

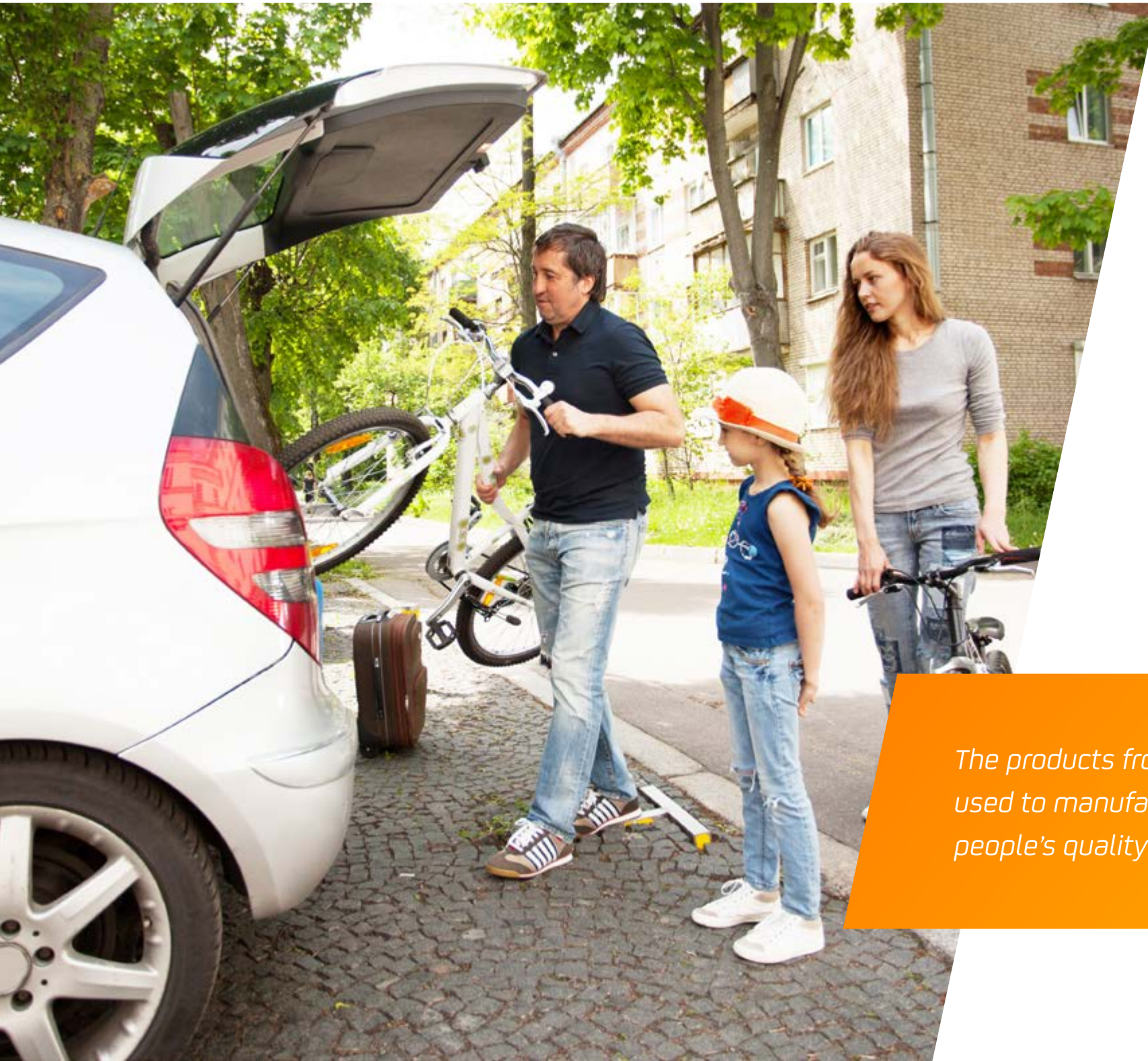
# Lightweight solutions for the automotive market

Polyolefins that fuel sustainable mobility





# Repsol. Producing and transforming your everyday energy



## 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 90 countries where we market our products

Repsol employs over 25,000 people and sells its products in more than 90 countries, reaching 10 million customers. Repsol's Chemicals Division, with a high degree of integration, focuses its strategy on the constant generation of value through differentiated products and services.

