LOTADER® - OREVAC® - LOTRYL® - EVASIN™

INNOVATIVE SOLUTIONS FOR PACKAGING

- SUSTAINABILITY
- EASY OPENING
- OXYGEN BARRIER
- ECODESIGN

Click the blacks dots

● RESINS FOR EXTRUSION COATING & LAMINATION

● CIRCULAR ECONOMY

● RIGID & FLEXIBLE PACKAGING

● LOTRYL® BESTPEEL SEAL-PEEL RESINS

SK functional polymer

Consumers benefits

Longer product conservation/freshness

- Protection from oxygen
- Aroma barrier
- Food waste reduction

Conveniency and easy opening

- Peelable barrier lids
- EVOH transparent barrier films

Sustainability

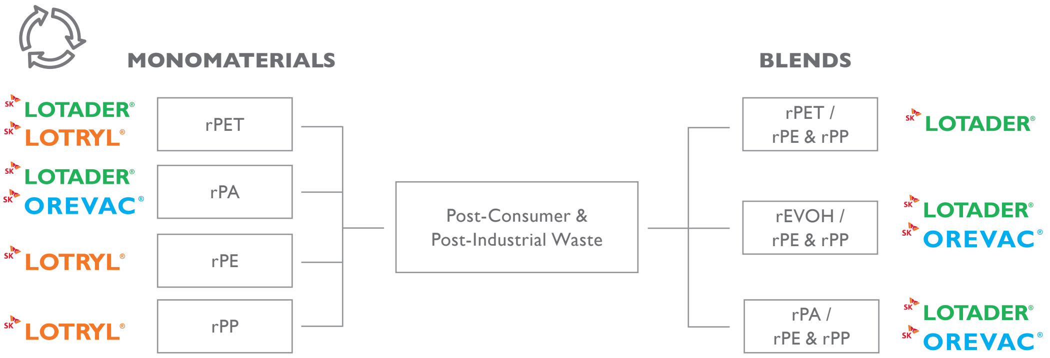
- Monomaterial recyclable packaging
- Recycling solutions for multimaterial packaging
- Lighter packaging

Safety

- Peelable lids opening without cutting device
- Burstpeel for PET trays

Mechanical Recycling Solutions

SKFP proposes a full range of **recycling boosters** to reprocess plastic wastes into valuable applications. Lotryl®, Lotader® and Orevac® **compatibilizers** are used for mechanical recycling of multimaterial plastic blends based on polyolefins (LDPE, PP, HDPE) and barrier resins (EVOH, PA).



Converters benefits

Solutions for coextrusion, extrusion coating, blow & injection molding

- One-stop partner: EVOH barrier, tie resin, seal-peel, seal lock, burst peel, EVA, acid copo, ionomer
- Faster packaging development on circular economy
- Ability to develop new tie resin upon demand
- Better productivity thanks to no curing / no drying solutions

Close to its customers, SKFP offers a one-stop approach for

- Faster development: expertise and products know-how for functionalities required to design a recyclable packaging
- Prototyping: especially in sealing and barrier materials
- Taylor-made trials with converters and customers at SKFP R&D center
- Performance testing: ability to support testing necessary to evaluate packaging
- ISO certified production and R&D facilities, state-of-the art production controls, fast raw material traceability
- **Regulatory status available with dedicated experts**

LOTADER® OREVAC®

SK functional polymer

RESINS FOR EXTRUSION COATING & LAMINATION

Lotader® tie layers

Lotader® resins, unique combination of ethylene, acrylate and maleic anhydride, exhibit outstanding ability to bond to various substrates such as plain, metallized and printed plastic films, aluminum foil, ...

	TYPICAL PROPERTIES					
LOTADER® Grades	Reactive group (%)		Comonomer (%)	Melt index (g/10 min) (190°C–2.16 kg)	Melting point (°C)	Vicat softening temp. (°C)
3210	MAH High content	3.1	BA (6%)	5	107	76
3410		3.1	BA (17%)	5	89	47
3430		3.1	MA (15%)	7	84	45
LX4110		3	EA (5%)	5	105	78
4210		3.6	BA (6.5%)	10	105	69
4403	MAH Low content	0.3	MA (20%)	8	80	45
4503		0.3	MA (20%)	8	80	45
4513T		0.3	MA (24%)	8	96	41
Test method		FTIR	FTIR	ASTM D1238	DSC	ASTM D1525
		Int. method	Int. method	ISO 1133	ISO 11357-3	ISO 306

Orevac® solutions for extrusion coating and lamination

Orevac® resins have been designed to bond to substrates such as primed plastic films, aluminum foil,... Both ready-to-use and concentrates are available. Orevac® PP tie layers are recommended in applications requiring hot filling, sterilization or retort.

