Solutions for the automotive market

Polyolefins that fuel sustainable mobility
Repsol. Producing and transforming your everyday energy

The products from Repsol’s Chemicals Division are used to manufacture everyday items that improve people’s quality of life, wellbeing, and safety.
A global multi-energy company

With over 8 decades of experience in the world of energy

Repsol is a global company, present along the entire energy value chain. It operates low-emissions power generation assets and is currently developing renewable photovoltaic and offshore wind projects. The company is a pioneer in the development of mobility initiatives that contribute to innovative solutions and energies for transport.
Over 30 years of experience in polypropylene compounds

As a manufacturer of polyolefins, Repsol guarantees the quality of the raw materials it uses and offers its customers the full potential of its technology to develop new materials. Our company revolves around our customers, and we innovate with only them in mind.
Lightweight solutions for sustainable mobility

By placing our customers at the heart of our operations, we focus our innovation solely on their needs. This allows us to create highly differentiated products, compliant with even the strictest standards.

Our Repsol Impacto® range of high impact resistance polypropylene compounds is a new step forward. These high-quality, lightweight materials offer an excellent solution for all automotive applications that require both high impact resistance and high rigidity.

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At Repsol, we believe in the circular economy. Consistent with that, we have developed our Repsol Reciclex® range of polyolefins that contain post-consumer recycled waste, including vehicle parts.

These materials deliver outstanding technical performance certified by the UNE-EN 15343 standard and are adapted to automotive industry application needs. We have also incorporated circular polyolefins, originated from chemically recycled plastic waste, that are both ISCC Plus certified and maintain the same properties and quality as the original raw materials.
At Repsol, we believe in the circular economy, and we run specific projects that minimize the environmental impact of our materials. To this end, we are committed to making our industrial processes increasingly efficient and reducing the carbon footprint of our polymers.

We have a specialized circular economy department dedicated to recycling post-consumer materials to drive development of new materials offering solutions based on innovative polyolefins with recycled content.

We use recycled plastics in critical applications, creating new markets for plastic waste and driving circularity by giving that waste a new use. As a result, we offer a wide range of polyolefins with recycled content that deliver excellent engineering performance certified under UNE–EN 15343.

We have circular polyolefins obtained by incorporating pyrolysis oil, from chemically recycled plastic waste not suitable for mechanical recycling, 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. Moreover, our wide range of polyolefins is 100% recyclable.

Our ambition is to recycle by 2030 the equivalent of 20% of the polyolefins we produce to support, in conjunction with the other initiatives in Repsol’s circular economy strategy, the goal we announced in December 2019: to reach net zero emissions by 2050.

To contribute to the company’s emissions neutrality goal, our chemicals business has launched its 3030 Plan, intended to cut our carbon intensity by 30% by 2030.

Advancing the circular economy and lowering carbon intensity in our chemicals business will contribute towards transforming Repsol’s industrial operations, as well as developing high-value-added raw materials, making it possible to manufacture an infinite number of products that improve human well-being, safety, and quality of life while enhancing the environment.
Innovative range of polyolefins solutions for the industry that moves the world

**Repsol Impacto®**
- **PP VHI:** Very High Impact resistance Polypropylene
- **PP VHI-compounds with mineral fillers**
- **Innovative PP VHI-compounds for foaming technologies**

**Repsol Isplen**
- **Talc PP compounds**
- **Short glass fiber PP compounds**

**Repsol Reciclex®**
- % recycled post-consumer material

**INTERIOR**
- High-impact resistance.
- Low VOC, odor.
- Scratch resistance.
- Low density materials for lighter parts.
- Thermal & UV stability
- Aesthetics.

**EXTERIOR**
- Safety and resistance in bumpers, doors and steering column.
- Acoustic insulation in door panels and engine compartment.
- Stiffness and high impact resistance.
- Resistance to UV and heat.
- Good behavior at low temperatures.
- Low CLTE.

**FLUID SYSTEMS**
- HDPE and HMW HDPE specially designed for blow molded automotive fuel reservoirs, filler pipes, air ducts and water boxes.

