Repsol Reciclex®
Towards a Circular Economy
Repsol.
Committed to developing new energy solutions

With over eight decades’ experience, Repsol is one of the largest energy companies worldwide and one of the biggest private oil & gas companies.

Chemicals are a key part of our history

At Repsol, we manufacture and market a wide variety of products, from basic petrochemicals through to derivatives. We offer a host of solutions tailored to customer’ requirements; quality, safety and innovation are an integral part of all our products and services.
Sustainable solutions.
A wide range to meet every need

**Basic petrochemicals**
We produce monomers like ethylene, propylene, benzene and butadiene, the building blocks of petrochemical derivatives. As a highly integrated company, we use most of these raw materials to manufacture Repsol-brand derivatives; the rest are placed on the market.

**Intermediate products**
Our chemical derivatives include intermediate products like styrene, propylene oxide, polyether polyols and propylene glycols.

**Polyolefins**
We have been producing and marketing polyolefins for over 40 years, manufacturing polypropylene (PP) and PP compounds, high-density and low-density polyethylene (HDPE and LDPE), metalloocene linear low-density polyethylene (mLLDPE), ethylene vinyl acetate (EVA) and ethylene butyl acrylate (EBA) copolymers.

Polyolefin applications: household, healthcare, well-being and consumer products, packaging, agriculture, automotive, building and infrastructure; a broad offering for a better world.
Creating value with products that improve well-being

Our clients are always our top priority, driving us to deliver highly differentiated products that meet their needs while preserving the world we live in.

We are further strengthening our commitment to sustainability through innovation, and are creating value with our differentiated ranges and products:

- Repsol Primeva®
- Repsol Ebantix®
- Repsol Healthcare®
- Repsol Reciclex®
- Repsol GridEffect®
- Repsol Resistex®
- Repsol ImpactO®
- Repsol PE Ultraclean®

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Working to create a sustainable world

Repsol Reciclex®

New polyolefins that incorporate recycled materials. With this new range, we are furthering our commitment to the circular economy and our value chain, marketing innovative solutions that generate additional value for recycled plastics.

Join us!
New portfolio of circular polyolefins

We have reached another important milestone in our commitment to boosting the circular economy with the production of our first chemically recycled circular polyolefins.

Pyrolysis oil, obtained from plastic waste not suitable for mechanical recycling, is incorporated together with virgin feedstock into our petrochemical process, reducing the consumption of non-renewable resources.

These circular polyolefins have the same properties and quality as virgin material and hold Food Contact Approval.

We have obtained ISCC PLUS certification for circular and traceable polyolefins that use plastic waste as raw material.
Over 10 grades of Repsol Reciclex®
We are ready to embark on partnerships to find solutions together.
We are committed to innovating to increase the circularity
and efficient use of plastic materials.

/ Incorporating mechanically recycled plastics
/ Giving plastic waste a new life to avoid it ending up in landfill
/ Reducing fossil raw material consumption
/ Reducing carbon footprint
/ Committing to technical requirements
/ Helping to meet voluntary commitments and legislative targets

Flexible packaging
Blow moulding
Injection moulding
Fibers
Automotive sector
Flexible packaging

LDPE

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Density</th>
<th>% Recycled post-consumer material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>50RX2805F</td>
<td>0.6</td>
<td>924</td>
<td>50</td>
<td>Shrink Film, medium duty industrial bags, films for general packaging. Excellent balance of stiffness and mechanical properties with high consistency</td>
</tr>
<tr>
<td>70RX2805F</td>
<td>0.8</td>
<td>923</td>
<td>70</td>
<td>Shrink Film, medium duty industrial bags, films for general packaging. Excellent mechanical properties like tear resistance and dart impact resistance</td>
</tr>
<tr>
<td>60RX3235FG</td>
<td>2</td>
<td>923</td>
<td>60</td>
<td>Hygiene overwrap films</td>
</tr>
<tr>
<td>70RX2310F</td>
<td>1</td>
<td>922</td>
<td>70</td>
<td>Bags and medium duty industrial bags</td>
</tr>
<tr>
<td>15RX2335FG</td>
<td>2.5</td>
<td>920</td>
<td>15</td>
<td>Thin films, bags for the textile industry and automatic packaging</td>
</tr>
</tbody>
</table>

Repsol Reciclex® 60RX3235FG Easy tear films

Monomaterial solutions that facilitate the recyclability of industrial film. They incorporate post-consumer recycled materials improving their sustainability and maintaining excellent properties.
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### Flexible packaging