		TYPICAL PROPERTIES				
OREVAC® Grades	Base polymer	Reactivity*	Melt index (g/10min.) (190°C, 2.16kg)	Melting point (°C)	Vicat softening temp. (°C)	Density
OE850	LDPE	+++	7.5	104	89	0.915
18750	Homo PP	++	35	160	121	0.920
18751	Homo PP	+	35	160	138	0.910
18790	Random PP	+++	45**	137	-	0.890
Test method		Internal Method	ASTM D1238	DSC	ASTM D1525	
			ISO 1133	ISO 11357	ISO 306	

* Reactivity MAH% + 0.1-0.3 ++ 0.3-0.6 +++ 0.6-1.0 ++++ >1 ** Melt index @ 190°C, 325 g

#1 Lotader® PE tie layer for coextrusion coating and lamination

Ready-to-use grades Lotader® 4503 and Lotader® 4513T exhibit outstanding adhesion to unprimed plastic substrates such as reverse-printed films.

Lotader® 4210, 3210, 3410 and 3430 concentrates contain high maleic anhydride content enabling to be diluted in LDPE to provide adhesion on metallized films or aluminum.

#2 Orevac® PE tie layer for coextrusion coating and lamination

Orevac® OE850 maleic anhydride-grafted PE tie resin is used for coextrusion with EVOH, extrusion lamination of aluminum foils, metallized or primed plastic films.

Cardboard
Orevac® OE850 + PE
EVOH
Orevac® OE850 + PE
PE Sealing layer

Orevac® OE850 tie layer can be used to design more sustainable cellulosic packaging such as Carboard/PE/tie layer/EVOH/tie layer/PE.
It is also suitable for paper//EVOH like structures.

#3 Orevac® PP for retort packaging

Orevac® 18750 and Orevac® 18751 are maleic anhydride grated PP used as tie resins between Aluminum and PP sealant layers. Their rheology has been optimized for the extrusion coating process. These specialty grades require the use of a post-heat treatment facility after the extrusion coating step.

Both grades can withstand sterilization/retort process. They are used in K-cup, pharmaceutical lidding, seal-peel pet food lidding …

#4 Orevac® 18790 concentrate PP tie resin

Orevac® 18790 fluid maleic anhydride grafted PP concentrate is designed to be diluted with PP. It can be processed by extrusion coating or lamination. This specialty grade bonds with polyethylene imine (PEI), a primer widely used in the production of woven PP bags.

BOPP
Ink
PEI Primer
Orevac® PP + PP (5-8 g/m²)
Extruded PP + LDPE blend
Woven PP

This fluid grafted PP concentrate could also be used in coinjection, compounds, …). It enables the production of monomaterial PP-based packaging.

Circular economy solutions

#1
Lotader® tie layers contribute to the ecodesign of new monomaterial 100% PE-based structures !

Oriented printed PE film
Lotader® lamination layer
PE Sealing layer

#2
Orevac® resins are used to ecodesign of new monomaterial full PP-based packaging structures !

BOPP film
Orevac® + PP lamination layer
PP Woven film

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OREVAC® LOTADER® LOTRYL®

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CIRCULAR ECONOMY

ECODESIGN

Starting at the design stage, packaging have to meet new criteria such as:
- ease of recyclability of the finished packaging,
- reduction of plastics content issued from fossils-based naphtha or natural gas.

SKFP teams develop solutions to meet the above objectives.

MDO PE FOR MONOMATERIAL PACKAGING

Machine direction orientation (MDO) is used to enhance the properties of HDPE in order to substitute bioriented PET or PA films. Once the PET or PA have been replaced, all the layers of the composite films are ethylene based. These composites can then be considered as monomaterial, more easily recyclable. SKGC/SKFP developed YUZEX™ HD8300, a new resin for MDO.