**UNDER-THE-HOOD**
- Very high stiffness.
- Dimensional stability under high heat load.
- Reduced warpage.
- Excellent chemical resistance.
### Repsol Impacto®

**PP VHI: Very High Impact resistance Polypropylene**

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Flexural modulus</th>
<th>Charpy notched</th>
<th>Additives</th>
<th>Key properties</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISO 1133 (g/10 min) 230 °C / 2.16 kg</td>
<td>ISO 179 (MPa)</td>
<td>ISO 179 (KJ/m²) 23 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HI0850KM</td>
<td>8</td>
<td>1,000</td>
<td>60</td>
<td>NUC / AS</td>
<td>Excellent impact resistance, even at low temperatures.</td>
</tr>
<tr>
<td>HI1150ND</td>
<td>11</td>
<td>1,200</td>
<td>45</td>
<td>NUC</td>
<td>Excellent solution for high impact/stiffness applications.</td>
</tr>
<tr>
<td>HI1550KM</td>
<td>15</td>
<td>1,000</td>
<td>60</td>
<td>NUC / AS</td>
<td>Excellent impact resistance, even at low temperatures.</td>
</tr>
<tr>
<td>HI2050GM</td>
<td>20</td>
<td>800</td>
<td>60</td>
<td>-</td>
<td>Excellent impact resistance, even at low temperatures.</td>
</tr>
<tr>
<td>HI2050KM</td>
<td>20</td>
<td>1,000</td>
<td>60</td>
<td>NUC / AS</td>
<td>Excellent impact resistance, even at low temperatures.</td>
</tr>
</tbody>
</table>

NUC: Nucleating Agent; AS: Antistatic Agent.

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Repsol decided to invest in improvements for its facilities with the installation of a new gas-phase reactor for the manufacture of very high-impact resistance polypropylene (PP VHI) for the automotive sector. These materials can reduce vehicle weight, thus improving their environmental footprint and significantly increasing the impact resistance, which protects the interior of the passenger compartment along with exterior bumper shields, increasing passenger safety.

**Current portfolio**
Repsol Impacto® PP VHI

**Current and future portfolio**
Repsol Impacto® PP VHI

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**MFI** [from 8 to 20 g/10 min]  
**Flexural modulus** [from 800 to 1200 MPa]  
**Charpy notched 23 ºC** [from 25 to 60 kJ/m²]

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## PP VHI-compounds with mineral fillers

### Automotive Advanced Solutions

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Flexural modulus</th>
<th>Charpy notched</th>
<th>Additives</th>
<th>Key properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI1150ND</td>
<td>11</td>
<td>1,200</td>
<td>45</td>
<td>NUC</td>
<td>Excellent solution for high impact/stiffness applications. Available in Mistral HZD, UV stabilized. Other colors can be developed.</td>
</tr>
<tr>
<td>ITC75AE</td>
<td>15</td>
<td>1,500</td>
<td>50</td>
<td>UV</td>
<td>Copolymer 5% Mineral fillers reinforced. It is included in VW Approval List according to TL52388-H.</td>
</tr>
<tr>
<td>ITC85AE</td>
<td>20</td>
<td>1,450</td>
<td>40</td>
<td>UV</td>
<td>Copolymer 7% Mineral fillers reinforced. It is included in Renault PMR according to AS3b.</td>
</tr>
<tr>
<td>ITQ83AE</td>
<td>17</td>
<td>1,600</td>
<td>45</td>
<td>UV</td>
<td>Copolymer 16% Mineral fillers reinforced. It is included in VW Approval List according to TL52388-D.</td>
</tr>
<tr>
<td>ITV82AC</td>
<td>20</td>
<td>1,750</td>
<td>25</td>
<td>UV</td>
<td>Copolymer 17% Mineral fillers reinforced with high impact resistance with good scratch resistance.</td>
</tr>
</tbody>
</table>

**NUC:** Nucleating Agent; **UV:** Ultraviolet
Repsol offers a new range of products under the Repsol Impacto® brand, our answer to the growing market demand for lightweight solutions. Our product portfolio includes three new grades with very high-impact resistance, scratch resistance and excellent aesthetical properties, suitable for interior applications such as instrument panels, door panels, central consoles, pillars, and interior trims.

The graph on the right shows the density reduction that can be achieved without loss of mechanical properties like impact strength or stiffness.
Innovative PP VHI-compounds for foaming technologies

It is an excellent solution for high-impact applications such as interior trims and door panels. Aesthetic properties were successfully achieved in visible colored door panel trials. Cell size is around 250 μm and pictures on the right show cell structure homogeneity.

