	38	44	50	65	85
compression set (22h / 70 °C)	ASTM D 395-B	%	32	36	36	33	32	36	33	36	38	40	44	56	61	-

Extrusion grades

			Forprene® 6NE.A55	Forprene® 6NE.A60	Forprene® 6NE.A65	Forprene® 6NE.A70	Forprene® 6NE.A75	Forprene® 6NE.A80	Forprene® 6NE.A85	Forprene® 6NE.A90	Forprene® 6NE.D40	Forprene® 6NE.D50
Physical properties	*Method*	*Unit*										
hardness 15"	ASTM D2240	Shore	A 57	A 62	A 67	A 72	A 76	A 82	A 87	A 91	D 41	D 51
density	ASTM D792	g/cm³	0.96	0.95	0.96	0.96	0.96	0.96	0.95	0.96	0.94	0.94
tensile strength	ASTM D412-C	MPa	4.8	5.3	6.0	6.6	7.5	8.4	10.5	13.1	17.4	22.5
elongation at break	ASTM D412-C	%	550	550	530	560	560	580	600	620	680	720
modulus 100%	ASTM D412-C	MPa	1.6	1.9	2.2	2.6	3.1	3.4	4.2	5.5	8.4	10.9
tear strength	ASTM D 624-C	kN/m	23	25	28	28	34	37	43	56	70	83
compression set (22h / 70 °C)	ASTM D 395-B	%	37	38	36	38	38	40	44	49	56	-

Blow moulding grades

			Forprene® 6B0.A68	Forprene® 6B0.A75	Forprene® 6NB.A85	Forprene® 6NB.A90	Forprene® 6NB.D40	Forprene® 6NB.D50
Physical properties	*Method*	*Unit*						
hardness 15"	ASTM D2240	Shore	A 68	A 77	A 87	A 92	D 40	D 49
density	ASTM D792	g/cm³	0.93	0.93	0.96	0.94	0.94	0.94
tensile strength	ASTM D412-C	MPa	6.5	8.5	11.5	15.8	18.0	24.0
elongation at break	ASTM D412-C	%	680	610	590	650	670	770
modulus 100%	ASTM D412-C	MPa	2.3	3.1	4.8	6.4	8.2	11.4
tear strength	ASTM D 624-C	kN/m	33	43	48	60	75	90
compression set (22h / 70 °C)	ASTM D 395-B	%	48	42	43	47	-	-

Range

Product family	*Improved UV resistance*	*High fluidity*	*Low odour*	*Low fogging*	*Processing technology*			*Special properties*
					Injection moulding	*Extrusion*	*Blow moulding*	
6M0					•			
6M5	•				•			
6MD		•			•			general purpose
6D5	•	•			•			
6E0					•	•		
6E5	•				•	•		
6EK					•	•		complex profiles
6K5	•				•	•		
6B0							•	general purpose
6NM	•	•	•	•	•			general purpose new generation grades
6NE	•		•	•	•	•		
6NB	•		•	•			•	
6NK					•	•		improved elasticy
6N5	•				•	•		
6SD	•	•	•	•	•			traslucent
6ESD	•		•	•	•	•		
665	•	•			•			car glass encapsulation
65VS	•				•	•		improved abrasion resistance
6E1					•	•		flame retardant
680					•	•		copper protection
6EF					•	•		filled grades
6MC					•			
6Z0		•			•			new economic grades
6ZE						•		
6ZB							•	

Chemical structure

The brand name Laprene® refers to a family of Thermoplastic Elastomers in which the elastic phase is made of SEBS rubber (Styrene-Ethylene-Butylene-Styrene) and the plastic phase has usually a polyolefinic nature. The plastic phase allows Laprene® both to be processed in an easy, unexpensive way by means of the traditional technologies used for thermoplastic materials and to be fully recyclable, while the elastomeric phase features typically rubber-like specifications such as elastic recovery and softness. The chemical nature of the SEBS rubber is saturated, which means it has no double bonds, and this particular structure gives Laprene® special resistance to weathering agents and UV ageing.

