

ENGINEERED MATERIALS | TPE



# Adhesion-modified TPE Solutions for Overmolding



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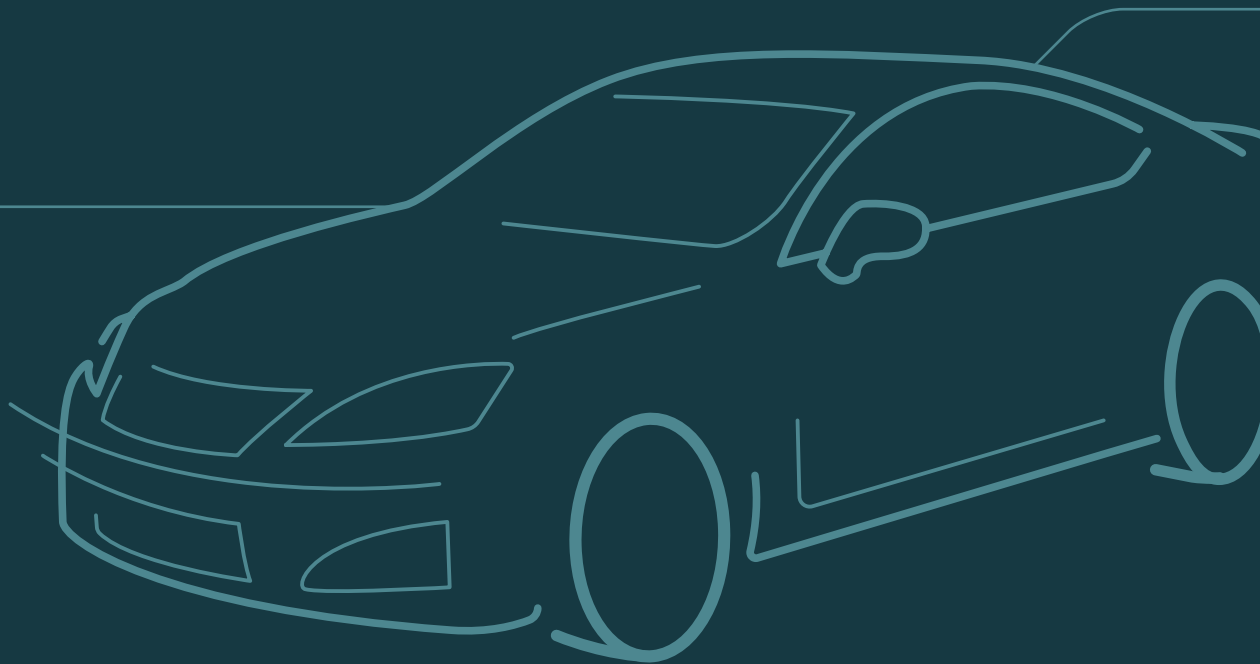
# Strong Bonds for Rigid and Soft-touch Plastics

The overmolding of soft TPEs and rigid plastics delivers genuine advantages in the functional, visual, acoustic and tactile properties of a product. We invite you to learn more about our expertise in overmolding, adhesion testing, and our adhesion-modified thermoplastic elastomeric compounds.

Over recent years, there has been a growing demand for high-quality applications that require the combination of soft and rigid substrates. In the automotive and engineering sectors (as well as in packaging, personal care and toys) more and more applications require a soft rubber-feel surface over rigid substrates.

Focusing on support for our customers facing the challenges in ever-evolving markets, we developed new adhesion-modified TPE types that play an important part in the development of applications with a soft-touch surface.

For overmolding, our modified TPEs guarantee strong bonds without the use of primers, adhesion promoters or surface treatment. They offer features like optimized emissions, excellent colorability, and durability, with good UV and weathering resistance, and allow for improved aesthetics, high-quality haptics, and increased performance of automotive applications.



# VDI 2019 and our Specialized Overmolding Center (SOC)

## Testing the adhesion of TPE on substrates

Trinseo company API is an active member of the committee that was specifically created to define the new VDI 2019 standard for the harmonization of the different methods previously used to determine the bonding strength between a soft component and a rigid substrate.

The VDI 2019 standard was announced at the German Rubber Conference 2015. It defines a testing method for the adhesion of thermoplastic elastomers on thermoplastic substrates. The standard describes a peeling test to determine the peeling resistance between soft and rigid substrates.