Other PP compounds, such as mineral filled solutions 10% for interior and 20% for exterior aesthetic applications, were recently approved by our customers and have since joined our portfolio.

For detailed technical information, please contact Repsol’s TS&D Department.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Ash level</th>
<th>Density</th>
<th>MFI</th>
<th>Flexural modulus</th>
<th>Charpy notched</th>
<th>Charpy notched</th>
<th>Additives</th>
<th>Key properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITD94AL</td>
<td>12</td>
<td>0,98</td>
<td>25</td>
<td>1,350</td>
<td>45</td>
<td>4,8</td>
<td>UV</td>
<td>Copolymer 12% mineral fillers reinforced developed for chemical foaming.</td>
</tr>
</tbody>
</table>

UV: Ultraviolet.

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The new Repsol Impacto® ITD 94AL is a copolymer reinforced with 12% mineral fillers. It demonstrates high-impact resistance and is suitable for chemical foaming, such as Core Back technology.

Basic properties, mechanical/impact requirements and organic emissions were evaluated on injected specimens, while multiaxial impact, bending tests and microstructural properties were tested on Core Back plaques from a door panel.

Repsol Impacto® ITD 94AL was specifically designed and manufactured to comply with the increasingly demanding requirements of the automotive market, and, as such, boasts reduced weight (a reduction of approximately 15%) for consumption savings and decreased emissions.
### Repsol Isplen

#### Talc PP compounds

**Automotive Interior under the hood applications**

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Impact</th>
<th>Flexural Modulus</th>
<th>Application</th>
<th>Key properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM440AT</td>
<td>PP-T40</td>
<td>3</td>
<td>2.9</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Under the bonnet parts subjected to high thermal stress (light housings, HVAC elements), AC inserts, heaters and air conditioning units. High stiffness, as well as a low warpage and shrinkage behavior. High heat and chemical stabilized.</td>
</tr>
<tr>
<td>PM180AT</td>
<td>PP-T10</td>
<td>22</td>
<td>2.5</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Technical parts, in general. Electrical appliances. Good processability, high stiffness with good impact resistance, and low warpage, and shrinkage behavior.</td>
</tr>
<tr>
<td>PM470RT</td>
<td>PP-T20</td>
<td>12</td>
<td>2.5</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Under the bonnet parts subjected to high thermal stress (light housings, heat and ventilation ducts). Heaters and air conditioning units. High stiffness, low warpage, and shrinkage behavior. High heat stabilized low emission and low odor properties.</td>
</tr>
<tr>
<td>PM162AV</td>
<td>P/E-T20</td>
<td>10</td>
<td>4</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Interior trims and panels, technical parts, in general and electrical appliances. Good impact strength, medium rigidity, high stiffness, low warpage, and low shrinkage behavior. UV stabilized.</td>
</tr>
<tr>
<td>PM278EV</td>
<td>P/E-T15</td>
<td>15</td>
<td>9</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Interior trims and panels and technical parts, in general. High impact resistance with excellent scratch resistance, good stiffness, and demolding properties during the transformation process. UV stabilized</td>
</tr>
<tr>
<td>PM274AS</td>
<td>P/E-T20</td>
<td>14</td>
<td>5.5</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Insertion, steps, structural parts, electrical appliances and white line and technical pieces, in general. High stiffness, good impact strength, good aesthetic properties, and a high gloss surface. Standard stabilization.</td>
</tr>
<tr>
<td>PM281AV</td>
<td>P/E-T20</td>
<td>26</td>
<td>3</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Interior trims and panels, electrical appliances and technical pieces, in general. High stiffness, good impact resistance, low warpage, and high shrinkage behavior, an outstanding gloss surface, and excellent scratch resistance. UV stabilized.</td>
</tr>
<tr>
<td>PM288AV</td>
<td>P/E-T20</td>
<td>16</td>
<td>6.5</td>
<td>ISO 1133 (g/10 min) 230 ºC / 2.18kg Notched ISO 179 (KJ/m²) ISO 178 (MPa)</td>
<td>Interior trims and panels, electrical appliances and technical pieces, in general. High stiffness and good impact strength. It was designed to show a high stiffness with good impact resistance, and low warpage and high shrinkage behavior. UV stabilized.</td>
</tr>
</tbody>
</table>

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As previously stated, one of the more challenging goals in the automotive market is to reduce the weight of vehicles to improve fuel efficiency and reduce CO₂ emissions. In the case of electric vehicles (ELVs), lightweighting is also of utmost importance. As such, it is imperative to work towards enhanced polymers that are capable of replacing traditional materials such as metals, PA or PC/ABS blends primarily in structural parts.

