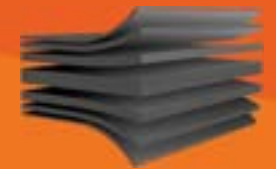


SKFP SOLUTIONS

FOR MULTILAYER RIGID PACKAGING



SK Functional Polymer, SAS
This is a proprietary material of SK Functional Polymer and subject to change without notice

www.sk-fp.com



PACKAGING MARKET SEGMENTS



Rigid Packaging



Tie resin / EVOH oxygen barrier

Cups, Trays, Jars, Containers, Bottles.

Made of PP, PE, PS and PET



Flex packaging



Tie resin / EVOH oxygen barrier

Barrier Flexible & Semi-Flexible Packaging

Made of PP, PE, PS and PET



Easy-Peel



Seal-Peel resins for lidding films.

For PET, PP and PS rigid packaging

SKFP SOLUTIONS FOR PACKAGING MARKETS



Seal Peel lid

SK **LOTRYL**®

Adhesives for extrusion coating

SK **LOTADER**®



A complete range
aligned with
market needs

Tie layers for
coextrusion

SK **OREVAC**®

Gas Barrier resin

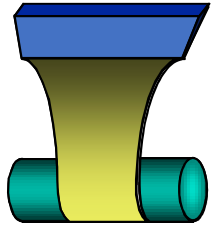
EVASIN™
EVOH



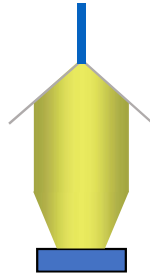
PE/PP
OREVAC® Tie layer
EVASIN™ EVOH
OREVAC® Tie layer
PE/PP



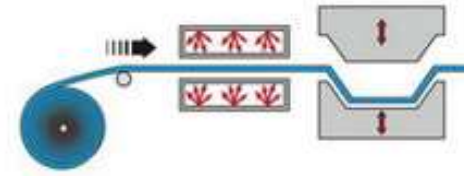
CONVERTING TECHNOLOGIES FOR SKFP RESINS



Cast Film

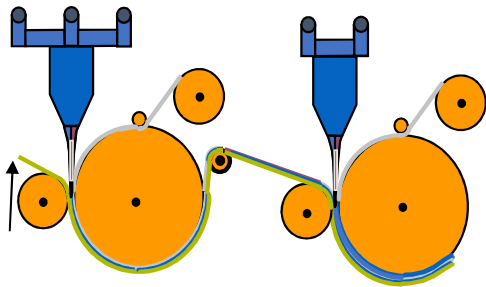


Blown Film

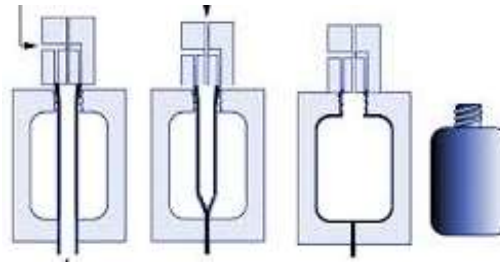


Sheet Thermoforming

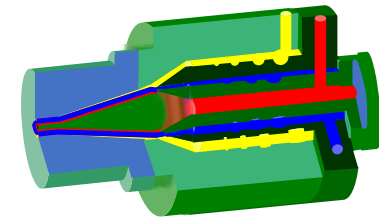
Each process requires a material with a specific rheology and/or specific reactivity



Extrusion coating & Lamination



Blow Molding



Tube Extrusion

OREVAC[®] & EVASIN[®]

