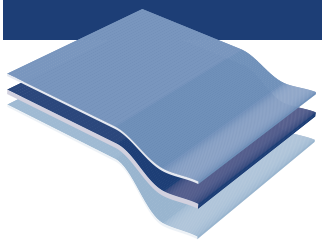
TERPHANE 10.48

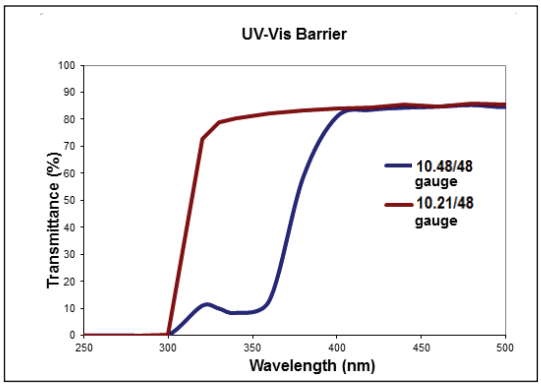


COEXTRUSION Treatment - COEX
PET Homopolymer
UV STABLE/BARRIER

TRANSPARENT, biaxially oriented UV STABLE polyester film
1 side COEX treated

Characteristics

- TERPHANE 10.48 is a transparent UV stable polyester film.
- The COEXTRUSION treatment improves adhesion of the PET core layer to both water and solvent based inks, adhesives, release coatings and metal.
- The film has excellent transparency, dimensional stability and barrier.
- Expected shelf-life for outdoor application is 9 to 12 months.
- TERPHANE 10.48 complies with international for food contact. Specific documents are available upon request.



Applications

Designed for applications, usually reverse printed and laminated, requiring protection against UV radiation for outdoor use.

Typical Values

PROPERTIES		Analysis Methods	Unit	Typical Values
Thickness		ASTM E 252	Gauge	48
Yield		ASTM D 646	Sq. In./lb.	41,900
Tensile Strength at Break	MD TD	ASTM D 882	Kpsi	27 31
Elongation at Break	MD TD	ASTM D 882	%	120 100
Initial Modulus	MD TD	ASTM D 882	Kpsi	640 680
Haze		ASTM D 1003	%	3.0
Shrinkage	MD TD	300°F/30 Min.	%	1.5 0
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4
Water Vapor Transmission Rate		ASTM F 1249 100°F 90% RH	g/100in.² 24 hrs.	2.6
Oxygen Transmission Rate		ASTM F 1927 75°F 85% RH	cc/100 in.² 24 hrs.	7.1
UV Barrier		Light transmission at 330 nm	%	10

For additional information, please contact our commercial department.

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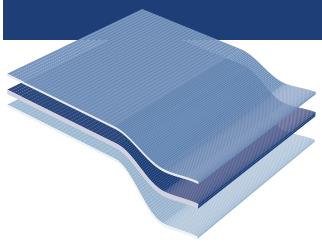
TERPHANE 10.49

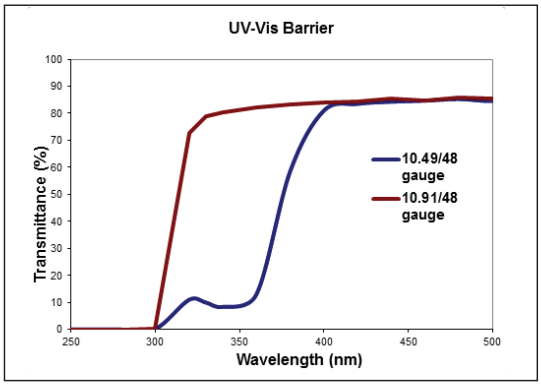


COEXTRUSION Treatment - COEX
PET Homopolymer
HIGH COF UV Stable/Barrier

TRANSPARENT, biaxially oriented UV stable polyester film.

Characteristics

- TERPHANE 10.49 is a transparent UV stable polyester film.
- The COEXTRUSION treatment improves the adhesion of the PET core layer to both water and solvent based inks, adhesives, release coatings and metal.
- The SLIP MODIFIED PET layer is formulated for use as the outer surface of laminated and multi-wall bags to prevent slipping of bags when stacked.
- The film has excellent transparency, dimensional stability and barrier.
- Expected shelf-life for outdoor application is 9 to months.
- TERPHANE 10.49 complies with international for food contact. Specific documents are available upon request.



Applications

Designed for applications, usually printed and laminated, requiring protection against UV radiation for outdoor use and a slip-resistant outer surface.

Typical Values

PROPERTIES		Analysis Methods	Unit	Typical Values
Thickness		ASTM E 252	Gauge	48
Yield		ASTM D 646	Sq. In./lb.	41,900
Tensile Strength at Break	MD TD	ASTM D 882	Kpsi	27 31
Elongation at Break	MD TD	ASTM D 882	%	120 100
Initial Modulus	MD TD	ASTM D 882	Kpsi	640 680
Haze		ASTM D 1003	%	3.0
Shrinkage	MD TD	300ºF/30 Min.	%	1.5 0
Coefficient of friction (side A x side B)	Static Dynamic	ASTM D 1894	-	1.0 0.8
Water Vapor Transmission Rate		ASTM F 1249 100°F 90% RH	g/100in.² 24 hrs.	2.6
Oxygen Transmission Rate		ASTM F 1927 75°F 85% RH	cc/100 in.² 24 hrs.	7.1
UV Barrier		Light transmission at 330 nm	%	10

For additional information, please contact our commercial department.

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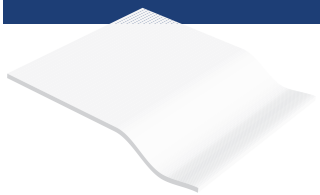
TERPHANE 61.20



WHITE PET Homopolymer

WHITE, biaxially oriented polyester film,
with LOW OPACITY.

Characteristics

- TERPHANE 61.20 is a low opacity white polyester film (translucent).
- The film has excellent dimensional stability and roll geometry.
- TERPHANE 61.20 complies with international regulations for food contact. Specific documents are available upon request.

Applications

Designed for applications, industrial and packaging, requiring a translucent film with high dimensional stability. Wire & Cable as market tape or the inner film of a 3-ply laminate to enhance opacity.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values		
Thickness		ASTM E 252	Gauge	48	92	200
Yield		ASTM D 646	Sq.in./lb.	41,900	21,900	10,000
Tensile strength at break	MD TD	ASTM D 882	kpsi	26 30		
Elongation at break	MD TD	ASTM D 882	%	120 100		
Initial modulus	MD TD	ASTM D 882	kpsi	600 650		
Light transmission		ASTM D 1003	%	68	61	50
Shrinkage	MD TD	300°F / 30 min.	%	1.5 0.5		
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4	1.5 0.5	
Water Vapor Transmission Rate		ASTM F 1249 100°F 90% RH	g/100in.² 24 hrs.	2.6	1.3	0.6
Oxygen Transmission Rate		ASTM F 1927 75°F 85% RH	cc/100 in.² 24 hrs.	7.1	3.7	1.7

For additional information, please contact our commercial department.