**LDPE**

<table>
<thead>
<tr>
<th>Repsol Reciclex® 50RX2805F</th>
<th>Collation shrink film</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>32% carbon footprint saving</strong></td>
<td><em>(600 kgCO2/ton)</em></td>
</tr>
<tr>
<td><strong>Europe reference LDPE</strong></td>
<td><strong>Repsol Reciclex® 50RX2805F</strong></td>
</tr>
<tr>
<td><strong>1.27</strong></td>
<td><strong>1.87</strong></td>
</tr>
</tbody>
</table>

*Source: PlasticsEurope*

The results are based on Repsol internal study; has not undergone ISO critical reviews.

<table>
<thead>
<tr>
<th>Collation shrink film</th>
<th>Sustainability</th>
<th>Less energy</th>
<th>Downgauging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repsol Reciclex® 50RX2805F</td>
<td>15% post-consumer material and 20% footprint saving</td>
<td>High fluidity, excellent processability</td>
<td>Film thickness reduction</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Repsol Reciclex® 15RX2335FG</th>
<th>Thin film</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanical properties</strong></td>
<td></td>
</tr>
<tr>
<td>Repsol Reciclex® 50RX2805F</td>
<td>Repsol Alcudia 2805F (reference grade)</td>
</tr>
<tr>
<td>Elongation break (%) DM</td>
<td>Tear resistance (kJ/m²)</td>
</tr>
<tr>
<td>700</td>
<td>600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Repsol Reciclex® 50RX2805F</th>
<th>Repsol Alcudia 2805F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DM Tear resistance (kJ/m²)</strong></td>
<td><strong>Dart test (kJ/m²)</strong></td>
</tr>
<tr>
<td>187</td>
<td>127</td>
</tr>
</tbody>
</table>
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** The estimated carbon footprint for Repsol Reciclex® SORX5503 grade is of approximately 1.3kgCO₂/kg. (the average European value for HDPE according to PlasticsEurope is 1.8kgCO₂/kg).

Repsol Reciclex® allows a 30% carbon footprint saving**

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Density</th>
<th>% Recycled post-consumer material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>SORX5503</td>
<td>0.25</td>
<td>955</td>
<td>50</td>
<td>Packaging of non-aggressive liquid detergents and chemicals</td>
</tr>
</tbody>
</table>

** Stress cracking**

- Physical MIX 50% recycled
- Repsol Reciclex® SORX5503
- Repsol Alcudia 5503

* Test conditions: Igepal 10%, 50°C (ESCR)

- Stress cracking**: 54%

** Mechanical properties**

- Flexural modulus
- Charpy impact strength

- Repsol Reciclex® SORX5503
- Repsol Alcudia 5503

This grade has a 50% recycled post-consumer material, excellent mechanical properties: flexural modulus and charpy impact.
# Injection moulding

## Polypropylene

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>MPa</th>
<th>Charpy impact strength</th>
<th>% Recycled post-consumer material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>50RXPB171</td>
<td>10</td>
<td>1100</td>
<td>10 23ºC, notched kJ/m²</td>
<td>50</td>
<td>Widely used for technical components, transport systems and storage equipment: crates, suitcase shells, professional storage solutions, automotive components, battery boxes, buckets, waste and disposal management systems, industrial components (sports, leisure, electrical...)</td>
</tr>
<tr>
<td>30RXPB176</td>
<td>15</td>
<td>1700</td>
<td>7 23ºC, notched kJ/m²</td>
<td>30</td>
<td>Paels. Domestic and leisure furniture. Square boxes and round storage containers for consumer appliances. Flowerpots, buckets, storage organizers, waste containers, trays...</td>
</tr>
<tr>
<td>20RXPB180</td>
<td>20</td>
<td>1250</td>
<td>7.5 23ºC, notched kJ/m²</td>
<td>20</td>
<td>Domestic and leisure furniture. Square boxes and round storage containers for consumer appliances. Industrial components: sports, leisure, automotive, storage organizers, packaging...</td>
</tr>
<tr>
<td>30RXPB190</td>
<td>30</td>
<td>1300</td>
<td>6 23ºC, notched kJ/m²</td>
<td>30</td>
<td>Domestic and leisure furniture. Square boxes and round storage containers for consumer appliances. Thin-walled containers. Flowerpots, buckets, storage organizers, waste containers, trays...</td>
</tr>
<tr>
<td>RX501V</td>
<td>35</td>
<td>1500</td>
<td>2.5 23ºC, notched kJ/m²</td>
<td>50</td>
<td>Indoor and outdoor furniture, desing and decorative elements. Aesthetic applications with excelent surface finish. Flowerpots, buckets, storage organizers, waste containers, trays... This product is UV stabilized and available in different colours.</td>
</tr>
</tbody>
</table>

## Carbon footprint saving

The results are based on Repsol internal study; has not undergone ISO critical reviews.