At our manufacturing site in Mussolente, Italy, we established the Specialized Overmolding Center (SOC) for research. The SOC is equipped with state-of-the-art laboratory equipment enabling our experts to measure the adhesion between soft and rigid components in accordance with the VDI 2019 standard. It enables us to determine the adhesion in relation to the main injection molding variables such as:

- Material temperature
- Mold temperature
- Injection speed
- Injection pressure/post pressure



fig. 1 Two-component injection molding machine



fig. 2 Dynamometer

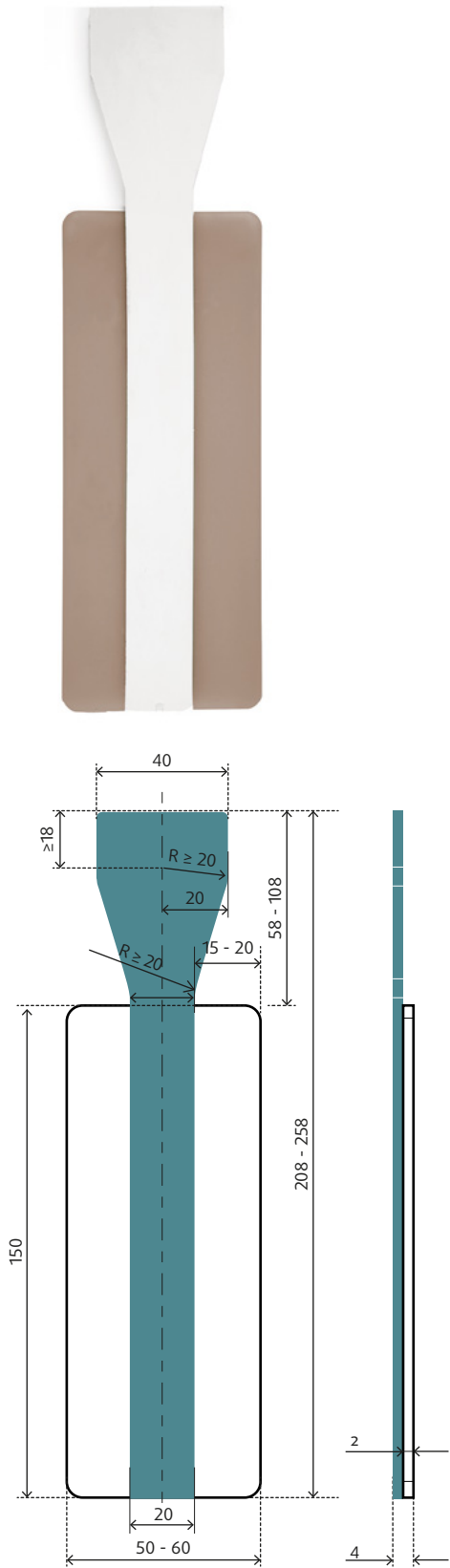


fig. 3 Test specimen

Test method in accordance with VDI 2019

Test specimens (fig. 3) are produced using two-component injection molding technology (fig. 1) to inject both soft and rigid materials. Following production, the specimens must be conditioned for 16 hours in a controlled atmosphere at 23°C 50% Rh (ISO 554).

The specimens are then placed in a dynamometer (fig. 2), which registers the peel strength of the soft strip onto the rigid surface (fig. 4-5). Test results are based on an average of at least 5 specimen measurements.

Interpretation of the results

According to the VDI 2019 standard, the test results are expressed in the form of a number followed by one or more letters. The number represents the peeling strength (Ws) in N/mm normalized by the width of the specimen, 20 mm, measured by a dynamometer test.

The letters represent the fracture pattern of the specimen assessed visually at the end of the peeling test. The first letter describes the residue of TPE on the rigid substrate, and the second letter, if present, indicates whether the TPE strip breaks during peeling at any point along the peel path (fig. 6-12).

