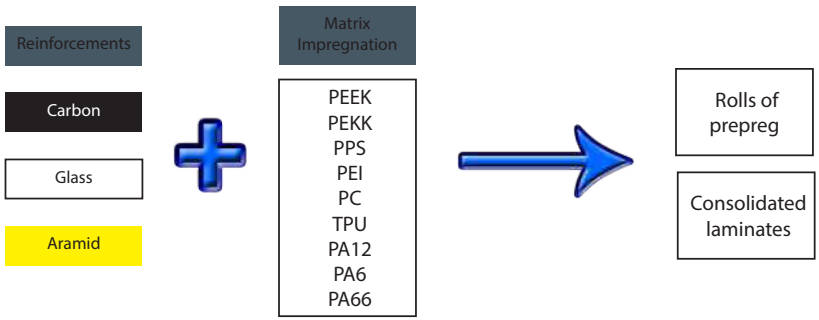
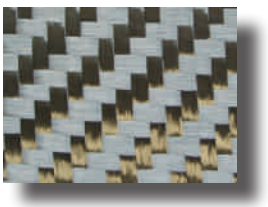
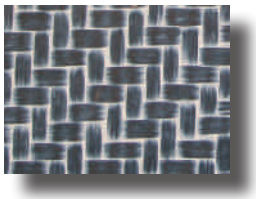
OUR PROCESS