GRAFTING PROCESS
BONDING MECHANISM
OXYGEN BARRIER



OREVAC® GRAFTING PROCESS

30 years of expertise in **Grafting Process**

Base polymer

LLDPE
EVA
EMA
PP
VLDPE/POE

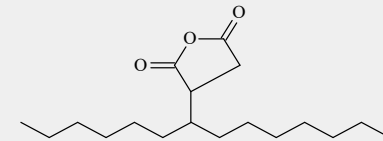
Initiator

+



+ Energy

Maleic Anhydride



Orevac® Grafted polyolefin

Maleic Anhydride reacts with

- ⇒ OH (EVOH, PET)
- ⇒ NH₂ (Polyamide)
- ⇒ Metallic surfaces
- ⇒ Epoxy coating

Highly versatile process for very fine molecular design

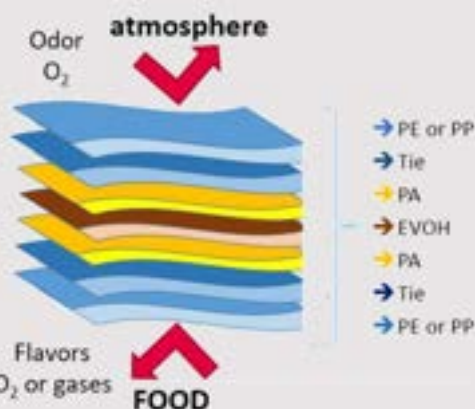
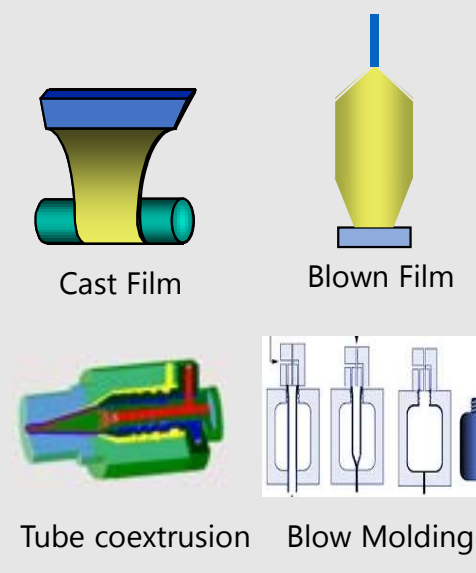



- ⇒ Base polymer type (PE, PP, EVA, POE)
- ⇒ Molecular mobility / reactivity
- ⇒ Rheology
- ⇒ **Inline quality control**

Tailor made tie layers dedicated to customers needs

- ⇒ Ready to use tie resin
- ⇒ Concentrate tie resin intended to be blended

EVASIN™ EVOH FOR HIGH BARRIER PACKAGING

EVASIN™ oxygen-barrier resins for longer food shelf-life

Barrier to gas: O ₂ , N ₂ , CO ₂ , Aromas	Resin solutions	Processes	Applications
	<p style="text-align: center;">Barrier properties increase ↑</p> <ul style="list-style-type: none"> EV2951F 29% Ethylene EV3201F 32% Ethylene EV3251F 32% Ethylene EV3251FT 32% Ethylene EV3851F/V 38% Ethylene EV4405F 44% Ethylene EV4451F 44% Ethylene <p style="text-align: center;">↓ Ethylene content increase</p>		<p>Agriculture for soil disinfection</p>  <p>Food industry for extended shelf life</p>  <p>Pharmaceutical</p> 