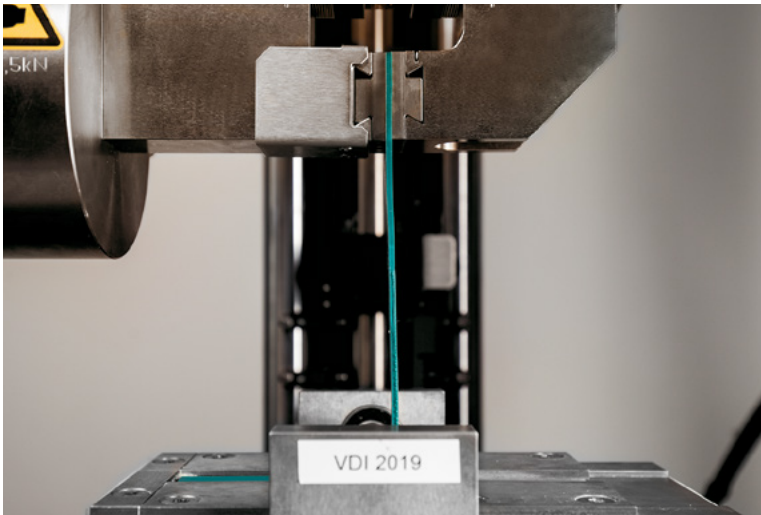


fig. 4 Peeling force 90°

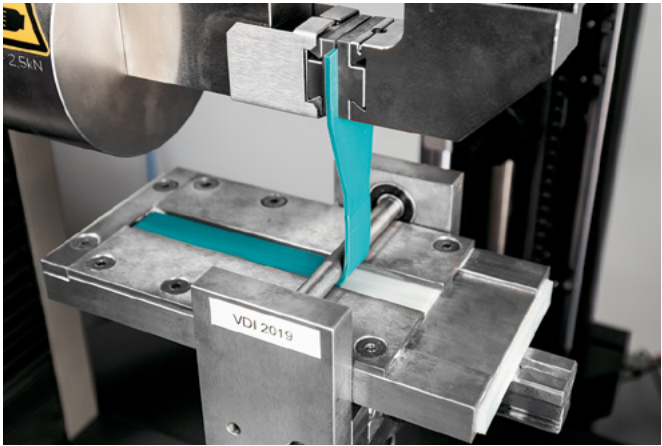


fig. 5 Dynamometer carriage detail

Fracture Pattern A

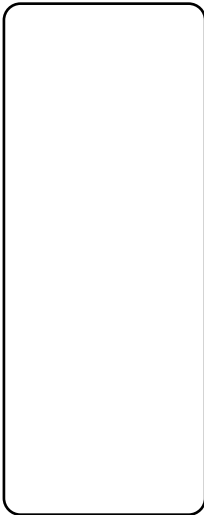


fig. 6 No TPE residue on hard component

Fracture Pattern B



fig. 7 (1-50%) TPE residue on hard component

Fracture Pattern C

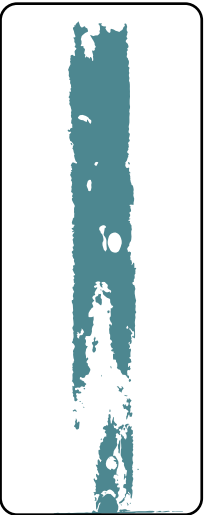


fig. 8 (50-99%) TPE residue on hard component

Fracture Pattern D

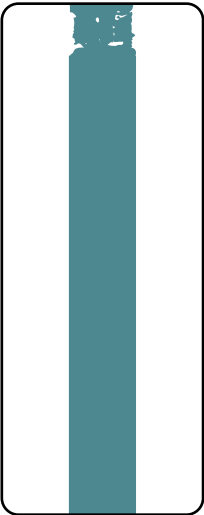


fig. 9 Sample destruction, soft component torn off (≤ 15 mm)