Characteristics

- Excellent resistance to UV ageing, ozone and weathering
- Wide hardness range from 2 ShA to 60 ShD
- Operating temperature ranging from -50 °C to +120 °C
- High fatigue resistance
- Excellent resistance to several chemical agents, i.e. bases, acids, alcohols, detergents, water solutions
- High elastic recovery within a wide temperature range
- High thermal and electric insulation values
- Specific rheology for each type of process
- Density ranging from 0.90 g/cm^3 to 1.20 g/cm^3 and over
- Excellent colorability and aesthetic properties

Range

- **Standard grades for injection moulding**
  filled and semi-filled grades, from 10 ShA to 50 ShD
- **Traslucent and trasparent grades**
  starting from 2 ShA hardness
- **Extrusion grades**
  hardness range from 25 ShA to 90 ShA
- **Grades for adhesion on polar polymers**
  ABS, PC, PC/ABS, ASA, PETG, PMMA, SMMA.
  Laprene 830.696 is suitable for adhesion on PS.
  Laprene series 84 is suitable for adhesion on PE.
- **Food contact grades**
  for injection moulding (also to be expanded) and extrusion
- **Grades with very high fluidity**
- **Grades with improved temperature resistance**
  up to 120 °C and over

Application

Automotive
Soft skins, mats for glove compartments, keypads, soft-touch finishes, glass encapsulation

Building
Extruded seals for doors and windows, simple and co-moulded hydraulic seals

Household appliances
Magnetic seals for refrigerators, power tools handles, remote control covers, mobile phone covers, push-button panels, shock absorbing protections for vacuum cleaners

Sport and leisure
Items for diving (flippers, snorkels, masks) and skiing (ski pole handles, ski boots)

Food
Synthetic corks for wine and liquor bottles, gaskets for food containers

Cosmetics
Handles for toothbrushes and healthcare items, perfume bottle coatings

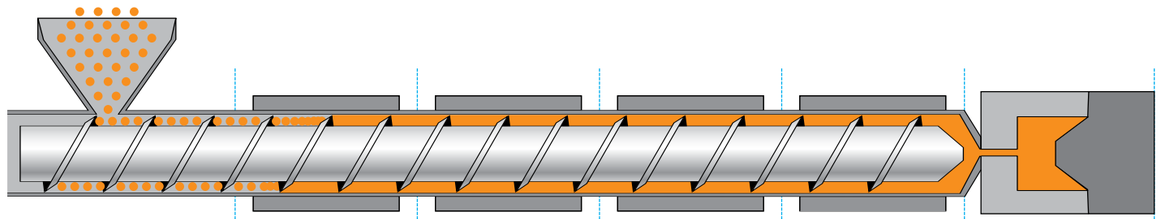
Storage conditions

Laprene® must be stored indoors in the original, unopened and undamaged packaging, away from direct sunlight, moisture and heat.

Processing conditions

Injection moulding	
drying	usually not necessary
plasticizing screw	polyolefin type screws
screw L/D ratio	≥ 20
screw compression ratio	2.5:1 ÷ 3.5:1
plasticizing speed	high
injection speed	medium-high
injection pressure	medium
runners	having circular section and gradually decreasing flow-through diameter
injection points	Ø ≥ 0.7 mm we recommend not using injection points having a diameter <0.3 mm without prior selection of the appropriate grades, to be agreed with SO.F.TER. Technical Support.
mould air vents	0.03 ÷ 0.05 mm
Shrinkage	
shrinkage	from 1.5% to 3.5% depending on the hardness
Extrusion	
drying	usually not necessary
plasticizing screw	polyolefin type screw
screw L/D ratio	≥ 24
screw compression ratio	2:1 ÷ 3:1
die land	<10 mm
breaker plate	60 Mesh

Indicative processing temperatures (°C)



Injection moulding	1st Zone	2nd Zone	3rd Zone	Nozzle	Mould
hardness < 80 ShA	170	180	180	190	20 - 40
hardness > 80 ShA	180	190	190	200	20 - 40

Extrusion	1st Zone	2nd Zone	3rd Zone	Head	Die
hardness < 75 ShA	160	170	180	180	170
hardness > 75 ShA	170	180	185	195	185

