



HIGH PERFORMANCE FILMS & TAPES



YOUR CHOICE FOR FLUOROBASED PRODUCTS
GUARNIFLON®

www.guarniflon.com

HIGH PERFORMANCE FILMS & TAPES

SPECIALTY SKIVED EXTRUDED AND BLOW
TECHNICAL FILMS & TAPES

TEKFILM[®]
SKIVED AND EXTRUDED FILMS

TEKBOND
PRESSURE SENSITIVE ADHESIVE TAPES

TEKLEASE[®]
RELEASE FILMS

BY GUARNIFLON[®]

HPF HIGH PERFORMANCE FILMS & TAPES

High Performance Films and Tapes from Guarniflon® are skived, melt/blow, extruded fluoropolymer and polyolefin technical films and tapes engineered by Guarniflon® R&D Department to allow the customers to select the right film for their application requirements.

A wide range of grades including PTFE, FEP, PFA, MFA, ETFE, PVDF, THV, HDPE, PP to match the right combination of physical and chemical performances in a variety of key market segments including composite molding for the automotive and aerospace industries, chemical processing, electrical/electronics, renewable energies, recreational and marine.

HPF from Guarniflon® are classified under 3 main product families:



PTFE skived tapes and films that also can be offered calendered or ultra flat. Tapes and films can be chemically, and physically etched. Thermoprocessables fluoropolymers skived tapes and films in FEP - PFA - MFA.
Extruded films made by FEP - ETFE - THV - PVDF - PFA.



Premium Quality Pressure Sensitive Adhesive Tapes, offered with or without release liners in Fluorosilicone, Polyethylene, PVC, Paper.
Two different adhesive systems: Acrylic and Silicone.



Special products developed as release films for composite industry applications.
Perforation capability available.

AEROSPACE



ELECTRONICS



SOLAR ENERGY



TRANSPORTATION



AUTOMOTIVE



MARINE



HPF MATERIALS

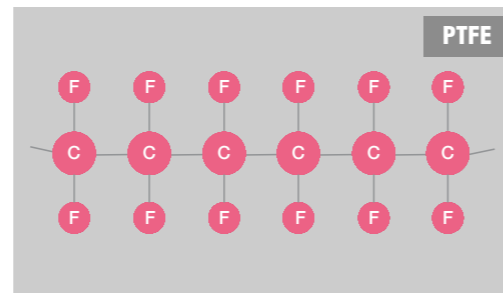
OPTIMAL PRODUCT PROPERTY COMBINATIONS

	PTFE	FEP	ETFE	PFA	MFA	PVDF	THV	HDPE	PP
Flexibility	■	■	●	■	■	■	▲	▲	▲
Chemical Resistance	▲	▲	■	▲	▲	■	■	■	■
High Temperature Resistance	▲	▲	▲	▲	▲	■	■	●	●
Fire Resistance	▲	▲	■	▲	▲	■	■	●	●
Electrical Insulation	▲	▲	▲	▲	▲	●	●	■	■
Mechanical Strength	■	■	▲	■	■	▲	■	■	▲
Low Temperature Processability	●	●	●	●	●	▲	▲	▲	▲
Optical Properties	●	■	■	■	■	■	▲	■	■
Co-processability with Hydrocarbons	●	●	●	●	●	▲	▲	▲	▲

▲ Optimum performance - generally recommended ■ Depends on product grade or application ● Generally not recommended

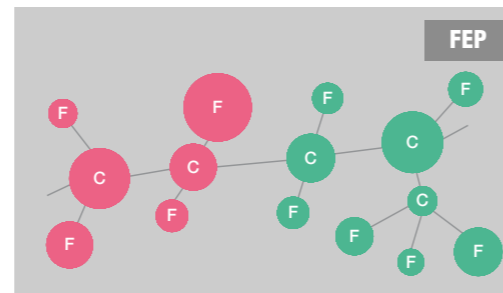
PTFE

The basic characteristics of PTFE are the ones offering a unique combination of low coefficient of friction, excellent chemical inertness, non-adhesive surface, wide temperature range (-200° C to +260°C) and excellent dielectric properties. PTFE is practically inert to all chemical products, except for some alkaline metals, chlorine trifluoride and basic fluorine at high temperatures and pressures. PTFE is considered one of the most stable materials from the thermal point of view. PTFE does not change its own physical and molecular properties, up to a continuous service temperature of 260° C.