Fracture Pattern A/D

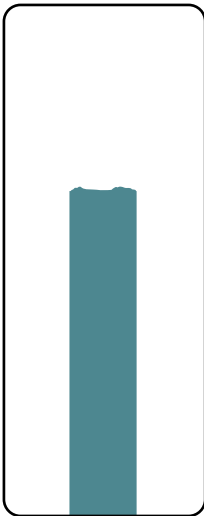


fig. 10 No TPE residue on hard component; TPE strip will tear off

Fracture Pattern B/D

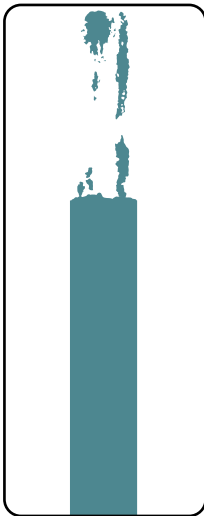


fig. 11 (1-50%) TPE residue on hard component; TPE strip will tear off

Fracture Pattern C/D

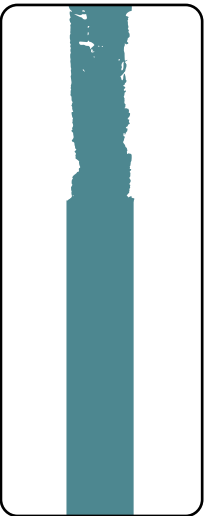


fig. 12 (50-99%) TPE residue on hard component; TPE strip will tear off

CLASSIFICATION

|     |   |
|-----|---|
| A   | No TPE residue on hard component                                |
| B   | (1-50%) TPE residue on hard component                           |
| C   | (50-99%) TPE residue on hard component                          |
| D   | Sample destruction, soft component torn off (≤ 15 mm)           |
| A/D | No TPE residue on hard component; TPE strip will tear off       |
| B/D | (1-50%) TPE residue on hard component; TPE strip will tear off  |
| C/D | (50-99%) TPE residue on hard component; TPE strip will tear off |



# MEGOL™ AUTO TPS-SEBS Compounds

## New TPE Grades for Overmolding



### High performance and exceptional surface quality

Meeting the increasing demand for an advanced automotive interior experience is a key target of Trinseo Automotive. Only the right surface technology and optimized surface materials allow for perfect surface aesthetics, haptics, and functional performance of an automotive component. Therefore, customized innovation has been our approach for the development of MEGOL™ AUTO TPS-SEBS Compounds – our brand-new series of TPEs including 16 adhesion-optimized grades.



**Chemical adhesion is best achieved when polymers are modified to application-specific needs creating tailor-made solutions.**



Modification in compounding and/or polymerization process of the TPE.



Increase of the TPE's compatibility with the target substrate.



Achieve better overmolding performance and application quality.



Typical Characteristics of Our New  
MEGOL™ AUTO TPS-SEBS Compounds

The new product series MEGOL™ AUTO AD-S, AD-C, AD-M, and AD-G provide improved adhesion to Trinseo’s MAGNUM™ ABS, PULSE™ PC/ABS, and other polar substrates. We developed our new soft-touch TPEs focused on excellent processability and strong adhesion in overmolding applications. Our 16 new grades enable high-quality surface appearance, including surface homogeneity, and good scratch resistance.



Good scratch resistance



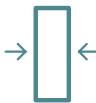
Good to excellent aesthetics/haptics



Easy demolding and wide processing window



Gloss range from matte to glossy



Wide range of hardness for each series



MEGOL™ AUTO  
TPS-SEBS Compounds

AD-B SERIES

Low gloss  
UV Resistance  
Easy processability

AD-C SERIES

Wide hardness range  
Low gloss  
Easy demolding  
Short cycle time

AD-G SERIES

Good scratch  
High gloss  
High fluidity

|                                 | Test standard | Unit |       |      |       |      |       |       |         |     |       |         |        |
|---------------------------------|---------------|------|-------|------|-------|------|-------|-------|---------|-----|-------|---------|--------|
| Hardness                        | ASTM D2240    | ShA  | 50    | 60   | 70    | 80   | 50    | 55    | 65      | 80  | 60    | 70      | 80     |
| Tensile strength                | ASTM D638     | MPa  | 3,05  | 3,59 | 5,22  | 5,33 | 4     | 5     | 6       | 7   | 7.3   | 17.0    | 14.2   |
| Elongation at break             | ASTM D638     | %    | 386   | 396  | 356   | 330  | 388   | 485   | 445     | 358 | 560   | 590     | 627    |
| Adhesion to MAGNUM™ 3325 MT ABS | VDI2019       | N/mm | -     | -    | -     | -    | 1.8-A | 3-A   | 3.3-A   | 4-A | 5-D   | 4.8-B   | 10-C/D |
| Adhesion to PULSE™ GX 50 PC/ABS | VDI2019       | N/mm | 2.5-B | 3-B  | 7-C/D | 9-D  | 2-A   | 3.5-B | 4.5-B/D | 7-D | 5-C/D | 6.5-C/D | 7.5-D  |