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TERPHANE 68.10

WHITE PET Homopolymer

WHITE, biaxially oriented polyester film,
with HIGH OPACITY.

Characteristics

- TERPHANE 68.10 is a high opacity white polyester film.
- The film has excellent dimensional stability and roll geometry.
- TERPHANE 68.10 complies with international regulations for food contact. Specific documents are available upon request.

Applications

Designed for applications, industrial and packaging, requiring a high opacity white film with high dimensional stability.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values		
Thickness		ASTM E 252	Gauge	48*	92*	200*
Yield		ASTM D 646	Sq.in./lb.	41,900	21,900	10,000
Tensile strength at break	MD TD	ASTM D 882	kpsi	27 31		
Elongation at break	MD TD	ASTM D 882	%	90 60		
Initial modulus	MD TD	ASTM D 882	kpsi	600 680		
Light transmission		ASTM D 1003	%	63	58	45
Shrinkage	MD TD	300°F / 30 min.	%	1.6 0.4		
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.4 0.4		
Water Vapor Transmission Rate		ASTM F 1249 100°F 90% RH	g/100in.² 24 hrs.	2.6	1.3	0.6
Oxygen Transmission Rate		ASTM F 1927 75°F 85% RH	cc/100 in.² 24 hrs.	7.1	3.7	1.7

* Volumes by request

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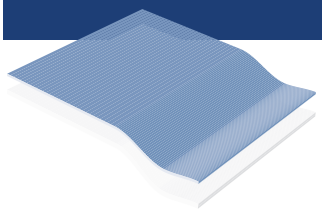
TERPHANE 68.15



CORONA Treatment
WHITE PET Homopolymer

WHITE, biaxially oriented polyester film,
with HIGH OPACITY
and CORONA treatment on one side.

Characteristics

- TERPHANE 68.15 is a high opacity white polyester film with CORONA treatment on one side.
- Designed to provide good bonds in printing, lamination, extrusion coating, cold seal and metallization without the need for primer.
- The film has excellent dimensional stability and roll geometry.
- TERPHANE 68.15 complies with international regulations for food contact. Specific documents are available upon request.

Applications

Designed for applications, industrial and packaging, requiring a high opacity white film with high dimensional stability and a treated side, higher surface tension, for enhanced adhesion if printing, laminating or metallizing.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values		
Thickness		ASTM E 252	Gauge	48*	92*	200*
Yield		ASTM D 646	Sq.in./lb.	41,900	21,900	10,000
Tensile strength at break	MD TD	ASTM D 882	kpsi	27 31		
Elongation at break	MD TD	ASTM D 882	%	90 60		
Initial modulus	MD TD	ASTM D 882	kpsi	600 680		
Light transmission		ASTM D 1003	%	63	52	36
Shrinkage	MD TD	300°F / 30 min.	%	1.6 0.4		
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.4 0.4		
Water Vapor Transmission Rate		ASTM F 1249 100°F 90% RH	g/100in.² 24 hrs.	2.6	1.3	0.6
Oxygen Transmission Rate		ASTM F 1927 75°F 85% RH	cc/100 in.² 24 hrs.	7.1	3.7	1.7
Surface tension (CORONA side)		ASTM D 2578	Dyne/cm	56		

* Volumes by request

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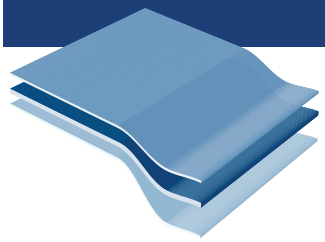
TERPHANE RMAT



MATTE, biaxially oriented polyester film,
with CORONA treatment on one side.

Characteristics

- TERPHANE RMAT is a LOW GLOSS polyester film with one CORONA treated side.
- Low permeability to gas, water vapor and aroma.
- TERPHANE RMAT complies with international regulations for food contact. Specific documents are available upon request.

Applications

Base film for industrial and packaging applications requiring a MATTE dull finish. It can be metallized, printed and laminated using traditional processes.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values
Thickness		ASTM E 252	Gauge	48
Yield		ASTM D 646	Sq.in./lb.	41,900
Tensile strength at break	MD TD	ASTM D 882	kpsi	28 31
Elongation at break	MD TD	ASTM D 882	%	100 90
Initial modulus	MD TD	ASTM D 882	kpsi	570 600
Haze		ASTM D 1003	%	45
Light transmission		ASTM D 1003	%	86
Gloss at 60°		ASTM D 2457	GU	50
Shrinkage	MD TD	300°F / 30 min.	%	1.1 0
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1
Surface Tension (CORONA side)		ASTM D 2578	Dyne/cm	56

Note:
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Film in development stage.
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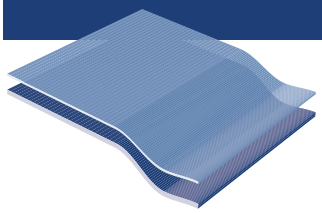
TERPHANE TWIST



CHEMICAL treatment
PET homopolymer

TRANSPARENT, biaxially oriented polyester film
with TWIST properties and
CHEMICAL treatment at one side.

Characteristics

- TERPHANE TWIST is a polyester film with excellent TWIST (in both hot and cold applications) and dead fold properties.
- Very good performance on printing processes.
- The treated layer allows very good ink (in both flexographic and gravure processes), adhesives and varnishes adhesion.
- Low permeability to gases, water vapor and aroma.
- The film has excellent optical and mechanical properties, thickness uniformity, thermal and dimensional stability.
- TERPHANE TWIST complies with international regulations for food contact. Specific documents are available upon request.

Applications

Film of choice for applications requiring twist and dead fold properties.
Typically used for candies (hard-boiled and toffees), lollipops, gums and chocolates packaging.

Typical Values

PROPERTIES		Test Methods	Unit	Typical Values			
Thickness		ASTM E 252	Gauge	54	60	72	92
Yield		ASTM D 646	Sq. in./lb.	37,400	33,500	27,900	21,900
Tensile strength at break	MD TD	ASTM D 882	kpsi	25 27			
Elongation at break	MD TD	ASTM D 882	%	120 100			
Initial modulus	MD TD	ASTM D 882	kpsi	620 670			
Haze		ASTM D 1003	%	4.0	5.0		
Twist and Dead Fold Retention	MD TD	Terphane GT-MA-029	-	excellent excellent			
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4			
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1	6.1	4.8	3.9
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6	1.9	1.9	1.6

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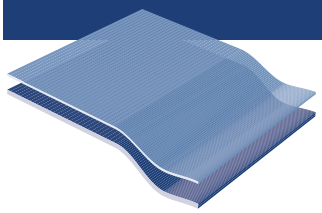
SEALPHANE 10.92



HEAT SEALABLE Copolymer
PET Homopolymer

TRANSPARENT, biaxially oriented polyester film,
with LIGHT SEAL STRENGTH on one side.