Injection moulding, general purpose filled grades

			Laprene® 830.540	Laprene® 830.541	Laprene® 830.551	Laprene® 830.542	Laprene® 830.543	Laprene® 830.545	Laprene® 830.808	Laprene® 830.546	Laprene® 830.844	Laprene® 830.823	Laprene® 830.824
Physical properties	*Method*	*Unit*											
hardness 3''	ASTM D2240	Shore	A 18	A 29	A 33	A 41	A 52	A 61	A 66	A 73	A 77	A 87	A 93
density	ASTM D792	g/cm³	1.08	1.13	1.13	1.15	1.17	1.18	1.18	1.16	1.14	1.18	1.14
tensile strength	ASTM D412-C	MPa	4.0	5.5	4.1	6.7	7.5	8.9	9.0	11.0	12.5	11.8	13.8
elongation at break	ASTM D412-C	%	940	780	820	800	750	780	760	760	810	680	660
modulus 100%	ASTM D412-C	MPa	0.3	0.5	0.7	0.8	1.0	1.2	1.7	2.3	2.5	3.4	4.8
tear strength	ASTM D624-C	kN/m	16	20	17	23	24	27	31	36	42	41	40
compression set (22h / 70 °C)	ASTM D395-B	%	38	33	45	35	36	38	48	41	45	54	56

Injection moulding, semi-filled grades

			Laprene® 83FM.A30	Laprene® 83FM.A55	Laprene® 83FM.A60	Laprene® 83FM.A65	Laprene® 83FM.A70	Laprene® 83FM.A84	Laprene® 83FM.A90
Physical properties	*Method*	*Unit*							
hardness 3''	ASTM D2240	Shore	A 31	A 58	A 61	A 66	A 72	A 84	A 90
density	ASTM D792	g/cm³	1.02	1.00	1.00	1.00	0.99	1.00	1.00
tensile strength	ASTM D412-C	MPa	5.5	8.7	9.1	11.2	13.1	13.5	16.0
elongation at break	ASTM D412-C	%	860	860	820	810	800	730	720
modulus 100%	ASTM D412-C	MPa	0.5	1.3	1.4	1.8	2.0	3.3	4.3
tear strength	ASTM D624-C	kN/m	20	25	26	30	33	49	55
compression set (22h / 70 °C)	ASTM D395-B	%	39	39	39	48	42	52	55

Injection moulding, traslucent and trasparent unfilled grades

			Laprene® 830.859	Laprene® 830.860	Laprene® 830.861	Laprene® 830.561	Laprene® 830.862	Laprene® 830.547	Laprene® 830.951	Laprene® 830.955	Laprene® 830.968	Laprene® 830.969	Laprene® 830.970	Laprene® 830.971	Laprene® 83F.960
Physical properties	*Method*	*Unit*													
hardness 3''	ASTM D2240	Shore	A 3	A 12	A 17	A 22	A 31	A 34	A 45	A 44	A 50	A 67	A 72	A 82	A 90
density	ASTM D792	g/cm³	0.88	0.88	0.88	0.89	0.89	0.90	0.89	0.89	0.88	0.89	0.90	0.90	0.92
tensile strength	ASTM D412-C	MPa	3.8	3.7	4.2	4.6	7.1	8.0	4.5	8.5	8.0	12.0	12.0	17.8	11.5
elongation at break	ASTM D412-C	%	950	900	900	880	860	780	600	780	720	790	740	750	560
modulus 100%	ASTM D412-C	MPa	0.2	0.3	0.3	0.6	0.6	0.7	1.1	1.0	1.1	1.8	2.2	2.8	6.3
tear strength	ASTM D 624-C	kN/m	12	16	17	14	20	26	20	22	25	33	38	48	61
compression set (22h / 70 °C)	ASTM D 395-B	%	38	24	30	34	31	-	-	42	36	44	55	48	-

Extrusion grades

			Laprene® 83E2.A25	Laprene® 83E2.A30	Laprene® 83E2.A35	Laprene® 83E2.A45	Laprene® 83E2.A50	Laprene® 83E2.A60	Laprene® 83E2.A65	Laprene® 83E2.A70	Laprene® 83E2.A75	Laprene® 83E2.A90
Physical properties	*Method*	*Unit*										
hardness 3''	ASTM D2240	Shore	A 25	A 30	A 35	A 46	A 52	A 61	A 66	A 71	A 76	A 91
density	ASTM D792	g/cm³	1.18	1.19	1.19	1.18	1.18	1.17	1.19	1.19	1.19	1.20
tensile strength	ASTM D412-C	MPa	5.1	6.2	6.0	8.0	7.5	8.7	9.5	10.0	11.0	14.0
elongation at break	ASTM D412-C	%	850	830	800	800	750	750	750	750	720	700
modulus 100%	ASTM D412-C	MPa	0.4	0.5	0.7	1.0	1.2	1.5	1.7	2.1	2.3	4.3
tear strength	ASTM D 624-C	kN/m	17	19	20	25	26	29	31	34	35	48
compression set (22h / 70°C)	ASTM D 395-B	%	48	46	38	33	36	32	45	44	45	54

