



Exceed<sup>®</sup> Tough+

## Help farmers protect their harvests using high performance agricultural film

Exceed Tough+ performance polymers offer a new benchmark for thinner agricultural blown film solutions that require high performance. This new solution enables converters to fabricate high integrity agricultural films that are extremely damage-resistant that protect and preserve harvests and other farm produce.

### Delivered attributes

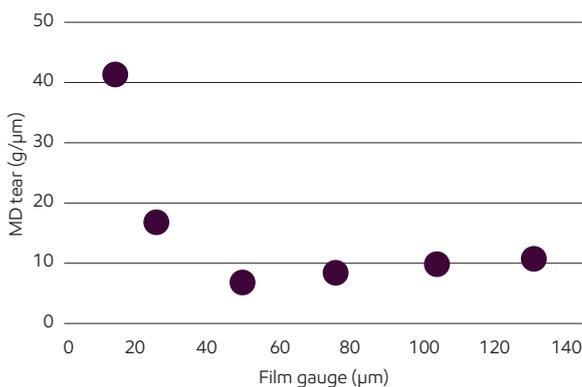
- Extreme toughness
- Outstanding MD tear strength
- High melt strength

### Derived benefits and potential value

- Reduced risk of waste and spoilage
- Enhanced durability of thin films, for which high MD tear is particularly important
- Cost effective solutions with linear blends which are synergistic for MD tear
- High output without the need for LDPE resin, which is detrimental to MD tear resistance/toughness

**Figure 1:**

Exceed Tough+ m 0516 demonstrates extreme MD tear resistance in blown films when processed with high machine orientation – low blow-up ratio (BUR), high outputs, low frost line height (FLH) and wider die gap. This attribute is specifically demonstrated in thin films, which is a unique feature versus conventional polyethylene grades.



**Table 1: Processing conditions**

Die gap	1.5 mm
Die diameter	160 mm
BUR	2.5
Output	135 kg/h
Frost-line height	760 mm
Melt temperature	223 °C

Test methods based on: Elmendorf tear strength – ASTM D1922

## Agricultural film integrity

Exceed™ Tough+ performance polymers allow converters to fabricate films with high MD tear strength and toughness to reduce the risk of waste and spoilage. The extreme toughness performance of these polymers helps prevent damage in the field and during handling to maintain film integrity in applications such as silage stretch wrap and mulch.

## Innovation opportunities

Exceed enables converters to create new-to-the-world or improve current blown agricultural films. Additionally, using grades with 0.5 MI, they can leverage processing conditions and high machine orientation for exceptional MD tear strength.

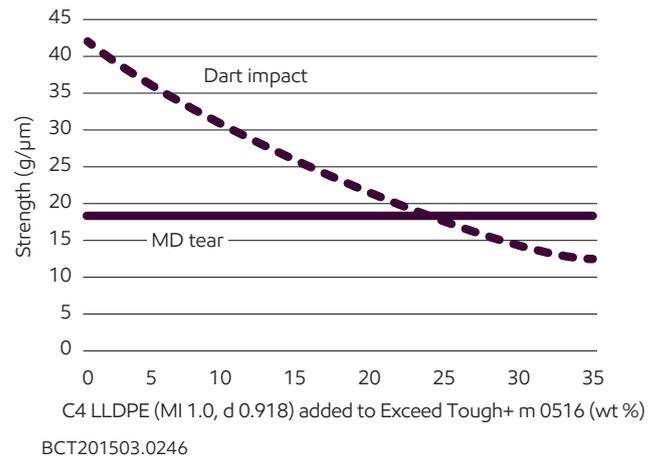
## Cost optimization

Converters are able to optimize film formulations and leverage processability to deliver cost-effective solutions. Exceed Tough+ with a 0.5 melt index (MI), has a high melt strength with exceptional mechanical properties which enables maximum output with extreme performance. Exceed-based film formulations may also be tailored with linear blends to optimize performance and cost.



**Figure 2:**

Using linear blends with thin, Exceed Tough+ films (25 micron, monolayer) there is potential to optimize dart, MD tear performance and cost.



**Table 2:**

Processing conditions for a thin Exceed-based film formulation with varying C4 LLDPE levels

Die gap	1.5 mm
Die diameter	160 mm
BUR	2.5
Output	135 kg/h
Frost-line height	710 mm
Melt temperature	223 - 229 °C

Test methods based on: Elmendorf tear strength - ASTM D1922;  
Dart impact - ASTM D1709

Grades	Melt index (g/10 min)	Density (g/cm <sup>3</sup> )	Melt flow ratio (I <sub>21</sub> /I <sub>2</sub> )	Distinguishing features for high performance
Exceed Tough+ m 0516	0.5	0.916	28-30	<ul style="list-style-type: none"> <li>▪ Exceptional tear and toughness</li> <li>▪ Excellent bubble stability</li> </ul>
Exceed Tough+ m 0518	0.5	0.918	28-30	<ul style="list-style-type: none"> <li>▪ Exceptional tear, toughness and holding force</li> <li>▪ Excellent bubble stability</li> </ul>
Exceed Tough+ m 1019	1.0	0.918	28-30	<ul style="list-style-type: none"> <li>▪ Excellent tear, toughness and holding force</li> <li>▪ Excellent film extrudability</li> </ul>

Notes: Exceed Tough+ m 0516 is also available with slip and antiblock.

Test methods based on: Melt index and Melt flow ratio - ASTM D1238; Density - ExxonMobil method

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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 and business goals.



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## 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 XP 8656	Exceed Tough+ m 0516
Exceed XP 8358	Exceed Tough+ m 0518
Exceed XP 8318	Exceed Tough+ m 1019

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](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](https://www.exxonmobilchemical.com/sptransform)