OREVAC® PE PRODUCT RANGE



Grades	Base polymer	Reactivity*	TYPICAL PROPERTIES			
			Melt index (g/10min.) (190°C; 2.16kg)	Melting point (°C)	Vicat softening temp. (°C)	Density
18211	EVA	+	3.5	75	51	0.950
18215	EVA	++	5	70	< 40	0.940
18603	EMA	++	3.5	92	< 40	0.950
18610	EBA	+++	3	-	-	0.929
18300	LLDPE	++	2.5	120	85	0.916
18302N	LLDPE	++	1.5	123	84	0.912
18334	LLDPE	+	1.0	125	101	0.920
18341	LLDPE	+++	1.5	121	95	0.918
18342N	HDPE	+	3.5	125	110	0.930
18362	LLDPE	+	2.5	123	-	0.918
18388	LLDPE	+++	3	-	-	0.890
18507	HDPE	+++	-5.0	128	-	0.954
18910	LLDPE	+	1.5	117	80	0.950
OE825	LLDPE	+++	3.0	118	100	0.913
OE850	LDPE	+++	7.5	104	89	0.915
OE808	VLDPE	+++	0.6	113	61	0.890
IM300	VLDPE	+	1.0	110	<40	0.876
IM800	VLDPE	+++	0.8	46	<40	0.866
Test method	Internal Method	ASTM D1238	DSC	ASTM D1525		
		ISO 1133	ISO 11357	ISO 306		

OREVAC® PP PRODUCT RANGE



		TYPICAL PROPERTIES				
Grades	Base polymer	Reactivity*	Melt index (g/10min.) (230°C ; 2.16 kg)	Melting point (°C)	Vicat softening temp. (°C)	Density
18722	Random PP	+	7.0	143	120	0.900
18729	Homo PP	+	4.5	162	137	0.900
18730	Homo PP	+	3	-	-	-
18732	Random PP	+	8.0	134	120	0.890
18750	Homo PP	++	35	160	121	0.920
18751	Homo PP	+	35	160	138	0.910
18780	Homo/copo PP	++	20	-	-	-
18790	Random PP	+++	45**	137	-	0.890
CA100 / CA100N	Copo PP	+++	10**	167	147	0.905
Test method		Internal Method	ASTM D1238	DSC	ASTM D1525	
			ISO 1133	ISO 11357	ISO 306	

EVASIN™ EVOH PRODUCT RANGE

EVASIN™ : from 29% to 44% ethylene content to adjust barrier properties



Grades	Ethylene (% mol)	MELT INDEX (g/10min)		MELTING POINT (°C)	CRYSTALIZATION POINT(°C)	GLASS TRANSITION POINT(°C)	O2 TRANSMISSION RATE (65% RH, 20°C) (cm³.20µm/m².24hrs.atm)
		190°C - 2.16 kg	210°C - 2.16 kg				
EV 2951F	29	-	2.5	188	163	62	0.2
EV 3201F	32	1.7	-	183	161	61	0.3
EV 3251F	32	1.7	4.1	183	159	60	0.3
EV 3251FT	32	1.9	4.3	183	155	57	0.5
EV 3851F/V	38	1.8	3.9	173	151	57	0.7
EV 4405F	44	5.5	12.0	165	146	55	1.8
EV 4451F/V	44	1.8	-	165	146	54	1.8
Test method		ASTM D1238 / ISO 1133		DSC ISO 11357	DSC ISO 11357	DMA ISO 11357	ASTM D3985 / ISO 14663-2

RIGID PACKAGING

Thermoforming - Blow molding
Trays, Cups, Bottles,.....



PP BARRIER RIGID PACKAGING

Applications

Fruit cup
Instant food
Coffee capsules



Properties

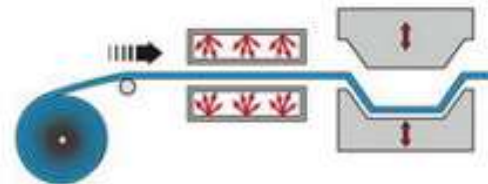
Retort / Pasteurization
Hot filled
Oxygen barrier
Recyclable