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI (ISO 1133 230 °C / 216 Kg)</th>
<th>Impact (ISO 178 [kJ/m²] Notched 23 °C)</th>
<th>Flexural Modulus (ISO 178 [MPa])</th>
<th>Key properties</th>
<th>Filler</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG370AT</td>
<td>PP-GF30 13</td>
<td>9</td>
<td>5,650</td>
<td>High impact resistance with an excellent balance in mechanical properties in terms of good stiffness and low temperature impact behavior. UV stabilized for long-term outdoor applications.</td>
<td>30% glass fiber</td>
</tr>
<tr>
<td>PG370AV</td>
<td>PP-GF30 13</td>
<td>9</td>
<td>5,650</td>
<td>Very high stiffness, keeping good impact strength at every range of temperatures, low warpage, and shrinkage behavior. High heat stabilized, and UV protection.</td>
<td>30% glass fiber</td>
</tr>
<tr>
<td>PG370DT</td>
<td>PP-GF30 15</td>
<td>10</td>
<td>7,000</td>
<td>High impact resistance with an excellent balance in mechanical properties in terms of good stiffness and low temperature impact behavior. UV stabilized for long-term outdoor applications.</td>
<td>30% glass fiber</td>
</tr>
<tr>
<td>PG362AV</td>
<td>PP-GF30 18</td>
<td>16</td>
<td>6,200</td>
<td>Very high stiffness, keeping high impact strength at every range of temperatures, shows low warpage, and shrinkage behavior. This material is thermal, and UV stabilized.</td>
<td>30% glass fiber</td>
</tr>
</tbody>
</table>

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## Repsol Isiplen

### Glass fiber PP compounds

Automotive materials solutions for EV chargers

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Impact</th>
<th>Flexural Modulus</th>
<th>Application</th>
<th>Key properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG660AV</td>
<td>PP-50GF</td>
<td>12</td>
<td>12,000</td>
<td>Parts subjected to severe mechanical stresses and technical parts, in general.</td>
<td>Very high stiffness, keeping good impact strength at every range of temperatures, shows low warpage, and shrinkage behavior. This material is thermal, and UV stabilized.</td>
</tr>
<tr>
<td>PG370CV</td>
<td>PP-30GF</td>
<td>12</td>
<td>5,650</td>
<td>Under the bonnet parts subjected to severe mechanical stresses and technical parts, in general.</td>
<td>High impact resistance with an excellent balance in mechanical properties in terms of good stiffness and low temperature impact behavior. UV stabilized for long term outdoor applications.</td>
</tr>
</tbody>
</table>

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### Repsol Reciclex®

% recycled post-consumer material

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Impact</th>
<th>Flexural Modulus</th>
<th>Application</th>
<th>Key properties</th>
<th>% recycled post-consumer material</th>
</tr>
</thead>
<tbody>
<tr>
<td>0SXRPM6400</td>
<td>PP-T40</td>
<td>3</td>
<td>ISO 1133 (g/10 min) 230 °C / 2.16Kg</td>
<td>Under the bonnet parts subjected to severe mechanical stresses. Technical parts, in general.</td>
<td>Very high stiffness, keeping good impact strength at every range of temperatures. Shows a low warpage, and shrinkage behavior. With thermal protection.</td>
<td>5%</td>
</tr>
<tr>
<td>10RXG370A</td>
<td>Homopolymer</td>
<td>15</td>
<td>ISO 179 (kJ/m²) Notched 23 °C</td>
<td>Technical parts, in general, electrical housings, power tools and washing machines cylinders.</td>
<td>Very high stiffness, keeping good impact strength at every range of temperatures. Shows a low warpage, and shrinkage behavior.</td>
<td>10%</td>
</tr>
<tr>
<td>50RXPP091</td>
<td>Homopolymer</td>
<td>35</td>
<td>ISO 178 (MPa)</td>
<td>Under the bonnet parts subjected to severe mechanical stresses. Technical parts, in general.</td>
<td>Good processability, excellent stiffness for technical pieces.</td>
<td>50%</td>
</tr>
<tr>
<td>PM274ZS801</td>
<td>PP-T20</td>
<td>15</td>
<td>ISO 178 (MPa)</td>
<td>Technical parts, in general, insertion, steps, structural parts.</td>
<td>High stiffness, low warpage, and shrinkage behavior.</td>
<td>n/a</td>
</tr>
</tbody>
</table>