FEP

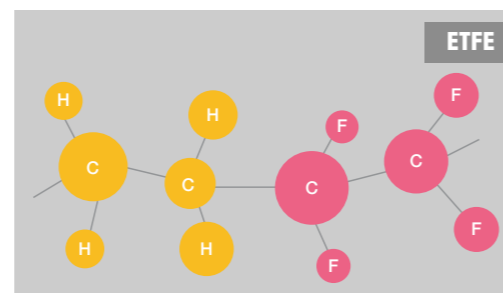
Fluorinated thermoplastic material (a polymer of tetrafluoroethylene and hexafluoropropylene) offers excellent thermal, electrical and chemical inertness properties. Widely used for different industrial applications for its excellent chemical resistance up to 200° C. It can be used as non-stick material in the compression moulding processes, or melting material between fluorinated resins.



ETFE

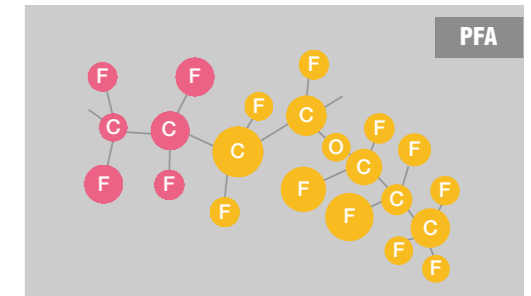
A polymer of tetrafluoroethylene and ethylene, known also by its acronym ETFE, is a thermoplastic fluorocarbon-based polymer (a fluoropolymer). It was originally designed to have high corrosion resistance and strength over a wide temperature range.

Compared to glass, ETFE film is 1% the weight, transmits more light and is also resilient, self-cleaning (due to its nonstick surface) and recyclable. An example of its use is as pneumatic panels covering the outside of large sport complexes, such as the football stadium Allianz Arena or the Beijing National Aquatics Centre - the world's largest structure made of ETFE film, well known also as the "Water Cube".



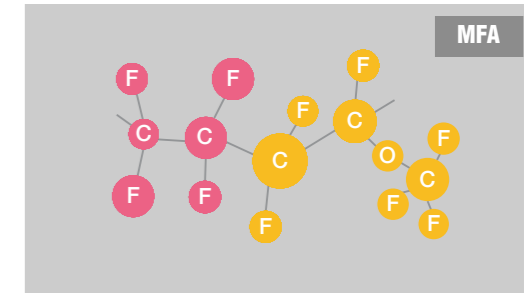
PFA

Fluorinated thermoplastic material (a polymer of tetrafluoroethylene and perfluorovinylether), offers the advantages of being thermo-processable whilst at the same time having the properties of PTFE, with excellent chemical and mechanical resistance for applications up to 260°C. Thanks to its fluidity during processing, the final products in PFA – especially the extruded films - are absolutely porous-free, hence very suitable for electrical applications.



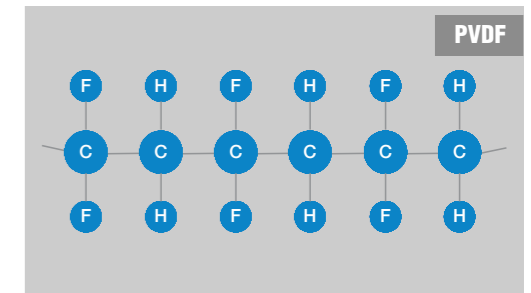
MFA

MFA is a semi-crystalline fully-fluorinated melt processable fluoropolymer (a polymer of tetrafluoroethylene and perfluorovinylether) which offers the highest temperature rating and broadest chemical resistance of all melt processable fluoropolymers. It is an ideal choice for extreme thermal and chemical environments. MFA exhibits the outstanding thermal behaviour and chemical resistance found in PTFE, PFA and FEP. In addition, parts made with MFA have been shown to have smooth finished surfaces. This makes MFA a good candidate for the semiconductor, electronics and biologic applications where sanitary flow (fully swept flow – no dead spots) is required.