Characteristics

- SEALPHANE 10.92 is a transparent polyester film with a COEXTRUDED layer of low seal strength CO-POLYMER adhesive.
- The CO-POLYMER adhesive layer is designed to heat seal onto itself or substrates such as APET, CPET, modified CPET, PET coated paperboard and PVC.
- Dual ovenable.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.92 until 410°F; at higher temperatures the film begins to warp.
- SEALPHANE 10.92 can withstand freezing temperatures down to -40°F.
- SEALPHANE 10.92 complies with international regulations for food contact. Specific documents are available upon request.

Applications

Designed for packaging applications requiring tack seals on the outer surface to tuck ears in pouches as film seals to itself. Can also be used as an over-wrap film with easy-open feature.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values		
Thickness		ASTM E 252	Gauge	48	72	92
Yield		ASTM D 646	Sq.in./lb.	41,900	27,900	21,900
Tensile strength at break	MD TD	ASTM D 882	kpsi	28 30		
Elongation at break	MD TD	ASTM D 882	%	120 110		
Initial modulus	MD TD	ASTM D 882	kpsi	640 710		
Haze		ASTM D 1003	%	4	5	
Shrinkage	MD TD	300°F / 30 min	%	1.5 0		
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4		
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6	1.7	1.3
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1	4.7	3.7
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 248°F, 33 psi, 1 sec	gms/inch	125		

Note:
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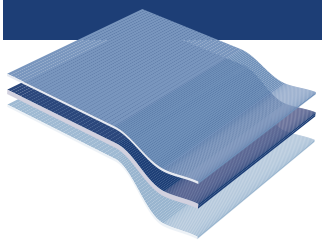
SEALPHANE 10.92T



HEAT SEALABLE Copolymer
PET Homopolymer
CORONA treatment

TRANSPARENT, biaxially oriented polyester film,
with CORONA treatment on one side
and LIGHT SEAL STRENGTH on the opposite side.

Characteristics

- SEALPHANE 10.92T is a transparent polyester film with CORONA treatment on one side and a COEXTRUDED layer of low seal strength CO-POLYMER adhesive.
- The CORONA treated side can be used for enhanced adhesion for printing and lamination.
- The CO-POLYMER adhesive layer is designed to heat seal to itself.
- Dual ovenable.
- The film has excellent transparency, dimensional stability and barrier.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.92T until 410°F; at higher temperatures the film begins to warp.
- SEALPHANE 10.92T can withstand freezing temperatures down to -40°F.
- SEALPHANE 10.92T complies with international regulations for food contact. Specific documents are available upon request.

Applications

Designed for packaging applications requiring tack seals on the outer surface to tuck ears in pouches as film seals to itself. Can also be used as an over-wrap film with easy-open feature.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values
Thickness		ASTM E 252	Gauge	48
Yield		ASTM D 646	Sq.in./lb.	41,900
Tensile strength at break	MD TD	ASTM D 882	kpsi	28 30
Elongation at break	MD TD	ASTM D 882	%	120 110
Initial modulus	MD TD	ASTM D 882	kpsi	640 710
Haze		ASTM D 1003	%	4
Shrinkage	MD TD	300°F / 30 min	%	1.5 0
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 248°F, 33 psi, 1 sec	gms/inch	125
Surfacel Tension (CORONA side)		ASTM D 2578	Dyne/cm	56

For additional information, please contact our commercial department.

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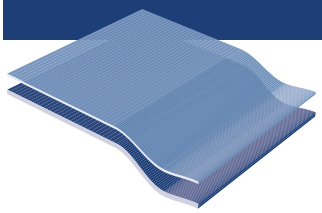
SEALPHANE 10.93



HEAT SEALABLE Copolymer
PET Homopolymer

TRANSPARENT, biaxially oriented polyester film,
HEAT SEALABLE on one side.

Characteristics

- SEALPHANE 10.93 is a transparent polyester film with a COEXTRUDED layer of medium seal strength CO-POLYMER adhesive.
- The CO-POLYMER adhesive layer is designed to heat seal onto itself or substrates such as APET, CPET, modified CPET, PET coated paperboard and PVC.
- Dual ovenable.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.93 until 410°F; at higher temperatures the film begins to warp.
- SEALPHANE 10.93 can withstand freezing temperatures down to -40°F.
- SEALPHANE 10.93 complies with international regulations for food contact. Specific documents are available upon request.

Applications

Versatile, heat sealable PET that can be used as a monolayer over-wrap or lidding film for tamper-evident packaging. It seals to itself or substrates such as APET, CPET, PET coated paperboard and PVC. It can also be converted with other products as part of a multi-layer structure.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values				
Thickness		ASTM E 252	Gauge	48	60	80	92	120
Yield		ASTM D 646	Sq.in./lb.	41,900	33,500	25,100	21,900	16,800
Tensile strength at break	MD TD	ASTM D 882	kpsi	23 26				26 27
Elongation at break	MD TD	ASTM D 882	%	130 100	145 120			140 95
Initial modulus	MD TD	ASTM D 882	kpsi	570 610				570 580
Haze		ASTM D 1003	%	3				4
Shrinkage	MD TD	300°F / 30 min	%	1.4 0	1.1 0			
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4				
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6	1.9	1.8	1.6	1.3
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1	6.1	4.5	3.9	3.2
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 248°F, 33 psi, 1 sec	gms/inch	400		600		900

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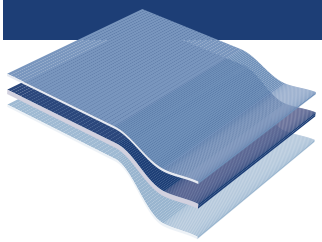
SEALPHANE 10.93T



HEAT SEALABLE Copolymer
PET Homopolymer
CORONA treatment

TRANSPARENT, biaxially oriented polyester film, with CORONA treatment on one side and HEAT SEALABLE on the opposite side.

Characteristics

- SEALPHANE 10.93T is a transparent polyester film with CORONA treatment on one side and HEAT SEALABLE (medium strength) on the opposite side.
- The CORONA treated side can be used for enhanced adhesion for printing and lamination.
- The SEALABLE layer is designed to heat seal onto itself or substrates such as APET, CPET, modified CPET, PET coated paperboard and PVC.
- Dual ovenable, with large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/ cooked in contact with SEALPHANE 10.93T until 410°F; at higher temperatures the film begins to warp.
- SEALPHANE 10.93T can be withstand freezing temperatures down to -40°F.
- SEALPHANE 10.93T complies with international regulations for food contact. Specific documents are available upon request.

