ExxonMobil
Signature Polymers

Fact sheet

Exceed™ Tough

Stretch film solution that incorporates post-consumer recycled (PCR) content

Wrapper consistency at 150% strain

Up to 200% ultimate strain

Puncture force of up to 30 N

PCR content incorporation

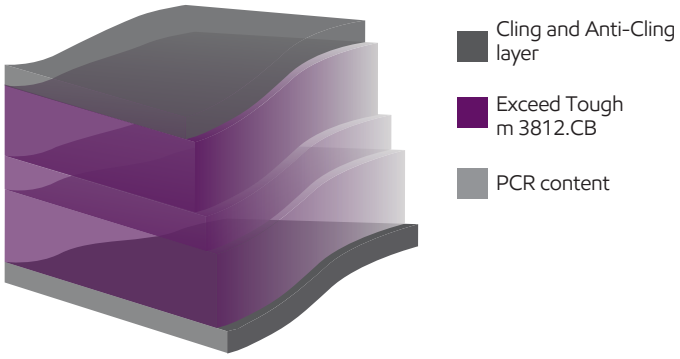
Data and results presented herein apply specifically to the noted application under this fact sheet.
Your results may differ depending on factors such as operating conditions, equipment and materials used.

Based on ExxonMobil testing, a C4-LLDPE-based formulation with the incorporation of PCR content may not deliver the film and end-use level of performance required for machine wrap stretch films unless high quality recycled content is used.

Exceed™ Tough m 3812.CB performance polymer is an excellent post-consumer recycled (PCR) content blend partner. As demonstrated in ExxonMobil testing, it helps enable the incorporation of up to 20% PCR content in a machine-wrap stretch film solution, with reduced impacts from gels and improved wrapper consistency.

Exceed Tough m 3812.CB performance polymer as an excellent PCR content blend partner demonstrated

- Higher melt index and lower density (vs reference performance PE (0.916 g/cm^3; 3.5 g/10 min)) exhibiting improved mechanical performance and processing capability.
- Especially suited as a blend partner with PCR content.
- Acted as a gel grinder, reducing the amount and size of gels, and helping improve wrapper consistency.

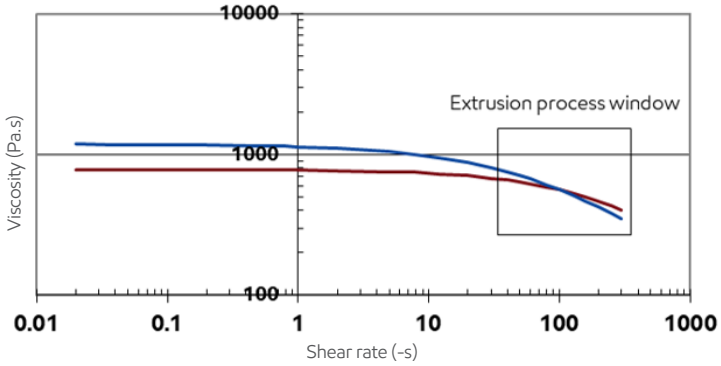


Note: Concept applicable for 3-layer line as an illustration

Exceed™ Tough m 3812.CB performance polymer as a gel grinder delivered higher shear

Tests performed on Exceed Tough m 3812.CB and the reference C4-LLDPE (using the same PCR content batch under the same processing conditions) observed that the addition of Exceed Tough m 3812.CB performance polyethylene in the blend reduced the amount of gels. Additionally, higher viscosities generally result in higher shear, which can grind larger gels and may help lower the total number of gels.

Predicted flow curve at 230°C



Number of gels per meter of film

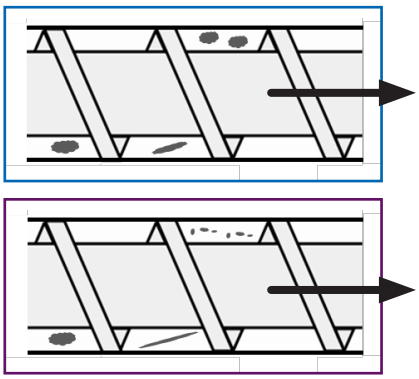
	200 - 400 µm	400 - 800 µm	800 - 1600 µm	1600 - 2400 µm	2400 - 4000 µm
	3145	706	35	0.4	0.0
	2708	525	21	0.1	0.0

Absolute values can vary according to the camera type and gel detection sensitivity settings.