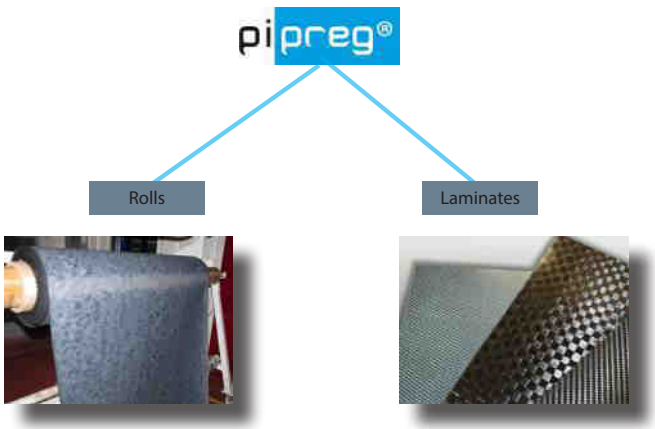


Weaving

Impregnation

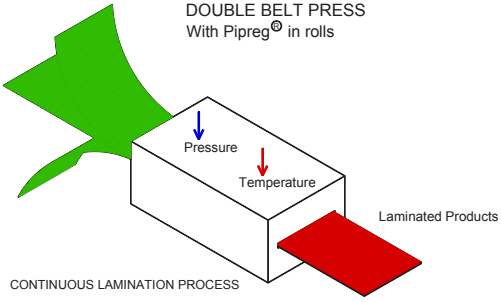


Consolidation

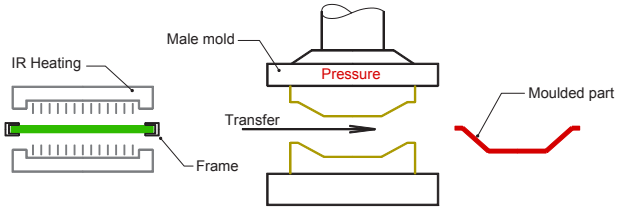


HOW TO HANDLE OUR THERMOPLASTIC COMPOSITES

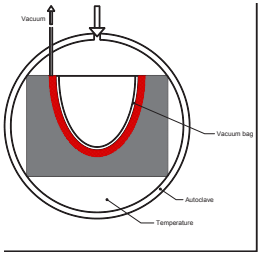
DOUBLE BELT PRESS
With Pipreg® in rolls

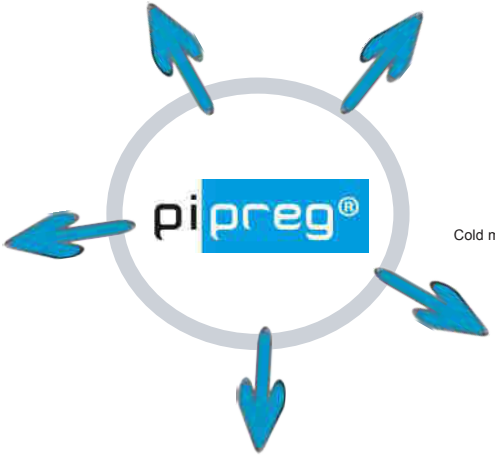


THERMOFORMING: with Pipreg® flat laminates

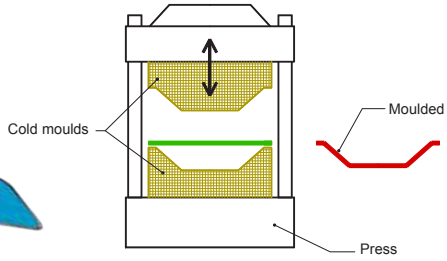


AUTOCLAVE MOLDING :
with Pipreg® layers

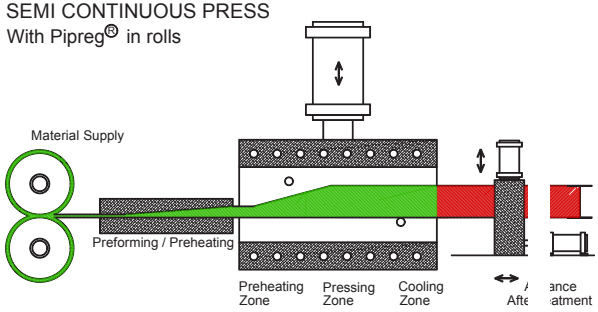




COMPRESSION MOLDING PROCESS
With Pipreg® layers



SEMI CONTINUOUS PRESS
With Pipreg® in rolls



Thermoplastic Composites

ADDED VALUES OF OUR COMPOSITES

Our facilities are **ISO 9001 : 2008** and **EN 9100 : 2009** certified in order to offer you the level of quality you expect from us, for both products and services.

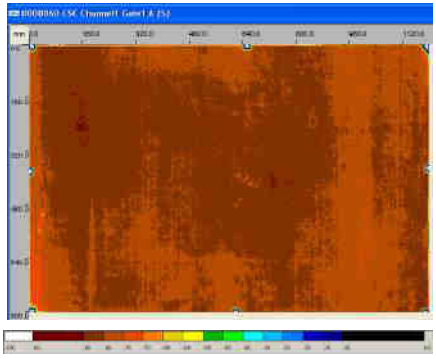
Thermoplastic composites combine the advantages of continuous fibers and polymers, where:

- woven continuous fibers bear the mechanical loads of the composite,
- polymers distribute these strengths over the fibers and determine the thermal, chemical and part of the impact resistance of the composite.

The use of composites gives very high flexibility to optimize the material according to the required specifications. It results in lighter, sometimes thinner, stronger and more durable structures compared to conventional materials.
Porcher Industries extended its know-how to thermoplastic composites in the early 1990's, before investing in a more competitive and flexible impregnation technology to be able to offer today a broad range of thermoplastic composites.

Pipreg® with other polymer / reinforcement combination and / or polymer volume content can be developed on request.

OUR COMMITMENT IN HIGH QUALITY



Thanks to our Ultrasonic NDT equipment, technicians check the quality of our consolidated laminates and their compliance with customer specifications.

Our operating people are certified:
- Level 1
- Level 2 COFREND / COSAC in US methods. Our NDT department is qualified by aeronautical customers on some specific products.

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

PEEK

(Poly-Ether-Ether-Ketone)

Semi-crystalline polymer

Properties	
Melting temperature Tm	343°C
Density	1.30 g/cm3
Processing temperature Tp	390 +/- 10°C
Processing pressure	10 bars
Glass transition temperature Tg	143°C
Service temperature	120°C (Aerospace) 260°C (Low stress applications)

Performances

- Good mechanical properties from cryogenic to high temperatures
- Excellent tribologic properties
- High toughness
- Good resistance to creep and fatigue
- Excellent impact resistance
- Excellent environmental resistance
- Excellent hydrolysis resistance
- Very low smoke & toxic gas emission
- Good bonding & painting
- Indefinite shelf life at ambient conditions

Carbon Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/ Weft	Polymer content in volume (in weight)	Style
294	1100	Plain	4.9 x 4.9	3K HS	40 (33)	3085-P51
326	1000	Plain	4.9 x 4.9	3K HS	47 (40)	3085-P55
344	1000	Plain	4.9 x 4.9	3K HS	50 (43)	3085-P17
344	1000	2 x 2 Twill	4.9 x 4.9	3K HS	50 (43)	3257-P17
350	1000	4 H Satin	5.5 x 5.5	3K HS	44 (37)	3419-P03 [1]
427	1250	5 H Satin	7.0 x 7.0	3K HS	40 (33)	3106-P51
439	1250	5 H Satin	7.0 x 7.0	3K HS	42 (35)	3106-P52
456	1250	5 H Satin	7.0 x 7.0	3K HS	45 (38)	3106-P03
485	1250	5 H Satin	7.0 x 7.0	3K HS	49 (41)	3106-P57 [1]
479	1250	5 H Satin	7.0 x 7.0	3K HS	48 (40)	3106-P55
497	1250	5 H Satin	7.0 x 7.0	3K HS	50 (43)	3106-P17
497	1000/1250	2 x 2 Twill	1.8 x 1.8	12K HS	50 (43)	2009-P17

E Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
161	1270	4 H Satin	23.6 x 22.9	EC5 11x2	51 (35)	120-P17 [1]
450	1270	8 H Satin	22.9 x 21.1	EC6 68	50 (34)	7781-P17
456	1270	8 H Satin	22.9 x 21.1	EC9 68	50 (34)	7581-P17

S2® Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
460	1270	8 H Satin	22.4 x 21.2	SC9 66	50 (35)	6781-P17

[1] **aeronautical qualified**

Standard laminates

Reference	Nominal thickness (mm)	No. of plies	Stacking sequence
L03106-57100602	1.86	6	[(0,90)/(+45,-45)/(0,90)]s
L03106-57100702	2.17	7	$[(0,90)/(+45,-45)]_3/(0,90)$
L03106-57100802	2.48	8	$[[(0,90)/(+45,-45)]_2]s$
L03106-57100902	2.79	9	$[(0,90)/(+45,-45)]_4/(0,90)$
L03106-57101002	3.10	10	$[[(0,90)/(+45,-45)]_2/(0,90)]s$
L03106-57101102	3.41	11	$[(0,90)/(+45,-45)]_5/(0,90)$
L03106-57101202	3.72	12	$[[(0,90)/(+45,-45)]_3]s$
L03106-57101402	4.34	14	$[[(0,90)/(+45,-45)]_3/(0,90)]s$
L03106-57101502	4.65	15	$[(0,90)/(+45,-45)]_7/(0,90)$

Available dimensions: 800 x 1200 mm
Possibility to add surface ply like PEEK / Glass Pipreg or wire bronze mesh

Thick laminates

Reference	Minimum thickness (mm)	No. of plies	Stacking sequence
L03106-17103401	10	34	(0,90)
L03106-17104001	12	40	(0,90)
L03106-17105001	15	50	(0,90)
L03106-17106602	20	66	(0,90)
L03106-17108201	25	82	(0,90)
L03106-17109801	30	98	(0,90)
L03106-17113001	40	130	(0,90)

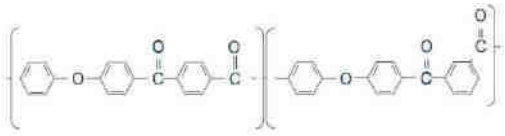
Available dimensions: 800 x 1200 mm

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

PEKK

(Poly-Ether-Ketone-Ketone)



Semi-crystalline polymer

Properties	
Melting temperature Tm	332°C
Density	1.29 g/cm3
Processing temperature Tp	370 +/- 10°C
Processing pressure	10 bars
Glass transition temperature Tg	162°C
Service temperature	120°C (Aerospace) & 260°C (low stress applications)

Performances

- Good mechanical properties from cryogenic to high temperatures
- High fracture toughness
- Good resistance to creep and fatigue
- Excellent impact resistance
- Excellent environmental resistance
- Excellent hydrolysis resistance
- Very low smoke & toxic gas emission
- Indefinite shelf life at ambient conditions

Carbon Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
336	1000	Plain	4.9 x 4.9	3K HS	50 (42)	3085-PA1
336	1000	2 x 2 Twill	4.9 x 4.9	3K HS	50 (42)	3257-PA1
486	1250	5 H Satin	7.0 x 7.0	3K HS	50 (42)	3106-PA1
495	1000	2 x 2 Twill	1.8 x 1.8	12K HS	50 (42)	2009-PA1

E Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
157	1270	4 H Satin	23.6 x 22.9	EC5 11x2	50 (33)	120-PA7
444	1270	8 H Satin	22.9 x 21.1	EC6 68	50 (33)	7781-PA7
452	1270	8 H Satin	22.9 x 21.1	EC9 68	50 (33)	7581-PA7

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

PPS

(Poly-Phenylene-Sulfide)

Semi-crystalline polymer

Properties	
Melting temperature Tm	280°C
Density	1.35 g/cm3
Processing temperature Tp	310 +/- 10°C
Processing pressure	10 bars
Glass transition temperature Tg	90°C
Service temperature	240°C (Low stress applications)