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>MPa</th>
<th>Carbon footprint (kg CO2 / kg polymer)</th>
<th>Reference polypropylene*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50RXPB171</td>
<td>10</td>
<td>1100</td>
<td>30% [313 kgCO2/ton]</td>
<td>[313 kgCO2/ton]</td>
</tr>
<tr>
<td>30RXPB190</td>
<td>30</td>
<td>1300</td>
<td>30% [317 kgCO2/ton]</td>
<td>[317 kgCO2/ton]</td>
</tr>
<tr>
<td>20RXPB176</td>
<td>20</td>
<td>1250</td>
<td>40% [447 kgCO2/ton]</td>
<td>[447 kgCO2/ton]</td>
</tr>
<tr>
<td>30RXPB180</td>
<td>30</td>
<td>1300</td>
<td>30% [313 kgCO2/ton]</td>
<td>[313 kgCO2/ton]</td>
</tr>
</tbody>
</table>

*Source PlasticsEurope*

**Moving PP injection moulding industry one step closer to plastic circularity**

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## Fibers

**Polypropylene**

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>% Recycled post-consumer material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>25RXPP08BY1E</td>
<td>25</td>
<td>25</td>
<td>Nonwoven fabric in spunbond lines</td>
</tr>
</tbody>
</table>

New PP grade incorporate recycled material while ensuring consistency in quality and functionality.
## Automotive sector

**Polypropylene**

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Density</th>
<th>MPa</th>
<th>Charpy impact strength</th>
<th>% Recycled post-consumer material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITV70RT (in development)</td>
<td>14</td>
<td>1.04</td>
<td>2200</td>
<td>4.5</td>
<td>25</td>
<td>Technical parts with high stiffness</td>
</tr>
</tbody>
</table>

Exploring the potential of transforming post-consumer polymers from ELV into new material solutions for the automotive industry
Because we care. At Repsol we believe that our society needs a transition towards a new Circular Economy and we are fully committed to developing solutions, minimizing the impact of our polymers on the environment.

We have strengthened our commitment to sustainability by submitting our voluntary pledge in response to the European Commission’s call for stakeholders to come forward with pledges to boost the uptake of recycled plastics. The European Commission target is for 10 million tons of recycled plastics to find their way into products in the EU by 2025. To meet this ambitious EU target, Repsol is leading the initiative to incorporate 100,000 tons of plastic waste, as a secondary raw material, into Repsol polymers using both mechanically recycled plastic waste and chemical recycling for non-mechanically recycled plastic waste. Additionally, we are working on an initiative to incorporate recycled plastics into the formula of our 25-kg multilayer industrial bags, directly helping create greater demand for recycled plastics. We have also signed the Paris Pledge for Action to contribute to a low-CO₂-emissions economy, and the Operation Clean Sweep (OCS) program to eliminate resin pellet loss in industrial centers.

Furthermore, Repsol supports the PlasticsEurope Plastics 2030 voluntary commitment to ensure high rates of re-use and recycling with the ambition of reaching 60% for plastic packaging by 2030, and ultimately 100% re-use, recycling or recovery of all plastic packaging by 2040.
Safety and quality are our priority

All our petrochemical complexes and production plants meet the most stringent quality and safety standards.

Our petrochemical complexes, packaging production plants and logistics centers have rigorous food-safety management systems in place and hold OHSAS 18001.2007 [Occupational Health and Safety Assessment Series]. Their manufacturing, distribution, transport and end-product storage processes are also certified to the ISO 9001:2015 quality standard. The Chemicals units at our complexes operate under an Energy Management System. Our Certified Environmental Management System guarantees that Best Available Practices and Technologies are in place in order to minimize the impact of our sites.

Certifications
All Repsol complexes and plants
OHSAS 18001.2007 / FSSC 22000

All Repsol complexes
ISO 9001:2015

Puertollano, Tarragona and Sines
ISO 50001 / ISO 14001 / ISO 14064

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