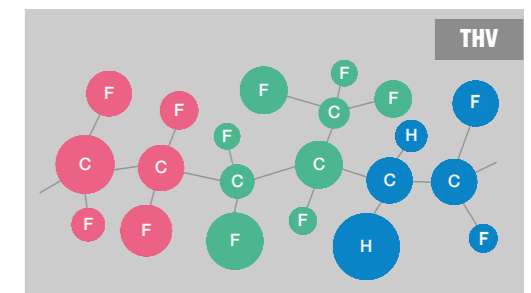
PVDF

Polyvinylidene Fluoride, or PVDF fluoropolymer, is a highly non-reactive thermoplastic fluoropolymer a polymer of vinylidene fluoride. PVDF is a specialty plastic material in the fluoropolymer family; it is used generally in applications requiring the highest purity, strength, and resistance to solvents, acids, bases. It generates low smoke during a fire event. Compared to other fluoropolymers, it has an easier melt process because of its relatively low melting point.



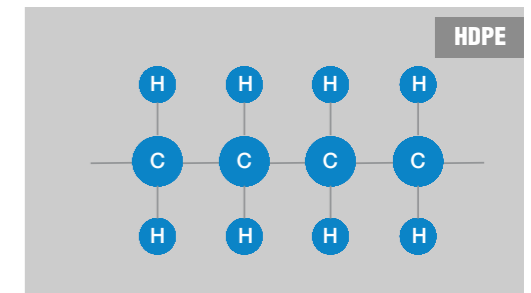
THV

THV Fluorothermoplastic (a polymer of tetrafluoroethylene, hexafluoropropylene and vinylidene fluoride) provides a combination of performance advantages such as ability to bond to elastomers and hydrocarbon based plastics, flexibility and optical clarity. These combined advantages create new opportunities to make multi-layers hoses, tubes, sheets and film unmatched by any other melt processable fluorothermoplastic.



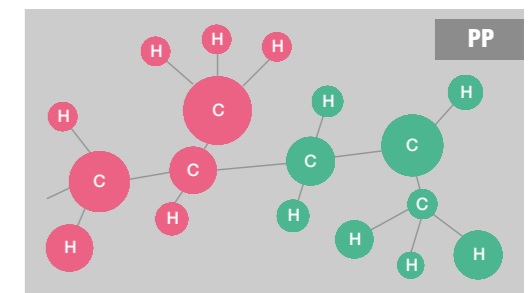
HDPE

High-density polyethylene (HDPE) is a thermoplastic polymer produced from the monomer ethylene. It is known for its high strength-to-density ratio. Thanks to its good release properties it can be used as an economical release film designed to suit different composite process application.



PP

Polypropylene belongs to the group of polyolefins and is partially crystalline and non-polar. Its properties are similar to polyethylene, but it is slightly harder, more heat and chemical resistant.



SKIVED - EXTRUDED - BLOW FLUOROPOLYMER FILMS

The Tekfilm[®] film range includes PTFE, FEP, PFA, MFA skived films and tapes in addition to melt extruded FEP, ETFE, PFA, THV, PVDF films and tapes.

Film modifications available for direct use in customers' application:

- flattening
- calendaring
- surface treatment: Sodium Naphthalene chemical etching, corona and plasma treatment
- adhesive coating

SKIVED

PTFE STANDARD SKIVED TEKFILM[®]

Tekfilm[®] skived PTFE is produced by compression molding a large cylindrical billet and "skiving" the film off of the billet in a lathe. Standard, modified, conductive and antistatic, pigmented PTFE available in a wide range of thicknesses with tight tolerances.