	Base Polymer	Reactivity	Melt index (g/10min, 190°C)	Vicat (°C)	Density (g/cm^3)
YUZEX™ HD8300	HDPE	Not reactive	0.7	124	0.963

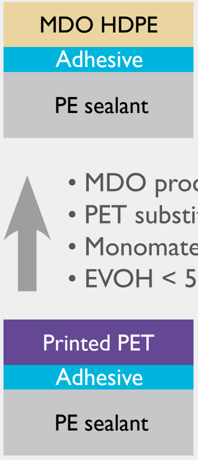
MONOMATERIAL EVOH-BASED BARRIER FILMS

EVASIN™ EVOH with 29% ethylene content to decrease the EVOH layer thickness below 5%. The PE/EVOH or PP/EVOH barrier films are therefore easier to recycle due to the low content of EVOH.

	Ethylene content (%mol)	Melt index (g/10min, 190°C)	Melt index (g/10min, 200°C)	Melting point (°C)	O^2 Trans.rate (65%RH,20°C,cm3.20μm^2.24hrs.atm)
EVASIN™ EV2951F	29	-	2.5	188	0.2

#1 MDO

New: 100% PE film MDO Monomaterial structure



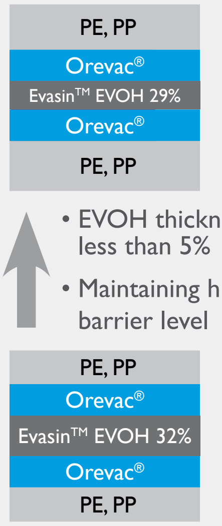
- MDO process
- PET substitution
- Monomaterial
- EVOH < 5%

Old: PET/PE film Multimaterial structure

Benefits:
- Improve film flatness for better printability
- Enhance mechanical properties: tear resistance in MDO, tensile strength, stiffness, impact strength
- Better optic: gloss and transparency

#2 Reduction EVOH thickness

New: < 5% EVOH MDO Monomaterial structure



- EVOH thickness reduction, less than 5%
- Maintaining high barrier level

Old: ~10% EVOH Multimaterial structure

With a decreasing ethylene content to 29%, EVOH/EVASIN™ offers the possibility to reduce EVOH thickness and develop subsequently monomaterial packaging and maintain high gas barrier.

MECHANICAL RECYCLING OF FOOD PACKAGING

Modern packaging can achieve great aesthetics, ease of processing and most important, long-term protection of the packaged foodstuff. These performance are due to the combination of multiple incompatible plastic layers. SKFP brings solutions to recycle these complex plastic blends.

MONOMATERIAL RECYCLED PLASTICS

- MECHANICAL BOOSTERS
  - Impact modification
  - Melt strength adjustments
  - Flexibilization

RECOMMANDATIONS

The addition of a few % of Lotryl® or /and Lotader® resin boosts the properties lost during lifetime of plastic or during their mechanical recycling.
Recommended for PET or Polyamides.

RECYCLED PLASTIC BLENDS

- BLEND COMPATIBILIZERS
  - Improve the mechanical properties
  - Limit "gels" presence
  - Reduce haze

RECOMMANDATIONS

Lotader® MAH and Orevac® G compatibilize polyolefins, EVOH and Polyamides.
Lotader® GMA for the compatibilization of polyolefins and thermoplastics polyesters (PET).

	Lotryl®		**Lotader®**				**Orevac®**	
Grade	24MA02T	29MA03T	AX8840	AX8900	TX8030	4210	18341	18507
Reactivity	-	-	Epoxide	Epoxide	Maleic	Maleic	Maleic	Maleic
Base resin	EMA	EMA	E-GMA	E-MA-GMA	E-EA-MAH	E-BA-MAH	LLDPE	HDPE
Composition	24%MA	29%MA	0% Acrylate	24%MA	13%EA	6.5%BA	d 918	d 954
Melt index (g/10min; 190°C, 2.16kg)	2	3	8	8	3	10	1.5	954
Melting point (°C)	95	92	104	65	95	105	121	128

#1 Recycling of multimaterial barrier PE/EVOH films

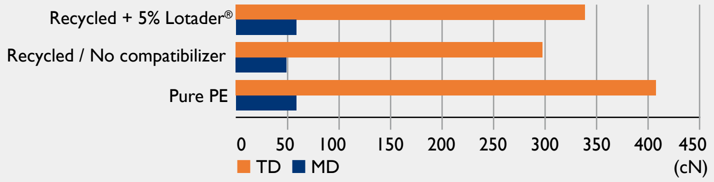
Structure: PE/Tie layer/EVOH/Tie layer/PE
(PE: 89%, EVOH 10%, Orevac® 1%)

Mechanical recycling results

Haze decreased from 45 without compatibilizer to 33 after the addition of 5% Lotader® 4210.

