

HIGH PERFORMANCE FILMS

SPECIALTY SKIVED
AND EXTRUDED
FLUOROPOLYMER FILMS



YOUR CHOICE FOR FLUOROBASED PRODUCTS
GUARNIFLON®

HIGH
PERFORMANCE
FILMS

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FLUOROPOLYMER FILMS

TEKFILM
TEKBOND
TEKLEASE

BY GUARNIFLON

HPF HIGH PERFORMANCE FILMS

High Performance Films from Guarniflon are skived and melt extruded fluoropolymer films engineered by Guarniflon Spa 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, ETFE, PVDF, THV, to match right combination of physical chemical performances in a variety of key market segments including composite molding for the automotive and aerospace industries, chemical processing, electrical/electronics, renewable energies and marine.

HPF from Guarniflon Spa are gathered under 3 main product families:

TEKFILM

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

TEKBOND

Premium Quality Pressure Sensitive Adhesive Tapes, offered with or without release liners in Fluorosilicone, Polyethylene, PVC, Paper.

Two different adhesive systems: Acrylic and Silicone.

TEKLEASE

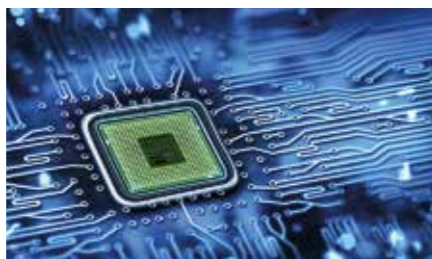
Special products developed as release films for composite industry applications.

Perforation capability available.

AREOSPACE



ELECTRONICS



SOLAR ENERGY



TRANSPORTATION



AUTOMOTIVE



MARINE



HPF MATERIALS

OPTIMAL PRODUCT PROPERTY COMBINATIONS

	PTFE	FEP	ETFE	PFA	MFA	PVDF	THV
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

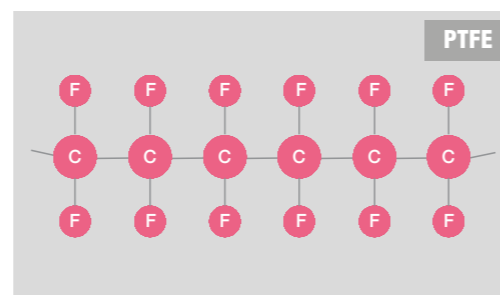
■ Depends on product grade or application

● Generally not recommended

PTFE

The base characteristics of PTFE are the ones offering a unique combination of:

- low coefficient of friction
- excellent chemical inertness
- non-adhesive surface
- wide temperature range withstanding (-200° C to +260°C)
- excellent dielectric properties



MECHANICAL

The compressive strength at a certain predetermined compression value is one of the most significant mechanical characteristics of PTFE, in a wide range of service temperatures.

Flexibility strength, plastic memory and hardness, are additional characteristics of PTFE products.

ELECTRICAL

PTFE products have excellent dielectric performances in a wide range of frequencies and temperatures. The dielectric strength changes according to the thickness and decreases when the frequency increases, with no substantial alterations up to 300°C.

CHEMICAL INERTNESS

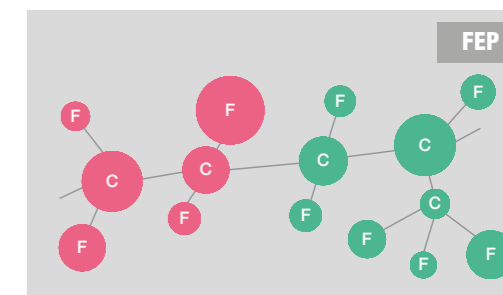
PTFE is practically inert to all chemical products, except for some alkaline metals, chlorine trifluoride and basic fluorine at high temperatures and pressures.

THERMAL

PTFE is considered one of the most stable materials from the thermal point of view. Up to a service temperature of 260° C PTFE does not change its own physical and molecular properties.