Adhesion on polar polymers

			Laprene® 8K1.A55	Laprene® 8K1.A60	Laprene® 8K1.A65	Laprene® 8K1.A70	Laprene® 8K1.A80	Laprene® 8K1.A90
Physical properties	*Method*	*Unit*						
hardness 3''	ASTM D2240	Shore	A 55	A 62	A 65	A 72	A 80	A 90
density	ASTM D792	g/cm³	1.03	1.05	1.03	1.05	1.08	1.10
tensile strength	ASTM D412-C	MPa	10.8	12.0	8.5	12.5	16.0	15.0
elongation at break	ASTM D412-C	%	580	550	570	550	590	530
modulus 100%	ASTM D412-C	MPa	1.8	2.2	2.1	2.9	3.7	5.4
tear strength	ASTM D 624-C	kN/m	37	40	35	45	60	68
adhesion	-	-	ABS, PC, PC/ABS, ASA					

Adhesion on polar polymers(*)

			Laprene® 8KS.A60	Laprene® 8KS.A65	Laprene® 8KS.A70	Laprene® 8KS.A80	Laprene® 8KS.A90
Physical properties	*Method*	*Unit*					
hardness 3''	ASTM D2240	Shore	A 60	A 68	A 75	A 80	A 90
density	ASTM D792	g/cm³	1.04	1.05	1.09	1.08	1.19
tensile strength	ASTM D412-C	MPa	6.0	6.1	6.0	6.5	8.5
elongation at break	ASTM D412-C	%	650	680	520	550	520
modulus 100%	ASTM D412-C	MPa	1.8	2.0	3.5	3.3	5.2
tear strength	ASTM D 624-C	kN/m	23	30	38	34	46
adhesion	-	-	ABS, PC, PC/ABS, PETG, ASA, PMMA, SMMA				

(*) All 8KS grades are available also in the following versions:
/H: heat stabilized grades
/1: grades with enhanced adhesion on PETG

Chemical structure

Sofprene T® is a Thermoplastic Elastomer in which the elastomeric phase is based on SBS rubber (Styrene-Butadiene-Styrene block copolymer) and the plastic phase is usually made of either polyolefinic or styrenic polymers. Sofprene T® offers excellent elastic properties and maintains its flexibility even at very low temperatures (-50 °C).
The unsaturated nature of the SBS rubber makes Sofprene T® vulnerable to UV rays, heat and ozone, however it is possible to improve its resistance to these agents by using appropriate additives.
Sofprene T® can be easily processed by means of the traditional technologies used for thermoplastic materials and it is fully recyclable.

Characteristics

- Wide hardness range from 25 ShA to 40 ShD
- Density from 0.9 g/cm^3 to 1.25 g/cm^3
- Operating temperature from -50 to 60 °C
- High elastic recovery both at low and room temperature
- Excellent resistance to several chemical agents, i.e. bases, acids, alcohols, detergents, water solutions
- High thermal and electric insulation values
- Good abrasion resistance
- Specific rheology for each type of process
- Excellent colorability

Special grades featuring the following specifications are also available:

- High trasparency
- Suitability for food contact
- Adhesion on polystyrene (PS) and other polymers having a similar chemical nature
- Additional protection against heat and UV rays
- **Extusion grades** available on request, starting from 40 ShA hardness

Application

Furniture
Shock-absorbers for bed slats, wheels, anti-shock profiles

Household goods
Non-slip mats, handles for tools, overmoulded rubber lips for dustpan and squeegees, plungers

