THE STAGE IS SET
FOR PACKAGING PERFORMANCE LIKE NEVER BEFORE
Introducing INNATE™ Precision Packaging Resins – a new ensemble of extremely talented and versatile performers that showcase unprecedented combinations of stiffness, toughness, and efficiency in a variety of film applications.

INNATE™ resins are born from a breakthrough patented molecular catalyst coupled with advanced process technology that allows accurate and consistent control of the resin chemistry, offering performance levels and combinations of film properties like never before to...

- Fill unmet packaging needs
- Create new market spaces
- Offer unprecedented packaging performance

Dow developed INNATE™ resins to address the needs of the packaging value chain. These resins specifically target critical performance gaps in the marketplace and can help deliver lighter, stronger, more durable packaging films.

The Industry’s Newest Film Star

What talents are needed to succeed on the competitive packaging stage? Strength ... Stiffness ... Toughness ... Durability ... Processability ... Sustainability ... Blendability ... These are essential characteristics elemental to today’s packaging applications. And these are the very properties of the innate DNA comprising Dow’s new family of precision packaging resins.
With such precision comes an unmatched versatility allowing use across many applications. INNATE™ resins can enhance formulations in food packaging; industrial packaging, including heavy-duty shipping sacks (HDSS) and pallet containment; silage wrap; specialty packaging; and even more – like components for artificial turf.

**Value for Film Converters**

For film converters, the “precision” found with INNATE™ Precision Packaging Resins means processing efficiencies, versatility in formulations, and more opportunities. You’ll find:

- Unprecedented downgauging possibilities due to the unique molecular structure
- Outstanding film toughness while maintaining stiffness
- Excellent blending capabilities to enhance film performance
- Ease of processability, with excellent bubble stability versus traditional metallocene resins – even for thick films

**Value for Brand Owners**

Brand owners may find “precision” in advanced performance and specific packaging differentiation, as well as:

- An excellent sustainability profile, due to material reduction potential, while maintaining or exceeding performance requirements
- Outstanding film protection and packaging optimization
- New opportunities for packaging efficiencies through material substitution

**Value for Retailers**

Retailers, too, can gain advantages from the outstanding performance of INNATE™ resins:

- Increased packaging reliability
- Improved package integrity for excellent shelf life
- Less product damage and fewer returns
DISTINGUISHING TALETNS

The first product in the family of INNATE™ Precision Packaging Resins is XUS 59910.02(1) developmental precision packaging resin. Like all INNATE™ resins, it allows accurate control to dial in precise and extraordinary properties like never before. Table 1 presents typical resin and film properties of XUS 59910.02(1) developmental resin.

Table 1: Resin & Film Properties, XUS 59910.02(1) developmental precision packaging resin

<table>
<thead>
<tr>
<th>Additive Concentration (ppm)</th>
<th>Antiblock: No</th>
<th>Slip: No</th>
<th>Processing Aid: No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Nominal Value (English)</td>
<td>Test Method</td>
<td></td>
</tr>
</tbody>
</table>

Resin Properties(2)

- Density: 0.918 g/cm³ ASTM D 792
- Melt Index (190°C/2.16 kg): 0.85 g/10 min ASTM D 1238

Film Properties (1 mil blown films)(2)

<table>
<thead>
<tr>
<th>Thickness</th>
<th>1.0 mil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dart Impact</td>
<td>1645 g</td>
</tr>
<tr>
<td>Secant Modulus</td>
<td>29,800 psi MD 33,140 psi CD</td>
</tr>
<tr>
<td>Tensile Modulus (Yield)</td>
<td>1800 psi MD 1600 psi CD</td>
</tr>
<tr>
<td>Tensile Modulus (Break)</td>
<td>5150 psi MD 4130 psi CD</td>
</tr>
<tr>
<td>Tensile Elongation (Break)</td>
<td>425 % MD 550 % CD</td>
</tr>
<tr>
<td>Elmendorf Tear</td>
<td>265 g MD 532 g CD</td>
</tr>
<tr>
<td>Optical</td>
<td>47 ASTM D 2457</td>
</tr>
<tr>
<td>Haze</td>
<td>14% ASTM D 1003</td>
</tr>
</tbody>
</table>

Fabrication Conditions for 1 mil monolayer blown film

- Die Diameter: 8 in.; Screw Type: DSB II; Die Gap: 90 mil; Melt Temperature: 428°F; Output: 10.4 lb/hr/in. of Die Circumference; Screw Size: 3.5 in.; Blow-up Ratio: 2.5 to 1; Screw Speed: 40 rpm; Frost Line Height: 40 in.