Thickness [mm]	Tolerance [mm]	Width [mm]	Tolerance [mm]	Width 1000 [mm]	Width 1200 [mm]	Width 1500 [mm]
STOCK						
0,025	+0,005 -0	Max 1300	+20 -0	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
0,050	+0,01 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
0,100	+0,01 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
0,150	+0,02 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
0,200	+0,02 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
0,250	+0,02 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
0,300	+0,02 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
0,400	+0,03 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
0,500	+0,03 -0	Max 1500	+20 -0	AVAILABLE	AVAILABLE	NOT AVAILABLE
0,600	+0,04 -0	Max 1500	+20 -0	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
0,800	+0,04 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
1,000	+0,05 -0	Max 1500	+20 -0	AVAILABLE	AVAILABLE	NOT AVAILABLE
1,500	+0,10 -0	Max 1500	+20 -0	AVAILABLE	AVAILABLE	NOT AVAILABLE
2,000	+0,20 -0	Max 1500	+20 -0	AVAILABLE	AVAILABLE	NOT AVAILABLE
2,500	+0,30 -0	Max 1500	+20 -0	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
3,000	+0,30 -0	Max 1500	+20 -0	NOT AVAILABLE	AVAILABLE	NOT AVAILABLE
4,000	+0,40 -0	Max 1500	+20 -0	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
5,000	+0,50 -0	Max 1500	+20 -0	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE
6,000	+0,60 -0	Max 1500	+20 -0	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE

GFI - ULTRA FLAT PTFE SKIVED TEKFILM[®]

A proprietary flattening process is used to produce an ultraflat film eliminating the curling effect typical of the PTFE skived films

Type	Code	Thickness [mm]	Max Width [mm]	Colour	Roll Length
Tekfilm Ultra Flat Film	GFI 400	from 0,025 to 0,508	1500	Natural	To customers' specifications

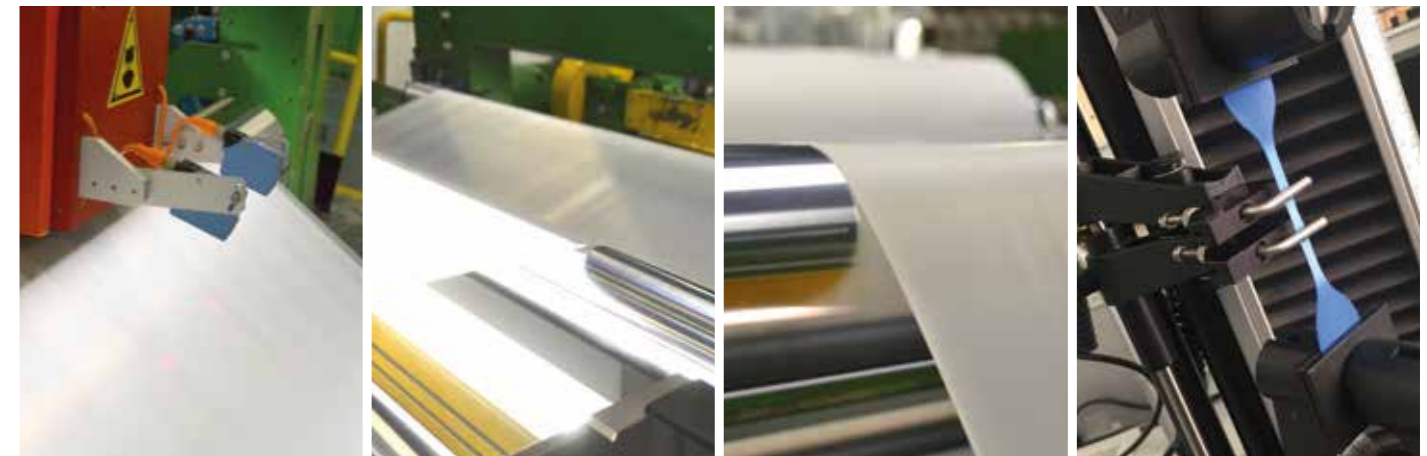
CALFILM GF - CALENDERED PTFE SKIVED TEKFILM[®]

Oriented high modulus PTFE skived films and tapes. The main benefit are:

- higher elastic modulus
- higher dielectric strength
- lower porosity
- reduced cold flow
- better transparency

Type	Code	Thickness [mm]	Max Width [mm]	Colour	Roll Length [mt]
Calendered Film	CALFILM G400	0,051	600 *	Natural	600-660
Calendered Film	CALFILM G511	0,051	600 *	Orange	600-660
Calendered Film	CALFILM G481	0,051	600 *	Blue	600-660

* TAPE on Request



FEP - PFA - MFA - THERMOPROCESSABLES FLUOROPOLYMER SKIVED TEKFILM[®]