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Repsol Reciclex®
% recicled post-consumer material

<table>
<thead>
<tr>
<th>Grade</th>
<th>MFI</th>
<th>Impact</th>
<th>Flexural Modulus</th>
<th>Application</th>
<th>Key properties</th>
<th>Reinforcing material</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW! PG18025000</td>
<td>Homopolymer</td>
<td>18</td>
<td>6.3</td>
<td>ISO 178 (kJ/m²) Notched 23°C</td>
<td>Automotive &amp; structural parts, electrical housings, power tools.</td>
<td>High stiffness and low warpage and shrinkage.</td>
</tr>
<tr>
<td>NEW! PG37025000</td>
<td>Homopolymer</td>
<td>13.7</td>
<td>9.3</td>
<td>ISO 178 (kJ/m²) Notched 23°C</td>
<td>Under the bonnet parts.</td>
<td>High stiffness and low warpage and shrinkage.</td>
</tr>
</tbody>
</table>

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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 ISO 45001.

Their manufacturing, distribution, transport, and end-product storage processes are also certified to the ISO 9001 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 to minimize the impact of our sites.

IATF 16949 certified
In 2021 we have obtained the highest certification for our auto products, having adapted all our automotive materials production centers under the IATF 16949 standard, an international standard for quality management systems in the automotive industry. This standard is the most demanding for quality management systems in the automotive sector at an international level and one of the essential requirements that car manufacturers require from their suppliers.

Certifications

<table>
<thead>
<tr>
<th>All Repsol complexes and plants</th>
<th>All Repsol complexes</th>
<th>Puertollano, Tarragona, and Sines</th>
<th>Puertollano, Tarragona and Monzón plants</th>
<th>Puertollano and Monzón plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 45001 FSSC 22000</td>
<td>ISO 9001 ISCC Plus</td>
<td>ISO 50001 ISO 14001 ISO 14064</td>
<td>IATF 16949</td>
<td>UNE–EN 15343</td>
</tr>
</tbody>
</table>
Environment

We offer sustainable solutions for our clients: 100% recyclable polyolefins.

We have set up and deployed an ambitious CO₂ program reduction that pursues a 40% reduction in SCOPE 1 & 2 emissions by 2030 [2017 as reference year] and zero emissions before 2050. Energy efficiency programs to reduce energy consumption and GHG emissions are one of the key elements of our strategy in the short term, followed by deep process electrification and CCUS. Biofeedstocks and renewable electricity will have a relevant role in this transition.

These programs pursue long-term targets made public to facilitate their progress by the stakeholders. In this sense, Repsol Química is committed to a reduction of 0.26 million tons per year of GHG emissions in the 2021-2025 Strategic Plan and a 1.3 million tons per year reduction until 2030 with a roadmap to be a net-zero company before 2050.

Regarding SCOPE 3 emissions, Repsol Química will contribute to the CO₂ emissions reduction at the plastics’ end of life with our circularity projects.

All petrochemical complexes have ISO 14001 certification for their environmental management and the reduction of the impact of their facilities, and ISO 14064 for the annual verification of greenhouse gas [GHG] emissions. In addition, the chemical area of our complexes in Tarragona [2015], Puertollano [2013], and Sines [2016] has implemented an Energy Management System according to the requirements indicated in the International Standard ISO 50001. This system is dedicated to developing and implementing our organization’s energy policy and managing the energy aspects of our activities, products, or services. The objective is to increase and improve our energy efficiency based on systems implementation aimed at continuous energy performance improvement, thus contributing to more efficient and sustainable energy use.

Repsol Química has released on a yearly frequency the carbon footprint of all its product families since 2020, considering the “cradle to gate” scope based on ISO 14067.

Repsol’s purpose is to become a net-zero emissions company by 2050, and our 2021-2025 Strategic Plan enables us to continue successfully advancing our multi-energy commitment.
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