

Recycled PS.  
Mechanical  
properties  
improvement  
through addition of  
**SBS**

March 2020





# Recycled PS mechanical properties improvement

## 1.- Introduction

- ▶ **Climate change** and the problem of plastic residues has become one of the main concerns of the population and the center of attention around the globe
- ▶ As a result demand of recycled plastics and **recycled** materials with improved properties has increased significantly
- ▶ Because of this, **Dynasol** has studied the improvement of recycled polystyrene mechanical properties through the addition of SBS
- ▶ Recycled PS compounds with **Calprene 700** show an important improvement in impact resistance at room and extreme low temperatures
- ▶ **Calprene 700** provides very good results even with quantities as low as 3%

# Recycled PS mechanical properties improvement

## 2.- Compounding

- ▶ The origin of the recycled PS employed in this study is post-consumer. Its main characteristics are:

M.F.I. (190°C, 5kg)	6,8 g/10 min		
Flexural modulus	2600 MPa		
Vicat point (50°C/h)	98,1°C		
Impact Izod resistance (unnotched) (kJ/m <sup>2</sup> )	23°C	0°C	-20°C
	28	29	19
Impact Charpy resistance (unnotched) (kJ/m <sup>2</sup> )	23°C	0°C	-20°C
	40	30	27

# Recycled PS mechanical properties improvement

## 2.- Compounding

- ▶ For this report the following compounds have been prepared

	Compound 1	Compound 2	Compound 3
Recycled PS	96,6%	94,6%	89,6%
C-700	3%	5%	10%
Antioxidants	0,4%	0,4%	0,4%

### Compounding procedure:

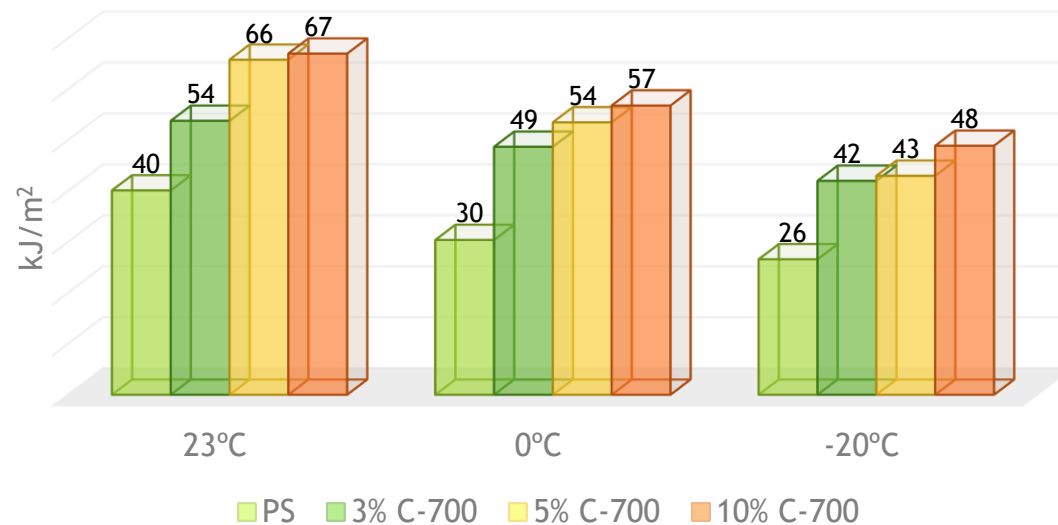
- Extrusion of the compound (twin-screw machine L/D:36):
  - Temperature profile: 190-200-210-210-210°C
  - Pressure: 125 Pa
  - Speed: 109 rpm
- Injection of test specimens at 210°C

# Recycled PS mechanical properties improvement

## 3.- Results

- ▶ Charpy impact resistance at different temperatures (UNE 179-1:2011)

Charpy impact resistance (unnotched )