Typical Structure

PP/Regrind/Tie/EVOH/Tie/PP

Processes

Co-extrusion +
thermoforming/ **blow molding**



SKFP Resin solutions

Phthalate free ready to use

Orevac® 18730


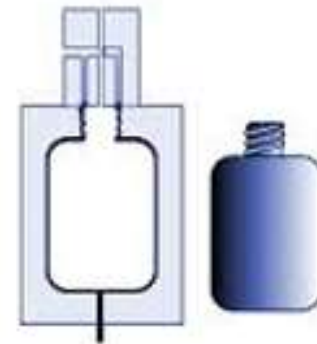
Orevac® 18729

Evasin™ EVOH 3251FT


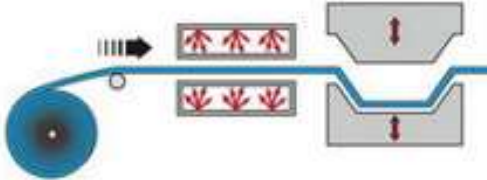
Evasin™ EVOH 3851F

PP BOTTLE FOR CONDIMENTS & SAUCES


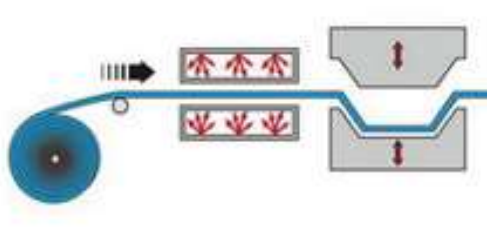
EVOH layer prevents food oxidation

Applications	Properties	Processes	SKFP Resin solutions
<p>Mayonnaise, Mustard, Ketchup and other dressing</p>	<p>Pasteurization Oxygen barrier Recyclable</p>	<p>Blow Molding</p>	<p>Ready to use tie resin: Orevac® 18730 Orevac® 18729 (depending melt index)</p>
	<p>Typical structure PP/Regrind/Tie/EVOH/Tie/PP</p>		<p>Evasin™ EVOH 3251F</p>

PET BARRIER FOOD PACKAGING


Applications	Properties	Processes	SKFP resins solutions
<p data-bbox="88 678 430 760">Fresh food Packaging (meat, noodles, pizza)</p> 	<p data-bbox="567 669 972 836">Transparent Packaging Optimal consumer appeal</p> <p data-bbox="567 795 804 836">Oxygen Barrier</p> <p data-bbox="634 963 972 1084">Typical structure PET/Tie/EVOH/Tie/PE</p>	<p data-bbox="1087 669 1535 709">Co-extrusion thermoforming</p> 	<p data-bbox="1633 698 1875 738">Lotader® 4513T</p> <p data-bbox="1633 779 1864 820">Orevac® 18603</p> <p data-bbox="1633 860 1864 901">Orevac® 18211</p> <p data-bbox="1644 1031 1995 1071">Evasin™ EVOH 3251FT</p> <p data-bbox="1644 1112 1980 1153">Evasin™ EVOH 3851F</p>

PS BARRIER FOOD PACKAGING

Applications	Properties	Processes	SKFP Resin solutions
<p>Packing processed fruits, convenience food preservation</p> 	<p>Good impact resistance Good thermoformability Oxygen barrier</p> <p>Typical structures</p> <p>PS/Tie/EVOH/Tie/PE PS/Tie/EVOH/Tie/PS</p>	<p>Co-extrusion thermoforming</p> 	<p>Orevac® 18910</p> <p>Orevac® 18211</p> <p>Orevac® 18603</p> <p>Evasin™ EVOH 3251FT</p> <p>Evasin™ EVOH 3851F</p>

HDPE BOTTLE FOR DAIRY PRODUCTS

EVOH protects vitamin against oxidation

Applications	Properties	Processes	SKFP Resin solutions
<p>Milk bottle with EVOH layer</p> 	<p>Pasteurization Oxygen barrier Recyclable</p>	<p>Blow Molding</p>	<p><u>Ready to use tie resin</u> Orevac® 18362</p> <p><u>Concentrate tie resin</u> Orevac® 18341 Orevac® OE825</p> <p>Concentrate loading: 10 to 20% blended with LLDPE</p> <p>Evasin™ EV 3251F</p>
	<p>Typical structure</p> <p>HDPE/Regrind/Tie/EVOH /Tie/ HDPE</p>	