# Overmolding Applications

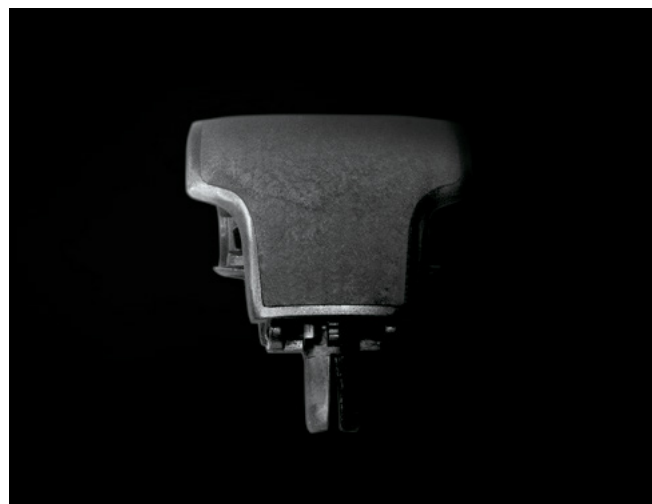
The functional, visual, acoustic, and tactile properties of rigid plastics applications can significantly benefit from being overmolded with adhesion-modified TPEs. Our soft-touch solutions offer design flexibility and optimized appearance. They enable also lighter weight and can enhance the durability of a wide range of multicomponent automotive applications.



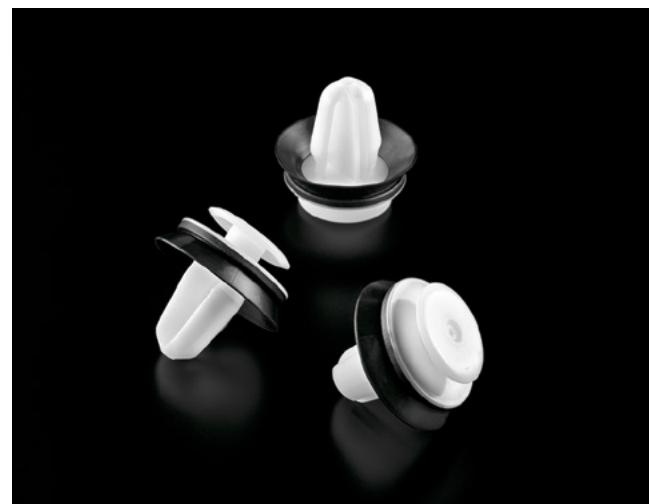
**TPS on ABS**  
Rear armrest cup-holder



**TPS on PP**  
Quarter glass sealing



**TPS on PA6**  
Gear knob



**TPS on POM**  
Assembly and trimming pins



**TPS on PC/ABS**  
Air ventilation thumb wheel



**TPS on PC/ABS**  
Fixed glass sealing



**TPU on PC/ABS**  
Door sill

## Our TPEs and TPUs for Overmolding

Suitable for automotive applications

**MEGOL™**  
TPS-SEBS COMPOUNDS

**APIGO™**  
TPO COMPOUNDS

**NEOGOL™**  
OBC COMPOUNDS

**TIVILON™**  
TPV COMPOUNDS

**APILON™ 52**  
TPU POLYMERS AND COMPOUNDS

In order to meet the broadest spectrum of application needs, we can offer a wide range of modified thermoplastic elastomeric compounds (TPE-S, TPE-O, TPE-U) all providing exceptional adhesion to the most common rigid plastic substrates, such as MAGNUM™ ABS or PULSE™ PC/ABS grades from Trinseo.

Our modified TPEs can also be overmolded on Polyamides (PA6, PA66, PA12), Polyesters (PBT, PET), POM and other polar polymers such as SAN, ASA, PMMA, and Polyolefins (PP and PE), including special blends and reinforced materials.



## Cases

Cup Holders for Volkswagen  
MEGOL™ TPS-SEBS Compound

Quarter and Fixed Glass Sealing  
for Hyundai/Kia  
MEGOL™ TPS-SEBS Compound

## Fast Facts

MEGOL™ TPS-SEBS Compounds

TIVILON™ TPV Compounds

APIILON™ 52 TPU Polymers and Compounds



# Cup Holders for Volkswagen MEGOL™ TPS-SEBS Compound

VW Golf and Passat benefit from the good scratch resistance and surface appearance as well as the large process window of the SEBS compound MEGOL™ HT1 55 SV/P UVR.