Toys
Wheels, handles, seats, toys

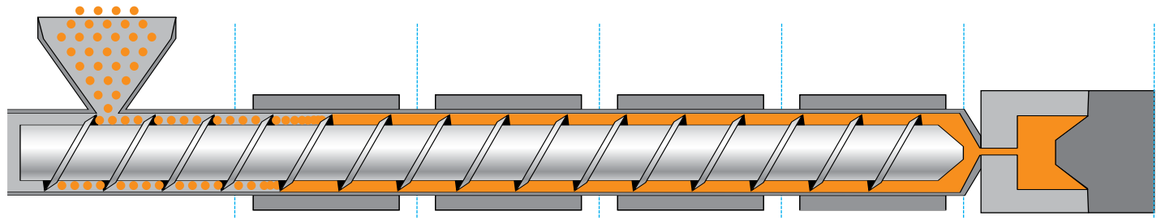
Storage conditions

Sofprene T® must be stored indoors in the original, unopened and undamaged packaging, away from direct sunlight, moisture and heat.

Processing conditions

Injection moulding	
drying	usually not necessary
plasticizing screw	polyolefin type screw
screw L/D ratio	≥ 20
screw compression ratio	2.5:1 ÷ 3.5:1
plasticizing speed	high
injection speed	medium-high
injection pressure	medium
runners	having circular section and gradually decreasing flow-through diameter
injection points	Ø ≥ 0.7 mm we recommend not using injection points having a diameter <0.3 mm without prior selection of the appropriate grades, to be agreed with SO.F.TER. Technical Support.
mould air vents	0.03 ÷ 0.05 mm
Shrinkage	
shrinkage	from 0.4% to 1.5% depending on the hardness
Extrusion/Blow moulding	
drying	usually not necessary
plasticizing screw	single screw
screw L/D ratio	18:1 - 24:1
screw compression ratio	1.5 ÷ 3.0
die land	<10 mm
breaker plate	60 or 80 Mesh

Indicative processing temperatures (°C)



Injection moulding	1st Zone	2nd Zone	3rd Zone	Nozzle	Mould
hardness < 55 ShA	150	160	170	175	20 - 40
hardness 55-85 ShA	160	170	180	185	20 - 40
hardness > 85 ShA	165	175	180	195	20 - 40

Extrusion / Blow moulding	1st Zone	2nd Zone	3rd Zone	Head	Die
hardness < 75 ShA	160	170	180	180	170
hardness > 75 ShA	170	175	185	190	180

Injection moulding grades

			Sofprene T® 5402.A30	Sofprene T® 5402.A40	Sofprene T® 5402.A45	Sofprene T® 5402.A50	Sofprene T® 5402.A55	Sofprene T® 5402.A60	Sofprene T® 5402.A65	Sofprene T® 5402.A70	Sofprene T® 5402.A75	Sofprene T® 5402.A80	Sofprene T® 5402.A85	Sofprene T® 5402.A90
Physical properties	*Method*	*Unit*												
hardness 3"	ASTM D2240	Shore	A 30	A 40	A 44	A 50	A 55	A 60	A 65	A 70	A 76	A 81	A 85	A 90
density	ASTM D792	g/cm³	1.04	1.04	1.04	1.06	1.04	1.04	1.05	1.04	1.03	1.04	1.04	1.03
tensile strength	ASTM D412-C	MPa	1.9	3.5	3.9	4.3	4.2	4.0	4.4	4.4	4.8	5.6	6.0	6.6
elongation at break	ASTM D412-C	%	720	840	830	790	750	680	670	620	590	580	540	510
modulus 100%	ASTM D412-C	MPa	0.8	0.7	0.9	1.1	1.3	1.6	1.8	2.2	2.6	3.0	3.6	4.4
tear strength	ASTM D624-C	kN/m	21	18	19	23	22	23	26	26	29	32	35	40

Injection moulding, high fluidity grades

			Sofprene T® 5405.A50	Sofprene T® 5405.A55	Sofprene T® 5405.A60	Sofprene T® 5405.A65	Sofprene T® 5405.A70	Sofprene T® 5420.A85	Sofprene T® 5420.A90	Sofprene T® 5420.A96
Physical properties	*Method*	*Unit*								
hardness 3"	ASTM D2240	Shore	A 52	A 56	A 61	A 66	A 70	A 86	A 90	A 96
density	ASTM D792	g/cm³	0.96	0.95	0.97	0.97	0.96	1.07	1.05	1.07
tensile strength	ASTM D412-C	MPa	4.3	3.8	4.0	3.8	4.8	6.2	6.8	10.0
elongation at break	ASTM D412-C	%	810	740	670	540	610	620	550	600
modulus 100%	ASTM D412-C	MPa	1.2	1.7	1.7	2.0	2.3	3.9	4.8	7.1
tear strength	ASTM D624-C	kN/m	23	24	24	24	32	40	44	56