High molecular weight grades transformed with a proprietary hot compression molding and skiving processes

Type	Code	Thickness [mm]	Max Width [mm]	Colour	Roll Length
FEP	FEP 2000S	from 0,05 to 3	1200	Natural	To customers' specifications
PFA	PFA 2400S	from 0,25 to 3	1200	Natural	To customers' specifications
MFA	MFA 3000S	from 0,05 to 3	1200	Natural	To customers' specifications

EXTRUDED

THERMOPROCESSABLE FLUOROPOLYMER EXTRUDED TEKFILM®

Melt extruded films processed with state of the art technologies in very thin thicknesses (down to 13 µm) at wide width (up to 2000 mm)
Surface treatment on one or both sides available

FEP

Type	Code
Cast extruded film	FEP2000E
Colour	Roll Length
Natural Clear / Red / Dark Red	To customers' specifications

Thickness [µm]	13	20	25	50	100	>100	Max. 250
Width max [mm]	1750	1780	1780	1850	1950	2000	

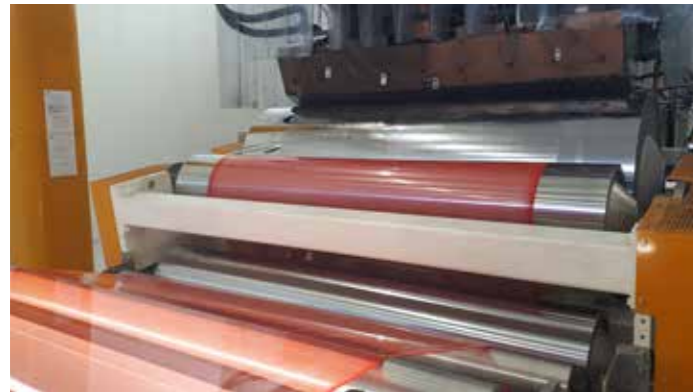
- Slitting available for thickness between 0,05 -0,2 mm. and width ≥ 25mm
- Standard offerings: film Width 1220 mm / Thickness 0,013 mm / Length 150 MT / Colour Red
- Mechanical grade available

ETFE

Type	Code
Cast extruded film	ETFE2600E
Colour	Roll Length
Natural Clear / Blue / Dark Blue	To customers' specifications

Thickness [µm]	15	20	25	50	100	>100	Max. 250
Width max [mm]	1750	1780	1780	1850	1950	2000	

- Slitting available for thickness between 0,05 -0,2 mm. and width ≥ 25mm
- Standard offerings: film Width 1220 mm / Thickness 0,015 mm / Length 150 MT / Colour Blue
- Mechanical grade available



PFA

Type	Code
Cast extruded film	PFA2400E
Colour	Roll Length
Natural Clear	To customers' specifications

Thickness [µm]				25	50	100	>100	Max. 200
Width max [mm]				1750	1800	1850	1850	

- Slitting available for thickness between 50 and 100 µm
- Perforation capability available
- Mechanical grade available

PVDF

Type	Code
Blow extruded film	PVDF2800B
Colour	Roll Length
Natural Clear	To customers' specifications

Thickness [µm]					50	100	150	Max. 150
Width max [mm]					450	400	350	

- Slitting available for thickness between 50 and 150 µm

THV

Type	Code
Cast extruded film	THV2200E* (THV500)
Colour	Roll Length
Natural Clear	To customers' specifications

Thickness [µm]					75	100	>100	Max. 200
Width max [mm]					1800	1900	2000	

- Slitting available for thickness between 75 and 180 µm
- Food & conductive (black) grades available

* Other THV grades available on request

PREMIUM QUALITY PRESSURE SENSITIVE ADHESIVE TAPES

PTFE films provide a conformable release surface and exhibit a remarkably low coefficient of friction with nonstick properties. PTFE films have high temperature resistance and are virtually unaffected by all chemicals.

At elevated temperatures, PTFE films retain excellent tensile strength. Film applications include high temperature coil and capacitor wrapping, composite bonding, masking and conveyor release linings.

ADHESIVE SYSTEMS

SILICONE

Perfect for extreme temperature applications, silicone adhesive performs in continuous service temperature from -73°C up to 260°C. Silicone based adhesive system exhibits good chemical resistance, retain electrical properties.

