

SEKISUI

FOAM
INTERNATION
Global Foam Solutions

Physically Cross-linked Polyolefin Foam

SOFTLON®



How SOFTLON® is made

SOFTLON was created using new cross-linking technology developed by Sekisui Chemical.

The manufacturing technology was invented following decades of Sekisui Chemical's proprietary research.

Polyolefin foam is commercialized as SOFTLON through the following processes.

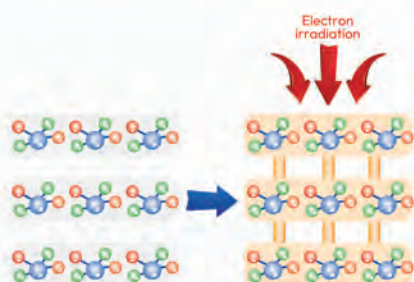


01

Extrusion

Extruding Polyolefin

Polyolefin resin is mixed with foaming agents and auxiliary materials, and formed through extrusion. Our high-precision extrusion technique is the basis for our products' fine thickness tolerance.

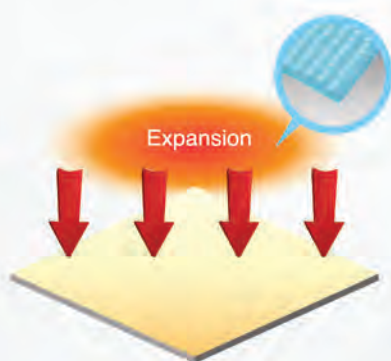


02

Cross-linking

Physically Cross-linking

Polyolefin is physically cross-linked with electron beams to cross-link the molecules. This electron irradiation technique is a unique technology in the field of applied industrial radiation, winning the Award of the Society of Polymer Science Japan.



03

Foaming

Foaming

Foamed polyolefin expands from 5 to 40 times its original volume. The fine closed-cells are resistant to water and chemicals. This supports the stable, superior quality of SOFTLON.



04

Winding

Winding into sheets

SOFTLON is a soft and continuous sheet-type product. SOFTLON allows for flexible fabrication, such as lamination and moulding.

Key Properties of **SOFTLON**[®]



SOFTLON
is made from
polyolefin polymer



▶ **Chemical resistance**

Polyolefin polymers have good resistance to acids, alkalis and solvents.

▶ **Thermoplastic**

Polyolefin is thermoplastic. Thermoplastic softens with heat and can be thermoformed, making Softlon an ideal foam material for thermoforming applications.

▶ **Ease of fabrication**

A variety of methods can fabricate Softlon. Please see the 6th page.

▶ **Water resistance**

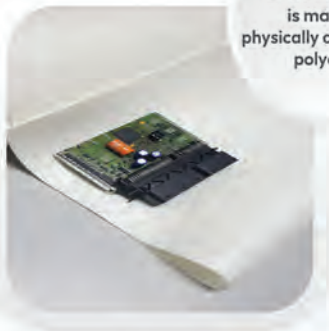
Polyolefin polymers do not corrode by water.

▶ **Elasticity/cushioning**

Polyolefin polymers provide good elasticity and cushioning performance.



SOFTLON
is made by
physically cross-linking
polyolefin



▶ **Thermal performance**

Physically cross-linking produces fine and even cell structures. Fine and even foam cells contribute to lower thermal conductivity. Physically cross-linked polyolefin foam is ideal for energy saving and preventing condensation.

▶ **Aesthetically better**

Physically cross-linking produces smooth, aesthetically better, and intact skin on foam surface

▶ **Physical property**

Superior tensile strength, tear strength and other physical properties.



SOFTLON
is with closed
cell foam structure



▶ **Thermal performance**

Air trapped in closed-cell foam contributes to lower thermal conductivity and superior thermal insulation performance.

▶ **Buoyancy**

Closed cell foam does not absorb water and floats on water.

▶ **Lightweight**

Foamed materials are lightweight alternatives to solid (non-foamed) materials. Closed-cell and physically cross-linked polyolefin foam maintains good physical strength.

▶ **Sealing performance**

Closed-cell foam has a very low water absorption ratio and is airtight, making it a good sealing material.

Mobility

Softlon is a lightweight solution for mobility applications that is an alternative to solid plastic materials. Higher heat resistance low emission and flame retardant grades of Softlon are ideal for mobility. Thermal forming suitable grades of Softlon are also available to contribute to more flexible auto part designs.