Tear strength

Significant tear resistance improvement with addition of 5% Lotader®



Typical compatibilizer loading recommendations for PE/EVOH films: 2 to 5% depending on the EVOH content.

#2 Recycling of PE/PA films

Structure: PE/Tie layer/PA/Tie layer/PE
(PE: 69%, PA 29%, Orevac® 2%)
The high PA content makes the films more difficult to recycle than the EVOH-based films.

Mechanical recycling results

Without compatibilizer, the recycled PA film could not be processed. 5% compatibilizer enables its processing into a new film. It also increases the tear resistance of the recycled film by >100% in the machine direction.

	Tear strength (cN)	
	0% Lotader	5% Lotader
Recycled PE/PA film	16	39

For PA-based barrier films, it is recommended to compound it with virgin PE. Lotader® 4210 added at 0.75% in the recycled/virgin blend enables to retrieve many of the original properties of virgin PE.

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OREVAC®

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RIGID PACKAGING

Orevac® solutions for co-extrusion

The outstanding ability to adhere to different substrates makes Orevac® adhesive resins the preferred tie layers used in rigid barrier structures made by co-extrusion.

Rigid packaging: Thermoforming - Blow molding - Tube

APPLICATIONS

- **Thermoformed sheet:** Cups and trays for coffee, fresh/convenience foods
- **Blow molding:** Bottle (Mayo, Mustard, Ketchup, Milk, Fertilizers…)
- **Plastic Barrier Laminate Tube (PBL) for cosmetics & toothpaste**
- **Compatibilizer:** PE/EVOH & PP/EVOH

FORMULATION

- Made of **PE, EMA, EVA, PP**
- **Reactive grafted MAH** for an effective adhesion on various substrates: EVOH, PA, Alu, Paper, PP, PS, PET, HDPE

MAIN PROPERTIES

- Ready to use or concentrate tie resins
- Suitable MFI to dedicated technology
- High bonding strength on various substrates: PP, PS, PET, PE, EVOH, PA
- Designed for various filling processes: hot filling, pasteurization
- Eco-design packaging solution (mono-PE, mono-PP…)

PROCESSING

- High processability in blow molding and co-extrusion/thermoformed foil
- Non-corrosive resins

PRODUCTS Grades	Base polymer	Reactivity*	Melt index: g/10 min (190°C; 2.16 kg)	Melting point (°C)	Vicat softening temp (°C)	Density	Structure example
Orevac® 18729	Homo PP	+	4.5	162	137	0.900	PP/Regrind/**Orevac®**/EVOH/**Orevac®**/PP
Orevac® 18730	Homo PP	+	3	162	136	0.905	PP/Regrind/Orevac®/PA/Orevac®/PP
Orevac® 18603	EMA	++	3.5	92	<40	0.950	PET/**Orevac®**/EVOH/**Orevac®**/PE
Lotader® 4513T	EMA	++	8	96	41	-	PET/**Lotader®**/PE
Orevac® 18211	EVA	+	3.5	75	51	0.950	PE/**Orevac®**/EVOH/**Orevac®**/PS
Orevac® 18910	LLDPE	+	1.5	117	80	0.950	
Orevac® 18362	LLDPE	+	2.5	123	-	0.918	PE/Regrind/Orevac®/EVOH /Orevac®/ PE
Orevac® 18341	LLDPE	+++	1.5	121	95	0.918	
Orevac® OE825	LLDPE	+++	3.0	118	100	0.913	

*Reactivity, %MAH + 0.1-0.3 ++ 0.3-0.6 +++ 0.6-1.0

FLEXIBLE PACKAGING

Orevac® solutions for co-extrusion

The outstanding ability to adhere to different substrates makes Orevac® adhesive resins the preferred tie-layers used in flexible barrier structures made by co-extrusion.

Flexible packaging: Blown - Cast-Thermolamination - Thermoforming - Antifog

APPLICATIONS

- **Barrier film:** sealant film, lids (burst-peel, antifog, …)
- **Thermolamination:** tray for fresh meat, …
- **Pouch:** Vacuum bag, doy pack, flow pack, …
- **Compatibilizer:** PE/EVOH, PE/PA

FORMULATION

- Made of **PE, EMA, EVA, PP**
- **Reactive grafted MAH** for an effective adhesion on various substrates: EVOH, PA, Alu, Paper, PP, PS, PET, PE