Applications

Versatile, heat sealable PET that can be used as a monolayer over-wrap or lidding film for tamper-evident packaging. It seals to itself or substrates such as APET, CPET, PET coated paperboard and PVC. It can also be converted with other products as part of a multi-layer structure.

Typical Values

PROPERTIES		Test Contidions	Unit	Typical Values				
Thickness		ASTM E 252	Gauge	48	60	80	92	120
Yield		ASTM D 646	Sq.in./lb.	41,900	33,500	25,100	21,900	16,800
Tensile strength at break	MD TD	ASTM D 882	kpsi	23 26				26 27
Elongation at break	MD TD	ASTM D 882	%	130 100	145 120			140 95
Initial modulus	MD TD	ASTM D 882	kpsi	570 610				570 580
Haze		ASTM D 1003	%	3				4
Shrinkage	MD TD	300°F / 30 min	%	1.4 0.1	1.1 0			
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4				
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6	1.9	1.8	1.6	1.3
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1	6.1	4.5	3.9	3.2
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 248°F, 33 psi, 1 sec	gms/inch	400		600		900
Surfacel Tension (CORONA side)		ASTM D 2578	Dyne/cm	56				

Note:
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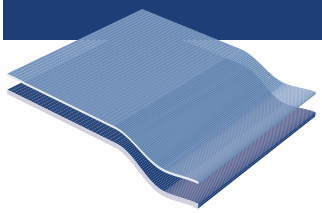
SEALPHANE 10.94



HEAT SEALABLE Copolymer
PET Homopolymer

TRANSPARENT, biaxially oriented polyester film,
HEAT SEALABLE on one side.

Characteristics

- SEALPHANE 10.94 is a transparent polyester film with a COEXTRUDED layer of high seal strength CO-POLYMER adhesive.
- The CO-POLYMER adhesive layer is designed to heat seal onto itself or substrates such as APET, CPET, modified CPET, PET coated paperboard and PVC.
- Dual ovenable.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE10.94 until 410°F; at higher temperatures the film begins to warp.
- SEALPHANE10.94 can withstand freezing temperatures down to -40°F.
- SEALPHANE10.94 complies with international regulations for food contact. Specific documents are available upon request.

Applications

Versatile, TERPHANE 10.94 is a heat sealable PET that can be used as a monolayer over-wrap or lidding film for tamper-evident packaging.
It seals to itself or substrates such as APET, CPET, PET coated paperboard and PVC.
It can also be converted with other products as part of a multi-layer structure.
TERPHANE 10.94 has a higher seal strength than 10.93 for more demanding applications requiring robust seals.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values		
Thickness		ASTM E 252	Gauge	60	80	120
Yield		ASTM D 646	Sq.in./lb.	33,500	25,100	16,800
Tensile strength at break	MD TD	ASTM D 882	kpsi	23 26		26 27
Elongation at break	MD TD	ASTM D 882	%	145 120		140 95
Initial modulus	MD TD	ASTM D 882	kpsi	570 610		570 580
Haze		ASTM D 1003	%	3		4
Shrinkage	MD TD	300°F / 30 min	%	1.1 0		
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4		
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.1	1.5	1.0
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	5.7	4.3	2.8
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 248°F, 31 psi, 1 sec	gms/inch	600	800	1200

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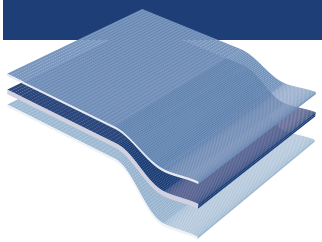
SEALPHANE 10.94T



HEAT SEALABLE Copolymer
PET Homopolymer
CORONA treatment

TRANSPARENT, biaxially oriented polyester film
with CORONA treatment on one side
and HEAT SEALABLE on the opposite side.

Characteristics

- SEALPHANE 10.94T is a transparent polyester film with CORONA treatment on one side and HEAT SEALABLE (high seal strength) on the opposite side.
- The CORONA treated side can be used for enhanced adhesion for printing and lamination.
- The heat sealable layer is designed to heat seal onto itself or substrates such as APET, CPET, modified CPET, PET coated paperboard and PVC.
- Dual ovenable with large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE10.94T until 410°F; at higher temperatures the film begins to warp.
- SEALPHANE10.94T can withstand freezing temperatures down to -40°F.
- SEALPHANE10.94T complies with international regulations for food contact. Specific documents are available upon request.

Applications

Versatile, heat sealable PET that can be used as a monolayer over-wrap or lidding film for tamper-evident packaging. It seals to itself or substrates such as APET, CPET, PET coated paperboard and PVC. It can also be converted with other products as part of a multi-layer structure. Higher seal strength than 10.93T for more demanding applications requiring robust seals.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values		
Thickness		ASTM E 252	Gauge	60	80	120
Yield		ASTM D 646	Sq.in./lb.	33,500	25,100	16,800
Tensile strength at break	MD TD	ASTM D 882	kpsi	23 26		26 27
Elongation at break	MD TD	ASTM D 882	%	145 120		140 95
Initial modulus	MD TD	ASTM D 882	kpsi	570 610		570 580
Haze		ASTM D 1003	%	3		4
Shrinkage	MD TD	300°F / 30 min	%	1.1 0		
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4		
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.1	1.5	1.0
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	5.7	4.3	2.8
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 248°F, 31 psi, 1 sec	gms/inch	600	800	1200
Surfacel Tension (CORONA side)		ASTM D 2578	Dyne/cm	56		

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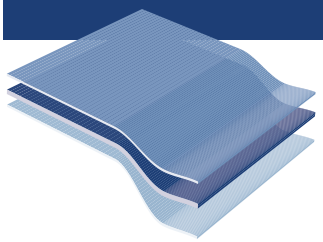
SEALPHANE 10.96



HEAT SEALABLE copolymer
PET homopolymer
CHEMICAL treatment

TRANSPARENT, biaxially oriented polyester film,
one side slightly HEAT SEALABLE
and CHEMICALLY treated at the opposite side.

Characteristics

- Slight heat sealing property (to itself).
- Very good performance on printing and lamination processes, as well as on vertical packaging machines.
- The chemically treated layer allows good ink (on both gravure and flexographic processes), adhesives and varnishes adhesion.
- The sealing layer also allows ink adhesion; we recommend testing ink performance when printing is necessary at sealing area.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.96 until 410°F; at higher temperatures the film begins to warp.
- SEALPHANE 10.96 can withstand freezing temperatures down to -40°F.
- SEALPHANE 10.96 complies with international regulations for food contact. Specific documents are available upon request.

Applications

Designed for packaging applications requiring tack seal on the outer surface to tuck ears in flat bottom pouches.
SEALPHANE 10.96 can also be used as an overwrap film with easy-open feature.