*The products from Repsol's Chemicals Division are used to manufacture everyday items that improve people's quality of life, wellbeing and safety*

# Lightweight solutions that fuel a sustainable mobility

Repsol offers new, customized material solutions that help to achieve weight reduction targets in interior automotive applications, when compared with traditional PP compounds.

Weight reduction has become one of the key drivers in the design of plastic parts for the automotive industry, helping to achieve lower energy consumption and decrease vehicle carbon emissions. As an integrated supplier of raw materials, Repsol is committed to tailoring the properties of its PP compounds to meet the changing requirements, particularly for interior applications. Examples include the recent launch of a new range of low mineral filled compounds with very high-impact resistance [VHI Compounds] under the *Repsol ImpactO*<sup>®</sup> brand, as well as innovative materials designed for foaming technologies, and short and long glass fiber compounds with very high stiffness for semi-structural parts [SGF & LGF PP compounds].



## 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.



## Awarded Best Polypropylene Producer 2018

We received “The Best Polymer Producer Award 2018”, a prize awarded by Polymer Comply Europe, an outcome of the voting of polymer customers across Europe and an initiative of EuPC [European Association of Plastics Converters]. This award comes on the heels of the two “Best High Density Polyethylene Producer” awards we received the two previous years and the “Global Award for Innovation” we received in 2016.



See more about our offer for the [automotive segment](#)





# Innovative range of very high-impact polypropylene compounds

## Interior

- / High-impact resistance.
- / Low VOC, Odor.
- / Scratch resistance.
- / Low density materials for lighter parts.
- / Thermal & UV stability, CLTE.
- / 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.



## 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 Impact0®*

Low mineral fillers  
VHI-compounds



*Repsol Impact0®*

Innovative PP VHI-compound  
for foaming technologies



SGF PP Compounds

Short Glass Fiber compounds



LGF PP Compounds

Long Glass Fiber compounds



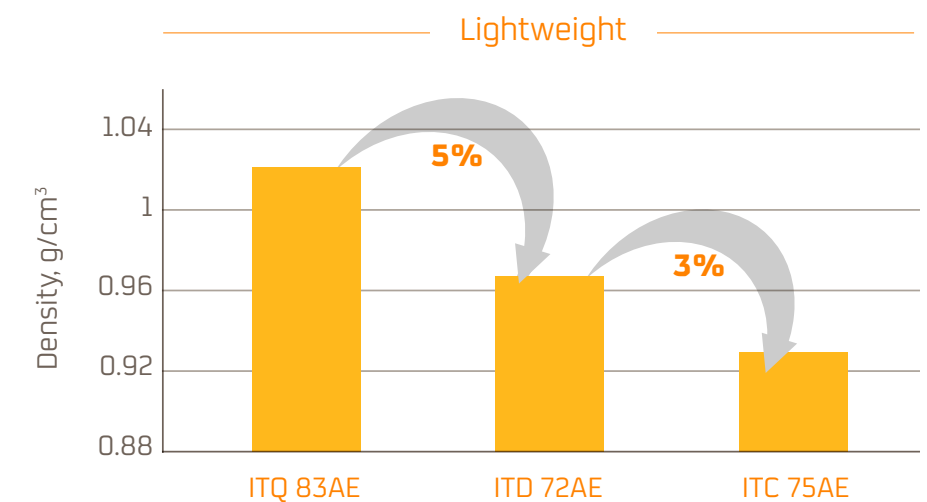
# Innovation and modern technology prepared for tomorrow's needs

## Repsol ImpactO<sup>®</sup>

### Low mineral fillers VHI-compounds

Repsol offers a new range of products under the **Repsol ImpactO<sup>®</sup>** 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.



| Grade    | Ash level<br>ISO 1172<br>% | Flexural modulus<br>ISO 178<br>MPa | Melt flow index<br>g/10min, ISO 1133<br>230°C / 2.16kg | Density<br>ISO 1183<br>g/cm <sup>3</sup> | Charpy impact strength<br>ISO 179-1/1eA<br>Notched 23°C , kJ/m <sup>2</sup> | Charpy impact strength<br>ISO 179-1/1eA<br>Notched -20°C , kJ/m <sup>2</sup> |
|----------|----------------------------|------------------------------------|--|--|---|--|
| ITQ 83AE | 16                         | 1600                               | 17   | 1.02                                     | 45  | 6  |
| ITD 72AE | 10                         | 1800                               | 15   | 0.97                                     | 35  | 5.6  |
| ITC 75AE | 6                          | 1500                               | 15   | 0.94                                     | 50  | 6.5  |