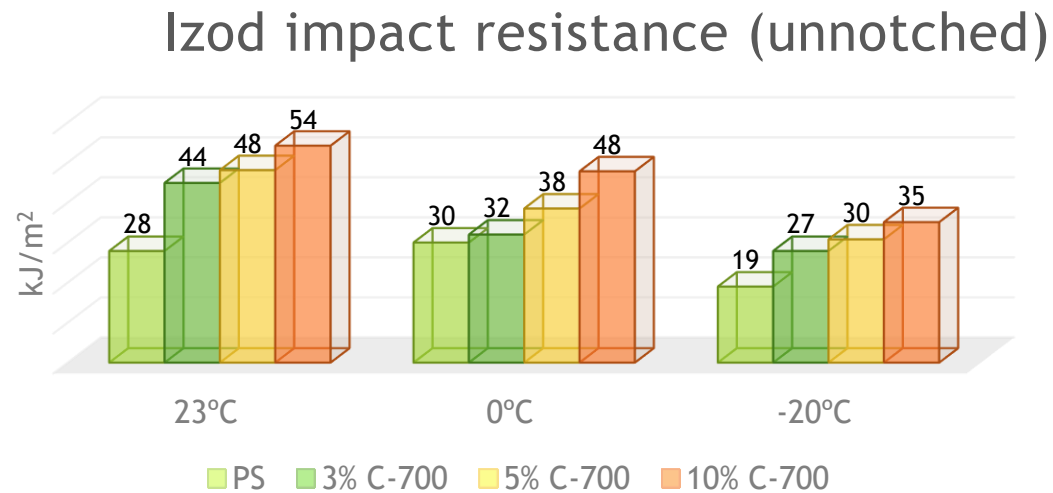
The improvement is achieved with only 3% of **Calprene 700**.  
The good results are also obtained at low temperature.



# Recycled PS mechanical properties improvement

## 3.- Results

- Izod impact resistance at different temperatures (UNE 180: A2-2013)



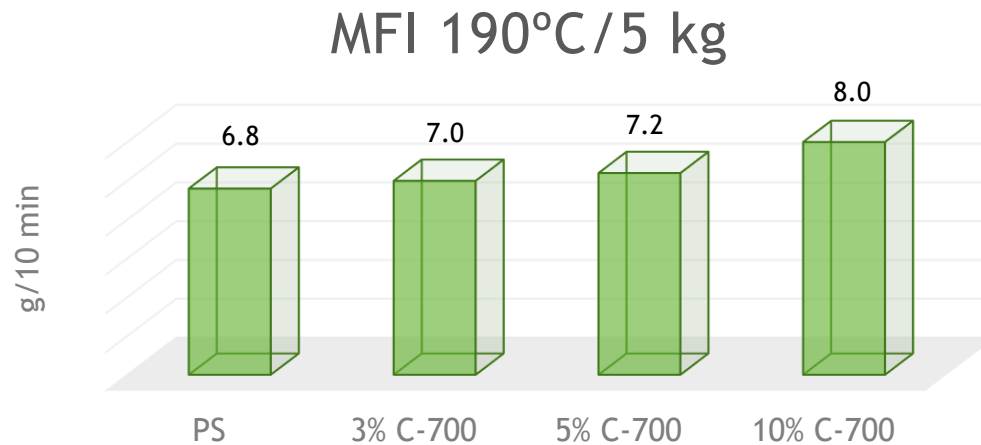
The improvement of the properties is also observed in Izod impact Test. To get better results, the amount of **Calprene 700** should be increased.



# Recycled PS mechanical properties improvement

## 3.- Results

- ▶ Melt Flow Index (190°C, 5 kg) (ASTM D 1238-13)