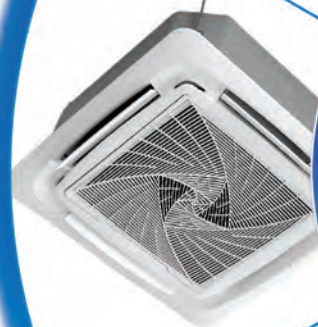
Consumer Appliances

The outstanding thermal performance of Softlon is ideal for thermal insulation and condensation pretension for consumer appliance applications. Flame retardant grades to meet UL94 HF-1 requirements are available. Softlon heat-resistant grades are the perfect material for insulation tubes. Softlon has lower acid contents because it is cross-linked by physical means, but not chemical means, which require strong acid. The risk of corrosion of copper and aluminium is lower with Softlon.



Packaging

The smooth surface of Softlon is ideal for packaging applications to protect fragile products. Softlon has excellent vacuum formability. Specially designed grades for the vacuum forming process are also available. An anti-static grade is also available to reduce the risk of static electricity building up on the foam surface and damaging electrical parts during transportation.



SOFTLON[®]

Applications

Tape Base and Medical Pats

Thinner Softlon grades are perfect for tape-base foam, which requires waterproofing and extra cushioning. Softlon grades with improved soft touch are suitable for medical pat applications. Ultra-thin Softlon XL-H is also available to meet thinner tape requirements.



Xlim – Smart Phones & Displays

Sekisui Foam International's leading-edge foaming technology enables the manufacturing of industry-leading ultra-thin polyolefin foam that is as thin as 0.06 mm. Ultra-thin Xlim has excellent flexibility, shock-absorbing, and water-sealing performance. Xlim is widely used for smartphone and display applications.



Other Applications

Softlon is used in various applications because of its well-balanced thermal insulation, flexibility, sealing, cushioning, resilience, durability, chemical resistance, and sound insulation performances. Softlon applications include medical & health care products, cap seals, leisure and sports products, shoe inner soles, expansion joints and gap fillers.

Fabrication of SOFTLON®

Softlon can be fabricated by a varieties of methods at ease.

Shaping



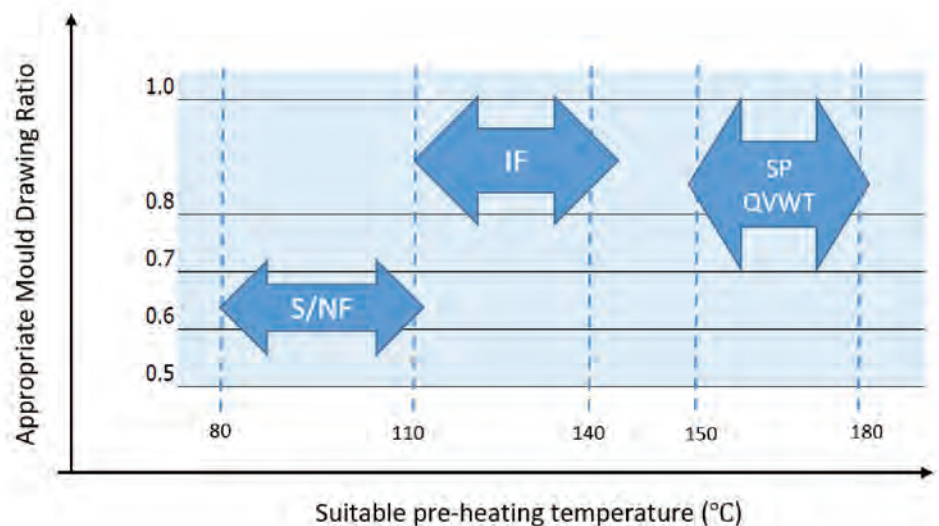
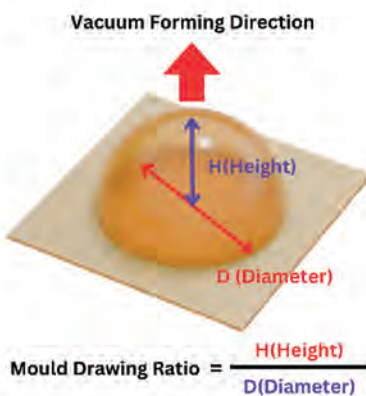
Surface Treatments



Vacuum Forming Applications

Softlon is made from foamed thermoplastic. Thermoplastic can be softened by applying heat and hardened after cooling. Softlon performs excellently in tensile strength, elongation, and tear strength since it is made from physically cross-linked polyolefin foam. Softlon IF series and SP series are developed for thermoforming applications enhancing thermo-formability. These characteristics make Softlon an ideal solution for thermoforming applications.