Typical Values

PROPERTIES		Test Methods	Unit	Typical Values
Thickness		ASTM E 252	Gauge	48
Yield		ASTM D 646	Sq. in/lb.	41,9
Tensile strength at break	MD TD	ASTM D 882	kpsi	30 31
Elongation at break	MD TD	ASTM D 882	%	120 110
Initial modulus	MD TD	ASTM D 882	kpsi	640 710
Haze		ASTM D 1003	%	4.0
Shrinkage	MD TD	300°F / 30 min	%	1.5 0
Coeficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.5 0.4
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	7.1
Oxigen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	2.6
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 248°F, 33 psi, 1 sec	gms/inch	125

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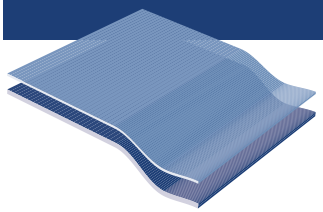
SEALPHANE 10.63



HEAT SEALABLE Copolymer - PEELABLE
PET Homopolymer

TRANSPARENT, biaxially oriented polyester film,
HEAT SEALABLE - PEELABLE on one side.

Characteristics

- SEALPHANE 10.63 is a transparent polyester film with a COEXTRUDED layer of CO-POLYMER adhesive.
- High barrier against gas, water vapor and aroma.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.63 until 410°F - at higher temperatures the film begins to warp.
- Self venting effect when heated in conventional and microwave ovens.
- SEALPHANE 10.63 can withstand freezing temperatures down to -40°F.
- The heat-sealable side has easy-open feature and allows ink adhesion; we recommend testing ink performance when printing is necessary at sealing area.
- Dual ovenable with non-stick properties.
- The film has excellent mechanical properties, thickness uniformity, thermal and mechanical stability.
- SEALPHANE 10.63 complies with international regulations for food contact. Specific documents are available upon request.

Sealing Performance	Sealing Temperature		
	260°F	330°F	410°F
To PET Substrates			Easy Peel / No Shredding
To Itself		Easy Peel / No Shredding	
To Contaminated Substrates			Easy Peel / No Shredding
To PET Substrates for Venting		Easy Peel / Venting	
To Itself for Venting	Easy Peel / Venting		
To PP, PE and PS	10.64 suggested		

•PET Substrates: CPET, APET, PETG, rPET and PET coated paper trays, bottles or containers.
•Contaminated substrates: trays, bottles or containers with sauce or grease contaminating the rim or other sealing surface.

Applications

Suitable for applications where there is a need for easy-open effects, like tray lids or safety seals.
Seals onto, and peels cleanly from, itself or substrates such as APET, CPET, modified CPET, PETG, rPET, PVC, PC, PLA, PET film or PET coated paperboard.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values			
Thickness		ASTM E 252	Gauge	53	80	100	144
Yield		ASTM D 646	Sq.in./lb.	37,400	25,100	20,100	14,000
Tensile strength at break	MD TD	ASTM D 882	kpsi	26 23			
Elongation at break	MD TD	ASTM D 882	%	135 95			
Initial modulus	MD TD	ASTM D 882	kpsi	520 585			
Haze		ASTM D 1003	%	10	12	14	15
Shrinkage	MD TD	300°F / 30 min	%	1.0 -0.2			
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.6 0.6			
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6	1.8	1.6	1.2
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1	4.5	3.9	3.2
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 230°F, 33 psi, 1 sec	gms/inch	450			

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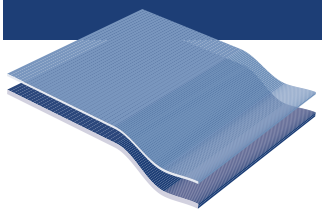
SEALPHANE 10.63H



HEAT SEALABLE Copolymer - PEELABLE
PET Homopolymer

TRANSPARENT, biaxially oriented polyester film,
HEAT SEALABLE - PEELABLE on one side.

Characteristics

- SEALPHANE 10.63H is a transparent polyester film with a COEXTRUDED layer of CO-POLYMER adhesive that provides higher seal atrength than SEALPHANE 10.63.
- High barrier against gas, water vapor and aroma.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.63H until 410°F - at higher temperatures the film begins to warp.
- Self venting effect when heated in conventional and microwave ovens.
- SEALPHANE 10.63H can withstand freezing temperatures down to -40°F.
- The heat-sealable side has easy-open feature and allows ink adhesion; we recommend testing ink performance when printing is necessary at sealing area.
- Dual ovenable with non-stick properties.
- The film has excellent mechanical properties, thickness uniformity, thermal and mechanical stability.
- SEALPHANE 10.63H complies with international regulations for food contact. Specific documents are available upon request.

Sealing Performance	Sealing Temperature		
	260°F	330°F	410°F
To PET Substrates			Easy Peel / No Shredding
To Itself		Easy Peel / No Shredding	
To Contaminated Substrates			Easy Peel / No Shredding
To PET Substrates for Venting		Easy Peel / Venting	
To Itself for Venting	Easy Peel / Venting		
To PP, PE and PS	10.64 suggested		

•PET Substrates: CPET, APET, PETG, rPET and PET coated paper trays, bottles or containers.
•Contaminated substrates: trays, bottles or containers with sauce or grease contaminating the rim or other sealing surface.

Applications

Suitable for applications where there is a need for easy-open effects, like tray lids or safety seals.
Seals onto, and peels cleanly from, itself or substrates such as APET, CPET, modified CPET, PETG, rPET, PVC, PC, PLA, PET film or PET coated paperboard.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values	
Thickness		ASTM E 252	Gauge	80	100
Yield		ASTM D 646	Sq.In./lb.	25,100	20,100
Tensile strength at break	MD TD	ASTM D 882	kpsi	26 23	
Elongation at break	MD TD	ASTM D 882	%	135 95	
Modulus	MD TD	ASTM D 882	kpsi	520 585	
Haze		ASTM D 1003	%	12	14
Shrinkage	MD TD	300°F / 30 min	%	1.0 -0.2	
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.6 0.6	
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	1.8	1.6
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	5.0	4.0
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 230°F - 33 psi, 1 sec	gms/inch	700	800

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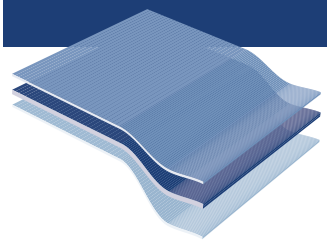
SEALPHANE 10.63T



CORONA Treatment
PET Homopolymer
HEAT SEALABLE Copolymer - PEELABLE

TRANSPARENT, biaxially oriented polyester film,
with CORONA treatment on one side
and HEAT SEALABLE - PEELABLE on the opposite side.