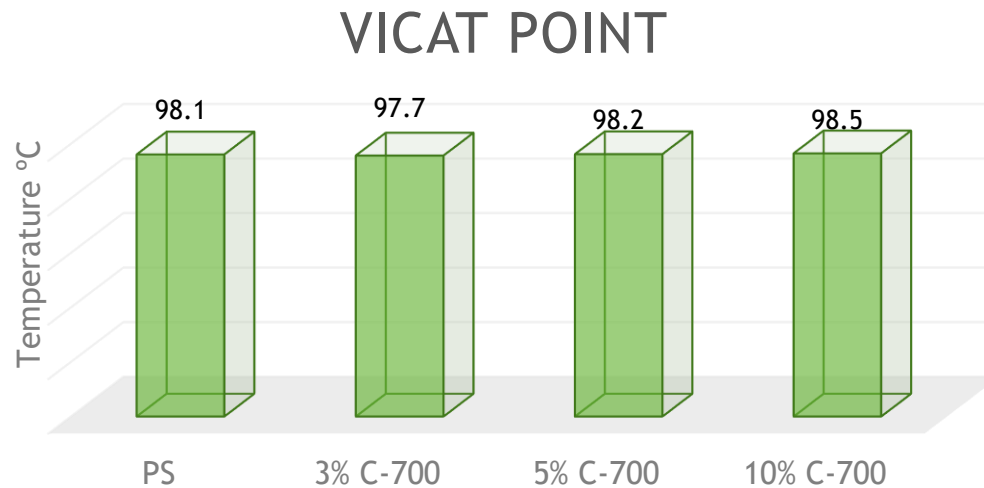
The MFI is increased thanks of the presence of **Calprene 700**



# Recycled PS mechanical properties improvement

## 3.- Results

- ▶ Vicat Point (50°C/h) (UNE 306-15)



The Vicat Point temperature remains constant, although the quantity of **Calprene 700** is increased

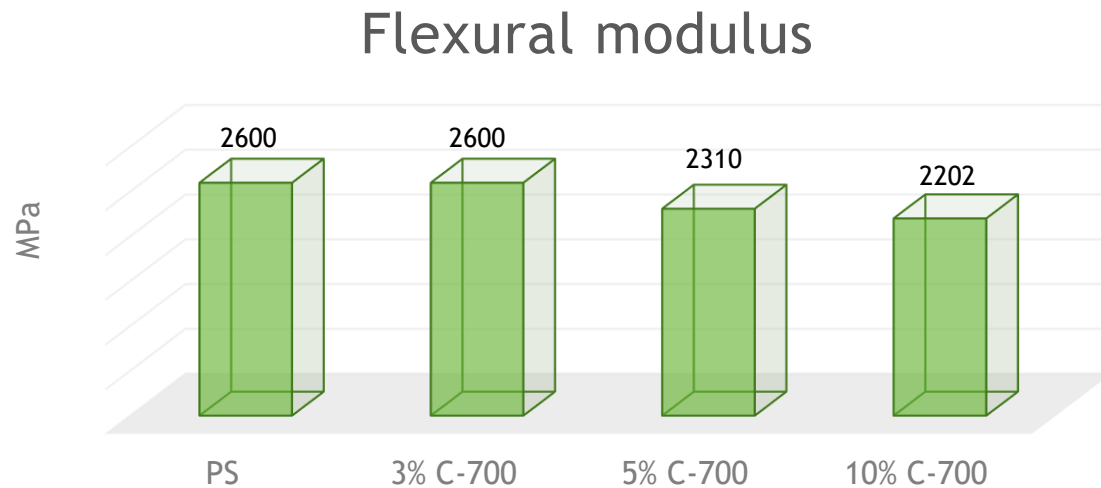




# Recycled PS mechanical properties improvement

## 3.- Results

- ▶ Flexural modulus (ASTM E 691 2008)



The flexural modulus may be slightly affected by the addition of **Calprene 700**



# Confidentiality Disclaimer

This presentation and any accompanying materials are intended only for the use of those to whom it is addressed and may contain information that is confidential and prohibited from further disclosure under law. If you have received this file in error, its review, use, retention and / or distribution is strictly prohibited. If you are not the intended recipient, please contact the sender by mail or reply email and destroy all copies of the original message and any attachments.

# “Sustainability, our compass for innovation”

[dynasolgroup.com](http://dynasolgroup.com)

For more information please email us @  
[marketing.dynasol@dynasol.com](mailto:marketing.dynasol@dynasol.com)