(1) Developmental product of The Dow Chemical Company
(2) Dow testing. Typical properties only, not to be construed as specifications. Users should confirm results by their own tests.
AN EXCELLENT PERFORMER IN ANY ROLE

Food & Specialty Packaging
Durability and abuse resistance, with efficient processing by itself and in blends, make INNATE™ Precision Packaging Resins an excellent fit for food packaging in particular, and consumer product packaging in general. They offer:
- Film toughness for enhanced package optimization
- Film stiffness needed for efficient filling, displaying, and storing of packages like stand-up pouches
- Improved toughness in combination with excellent flex crack resistance – advantageous for liquid packaging
- Outstanding durability for package and product protection

Industrial & Consumer Packaging
Films made using INNATE™ Precision Packaging Resins gain toughness and strength to stand up to virtually any challenging application, such as heavy-duty shipping sacks. Users will find:
- Significantly increased abuse performance leading to advances in bag drop performance
- Comparable heat seal performance to popular incumbent resins
- Downgauging potential for value creation

Sports
The talents of INNATE™ Precision Packaging Resins extend to the playing field, too, delivering resilient monofilament yarns for artificial turf. The resins offer:
- Good curl and shrinkage performance
- Higher processing line speed with equivalent yarn properties versus comparative products
Outstanding Stiffness/Toughness Balance in a Mono- or Multi-layer Structure

As shown in Figure 1, XUS 59910.02\(^{(1)}\) developmental precision packaging resin, the first of the INNATE\(^{™}\) resins, offers the packaging value chain an unprecedented stiffness/toughness balance, allowing a wealth of opportunities to blend, downgauge, and experiment using INNATE\(^{™}\) Precision Packaging Resins.

Consider these advantages of the premier INNATE\(^{™}\) resin:

- **Significantly increased abuse resistance**
  - In 1 mil film, XUS 59910.02\(^{(1)}\) developmental precision packaging resin demonstrates significantly higher dart performance at similar stiffness versus a competitive mLLDPE grade (1 MI, 0.918d) or at a higher stiffness versus ELITE\(^{™}\) EPE 5400G (1 MI, 0.916 d)
  - In LDPE blends (1 mil film), XUS 59910.02\(^{(1)}\) developmental packaging resin enables significantly higher dart performance versus a competitive mLLDPE grade (1 MI, 0.918d) and versus ELITE\(^{™}\) 5400G (1 MI, 0.916d)

- **Excellent tear and puncture**
  - In 1 mil film, XUS 59910.02\(^{(1)}\) developmental precision packaging resin offers similar or better tear and puncture performance compared to a competitive mLLDPE grade resin (1 MI, 0.918 d) and ELITE\(^{™}\) 5400G (1 MI, 0.916 d)

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\(^{(1)}\) Developmental product of The Dow Chemical Company

\(^{(2)}\) Dow testing. Typical properties only, not to be construed as specifications. Users should confirm results by their own tests.
A JOY TO WORK WITH

Excellent Processing Characteristics

XUS 59910.02(1) developmental precision packaging resin has demonstrated higher melt strength when compared to a competitive mLLDPE (see Figure 2).

That means improved processability and output rates. What’s more, INNATE™ Precision Packaging Resins exhibit more shear thinning than the competitive mLLDPE (see Figure 3) – leading to lower melt temperatures, amps, and back pressure.

INNATE™ resins have excellent heat seal performance, similar to a competitive mLLDPE (1 MI, 0.918 d) and to ELITE™ 5400G (see Figure 4). For HDSS applications, as well as liquid packaging, where dependable seals are imperative, INNATE™ Precision Packaging Resins can be counted on for robust seal performance.


The fact is, everyone can win with INNATE™ Precision Packaging Resins. INNATE™ resins may be the best new performer of the year from Dow, but you could take home the highest honors — like best new lightweight package, best new durable film, best new innovative package, best new film application...

Contact your Dow representative and let INNATE™ resins audition to star in your next film.
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