Characteristics

- SEALPHANE 10.63T is a transparent polyester film with CORONA treatment on one side and a COEXTRUDED layer of CO-POLYMER adhesive on the opposite side.
- The CORONA treated side can be used for enhanced adhesion for printing and lamination.
- High barrier against gas, water vapor and aroma.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.63 until 410°F - at higher temperatures the film begins to warp.
- Self venting effect when heated in conventional and microwave ovens.
- SEALPHANE 10.63T can withstand freezing temperatures down to -40°F.
- Dual ovenable with non-stick properties.
- SEALPHANE 10.63T complies with international regulations for food contact. Specific documents are available upon request.

Sealing Performance	Sealing Temperature		
	260°F	330°F	410°F
To PET Substrates			Easy Peel / No Shredding
To Itself		Easy Peel / No Shredding	
To Contaminated Substrates			Easy Peel / No Shredding
To PET Substrates for Venting		Easy Peel / Venting	
To Itself for Venting	Easy Peel / Venting		
To PP, PE and PS	10.64 suggested		

•PET Substrates: CPET, APET, PETG, rPET and PET coated paper trays, bottles or containers.
•Contaminated substrates: trays, bottles or containers with sauce or grease contaminating the rim or other sealing surface.

Applications

Suitable for applications where there is a need for easy-open effects, like tray lids or safety seals.
Seals onto, and peels cleanly from, itself or substrates such as APET, CPET, modified CPET, PETG, rPET, PVC, PC, PLA, PET film or PET coated paperboard.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values		
Thickness		ASTM E 252	Gauge	53	80	100
Yield		ASTM D 646	Sq.in./lb.	37,400	25,100	20,100
Tensile strength at break	MD TD	ASTM D 882	kpsi	26 23		
Elongation at break	MD TD	ASTM D 882	%	135 95		
Initial modulus	MD TD	ASTM D 882	kpsi	520 585		
Haze		ASTM D 1003	%	10	12	14
Shrinkage	MD TD	300°F / 30 min	%	1.0 -0.2		
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.6 0.6		
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6	1.8	1.6
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs	7.1	4.5	3.9
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 230°F, 33 psi, 1 sec	gms/inch	450		
Surface tension (CORONA side)		ASTM D 2578	Dyne/cm	56		

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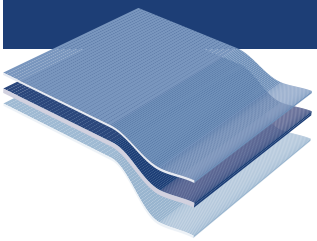
SEALPHANE 10.63HT



CORONA Treatment
PET Homopolymer
HEAT SEALABLE Copolymer - PEELABLE

TRANSPARENT, biaxially oriented polyester film,
with CORONA treatment on one side
and HEAT SEALABLE - PEELABLE on the opposite side.

Characteristics

- SEALPHANE 10.63HT is a transparent polyester film with CORONA treatment on one side and a COEXTRUDED layer of CO-POLYMER adhesive on the opposite side.
- The CORONA treated side can be used for enhanced adhesion for printing and lamination.
- High barrier against gas, water vapor and aroma.
- Large sealing temperature range without deformation: from 260 to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.63HT until 410°F - at higher temperatures the film begins to warp.
- Self venting effect when heated in conventional and microwave ovens.
- SEALPHANE 10.63HT can withstand freezing temperatures down to -40°F.
- Dual ovenable with non-stick properties.
- SEALPHANE 10.63HT complies with international regulations for food contact. Specific documents are available upon request.

Sealing Performance	Sealing Temperature		
	260°F	330°F	410°F
To PET Substrates			Easy Peel / No Shredding
To Itself		Easy Peel / No Shredding	
To Contaminated Substrates			Easy Peel / No Shredding
To PET Substrates for Venting		Easy Peel / Venting	
To Itself for Venting	Easy Peel / Venting		
To PP, PE and PS	10.64 suggested		

•PET Substrates: CPET, APET, PETG, rPET and PET coated paper trays, bottles or containers.
•Contaminated substrates: trays, bottles or containers with sauce or grease contaminating the rim or other sealing surface.

Applications

Suitable for applications where there is a need for easy-open effects, like tray lids or safety seals.
Seals onto, and peels cleanly from, itself or substrates such as APET, CPET, modified CPET, PETG, rPET, PVC, PC, PLA, PET film or PET coated paperboard.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values	
Thickness		ASTM E 252	Gauge	80	100
Yield		ASTM D 646	Sq.in./lb.	25,100	20,100
Tensile strength at break	MD TD	ASTM D 882	kpsi	26 23	
Elongation at break	MD TD	ASTM D 882	%	135 95	
Initial modulus	MD TD	ASTM D 882	kpsi	520 585	
Haze		ASTM D 1003	%	12	14
Shrinkage	MD TD	300°F / 30 min	%	1.0 -0.2	
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.6 0.6	
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	1.8	1.6
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs	4.5	3.9
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 230°F, 33 psi, 1 sec	gms/inch	700	800
Surface tension (CORONA side)		ASTM D 2578	Dyne/cm	56	

Note:
The information and suggestions contained herein represent the best information available to TERPHANE INC. and we believe them to be reliable. They should not, however, be construed as controlling and are presented without guarantee of performance either express or implied. We urge purchasers to conduct confirmatory tests to determine final suitability for their specific end uses. No statement with respect to use is intended as a positive recommendation for such use and no warranty with respect to infringement of patents held by others is made or intended.

For additional information, please contact our commercial department.

August 2012

TERPHANE
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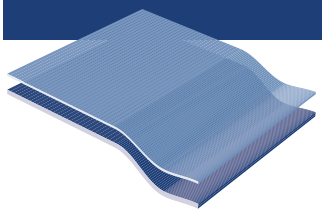
SEALPHANE 10.64



HEAT SEALABLE - PEELABLE Copolymer
PET Homopolymer

TRANSPARENT, biaxially oriented polyester film,
1 side HEAT SEALABLE - PEELABLE.

Characteristics

- SEALPHANE 10.64 is a clear polyester film with a HEAT SEALABLE - PEELABLE layer.
- The CO-POLYMER adhesive layer is designed to heat seal onto and peel cleanly from substrates such as PP, HDPE, PS and HIPS. It also seals to itself, APET, CPET, modified CPET, PETG, rPET, PET coated paperboard PC, PLA and PVC.
- SEALPHANE 10.64 has lower Seal Initiation Temperature than SEALPHANE 10.63.
- Large sealing tempearture range without deformation: from 210°F to 410°F.
- Food can be heated/cooked in contact with SEALPHANE 10.64 until 410°F; at higher temperatures the film begins to warp.
- Self venting effect when heated in conventional and microwave ovens.
- SEALPHANE 10.64 can withstand freezing temperatures down to -40°F.
- It has excellent mechanical properties, thickness uniformity, thermal and dimensional stability. Low oxygen, aroma and water vapor permeability.
- SEALPHANE 10.64 complies with international regulations for food contact. Specific documents are avaiable upon request.