## Trust in experienced partners and successful materials

With the acquisition of API S.p.A., Trinseo expanded its rigid plastics materials portfolio to include innovative TPE solutions and the associated technology expertise. Our customer Volkswagen and tier 1 supplier BOS Group rely on the benefits of API's Styrene-Ethylene-Butylene-Styrene (SEBS) compound MEGOL™ to produce high-quality, soft-touch armrest cup holders.

Distributor A. Schulman was able to provide MEGOL™ HT1 55 SV/P UVR Black for the injection molding of the rear armrest cup holders in the current VW models Golf and Passat. The material is approved against the OEM's specifications VW 50123, VW 50180, and VW 2.8.1. The BOS Group was looking for a soft material for the VW Golf 6 with which they could produce the armrest cup holders in the foldable middle seatback. The TPE solution had to enable a soft bottom for the application, as otherwise passengers would feel uncomfortable touching a hard component in the seatback when the armrest is raised.



## Softness and good appearance with cost-effective processing

Important requirements were a strong adhesion onto ABS, good scratch resistance, and a high-quality surface appearance. Naturally, the material had to meet the usual requirements for an automotive interior material, i.e. low emissions (VOC)/odor, and good UV resistance. Besides these aspects, the TPE solution had above all to address serious problems that occurred with a competitor's material: a very large process window was needed to avoid serious demolding problems with consequent part deformation. Additionally, the competitor's substrate caused adhesion problems and surface defects commonly known as flow lines and spots.

The most important advantage of MEGOL™ HT1 55 SV/P UVR Black – compared to the competition – is the larger process window when manufacturing the cup holder. It allows for shorter cycle times as well as a higher-quality surface appearance and significantly fewer rejected parts.

## Features of MEGOL™ HT1 55 SV/P UVR

- Good adhesion on ABS
- High scratch resistance
- Low stiffness
- Low emissions, odor, and fogging
- Good UV resistance

MEGOL™ HT1 55 SV/P UVR Black enabled our partner to produce a 2K application fulfilling the desired purpose of the application's softness not unlike the rest of the back seat. Our solution provided very good adhesion between the TPE soft bottom and the ABS rigid frame (peeling force  $\geq 5\text{N/mm}$  according to VDI 2019 standard), good scratch resistance and surface appearance (no flow lines at all), and – crucially – a very large process window. With the use of our solution our partner could immediately reduce the percentage of discarded workpieces to acceptable standard levels. At the same time, MEGOL™ HT1 55 SV/P UVR Black ensures compliance with the OEM's requirements for fogging (VW PV 3015,  $< 2\text{mg}$ ), for VOC and odor (VW 50180), and UV resistance for automotive interiors (VW PV1303).

The whole MEGOL™ family of TPE compounds offers an optimized combination of the elasticity, look, and feel of rubber with the cost-efficiency of thermoplastics.



# Quarter and Fixed Glass Sealing for Hyundai/Kia MEGOL™ TPS-SEBS Compound

Korean OEM benefits from the performance, versatility and cost-competitiveness of our TPS-SEBS Compounds for exterior quarter glass seals, and exterior and interior fixed glass sealings.

## Meeting the increasing challenges for automotive glazing and glass sealing

Hyundai and Kia are using our TPE solution MEGOL™ DP2334/70FL1 UVR1 BLACK to produce interior and exterior fixed glass sealings for the 4-door sports sedan Kia K8 (Kia Stinger). The collaboration started for quarter glass seals and mirror triangle sealings thanks to the support and competence of our Korean distributor Novachem. Subsequently, Trinseo and Novachem were able to expand the business to fixed glass sealings because of our material's high performance and its cost-competitiveness.

In an ever-evolving market for automotive glazing, OEMs and suppliers must meet consistently increasing customer demands. Glass applications play a vital role in the aerodynamics, aesthetics, and comfort of a vehicle. Today's automotive glazing fulfills many complex tasks, such as active and passive safety functions, or integral contribution to the stability of the bodywork (structure-bonded fixed glazing). The demands of tier 1 supplier Sejin and the OEMs on the TPE solution to be used for the quarter and fixed glass application in our project were correspondingly high.