Different shear mixing due to different viscosity

Reference performance PE (0.916 g/cm³; 3.5 g/10 min) blended with PCR in sub-skins

Exceed Tough m 3812 (0.912 g/cm³; 3.8 g/10 min) blended with PCR in sub-skins



Exceed Tough m 3812.CB performance PE helped improve mechanical performance in a formulation that incorporated recycled PE content

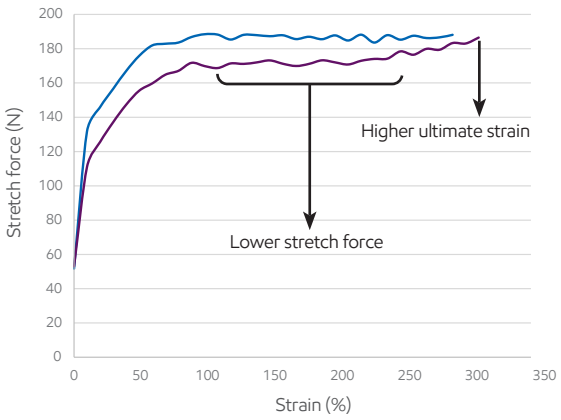
Test results observed improved mechanical performance when Exceed Tough m 3812 performance PE was incorporated into the formulation compared to a reference C4-LLDPE:

- Lower density of Exceed Tough m 3812 performance PE resulted in lower stretch force
- Improved toughness of Exceed Tough m 3812 performance PE increased ultimate strain and improved wrapper consistency

	Reference performance PE + 20% PCR content 22µm	**Exceed Tough m 3812.CB + 20% PCR content** 22µm
Ratio	1/8/1	1/8/1
Anti-cling		
Core	75% Reference mPE 25% PCR content*	75% Exceed Tough m 3812.CB 25% PCR content*
Cling		

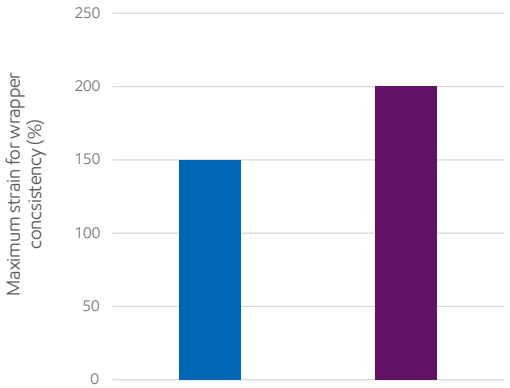
Same cling and anti-cling compositions
**PCR-Type 2 considered in these formulations.*
PCR2-type2: > 90% LLDPE, density: 0.917 g/cm³, MI: 1.7 g/10 min

FPT ultimate curve



Translated into

Wrapper consistency



Reference performance PE (0.918 g/cm³ ; 3.5 g/10 min)

Exceed Tough m 3812 (0.912 g/cm³ ; 3.8 g/10 min)

Test item	Test method
Ultimate strain	FPT-750 equipment: 30 N unwind force, -4% wind strain, 4000 mm/s line velocity, W stretch pattern
Gel count (by consistency test)	50 m of unstretched film on FPT-750 equipment: 30 N unwind force, 0% pre-stretch, 5% wind strain, 4000 mm/s line velocity, W stretch pattern, gray value 140
Wrapper consistency	50 m of unstretched film on FPT-750 equipment: 30 N unwind force, 5% wind strain, W-stretch pattern. Wrapper velocity of 50 wraps/min at 100% 150%, 200%, or 250% pre-stretch; 3 times no film break is seen as a successful test
Melt index	(190°C / 2.16 kg) – based on ASTM D1238
Density / specific gravity	Based on ASTM D792

All data in this document have been tested by or on behalf of ExxonMobil

ExxonMobil Signature Polymers

Bring your impossible

ExxonMobil Signature Polymers was born from the belief that people fuel progress. From automotive and construction to packaging, agriculture, industrial, and beyond, we leverage the scale and reach of ExxonMobil to deliver the insights and innovations that empower our diverse, global partners to take their businesses to new heights. We continuously work to provide the listen-first, service-driven, game-changing collaboration that unlocks opportunities for our partners and advances their business goals.

What's new: ExxonMobil Signature Polymers

All our polymers are now positioned under a single portfolio brand: ExxonMobil Signature Polymers. The aim is to simplify our product architecture and naming to improve portfolio navigation for you. We would like to stress that our commitment to high quality products remains the same, it is the names that change. Everything else remains the same. We will be making these modifications over the next six months so you will see both old and new grade names highlighted during that time.

Here's a quick overview of brands and grade names that have changed in this document:

Legacy commercial name	New commercial name
Exceed™ 3812CB	Exceed™ Tough m 3812.CB

Some of our existing Exceed, Achieve, Paxon and premium PP/HD grades have moved to Exceed brand; most existing Enable grades have moved to Exceed Flow[+]; most of our existing Exceed XP grades have moved to Exceed Tough[+]; most of our existing Exceed S grades have moved to Exceed Stiff[+]. More details here **https://www.exxonmobilchemical.com/en/brands/signature-polymers/exceed_high_performance_polymers** or contact your ExxonMobil representative to know more.

Want to see what's changed in our portfolio? Go to **exxonmobilchemical.com/sptransform**