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# Repsol ImpactO<sup>®</sup>

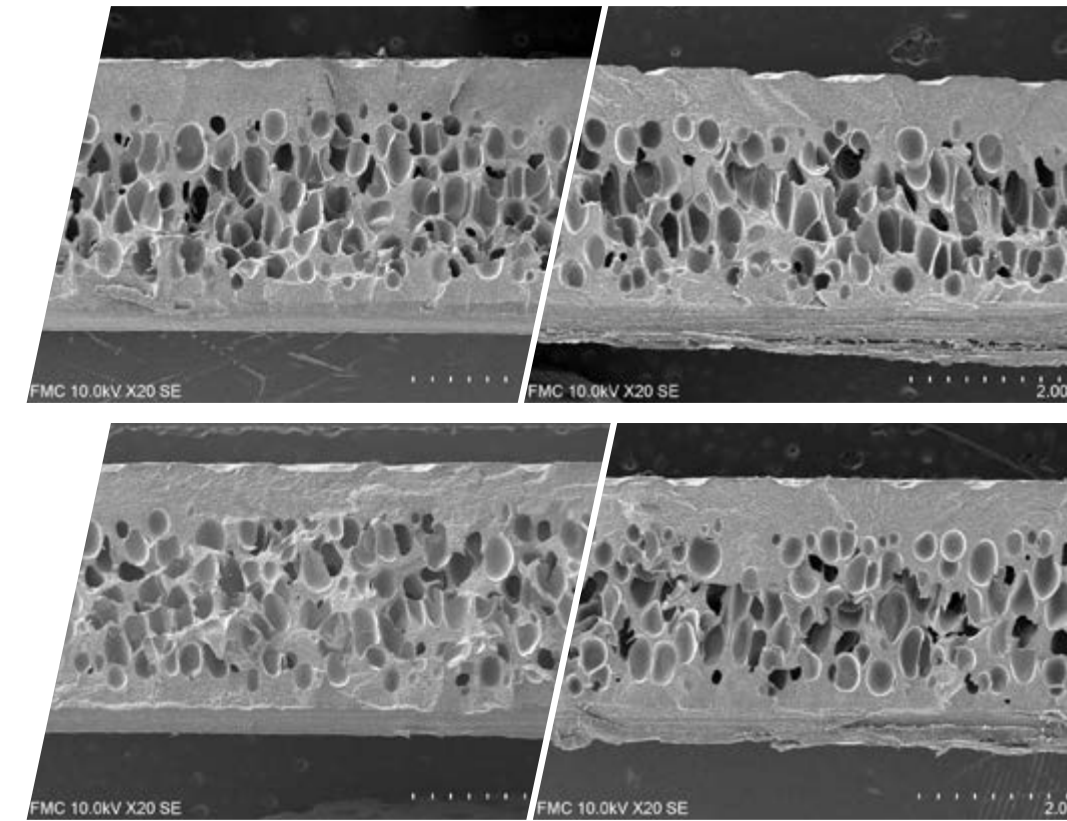
## Innovative PP VHI-compound for foaming technologies

The new **Repsol ImpactO<sup>®</sup>** ITD 93AE 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<sup>®</sup>** ITD 93AE 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.

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.

| Grade    | Ash level<br>ISO 1172<br>% | Flexural modulus<br>ISO 178<br>MPa | Melt flow index<br>g/10min, ISO 1133<br>230°C / 2.16kg | Density<br>ISO 1183<br>g/cm <sup>3</sup> | Charpy impact strength<br>ISO 179-1/1eA<br>Notched 23°C , kJ/m <sup>2</sup> | Charpy impact strength<br>ISO 179-1/1eA<br>Notched -20°C , kJ/m <sup>2</sup> |
|----------|----------------------------|------------------------------------|--|--|---|--|
| ITD 93AE | 12                         | 1300                               | 25   | 0.98                                     | 43  | 4.8  |

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## Glass fiber compounds

As previously stated, one of the more challenging goals in the automotive market is to reduce the weight of vehicles in order to improve fuel efficiency and reduce CO<sub>2</sub> 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.