Injection moulding, economical series

			Sofprene T® 5501.A40	Sofprene T® 5501.A45	Sofprene T® 5501.A55	Sofprene T® 5501.A60	Sofprene T® 5501.A65	Sofprene T® 5501.A70	Sofprene T® 5501.A75	Sofprene T® 5501.A80
Physical properties	*Method*	*Unit*								
hardness 3"	ASTM D2240	Shore	A 40	A 45	A 55	A 60	A 66	A 71	A 75	A 80
density	ASTM D792	g/cm³	1.16	1.17	1.18	1.16	1.16	1.17	1.16	1.15
tensile strength	ASTM D412-C	MPa	1.3	1.5	1.6	1.6	2.0	2.3	2.5	2.6
elongation at break	ASTM D412-C	%	520	520	420	370	380	450	350	330
modulus 100%	ASTM D412-C	MPa	0.7	0.8	1.2	1.4	1.6	1.7	2.0	2.2
tear strength	ASTM D624-C	kN/m	9	12	11	14	16	18	22	17

Chemical structure

The Forflex® thermoplastic elastomer family consists of heterophasic compounds based on an amorphous elastomeric phase and a crystalline phase, usually both of a polyolefinic nature. This chemical composition confers elastic properties to finished products up to a temperature of 70 - 80 °C. These compounds are classified as TPOs.

Characteristics

- Good weather resistance
- Excellent electrical insulation properties
- Low density (from 0.89 g/cm^3)
- Excellent elastic properties at low temperatures
- Excellent colorability
- Adhesion on PP and polyolefin based materials
- Standard grades for injection moulding and extrusion
- Food-contact grades

Application

Automotive
Arch wheels, mudguards, mats

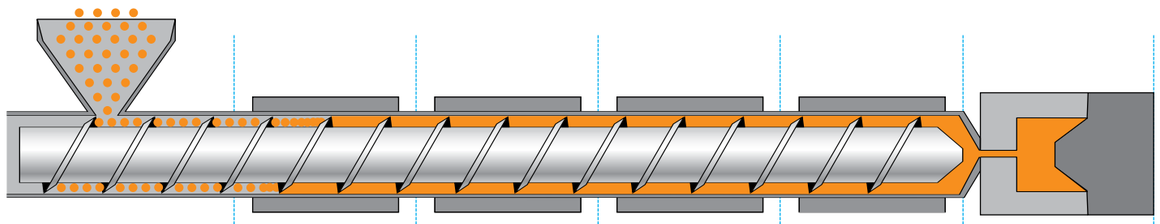
Building
Window gaskets co-extruded with soft TPEs

Sport and leisure
Ski boots, flippers

Processing conditions

Injection moulding	
drying	usually not necessary
plasticizing screw	polyolefin type screw
screw L/D ratio	≥ 20
screw compression ratio	2.5:1 ÷ 3.5:1
plasticizing speed	high
injection speed	high
injection pressure	medium
runners	having circular section and gradually decreasing flow-through diameter
injection points	Ø ≥ 0.7 mm we recommend not using injection points having a diameter <0.3 mm without prior selection of the appropriate grades, to be agreed with SO.F.TER. Technical Support
mould air vents	0.03 ÷ 0.05 mm
Shrinkage	
shrinkage	from 0.4% to 1.5% depending on the hardness
Extrusion	
drying	usually not necessary
plasticizing screw	polyolefin type screw
screw L/D ratio	≥ 20
screw compression ratio	≥ 2.5
die land	<10 mm
breaker plate	60 Mesh

Indicative processing temperatures (°C)



Injection moulding	1st Zone	2nd Zone	3rd Zone	Nozzle	Mould
hardness < 85 ShA	160	170	180	190	20 - 40
hardness > 85 ShA	170	190	200	210	20 - 40

Extrusion / blow moulding	1st Zone	2nd Zone	3rd Zone	Head	
hardness < 90 ShA	160	170	190	170	
hardness > 90 ShA	180	210	220	210	