MAIN PROPERTIES

- Ready to use or concentrate tie resins
- Suitable MFI to dedicated technology
- High bonding strength on various substrates: PP, PS, PET, PE, EVOH, PA
- Suitable for eco-design packaging solution (mono-PE, mono-PP, …)

PROCESSING

- **High processability** in blown film, cast film and thermolamination
- Designed for miscellaneous converting technologies : multibubble, barrier MDO, water quenching applications.
- Non-corrosive resins

OREVAC® Grades	**Base polymer**	**Reactivity***	**MFR**	**Melting point (°C)**	**Vicat softening temp (°C)**	**Density**	**Structure example**
Orevac® 18300	LLDPE	++	2.5	120	85	0.916	PE/**Orevac®**/EVOH/**Orevac®**/PE PE/**Orevac®**/PA/**Orevac®**/PE (Antifog, multibubble, water quenching)
Orevac® 18362	LLDPE	+	2.5	123	-	0.918	PE/**Orevac®**/EVOH/**Orevac®**/PE PE/**Orevac®**/PA/**Orevac®**/PE
Orevac® 18341	LLDPE	+++	1.5	121	95	0.918	
Orevac® OE825	LLDPE	+++	3.0	118	100	0.913	
Orevac® 18722	Random PP	+	7	143	120	0.900	PP/**Orevac®**/EVOH/**Orevac®**/PP PP/**Orevac®**/PA/**Orevac®**/PP
Orevac® 18729	Homo PP	+	4.5	162	137	0.900	PP/**Orevac®**/PA/**Orevac®**/PP
Orevac® 18603	EMA	++	3.5	92	<40	0.950	Co PET/**Orevac®**/PE/Tie/EVOH or PA/**Orevac®**/PE/Glue//BOPP (Burst-peel)
Orevac® 18211	EVA	+	3.5	75	51	0.950	**Orevac®**/PE/**Orevac®**/EVOH/**Orevac®**/PE or **Orevac®**/PE/Tie/EVOH/Tie/PE
Orevac® T9304	EVA	+	7.5	80	49	-	

*Reactivity, %MAH + 0.1-0.3 ++ 0.3-0.6 +++ 0.6-1.0

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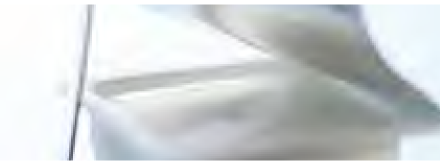
LOTRYL® BESTPEEL SEAL-PEEL RESINS



Lotryl® Bestpeel product range gather different seal-peel resins for dry and refrigerated food lidding applications.
They are designed to produce multilayer structures by coextrusion coating, cast film coextrusion, and blown film coextrusion.

Lotryl® Bestpeel resins provide:
- strong heat sealing strength onto various substrates
- easy opening by interfacial peeling
- no residues on trays, cups or bottles to facilitate their recycling

APPLICATIONS

- **Easy-peel lids**
- **For Dry & Refrigerated food:** instant food, dairy products, cheese, meat, …
- Not for retort and microwavable applications

MAIN PROPERTIES

RESIN PROPERTIES

- **Ready to use or concentrate tie resins**
- **High thermal stability** (EMA)
- Suitable MFI to dedicated technology
- High sealing strength on various substrates: **PP, PS, APET, PVC, HDPE, …**

PEEL MECHANISM

- **Adhesive and smooth peeling**
- No peeling properties on itself
- No residue left on the seam of the tray/cup
- No filament during lid opening

FORMULATION

CARRIER RESINS

- Made of EMA or EVA
- High co-monomer content for an effective adhesion on various substrates: PP, PS, PET, PVC, HDPE

ADDITIVATION

Contain slip and anti-block agents for:
1. Smooth and continuous peeling of end lidding solution
2. Optimized composition for processing on various co-extrusion technologies

PROCESSING

- **High processability** in blown film, cast film, extrusion coating, and thermolamination
- Designed for miscellaneous converting technologies : multi-bubble, barrier MDO, water quenching applications.
- **Non-corrosive resins**

How to choose the right Lotryl® Bestpeel grade?