Mould Drawing Ratio



List of SOFTLON® Grades

Softlon is made in various formulations with specific characteristics.

These types include:

Grade Name	Descriptions	Typical Applications
Softlon® S	Physically crosslinked polyethylene foam. It is also available in anti-static grade.	Thermal insulation and other general industrial applications
Softlon® FR-ND	Physically crosslinked fire retardant polyethylene foam.	Thermal insulation and other general industrial applications.
Softlon® IF	Physically crosslinked polyethylene foam designed for vacuum and press forming applications. Also available in fire retardant grade.	Vacuum-formed products for packaging and automotive applications.
Softlon® NF	Physically crosslinked polyethylene with higher temperature resistance and more rigidity. Also available in fire retardant grade.	Thermal insulation tubes, automotive interiors, EV batteries.
Softlon® ES	Physically crosslinked EVA copolymer foam with increased softness and flexibility.	Medical products, tape base foam
Softlon® XL-IF	Physically crosslinked polyethylene foam developed for tape-based foam with excellent elongation. (t=0.8mm and above)	Tape base foam
Softlon® XL-H	Physically crosslinked polyethylene ultra-thin foam (t0.06-t0.7mm) for tape base foam	Thinner Tape base foam
Xlim	Physically crosslinked polyethylene ultra-thin foam (t0.06-t0.7mm).	Sealing and shock-absorbing gaskets for smartphones and other electrical gadgets
Softlon® OPC	Physically crosslinked polyethylene foam with superior softness and sound absorption properties. Also available in fire retardant grade.	Cushioning and acoustic insulation for consumer electronics, automotive and industrial machines.
Softlon® SP/EPilon QV	Physically crosslinked polypropylene blended foam with high-temperature resistance and excellent thermal formability.	Automotive interior trims and EV Batteries

(Typical) Physical Properties of SOFTLON-S



PROPERTY	Unit	#0503	#1003	#1503	#2003	#3003	#4003
Cell structure		Closed	Closed	Closed	Closed	Closed	Closed
Average diameter of cell	mm	0.26	0.27	0.28	0.30	0.30	0.32
Apparent density	g/cm ³	0.20	0.10	0.066	0.050	0.033	0.025
Thickness ^(Note 1)	mm	3	3	3	3	3	3
Tensile strength	kPa (Vertical)	2,570	1,290	950	560	420	310
	kPa (Horizontal)	1,790	1,000	510	400	290	220
Elongation	% (Vertical)	380	328	280	220	204	161
	% (Horizontal)	300	265	175	170	165	141
Tear strength	kPa (Vertical)	122.5	61.7	41.2	31.4	23.5	19.6
	kPa (Horizontal)	101.9	51.0	30.4	20.6	14.7	12.7
Compressive Hardness	kPa	15.7	8.3	5.6	5.0	3.1	2.6
	kPa(25%)	323	63	59	53	33	29
Compressive Strength	kPa(50%)	559	155	143	128	98	83
	kPa(75%)	1,735	502	441	343	320	246
Compression set	%	3.5	4.0	4.5	5.1	6.5	7.5
Repeat Compression set	%	3.0	3.4	4.0	4.5	5.3	5.9
Thermal Conductivity	W/mK	-	-	-	-	0.0345	0.0321
Dimensional change under heat (22 hours under 70 degrees C)	%(Vertical)	-0.54	-0.83	-1.03	-1.43	-1.45	-1.50
	%(Horizontal)	-0.10	-0.20	-0.30	-0.40	-0.75	-0.90
Water absorption	mg/cm ³	0.02	0.03	0.04	0.05	0.07	0.09