### Short Glass Fiber compounds / SGF PP Compounds

| Grade   | Ash level<br>ISO 1172<br>% | Flexural modulus<br>ISO 178<br>MPa | Melt flow index<br>g/10min, ISO 1133<br>230°C / 2.16kg | Charpy impact strength<br>ISO 179-1/1eA<br>Notched 23°C , kJ/m <sup>2</sup> | Automotive application  |
|---------|----------------------------|------------------------------------|--|---|---|
| PG180AS | 10                         | 3150                               | 17.5   | 6   | Structural parts  |
| PG182AS | 10                         | 2900                               | 17.5   | 8   | Infant safety systems   |
| PG270AS | 20                         | 3400                               | 12   | 5.5   | Under the bonnet parts subjected to severe mechanical stresses      |
| PG270AT | 20                         | 3400                               | 12   | 5.5   | Under the bonnet parts subjected to very severe mechanical stresses |
| PG272AS | 20                         | 3500                               | 12   | 12  | Structural parts with impact requirements                           |
| PG340AT | 30                         | 5800                               | 2.5  | 11.5  | Under the bonnet parts subjected to severe mechanical stresses      |
| PG362AV | 30                         | 6200                               | 5.5  | 16  | Exterior parts  |
| PG370AS | 30                         | 5800                               | 12.5   | 10  | Under the bonnet parts subjected to severe mechanical stresses      |
| PG370AT | 30                         | 5800                               | 12.5   | 10  | Under the bonnet parts subjected to very severe mechanical stresses |
| PG370BT | 30                         | 7000                               | 12   | 10.5  | Under the bonnet parts subjected to severe mechanical stresses      |
| PG370CS | 30                         | 5800                               | 12.5   | 10  | Under the bonnet parts subjected to severe mechanical stresses      |
| PG370CT | 30                         | 5800                               | 12.5   | 10  | Under the bonnet parts subjected to severe mechanical stresses      |
| PG370DT | 30                         | 7000                               | 15   | 10.5  | Under the bonnet parts subjected to severe mechanical stresses      |
| PG370DS | 35                         | 7525                               | 14.4   | 10  | Under the bonnet parts subjected to severe mechanical stresses      |

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## Glass fiber compounds

Repsol has rounded out its glass fiber compounds portfolio with the development of **new Long Glass Fiber compounds (LFG Compounds)**. Four new grades have been launched, using pultrusion technology to achieve high-quality products in terms of fiber impregnation and aesthetics. Our product portfolio covers glass fiber contents from 20% through 60%, making them suitable for semi-structural parts and hybrid solutions, dashboards and door module carriers, as well as metal and other replacements for engineering plastics.

### Long Glass Fiber compounds / LGF PP Compounds

| Grade   | Ash level<br>ISO 1172<br>% | Flexural modulus<br>ISO 178<br>MPa | Density<br>ISO 1183<br>g/cm <sup>3</sup> | Charpy impact strength<br>ISO 179-1/1eA<br>Notched 23°C , kJ/m <sup>2</sup> | Automotive application   |
|---------|----------------------------|------------------------------------|--|---|--|
| IGV53AS | 20                         | 4200                               | 1.04                                     | 15  | Structural parts, dashboard carriers, door module carriers. Metal or other engineering plastics replacement                                    |
| IGT52AS | 30                         | 6600                               | 1.12                                     | 25  | Structural parts, dashboard carriers, door module carriers. Metal or other engineering plastics replacement                                    |
| EGK53AS | 40                         | 8100                               | 1.20                                     | 28  | Structural parts, dashboard carriers, door module carriers and front end and tailgate modules. Metal or other engineering plastics replacement |
| IGS53AS | 60                         | 14200                              | 1.40                                     | 28  | Suitable for dilution process and for structural parts   |

### Base resins (Recommended base resins to dilute IGS53AS)

| Grade    | Flexural modulus<br>ISO 178<br>MPa | Melt flow index<br>g/10min, ISO 1133<br>230°C / 2.16kg | Density<br>ISO 1183<br>g/cm <sup>3</sup> | Charpy impact strength<br>ISO 179-1/1eA<br>Notched 23°C , kJ/m <sup>2</sup> |
|----------|------------------------------------|--|--|---|
| PP099K2M | 1800                               | 55   | 0.91                                     | 2.5   |
| P8500K1M | 1500                               | 100  | 0.91                                     | 4   |