FEP

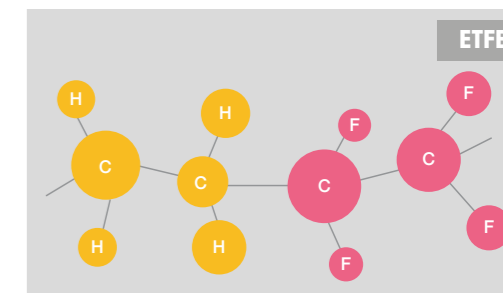
Fluorinated thermoplastic material (a polymer of tetrafluoroethylene and hexafluoropropylene) offers excellent thermal, electrical and chemical inertness properties. Widely used for different industrial applications for its excellent chemical resistance up to 200° C. It can be used as non-stick material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



ETFE

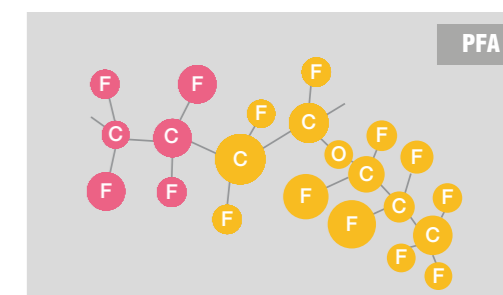
A polymer of tetrafluoroethylene and ethylene, known also by its acronym ETFE, is a thermoplastic fluorocarbon-based polymer (a fluoropolymer). It was originally designed to have high corrosion resistance and strength over a wide temperature range.

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 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".



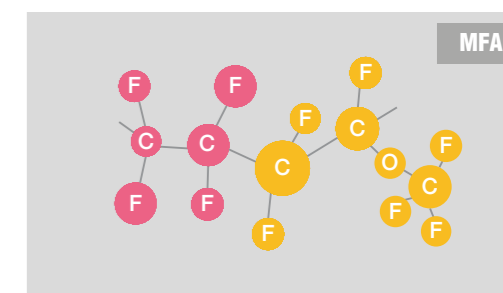
PFA

Fluorinated thermoplastic material (a polymer of tetrafluoroethylene and perfluorovinylether), offers the advantages of being thermo-processed 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 the processing, the final products in PFA – especially the extruded films - are absolutely porous-free, hence very suitable for electrical applications.



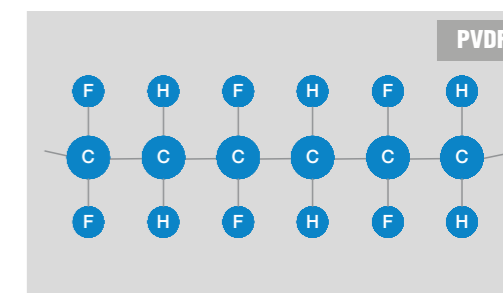
MFA

It's 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.



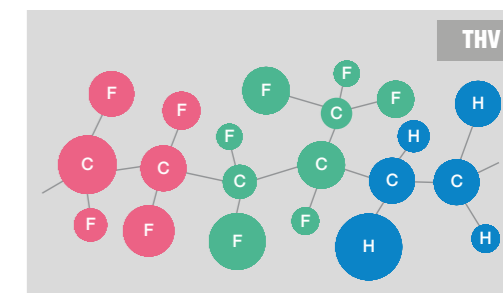
PVDF

Polyvinylidene Fluoride, or PVDF is a highly non-reactive thermoplastic fluoropolymer a polymer of vinylidene fluoride. It is also known as KYNAR® (Arkema) or HYLAR® (Solvay Solexis). 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 and heat and low smoke generation 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.