ACRYLIC

Acrylic adhesives perform in continuous operating temperatures from -40°C to +177°C. Benefits include exceptional solvent resistance, excellent adhesion to metal, superior weathering and aging characteristics. Acrylics have an excellent shelf life and when exposed to elevated temperatures their ability to wet-out improves thus increasing both adhesion and tack properties.

Acrylic adhesives will generally thermoset when exposed to heat. The adhesive will then exhibit increased strength and improved thermal capabilities.

RELEASE LINERS

PVC

A general purpose release liner, PVC conforms well to tape and protects the adhesive during handling. Although these liners have good release properties and slit well, they are generally not used for die-cutting. Only available with silicone adhesive tapes, a yellow liner is standard. Corrugated liners are standard on most PTFE coated fabrics, whilst dimpled liners are used on the majority of thermal spray tapes.

POLYETHYLENE

These thin release liners not only conform well to tape, but slit and release easily, making them a sensible choice for die-cutting. Available with acrylic adhesive systems, a smooth blue release liner is standard on most acrylic-adhesive pressure sensitive products.

POLYCOATED KRAFT

Paper is the ideal choice for die and kiss cutting. They have the advantage of low cost and excellent release properties. Available with silicone rubber and acrylic adhesive systems, these beige release liners are specially treated to ensure excellent release properties.

FLUOROSILICONE

This release liner incorporates advanced release technology for use with silicone adhesives. As a flat, diecuttable liner, it has exceptional release properties, making it an ideal choice for small or complex parts.

PTFE PRESSURE SENSITIVE ADHESIVE TAPE WITH HIGHER ELONGATION

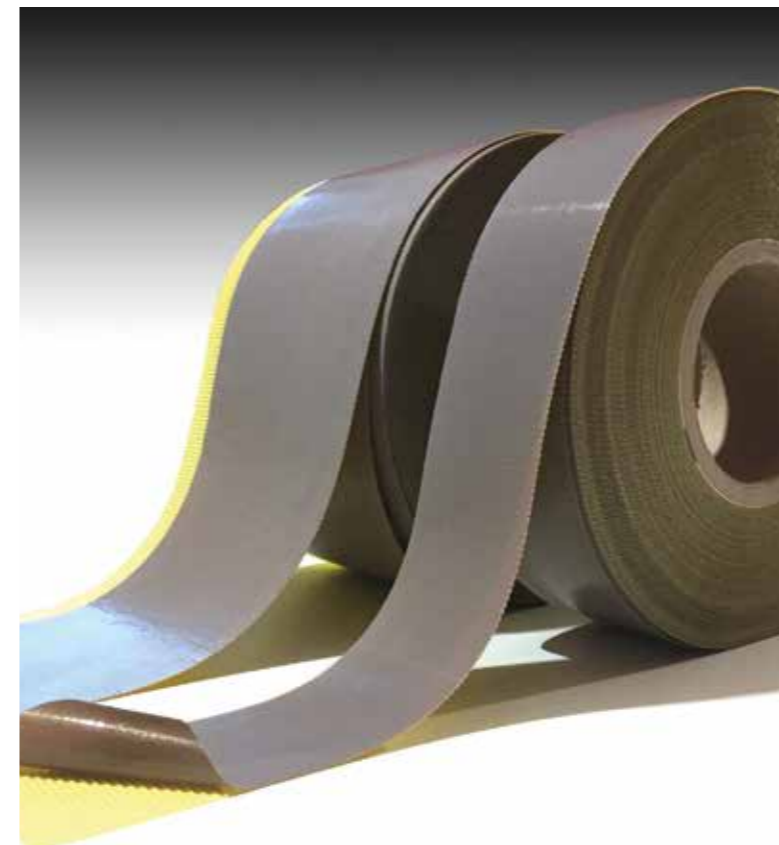
Code	Thickness [mm]	Max Width [mm]	Adhesive	Colour	Liner	Roll Length [mt]
4010-S5	0.127	1000	Silicone	Greych	Embossed Yellow PVC Paper	*33
4010-S10	0.254	1000	Silicone	Greych	Embossed Yellow PVC Paper	*33
4010-S20	0.508	1000	Silicone	Greych	Embossed Yellow PVC Paper	*33
4020-A5	0.127	1000	Acrylic	Greych	Polyethylene Blue	*33
4020-A10	0.254	1000	Acrylic	Greych	Polyethylene Blue	*33
4020-A20	0.508	1000	Acrylic	Greych	Polyethylene Blue	*33
4022-A5	0.127	1000	Acrylic 3M®	Greych	Polycoated Kraft	*33
4022-A10	0.254	1000	Acrylic 3M®	Greych	Polycoated Kraft	*33
4022-A20	0.508	1000	Acrylic 3M®	Greych	Polycoated Kraft	*33