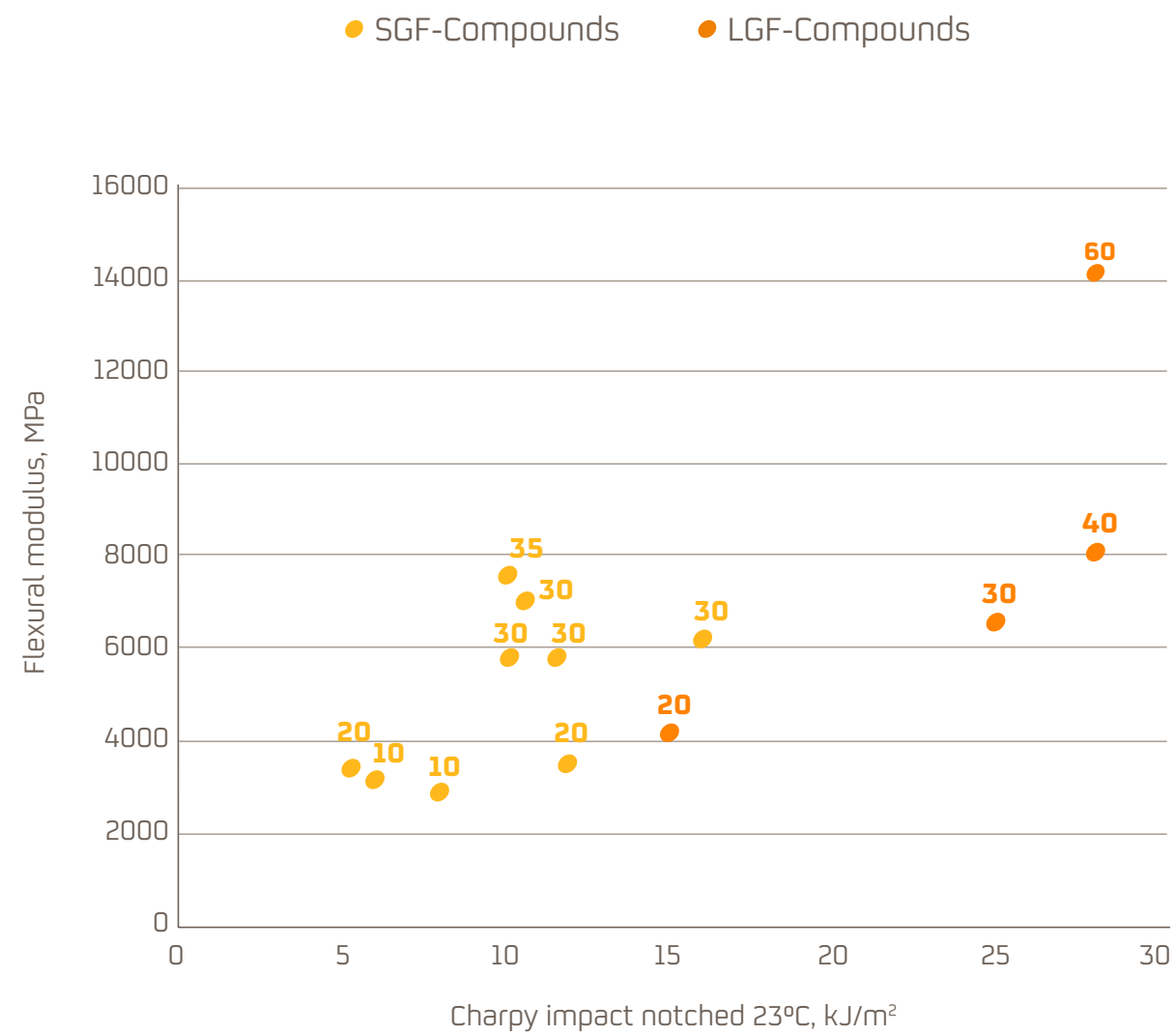


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# Glass fiber compounds

SGF & LGF Compounds portfolio, showing ash level



*Our unique range of polyolefins is technically adapted to each market and each manufacturer, to make our customers supremely competitive*



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*Efficiency*

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*Responsibility*

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*Safety*

*Differentiation*

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