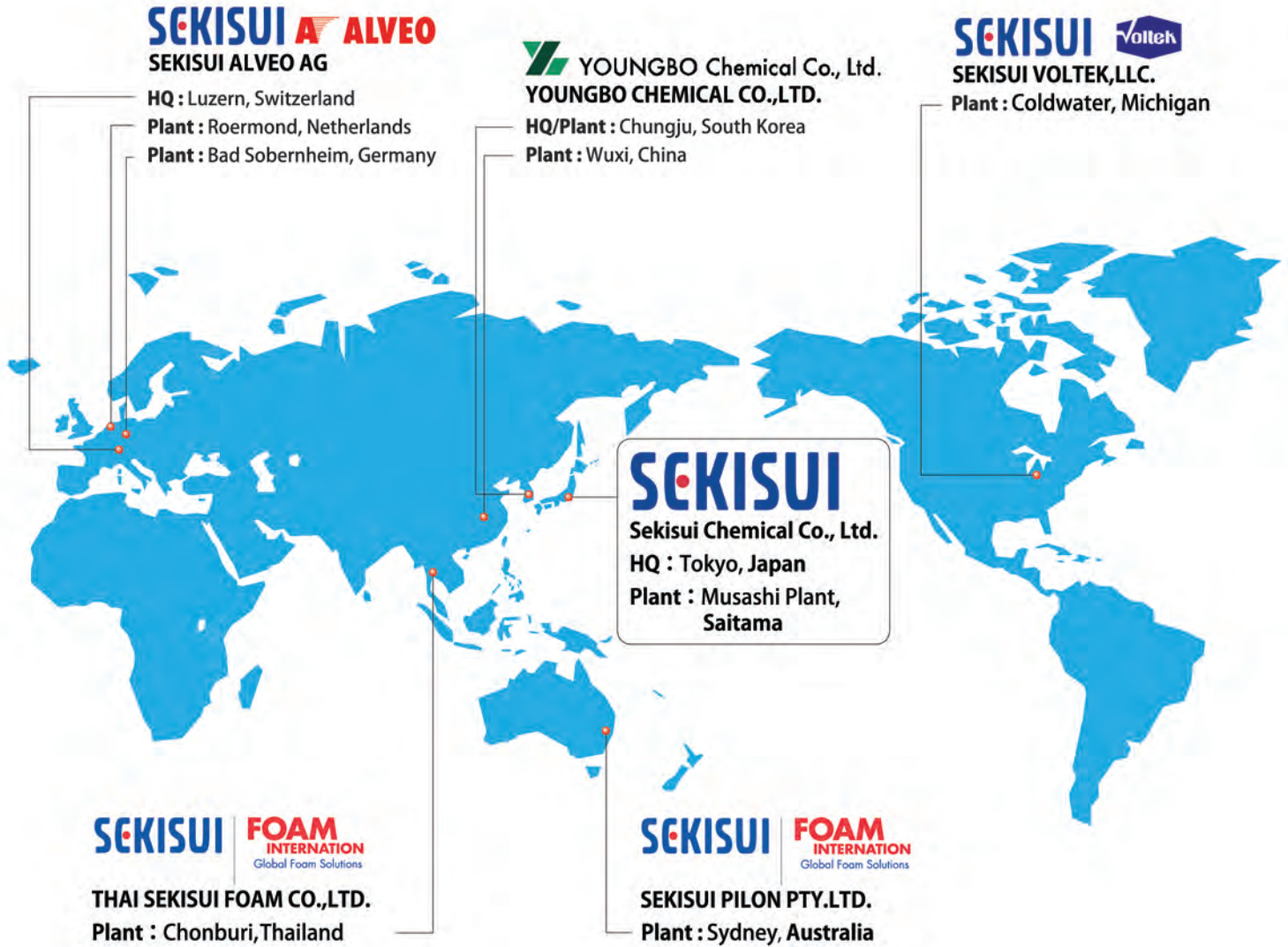
(Measuring method : JIS K6767)

(Note1) Thickness : Foams are flexible in general. During measurement, as the sample foam changes its thickness depending on the compression, a dial gauge with 0.01 mm graduation was used with a sample area of 10 cm² and sample pressure 2g/cm².

(Note2) Physical property values are representative values and cannot be used as standards.

Foam production bases

Sekisui Chemical is the world's largest & leading manufacturer of cross-linked polyolefin foam and operates 8 plants worldwide. All operating under ISO quality systems.



SEKISUI

FOAM INTERNATION

Global Foam Solutions

SEKISUI CHEMICAL CO., LTD
High Performance Plastic Company Foam Division
Address: 2-10-4 Toranomon, Minato-ku,
Tokyo 105-8566 Japan
Website : <https://www.sekisuichemical-foam.com/en>

THAI SEKISUI FOAM CO., LTD.
700/379 Moo 6, Tumbol Donhua-loh
Amphur Muang, Chonburi 20000 THAILAND
Tel : + 66 (0) 3821 3219 ~ 26
Email : info@thaisekisui.co.th
Web : www.thaisekisui.co.th

SEKISUI FOAM AUSTRALIA
1-5 Parraweena Road
Taren Point, NSW 2229 AUSTRALIA
Tel : + 61 29525 9880
Email : info@sekisuifoam.com.au
Web : www.sekisuifoam.com.au