Lotryl® Bestpeel Seal-Peel resins

	TYPICAL PROPERTIES													
	Carrier resin	Comonomer (%)	MFI 190°C, 2.16 kg	Melting point (°C)	Vicat softening temp. (°C)	Density	Clarity	PP	PS	APET	HDPE	PVC	Process*	Food compliance
BESTPEEL 2008	EMA	20	7	79	46	1.05	-	•••	••	••	•••	••	EC, B, C	FDA/EU
BESTPEEL 2407	EMA	23	2	69	<40	0.94	++	•••	•••	••	•••	•••	B, C	FDA/EU
BESTPEEL 2805V	EVA	28	6	72	40	0.95	+++	•••	•••	•••	•••	•••	B, C, (EC)	FDA/EU

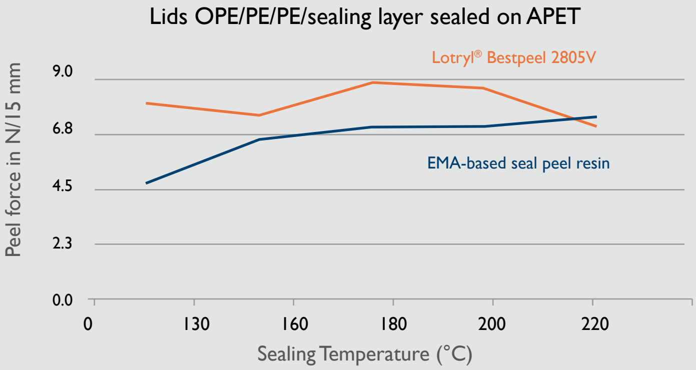
Lotryl® Masterbatch

Lotryl® MM1297 slip & antiblock masterbatch facilitates the processing of Lotryl® Bestpeel.

	TYPES OF ADDITIVES/ACTION				
Masterbatch	Anti-block	Slip agent	Soft touch	COMPATIBILITY	Food compliancy
MM1297	o	o	-	EMA, EVA	FDA/EU

#1 Lotryl® Bestpeel 2805V for Low SIT lidding solutions on APET

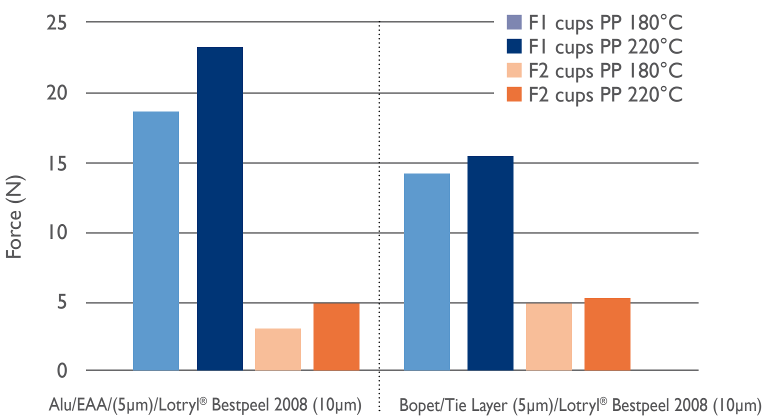
Lotryl® Bestpeel 2805V provides low SIT on APET thanks to its special additivation and EVA carrier resin. This grade can also be used for transparent lidding, taking advantage of its outstanding optical properties.

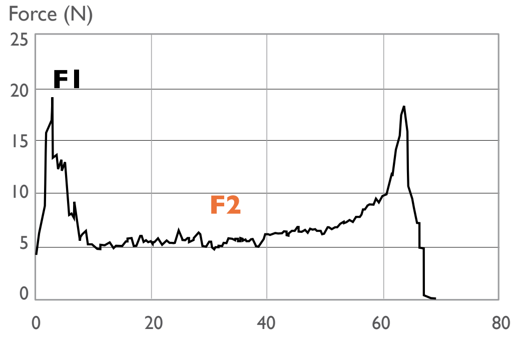


#2 Lotryl® Bestpeel 2008 performances on PP cups

Two different lids produced by extrusion coating of Lotryl® Bestpeel 2008 on Alu and BOPET have been tested on PP cups. Sealing temperatures: 180° & 220°C ; 1 sec; 4.5 bars. The initiation force (F1) & propagation force (F2) have been measured.

Sealing strength on PP cups





Lotryl® Bestpeel for sustainable peelable lids !

Lotryl® Bestpeel can actively participate to the ecodesign of monomaterial lids.
As an example, Lotryl® Bestpeel based sealant & barrier film can be laminated with MDO-PE printed film using Lotader® 4513T as lamination tie layer. This structure is considered as a monomaterial ethylene-based lidding solution since all layers are mainly made of ethylene.
Let's discuss together to reach your sustainability targets !

MDO PE printed film
Lotader® 4513T tie layer
PE/EVOH barrier layer
Lotryl® Bestpeel

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