PTFE HIGH MODULUS PRESSURE SENSITIVE ADHESIVE TAPE

Code	Thickness [mm]	Max Width [mm]	Adhesive	Colour	Roll Length [mt]
HM400-S2	0.051	600	Silicone	Light Brown	*33
HM481-S2	0.051	600	Silicone	Blue	*33
HM511-S2	0.051	600	Silicone	Orange	*33
HM400-A2	0.051	600	Acrylic	Light Brown	*33
HM481-A2	0.051	600	Acrylic	Blue	*33
HM511-A2	0.051	600	Acrylic	Orange	*33

*Tape on request

PTFE PRESSURE SENSITIVE ADHESIVE TAPE WITH HIGHER ELONGATION



PTFE HIGH MODULUS PRESSURE SENSITIVE ADHESIVE TAPE

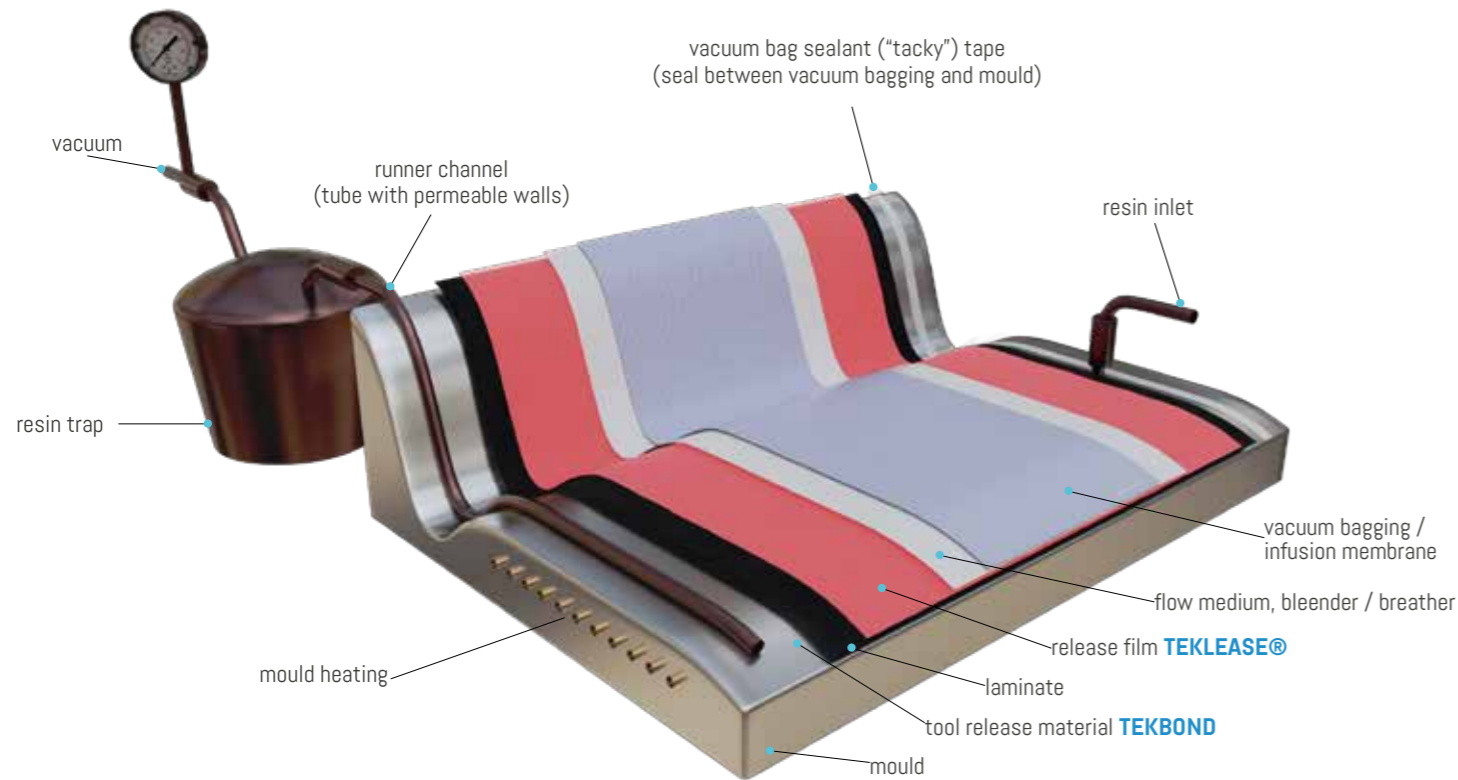


HIGH TEMPERATURE RELEASE FILMS FOR COMPOSITE INDUSTRY

TEKLEASE® release film products have been specially formulated to suit a variety of individual composite process applications. Release films are used to separate and release the laminate from the vacuum stack following the cure of the composite components.

TEKLEASE® films are supplied both as perforated and unperforated to allow resins and volatiles to bleed out of the laminate and coloured for easy identification. The selection of a release film should be based on the resin system being used, the temperature and pressure of the cure cycle, the shape of the component to be cured and the amount of resin bleed that is required.

For example, release films that have higher elongations, will be more suitable for complex curvatures, though tailoring the film is recommended to ensure no bridging of the film occurs. It is important to remember that the mechanical performance of a film is strongly affected by the presence of the perforations. Rolls of TEKLEASE® should be stored and handled in clean and dry conditions to prevent any contamination onto the final composite component.



PRODUCT RANGE AND MATERIAL PROPERTIES