TEKFILM

SKIVED AND EXTRUDED 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:

- flatterring
- calendering
- surface treatment: Sodium Naphthalene chemical etching, corona 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	TOLLERANCE	MAX WIDTH	TOLLERANCE	IN STOCK
mm	mm	mm	mm	mm
0,025	+0,005 -0	1300	+20 -0	Width 1000 - 1200 - 1500
0,05	+0,010 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,10	+0,010 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,15	+0,020 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,20	+0,020 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,25	+0,020 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,30	+0,020 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,40	+0,030 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,50	+0,030 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,60	+0,040 -0	1500	+20 -0	Width 1000 - 1200 - 1500
0,80	+0,040 -0	1500	+20 -0	Width 1000 - 1200 - 1500
1,00	+0,050 -0	1500	+20 -0	Width 1000 - 1200 - 1500
1,50	+0,100 -0	1500	+20 -0	Width 1000 - 1200 - 1500
2,00	+0,200 -0	1500	+20 -0	Width 1000 - 1200 - 1500
2,50	+0,300 -0	1500	+20 -0	Width 1000 - 1200 - 1500
3,00	+0,300 -0	1500	+20 -0	Width 1000 - 1200 - 1500
4,00	+0,400 -0	1500	+20 -0	Width 1000 - 1200 - 1500
5,00	+0,500 -0	1500	+20 -0	ON REQUEST
6,00	+0,600 -0	1500	+20 -0	ON REQUEST

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 film

TYPE	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
Ultra Flat Film	from 0,025 mm to 0,508 mm	1500 mm	Natural	To customers' specifications

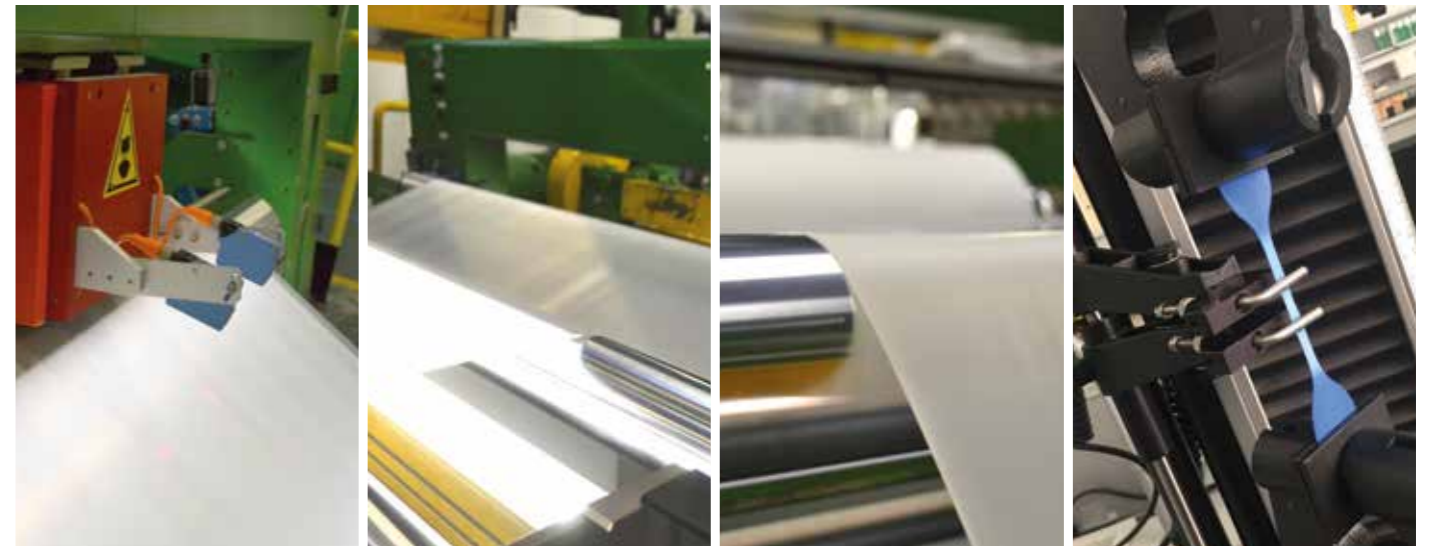
CALFIM GF - CALENDERED PTFE SKIVED TEKFILM

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	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
Calendered Film	0,051 mm	635 mm *	Blue/Orange/Natural	33 m

*Tape on request



FEP - PFA - MFA - THERMOPROCESSABLES FLUOROPOLYMER SKIVED TEKFILM

High molecular weight grades transformed with a proprietary hot compression molding process and skived

