



Exceed™ XP Exceed™ Enable™
ExxonMobil™ LDPE

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Sustainable collation shrink packaging using recycled PE content

Collation shrink packaging can now be made using recycled polyethylene and virgin performance polyethylene (PE) polymers without compromising performance, helping customers create sustainable solutions.

 <p>Toughness – puncture, and dart impact</p>	 <p>Stiffness and holding force</p>	 <p>Shelf appeal, brand visibility with up to 30% recycled PE</p>	 <p>Comparable shrink performance with up to 30% recycled PE</p>
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This collation shrink solution using performance PE polymers and recycled PE is a mono-material, lightweight solution that uses less materials and can be recycled where programs and facilities to collect and recycle plastic films exist.

Challenge:

Sustainable collation shrink film solution containing up to 30% recycled polyethylene.

As consumers become increasingly concerned about the environmental impact of packaging, the value chain is looking at using recycled content as part of the solution.

As part of its commitment to helping customers create sustainable solutions, **ExxonMobil** wanted to develop a thinner-tougher collation shrink solution that would include recycled PE, while maintaining packaging quality and integrity.

Solution:

Extrusion technology with performance PE polymers allow the use of different recycle PE streams.

A collaboration between ExxonMobil, **Windmüller & Hölscher**, and **Grupo Armando Alvarez** has created a 40-micron, 5-layer POD collation shrink film, which includes up to 30% recycled polyethylene (PE). The solution is designed to wrap 6 x 1.5L bottles.

The collation shrink film, which includes up to 30% recycled PE, was processed on a **VAREX II** blown film line and maintains performance due to the inclusion of **Exceed™ XP** and **Enable™** performance PE polymers in the formulation.



WINDMÜLLER & HÖLSCHER

The combination of VAREX II technology and ExxonMobil performance PE polymers, allows different recycled polyethylene streams to be used. The processing challenge presented by recycled materials with a broad melt index and density range is solved by using Exceed™ XP and Enable™ performance polyethylene polymers.

Result:

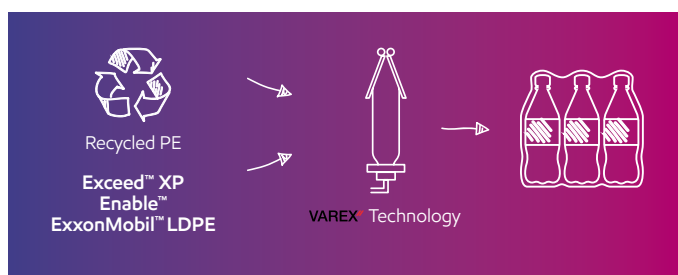
Thinner film with excellent package integrity, optical properties and processability while adding recycled PE.

eXtreme toughness and excellent optics with Exceed XP

Exceed XP performance polymers boost the mechanical properties of the film, so that recycled PE can be added without having to increase film thickness. Exceed XP maintains the toughness, optical properties and improves processability. The extreme performance properties provided by Exceed XP allow more recycled materials to be included in film formulations. Converters can optimize film formulations and increase output, helping them to produce extremely tough 5-layer polyolefin-dedicated (POD) collation shrink packaging solutions.

Package integrity and process consistency, even with recycled PE

Medium density Enable performance PE polymers deliver collation shrink packaging films with balanced properties including shrinkability, holding force and toughness-stiffness. The shrink speed of the film can be adjusted for different shrink process conditions using ExxonMobil™ LDPE.



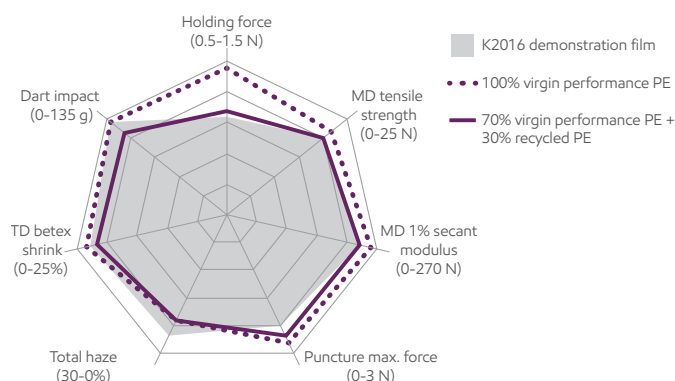
Comparable performance with up to 30% recycled content

The new collation shrink packaging with Exceed XP delivers eXtreme Performance properties, which allows up to 30% recycled PE to be included and delivers:

- Toughness** - puncture and dart impact
- Stiffness** - MD tensile strength, excellent holding force
- Optics** - Shelf appeal, brand visibility with up to 30% recycled PE
- Shrink performance** - comparable shrink performance with up to 30% recycled PE.

	40 µm 100% performance PE with Exceed ¹	40 µm 100% virgin performance PE with Exceed XP ²	40 µm 70% virgin performance PE with Exceed XP + 30% recycled PE ²
Layer configuration	1/2/4/2/1	1/2/4/2/1	1/2/4/2/1
Skin layer	Exceed + ExxonMobil LDPE	Exceed XP + ExxonMobil LDPE	Exceed XP + ExxonMobil LDPE
Sub-skin	Enable	Enable	Enable + ExxonMobil LDPE
Core	Exceed + Enable + ExxonMobil LDPE	Exceed + Enable + ExxonMobil LDPE	Recycled PE + ExxonMobil LDPE/HDPE
Sub-skin	Enable	Enable	Enable + ExxonMobil LDPE
Skin layer	Exceed + ExxonMobil LDPE	Exceed XP + ExxonMobil LDPE	Exceed XP + ExxonMobil LDPE

1. presented in K2016
2. presented in K2019



All data from tests performed by or on behalf of ExxonMobil.

ExxonMobil performance PE for collation shrink		
Grade	Density (g/cm ³)	Melt index (g/10 min)
Exceed XP 6056ML	0.916	0.50
Exceed XP 8318ML	0.918	1.0
Exceed 2018MA	0.918	2.00
Enable 4009MC	0.940	0.90
Enable 4002MC	0.940	0.25
ExxonMobil HDPE HTA108	0.961	0.70
ExxonMobil LDPE 171BA	0.929	0.55
ExxonMobil LDPE 165BW1	0.922	0.33



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