Performances

- Good impact resistance
- Inert to aggressive chemicals (engine & hydraulic oils, fuels, solvents, ...)
- Very good hydrolysis resistance
- Inherently flame retardant
- High hardness and rigidity
- Very low water absorption
- Excellent creep resistance (even at elevated temperatures)
- Excellent dimensional stability
- Indefinite shelf life at ambient conditions

Carbon Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
501	1250	5 H Satin	7.0 x 7.0	3K HS	50 (43)	3106-P23
510	1000/1250	2 x 2 Twill	1.8 x 1.8	12K HS	50 (43)	2009-P23
533	1000	Plain	3.5 x 4.5	12K HS / EC9 34	50 (43)	13796-P23
559	1000	Plain	3.5 x 4.5	12K HS / 1K HS	50 (43)	13795-P31

E Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
159	1000/1270	4 H Satin	23.6 x 22.9	EC5 11x2	50 (34)	120-P23
450	1270	8 H Satin	22.9 x 21.1	EC6 68	50 (34)	7781-P23
462	1270	8 H Satin	22.9 x 21.1	EC9 68	50 (34)	7581-P23
827	1270	8 H Satin	20.7 x 19.0	EC9 136	50 (34)	3783-P23

S2® Glass Pipreg® rolls

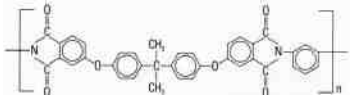
Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
460	1270	8 H Satin	22.4 x 21.2	SC9 66	50 (35)	6781-P23

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

PEI

(Poly-Ether-Imide)



Amorphous polymer

Properties	
Density	1.27 g/cm3
Processing temperature Tp	370 +/- 10°C
Processing pressure	10 bars
Glass transition temperature Tg	217°C
Service temperature	170°C (Low stress applications)

Performances

- Inherent flame resistance, LOI 47%
- Low smoke evolution
- Strength and modulus at elevated temperatures
- Good chemical resistance
- Indefinite shelf life at ambient conditions

Carbon Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
340	1000	2 x 2 Twill	4.9 x 4.9	3K HS	50 (42)	3257-P44
489	1250	5 H Satin	7.0 x 7.0	3K HS	50 (42)	3106-P44
495	1000/1250	2 x 2 Twill	1.8 x 1.8	12K HS	50 (42)	2009-P44
521	1000	Plain	3.5 x 4.5	12K HS EC9 34	50 (41)	13796-P44

E Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
157	1000/1270	4 H Satin	23.6 x 22.9	EC5 11x2	50 (33)	120-P44
440	1000/1270	8 H Satin	22.9 x 21.1	EC6 68	50 (33)	7781-P44
450	1270	8 H Satin	22.9 x 21.1	EC9 68	50 (33)	7581-P44

High Modulus Glass Pipreg® rolls

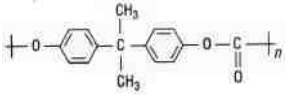
Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
438	1270	8 H Satin	22.4 x 21.2	SC9 66	47 (32)	6781-P44

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

PC

(Polycarbonate)



Amorphous polymer

Properties	
Density	1.20 g/cm3
Processing temperature Tp	275 +/- 10°C
Processing pressure	10 bars
Glass transition temperature Tg	143°C
Service temperature	120°C (Low stress applications)

Performances

- High Transparency
- Flame retardant (UL94 V-0 rated)
- Exceptional impact resistance
- High ductility and toughness over a wide temperature range
- Low water absorption
- Good dimensional stability
- Indefinite shelf life at ambient conditions
- Halogen free
- UV Stabilized

Carbon Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
328	1250	2 x 2 Twill	4.9 x 4.9	3K HS	50 (40)	3257-P48
328	1000	Plain	4.9 x 4.9	3K HS	50 (40)	3085-P48
358	1000	2 x 2 Twill	4.9 x 4.9	3K HS	55 (45)	3257-P53
358	1000	Plain	4.9 x 4.9	3K HS	55 (45)	3085-P53
479	1250	5 H Satin	7.0 x 7.0	3K HS	50 (40)	3106-P48
479	1000/1250	2 x 2 Twill	1.8 x 1.8	12K HS	50 (40)	2009-P48
521	1000/1250	2 x 2 Twill	7.0 x 7.0	3K HS	55 (45)	3101-P53
521	1000	2 x 2 Twill	1.8 x 1.8	12K HS	55 (45)	2009-P53

E Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
442	1270	8 H Satin	22.9 x 21.1	EC9 68	50 (32)	7581-P48
571	1000	2 x 2 Twill	6.0 x 6.6	EC9 68x5 / EC9 272	50 (32)	1989-P48
612	1000	2 x 2 Twill	6.0 x 6.6	EC9 68x5 / EC9 272	55 (36)	1989-PX4 [1]

[1]: Black finish (carbon appearance)

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

TPU

(Thermoplastic PolyUrethane, polyester based)

Properties	
Density	1.21 g/cm3
Processing temperature Tp	235 +/- 10°C
Processing pressure	10 bars
Glass transition temperature Tg	90°C
Service temperature	80°C (Low stress applications)

Performances

- High modulus
- High transparency
- Good toughness
- Good abrasion & wear resistance
- Good chemical resistance
- Low water absorption
- Indefinite shelf life at ambient conditions

Carbon Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
334	1000	Plain	4.9 x 4.9	3K HS	50 (41)	3085-P29
334	1000	2 x 2 Twill	4.9 x 4.9	3K HS	50 (41)	3257-P29
362	1000	Plain	4.9 x 4.9	3K HS	55 (46)	3085-P54
362	1070	2 x 2 Twill	4.9 x 4.9	3K HS	55 (46)	3257-P54
481	1250	5 H Satin	7.0 x 7.0	3K HS	50 (41)	3106-P29
481	1000/1250	2 x 2 Twill	1.8 x 1.8	12K HS	50 (41)	2009-P29

E Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
283	1220	2 x 2 Twill	14.0 x 14.0	EC9 68	50 (32)	3423-P29
416	1000	2 x 2 Twill	7.0 x 6.5	EC9 68x3 / EC9 204	50 (32)	3063-P29
416	1000	2 x 2 Twill	7.0 x 6.5	EC9 68x3 / EC9 204	50 (32)	3063-P38 [1]
440	1000	2 x 2 Twill	7.0 x 6.5	EC9 68x3 / EC9 204	55 (36)	3063-P54
575	1000	2 x 2 Twill	7.0 x 6.6	EC9 68x5 / EC9 272	50 (32)	1989-P29
576	1000	2 x 2 Twill	7.0 x 6.6	EC9 68x5 / EC9 272	50 (32)	1989-P45 [2]

[1] Aluminium finish
[2] Black finish (carbon appearance)

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

PA12

(Polyamide 12)

H - [NH - (CH2)11 - CO]n - OH

Semi-crystalline polymer

Properties	
Melting temperature Tm	176°C
Density	1.02 g/cm3
Processing temperature Tp	230 +/- 10°C
Processing pressure	10 bars
Glass transition temperature Tg	55°C
Service temperature	70°C (Low stress applications)

Performances

- Medium toughness
- Very good impact resistance
- Good chemical resistance
- Good abrasion resistance
- Lowest humidity absorption vs. all available polyamides
- Indefinite shelf life at ambient conditions

Carbon Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
310	1000	Plain	4.9 x 4.9	3K HS	50 (37)	3085-P19
310	1250	2 x 2 Twill	4.9 x 4.9	3K HS	50 (37)	3257-P19
451	1250	5 H Satin	7.0 x 7.0	3K HS	50 (37)	3106-P19
451	1000/1250	2 x 2 Twill	1.8 x 1.8	12K HS	50 (37)	2009-P19

E Glass Pipreg® rolls

Pipreg® areal weight (g/sqm)	Width (mm)	Weave	Warp/Weft (yarn/cm)	Warp/Weft	Polymer content in volume (in weight)	Style
412	1270	8 H Satin	22.9 x 21.1	EC6 68	50 (28)	7781-P19
422	1270	8 H Satin	22.9 x 21.1	EC9 68	50 (28)	7581-P19
545	1000	2 x 2 Twill	6.0 x 6.6	EC9 68 / EC9 272	50 (28)	1989-P19

THERMOPLASTIC COMPOSITES

Polymer Data Sheet

PA6

(Polyamide 6)

H - [NH - (CH2)5 - CO]n - OH

Semi-crystalline polymer

Properties	
Melting temperature Tm	225°C
Density	1.13 g/cm3
Processing temperature Tp	250 +/- 10°C
Processing pressure	4 bars
Glass transition temperature Tg	50°C
Service temperature	100°C

Performances

- High fluidity grade
- Shorter cycle times or lower pressure need
- Colored grade (black)
- Cost efficiency
- Outstanding crash resistance
- Medium water absorption
- Indefinite shelf life at ambient conditions