TYPE	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
FEP	from 0,05 to 3 mm	1200 mm	Natural	To customers' specifications
PFA	from 0,25 to 3 mm	1200 mm	Natural	To customers' specifications
MFA	from 0,05 to 3 mm	1200 mm	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 12.5 µm) at wide width (up to 2000 mm)

FEP

TYPE	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
Cast extruded film	from 0,013 mm to 0,250 mm	Up to 2000 mm	*Red/Clear	To customers' specifications

Standard offerings: Sheets Width 1220 mm / Thickness 0,013 mm / Length 150 M / Colour Red

Perforation capability available

*Other colours available

ETFE

TYPE	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
Cast extruded film	from 0,015 mm to 0,250 mm	Up to 2000 mm	*Blue/Red/Clear	To customers' specifications

Standard offerings: Sheets Width 1220 mm / Thickness 0,020 mm / Length 150 M / Colour Blue

Perforation capability available

*Other colours available



PFA

TYPE	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
Cast extruded film	0,050 mm	Up to 1200 mm	Transparent	To customers' specifications
Cast extruded film	0,127 mm	Up to 1200 mm	Transparent	To customers' specifications

Standard offerings: Strips of Width 50-100 mm / Thickness 0,050 mm / Length 500 M

Perforation capability available

PVDF

TYPE	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
Blow extruded film	0,050 mm	Up to 300 mm	Clear	To customers' specifications

Standard offerings: Strips of Width 50-100 mm / Thickness 0,050 mm / Length 500 M

THV

TYPE	THICKNESS	MAX WIDTH	COLOUR	ROLL LENGTH
Blow extruded film	from 0,050 to 0,200 mm	Up to 300 mm	White/Black	To customers' specifications

Standard offerings: Tapes Width 50-75-100 mm / Thickness 0,100 mm / Length 250 M

Food grade available & conductive (black)

TEKBOND

PREMIUM QUALITY PRESSURE SENSITIVE ADHESIVE TAPES

PTFE films provide a conformable release surface and exhibit a remarkably low coefficient of friction and 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 perform in continuous service temperature from -73°C up to 260°C. Silicone based adhesive system exhibit 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.

PAPER (COATED)

Paper is the ideal choice for die- and kiss-cutting. They have the advantage of low cost and excellent release characteristics. 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.

PRESSURE SENSITIVE ADHESIVE TAPE WITH HIGHER ELONGATION

THICKNESS	MAX WIDTH	ADHESIVE	COLOUR	ROLL LENGTH
0.127 mm	1000 mm	Silicone/Acrylic	GreysH	*33m
0,254 mm	1000 mm	Silicone/Acrylic	GreysH	*33m
0,508 mm	1000 mm	Silicone/Acrylic	GreysH	*33m

Standard liner: embossed yellow PVC paper.

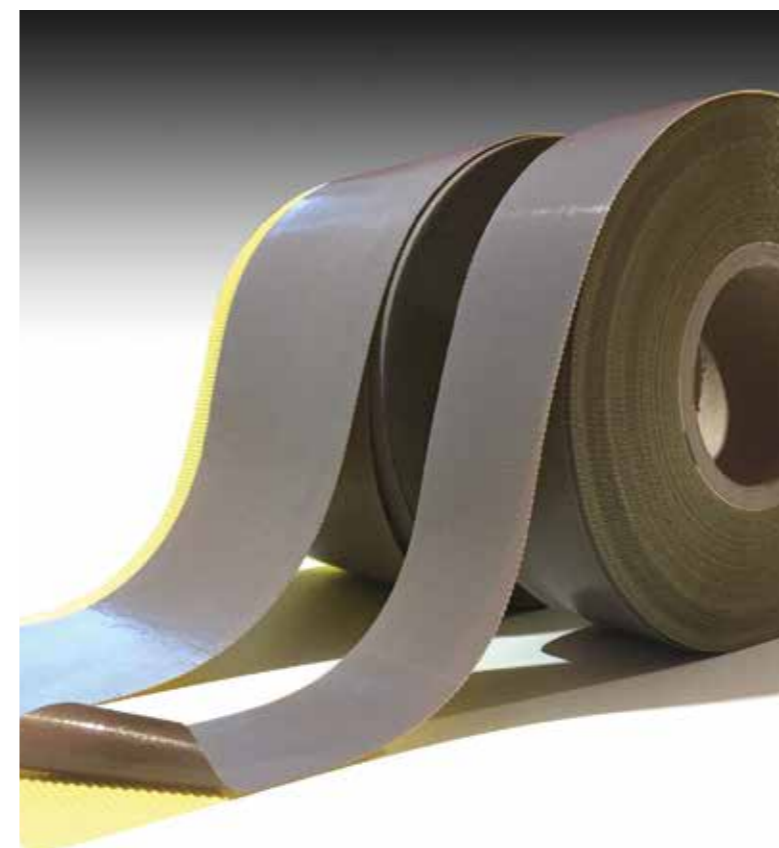
* Special length according to customers' requirements