Sealing Performance	Sealing Temperature		
	280°F	320°F	340°F
To PET Substrates and Itself	Easy Peel / No Shredding		
To PP and HDPE		Easy Peel / No Shredding	
To HIPS			Easy Peel / No Shredding
To Itself for Venting	Easy Peel / Venting		
To PET Substrates for Venting		Easy Peel / Venting	

• PET Substrates: CPET, APET, PETG, rPET and PET coated paper trays, bottles or containers.
• Contaminated substrates: trays, bottles or containers with sauce or grease contaminating the rim or other sealing surface.

Applications

Dual ovenable lidding film for packaging refrigerated and frozen foods. Seals to itself, PP, HDPE, PS, HIPS, APET, CPET, modified CPET, PETG, rPET, PVC, PC, PLA and PET coated paperboard trays, containers, bottles, and jars.

Typical Values

PROPERTIES		Test Conditions	Unit	Typical Values	
Thickness		ASTM E 252	Gauge	53	100
Yield		ASTM D 646	Sq.in./lb.	37,400	20,100
Tensile strength at break	MD TD	ASTM D 882	kpsi	26 23	
Elongation at break	MD TD	ASTM D 882	%	135 95	
Initial modulus	MD TD	ASTM D 882	kpsi	520 585	
Haze		ASTM D 1003	%	10	14
Shrinkage	MD TD	300°F / 30 min	%	1.0 0	
Coefficient of friction (Side A x Side B)	Static Dynamic	ASTM D 1894	-	0.4 0.2	
Water vapor transmission rate		ASTM F 1249 100°F - 90% RH	g/100in.² 24 hrs.	2.6	1.6
Oxygen transmission rate		ASTM F 1927 75°F - 85% RH	cc/100in.² 24 hrs.	7.1	3.9
Heat seal strength (Sealable side x Sealable side)		Film/Film @ 230°F, 33 psi, 1 sec	gms/inch	450	

For additional information, please contact our commercial department.

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TERPHANE

REGULATORY INFORMATION

May 2nd, 2012

We would like to inform that:

All of our Terphane polyester films are in compliance with the Model Toxics Legislation developed by the Coalition of North Eastern Governors (CONEG). We do not intentionally add lead, mercury, cadmium or hexavalent chromium, polybrominated biphenyls or polybrominated diphenyls ethers to any of our products (Directive 2002/95/EC-ROHS and 2004/12/EC amending directive 9462/EEC and it´s amendment 2005/20/EC).

All of our Terphane polyester films do not contain any of the 31 Priority Chemicals listed by the United States Environmental Protection Agency (EPA).

All of our Terphane polyester films do not contain any animal-based additives, nor are they processed on equipment used to process animal-based materials.

All of our Terphane polyester films and their functional components are either included on the Toxic Substances Control ACT/EPA-USA (TSCA) Chemical Substance Inventory, or are exempt from the listing requirements.

All of our Terphane polyester films pose no significant risk of cancer or reproductive toxicity from exposure to substances that are characterized as known to the State of California to cause cancer or to be a reproductive toxicant under the California Safe Drinking Water and Toxic Enforcement Act (Proposition 65 – June 19, 2009).

All of our Terphane polyester films do not contain any perfluorochemicals (PFCs) and their precursors according to Senate Bill 1313 (SB 1313- February 20, 2008)

All of our Terphane polyester films do not contain natural rubber latex (NRL) or synthetic rubber latex, as well as, do not contain thiurams.

All of our Terphane polyester films are in compliance with Ordonnance du DFI - Le Département Fédéral de L'intérieur sur les objets et matériaux – Annexe 6

All of our Terphane polyester films do not contain any of the following known, probable or suspected endocrine system disruptors: p-Nonylphenol, Bisphenol A, Di(2-ethylhexyl) phthalate (DEHP), p-Octylphenol, Butyl benzyl phthalate, Dicyclohexyl phthalate, Dibutyl phtalate (DBP), Di(2-ethylhexyl) Adipate (DEHA), Di-n-butyl Phthalate, Di-n-hexyl Phthalate, Di-n-pentyl Phthalate, Di-n-propyl Phthalate, Di-n-octyl Phtalate (DnOP), D-isonyl Phtalate(DINP), Di-isodecyl Phtalate (DIDP), Di-isopropylanaphtalente (DIPN), perfluorooctane sulfonate (PFOS), Perfluorooctanoic Acid (PFOA), p-sec-Butylphenol, p-t-Butylphenol, p-i-Pentylphenol, p-t-Pentylphenol and Polyvinychloride (PVC).

All of our Terphane polyester films do not contain the controlled ozone-depleting substances cited in the Federal Register V.56, N.14, January 22, 1991.

All of our Terphane polyester films do not contain any of the substance mentioned in the CEPA list, including the recently released Batch 9 up to futures Batch 12 substance list.

All of our Terphane polyester films do not contain any FDA known allergens substances, Fluorotelomers or Colophony (Rosin resin).

All of our Terphane polyester films do not contain BHA (butylated hydroxyanisole), BHT (butylated hydroxtoluene) or TBHQ (tertiary butylhydroquinone), hydrazine, dioxins, nitroamines, nitrofurazone, synthesis nanoparticles and fungicides.

Roberto Cavalcanti
Technical Manager

Marcos Vieira
R&D Manager

TERPHANE

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FOOD CONTACT STATUS

July 24th, 2012

Dear Sir,

I would like to inform that our polyester film products named **TERPHANE AND SEALPHANE 10.10, 10.15, 10.21, 10.25, 10.28, 10.41, 10.51, 10.55, 10.61, 10.63, 10.63S, 10.63H, 10.63T, 10.63HT, 10.64, 10.65, 10.71, 10.81, 10.82, 10.87, 10.91, 10.92, 10.92T, 10.93, 10.93T, 10.94, 10.94T, 10,96, RT, LID, 22.00, 22.07, 22.51, 22.80, 24.00, 61.20, 68.10, 68.15, 68.21** and **RMAT**, as well as the polyester side of metallized films **TERPHANE MP, MR, MX, MQ, MA, MH, MHB, MAX, MAB, MABX, MMAT, MSEAL, MXLID, MAXLID, MZ** and **MAZ**, are in compliance with the following regulations regarding raw-materials, additives, overall and specific migration limits:

- **21 Code of Federal Regulations (CFR) 177.1630, United States Food And Drug Administration (FDA);**
- **Regulation 10/2011/EC Amended by commision regulation (EU) Nº 1282/2011 of November 28th 2011, regulation 1935/2004/EC and Directives: 94/62/EC (Amended by 2004/12/EC) and 67/548/EEC from European Union;**
- **Brazilian resolutions 51 dated by November 26th 2010, 105 dated by May 19th 1999, and RDC 17 dated by 17th March 2008 from AGÊNCIA NACIONAL DE VIGILÂNCIA SANITÁRIA (ANVISA);**
- **Southern Common Market resolution 32/10 dated by June 26th 2010;**
- **Germany Recommendation BfR (BgVV), Chapter XVII.**

You must make your own determination that your use of this product is safe, lawful and technically suitable in your intended applications.