Code	Description	Max Use Temp [°C]	Elongation at Break [%]	Colour
ET6200	ETFE	232	350	Blue / Dark Blue
FE5000	FEP	260	280	Red / Dark Red
MRF1	PTFE	315	250	Natural
MRF2	Modified PTFE	315	400	Natural
PE4700	HDPE	120	550	Orange/ Red
PP4900	PP	157	500	Blue / Green

STANDARD AVAILABILITY

Code	Thickness [µm]	Width [mm]	Roll Length [mt]	Other
ET6200	15, 20, 25, 50	1220, 1530	153	Perforation available
FE5000	13, 20, 25, 50	1220, 1530	153	Perforation available
MRF1	25, 50	1220	On request	Perforation available
MRF2	25, 50	1220	On request	Perforation available
PE4700	25	1520	250	Perforation available
PP4900	50	1520	250	Perforation available

AVAILABLE PERFORATIONS

Perforation Pattern	Nominal Hole Diameter [mm]	Description [mm]	Nominal Open Area [%]	Maximum Width [mm]
P3	0.381	Staggered 6.3 center	0.14	1830
P3F	0.381	Staggered 10 -20	0.13	1830
P6	0.381	50.8 center	0.0044	1830
P7	0.381	76.2 center	0.0019	1830
P8	0.381	203.2 center	0.0003	1830
P11	0.381	6.3 center	0.28	1830
P16	0.406	Staggered 3.0	0.698	1830
P31	0.381	254 center	0.018	1830

RESIN COMPATIBILITY

Maximum Use Temperature [°C]	Release Film	Epoxy	Polyester & Vinylester	Phenolic	Bismaleimide BMI	Cyanate Ester
121	PE4700	▲	▲	▲	●	●
157	PP4900	▲	▲	■	■	■
232	ET6200	■	■	■	■	■
260	FE5000	■	■	■	■	■
315	MRF1	■	■	■	■	■
315	MRF2	■	■	■	■	■

▲ RECOMMENDED ■ COMPATIBLE ● NOT COMPATIBLE

NOTE:

The following table is intended for reference only and cannot be used as guarantee of product functionality because Guarniflon cannot control processing parameters or test all resins available. Testing before using each film is strongly recommended. Film selection should be based on temperature requirement.

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