HIGH MODULUS PRESSURE SENSITIVE ADHESIVE TAPE

THICKNESS	MAX WIDTH	ADHESIVE	COLOUR	ROLL LENGTH
0.051 mm	635 mm	Silicone/Acrylic	Blue/Orange/Natural	33m

Without release paper -Tape on request

Pressure sensitive adhesive tape



High modulus pressure adhesive tape



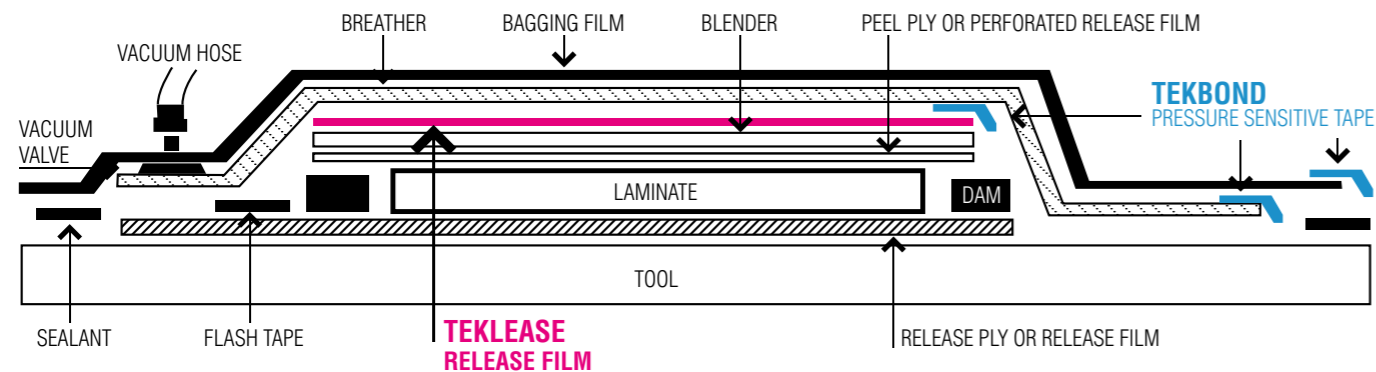
TEKLEASE

HIGH TEMPERATURE RELEASE FILMS FOR COMPOSITE INDUSTRY

Guarniflon 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 component.

TEKLEASE films are supplied both as perforated and unperforated to allow resin 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 dramatically 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 AVAILABILITY

NAME	DESCRIPTION	MAX USE TEMP.	ELONGATION AT BREAK	COLOUR
ET6200	ETFE	232°C	350%	Blue
FE5000	FEP	260°C	280%	Red
MRF1	PTFE	315°C	250%	Natural
MRF2	Modified PTFE	315°C	400%	Natural

NAME	THICKNESS	MAX WIDTH	ROLL LENGTH	OTHER
ET6200	15, 20, 25, 50 µm	1220, 1530, 1780 mm	153 m	Perforation available
FE5000	13, 20, 25, 50 µm	1220, 1530, 1780 mm	153 m	Perforation available
MRF1	25, 50 µm	1220 mm	On request	
MRF2	25, 50 µm	1220 mm	On request	



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