Your partner in METALLOCENE LLDPE FILM

Eltex® PF

Thinner, faster, better!

www.ineos.com
INEOS Metallocone mLLDPE Eltex® PF

ELTEX®PF Metallocone products are manufactured in Europe, based on unique proprietary gas-phase process and catalyst technology. Since January 2013, INEOS has dedicated one plant to 100 % mLLDPE production.

These unconventional mLLDPEs offer a wide range of applications:

- Cast & blown film
- Extrusion-coating
- Pipes
- Wires & cables

They exhibit the following characteristics:

- Very good processability
- A wide range of density and fluidity
- Excellent optical properties
- Low gels
- Superior sealing properties
- High downgauging potential

INEOS mLLDPE Product Portfolio

![Graph showing density and melt index](image-url)
Eltex® PF Products: Unique and Distinctive

A combination of

**Innovene™ G + Proprietary Constrained Geometry Metallocene Catalyst**

The Advanced PE Gas-Phase Technology

**HIGH PERFORMANCE LINEAR LOW = HPLL**

The next generation metallocene technology
Eltex® PF – product range for flexible packaging

Reverse Comonomer Distribution

<table>
<thead>
<tr>
<th>Conventional Ziegler</th>
<th>Conventional Metallocene</th>
<th>HPLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad MWD</td>
<td>Very narrow MWD</td>
<td>Narrow MWD</td>
</tr>
<tr>
<td>Comonomer decreases</td>
<td>Comonomer evenly</td>
<td>Comonomer increases</td>
</tr>
<tr>
<td>with Mw</td>
<td>distributed</td>
<td>with Mw</td>
</tr>
</tbody>
</table>

It confers exceptional mechanical properties (impact, ESCR) and very good sealing and optical properties – demonstrated on dozens of accounts.

Long Chain Branching

<table>
<thead>
<tr>
<th>Ziegler-Natta Catalyst</th>
<th>Conventional Metallocene Catalyst</th>
<th>INEOS HPLL Metallocene Technology</th>
</tr>
</thead>
</table>

It confers exceptional processability (low melt pressure, outstanding bubble stability, no need for PPA addition) – demonstrated at leading film converters.
ELTEX® PF mLLDPE Cast Film Grades

Eltex®PF mLLDPE cast film products offer specific benefits in comparison with standard LLDPE:

- Better mechanical properties
- Improved optics/clarity
- Equivalent processability/stretchability

Specific grades with extremely low gel levels are particularly suited for lamination of high quality printed films.

For which markets?
- Stretch film
- Palletisation film
- Lamination

Product offer

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFR</th>
<th>d</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF6130AA</td>
<td>3.6</td>
<td>918</td>
<td>High performance stretch</td>
</tr>
<tr>
<td>PF6140AA</td>
<td>4.5</td>
<td>918</td>
<td>Improved processability stretch</td>
</tr>
<tr>
<td>PF6130LA</td>
<td>3.6</td>
<td>918</td>
<td>Very high quality stretch &amp; lamination</td>
</tr>
</tbody>
</table>

Competitive advantages:

- Exceptional processability compared to competitive mLLDPE
- Low neck-in
- Limited self-heating during extrusion

Eltex®PF exhibits a distinctive balance of properties

Property improvement of Eltex®PF vs competitive mLLDPE

![Graph showing property improvements of Eltex®PF vs competitive mLLDPE]
**ELTEX®PF mLLDPE Blown Film Grades**

INEOS Olefins & Polymers Europe has developed a unique and very wide range of metallocene LLDPE grades covering all blown film applications, from sealing layers to high and very high stiffness.

- Density range: 912 to 936
- MFR range: 1.2 to 2.1

Wide range of formulations for each specific market requirement:

- Antioxidants only
- Slip and antiblock
- Special grades with extra processing aid for extreme conditions

Typical markets for ELTEX®PF mLLDPE grades:

- Advanced food packaging film
- High quality lamination and temporary surface protection film
- Sealing layer
- Coextruded films for collation shrink and heavy duty sacks
- Superstrength film structures and blends
- Hygiene film
- Low gauge refuse sacks