Roberto Cavalcanti
Technical Manager

TERPHANE

STANDARD ROLL LENGTHS (FT.)

UNCOATED FILMS

Core ID (inches)	6	6	6
Roll OD (inches)	18	22	30
Weight (lb./inch-width)	11.5	17.2	32.9
8µ (.32 mil)	60,000	87,000	177,000
12µ (.48 mil)	40,000	60,000	120,000
15µ (.60 mil)	32,000	48,000	
18µ (.72 mil)	26,700	39,000	
20µ (.80 mil)	24,000	33,000	
23µ (.92 mil)	21,000	30,000	
25µ (1.00 mil)	19,200	28,800	
30µ (1.20 mil)	15,000	24,000	
50µ (2.00 mil)	9,600	14,000	

PVdC COATED FILMS

Core ID (inches)	6	6	6
Roll OD (inches)	19.5	23.5	32.0
Weight (lb./inch-width)	13.0	19.5	38.0
22.00/38	60,000	90,000	160,000
22.00/50	40,000	60,000	120,000
24.00/60	39,000	58,000	116,000

3 inch CORES (Maximum total weight of 50 pounds)

Gauge	Standard Length	Roll O.D. (inches)
50 (Width less than 203 mm)	16,400	12.8
50 (Width greater than 203 mm)	7,100	8.5
60	9,600	10.1
80	5,500	9.0
100 (Width less than 300 mm)	7,200	11.1
100 (Width greater than 300 mm)	4,100	8.7

TERPHANE

PROCEDURE TO DETERMINE THE ACTIVATED SURFACE OF 10.21 FILM

BACKGROUND

TERPHANE® 10.21 is a one-side surface activated PET film. Compared to plain and corona treated PET films, the activated surface provides superior adhesion of solvent- and water-based inks and adhesives. It also provides superior adhesion of vacuum-deposited aluminum.

Rolls of TERPHANE® 10.21 are labeled to identify the activated side. This procedure provides a simple means of confirming the activated surface.

EQUIPMENT NEEDED

- Flat bar heat sealer - Sentinel or equivalent
- Template or jig for cutting 1 inch wide strips of film
- Seal strength tester (optional) - Instron, spring scale, other

PROCEDURE

- Set Sealer: Temperature - 150°C (300°F)
  Pressure - 24 psi
  Dwell - 1 sec.
- Cut two »1.5 inch (TD) x »6 inch (MD) strips of film.
- Heat seal the strips to each other, inside surface to inside surface.
- Cut the sealed strips to 1 inch wide.
- Pull the seal apart using the seal strength tester (preferably) or by pulling the strips by hand.
- Repeat the above steps for the outside surface to outside surface.

ANALYSIS

The activated surface will have a seal strength of 80 grams/inch or higher. The plain polyester surface will have virtually zero seal strength.

USING WEB SPEED TO CALCULATE WEB TENSION

If a tension sensor/readout is not available, it is possible to calculate the actual web tension from web speed measurements taken at the entrance and exit of the equipment section in question by using a hand-held tachometer. It is best to measure between two nip points to assure that the web is traveling at the same speed as the driven rolls. If nips are not available or accessible, then be sure to run the tachometer wheel on the web itself, because the web usually floats over non-nipped rolls and will not be running at the same speed as the roll surface.

The web tension is calculated using the following formula:

$$T = kt\,\frac{x^2 - x^1}{x^1}$$

Where:

T = web tension (lb/inch-width)
k = film modulus (psi)
t = film thickness (inches)
x^1 = entering web speed (fpm)
x^2 = exiting web speed (fpm)

As an example, consider a direct gravure coater with a coating nip at the oven entrance and a chill roll nip near the oven exit. The web tension in the oven can be calculated from the relative speeds of these two nips since the film speeds should be the same as the nip speeds.

Assuming the following line conditions:

Gravure Nip Speed	=	500 fpm
Chill Roll Speed	=	502 fpm
Film Thickness	=	0.00032 inches (32 gauge)
Film Modulus	=	650,000 psi

The web tension then is:

$$T = \frac{(650{,}000)(0.00032)(502 - 500)}{500} = \textbf{0.83 lb/inch-width}$$

Control of web tension is critical to finished product quality. This technique is a tool which can be used to help achieve that goal.

TERPHANE

CURL AND TUNNELING IN LAMINATIONS

Curl and tunneling are two problems commonly encountered in laminations, particularly when one of the webs is more extensible (has a lower MD modulus) than the other. The cause of both problems is a difference in strain* (or extension) between the two webs prior to being laminated.

Curl is the tendency of a lamination to roll up on itself if one end is held and the other is allowed to hang free, much like a window shade. The web to which the lamination curls is the web that had too much strain prior to entering the laminating nip.

Tunneling is a separation of the strain plies of a lamination, typically in bands whose long direction runs TD (perpendicular to the machine direction). Large strain differences between two webs in a lamination create high shear forces that can exceed the green bond of the laminating adhesive used, and thus create tunnels.

Curl and tunneling strain problems can occur in adhesive, extrusion or thermal laminations. The solution to these problems lies in minimizing strain differences. Web strain from the unwind stands through the laminating nip all have an effect, with the region just prior to the nip the most critical. Reducing the strain in the web to which the lamination curls will reduce or eliminate the shear forces between the webs, and thus the tendency to curl and tunnel even if the green bond of the lamination is low.

Steps that will reduce the risk of tunneling:

1. Check that the lamination nip temperature is at the temperature specified for the adhesive being used (to maximize the green bond strength).
2. Confirm that the adhesive coating weight is as specified for the adhesive (to maximize the green bond strength).
3. Use an adhesive with higher green bond strength.
4. Rewind the lamination at a higher strain to put both webs under strain and prevent shear failure. Set rewind strain to the sum of the strain of the incoming webs.

The last step runs the risk of creating other problems such as blocking and distortion of the web in high ink coverage areas, areas with heavy adhesive lay-down and areas where gauge bands exist.

In laminations where one of the webs is paper, curl can also be caused by moisture level change, which causes the paper to expand or contract relative to the less sensitive web. In these cases re-moisturizing or drying the paper as needed can be added to the above remedies for curl and tunneling.

* Strain is a deformation (elongation) of film when placed under a load (tension).

If you have any questions about laminating TERPHANE® Polyester Films, please call our Technical Services Department at (585) 657-5800.

Note: 48 gauge polyester (PET) film has been the industry standard for a long time. To those converters used to running 48 gauge, printing, coating, laminating or winding a 32 gauge PET may be seen as a serious challenge. However, 32 gauge PET is as easy to run, if not easier than 73 gauge oriented polypropylene film (OPP), another long accepted industry standard. A comparison of the tensile properties of these films shows why.