### BLOWN FILM GRADES

<table>
<thead>
<tr>
<th></th>
<th>Barefoot = AE/LA</th>
<th>Formulated = KJ/LJ</th>
<th>Lamination = LA/LJ</th>
<th>Improved processability = AE/KE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very high stiffness</strong></td>
<td>PF6912AA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High stiffness</strong></td>
<td>PF6612AA</td>
<td>PF6612KJ</td>
<td></td>
<td>PF6612KE</td>
</tr>
<tr>
<td><strong>High quality/lamination</strong></td>
<td>PF6212LA</td>
<td>PF6212LJ</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard film</strong></td>
<td>PF6212AA</td>
<td>PF6212KJ</td>
<td>PF6220AA</td>
<td>PF6220AE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PF6220KJ</td>
<td>PF6220AE</td>
</tr>
<tr>
<td><strong>Super strength</strong></td>
<td>PF6112AA</td>
<td>PF6112KJ</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sealing layer</strong></td>
<td>PF6012AA</td>
<td>PF6112KJ</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Standard Grades PF6212AA/KJ and 6220AA/KJ

They are designed to be used pure or in blend and offer the following advantages:

- Easy processing
- High mechanical properties
- Possibility to downgauge whilst maintaining mechanical properties intact

Typical applications:
- Deep freeze bags
- Heavy duty bags
- Collation shrink
- Refuse sacks
- Stretch wrap
- Agricultural film
- Greenhouse film

Eltex®PF can easily be blended with LDPE to achieve an optimum balance of properties:

- Extrudability
- Shrink
- Optical and more …
Sealing Grades PF6012AA and PF6012KJ

Unique sealing properties are featured by PF6012AA and PF6012KJ:

- Lower seal initiation temperature
- Higher seal strength and hot tack

to the benefit of a higher output on VFFS packaging lines.

ELTEX® PF6012AA and PF6012KJ are also particularly suited for heat sensitive food and specialty applications.

Their sealing performanceCompetes with the best metallocene plastomers and is markedly better than conventional mLLDPE and ZN plastomers.
Lamination Grades PF6212LA/LJ

A specific range of products (PF6212LA and PF6212LJ) has been developed for high quality lamination applications. They feature the following key characteristics:

- **Extremely low gel content**
- **Very high cleanliness**
- **Outstanding optics: low haze, high gloss**

PF6212LA and PF6212LJ exhibit a very low gel content, lower than conventional gas phase LLDPE, which is key to high quality lamination and printing.

New installed process and quality control tools guarantee the highest consistency and quality of PF6212LA and PF6212LJ posing as the perfect fit for these extremely demanding applications.

Faster Processing, Thinner Films and Better Film Structures

PF6220AA, PF6220KJ and PF6220AE are high fluidity grades developed for very thin film or thinner coextruded layers. They allow for downgauging of the film while maintaining high mechanical characteristics. Up to 20% extruder pressure reduction and 15% extrusion energy savings can be achieved compared to lower fluidity products.
High Stiffness Applications
For applications where extra stiffness is required, PF6612AA and PF6612KJ are available. For ultimate stiff films, PF6912AA is recommended.

A further downgauging compared to the standard PF grades is possible. A typical example is the heavy duty bags (polymer bags) where the thickness can be lowered from 120 µm down to 100 µm while maintaining strength and creep performance.

Improved Processability Applications
For extreme conditions (thin film, narrow die gap, high speeds) specific grades have been developed: PF6212KE, PF6220AE and PF6612KE. These products do contain processing aid on top of the regular stabilisation.

They feature a much better surface quality (no shark skin or orange peel effects).
INEOS is one of the world’s largest chemical companies. Founded in 1998, the company employs 15,000 people and has turnover of around 47 billion US Dollars.

INEOS Olefins & Polymers Europe is a leading producer of olefins and polyolefins.

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INEOS Olefins & Polymers Europe offers a full range of high value polyolefins solutions for select market applications such as pressure pipes & fittings, sewage and drainage pipe and fittings, caps and closures, packaging, heat-seal and automotive, through dedicated sales and technical service teams focused on each market segment.

INEOS is a safe and environmentally responsible company. We are engaged in developing our sustainable agenda to improve our operations and to implement sustainable solutions for our customers. This includes products that offer lightweighting, energy efficiency, durability (extended lifetime) or conservation of resources. We care.

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