## Good processability and price advantage as decisive factors

Hyundai/Kia required a material enabling optimum cohesive adhesion of the TPE soft seal onto PC/ABS and ASA rigid frame in an overmolding application with two components. Since the final parts are used for exterior as well as for interior sealings, compliance with industry standards for exterior weathering resistance was expected. Above all, the material had to offer good processability in combination with

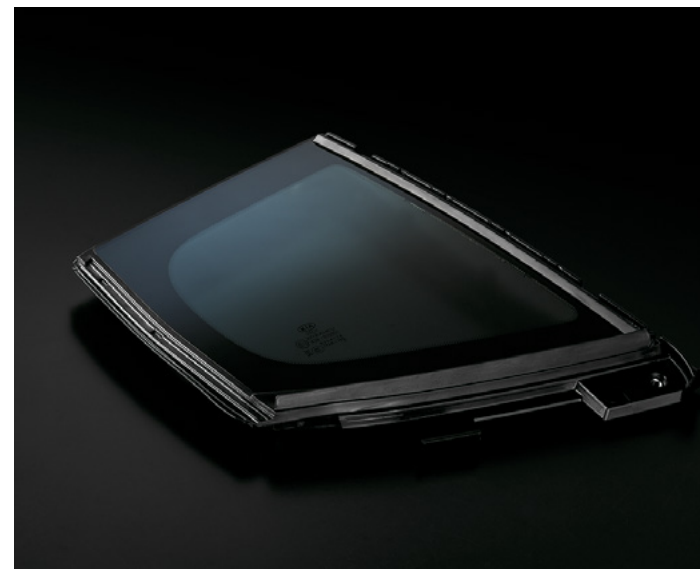
a very good surface without sink marks or flow lines, as well as cost-effective, very short cycle times. The TPE solution had to work smoothly in various molds with different geometries.

MEGOL™ DP2334/70FL1 UVR1 BLACK was the perfect match for the challenging requirements, and its price advantage over the competition determined the success of our project. The material meets the Hyundai/Kia material specification MS 210-06 for molded plastics used in general performance of automotive exterior parts.

Our successful TPS-SEBS Compound provides a peeling force greater than or equal to 7N/mm (according VDI 2019 standard), enabling the required cohesive adhesion with the rigid frame made from PC/ABS. At the same time, MEGOL™ DP2334/70FL1 UVR1 BLACK successfully passed the Hyundai/Kia climatic tests. It meets both the requirements of exterior weathering resistance (2500 kJ/sq m exposure with  $\Delta E < 3$  as well as the requirements for interior use (e. g. fogging, VOC emissions, and odor).

The customer benefits from easy demolding and from the wide processing window. The flow properties offer great flexibility even with complex geometries. It is currently used in eight molds for eight different parts. The material's good surface appearance and processability allow for a 5-second short cycle time.

MEGOL™ DP2334/70FL1 UVR1 BLACK can be considered to be a material of choice for 2K exterior (and interior) applications on PC/ABS and ASA, where high performance and versatility are required and need to be accompanied by significant price competitiveness without a lack of quality.





# MEGOL™ TPS-SEBS Compounds

The MEGOL™ family of TPE compounds offers the ideal combination of the elasticity and look and feel of rubber with the low processing costs of thermoplastics. Typically based on SEBS, the MEGOL™ range offers optimum cold and hot elasticity, UV and age resistance, low emissions and low fogging, as well as a large processing window.

Grades for overmolding and co-extrusion with technopolymers (PP, PE, ABS, SAN, PPMA, PC, PET, PA6, PA66, TPU, POM, etc).

MEGOL™ provides great looking, excellent soft-touch properties, and a good compression set.

## Typical characteristics:

- Remarkable range of hardness (5 ShA–60 ShD) and elastic modulus
- Excellent resistance to aging (UV, ozone and weathering)
- Almost white base color allows very wide color range
- Excellent performance at low temperatures (Tg = -50 °C)
- High temperature resistance (120 °C)
- Chemical resistance to acids, detergents, bases, and aqueous solutions

## Specific grades have special characteristics:

- High temperature resistance and low compression set (MEGOL™ HT)
- Suitable for co-molding and co-extrusion (MEGOL™ SV) for hard/soft compositions, also to non-polyolefinic substrates to which conventional MEGOL™ is compatible
- Calendering grades (MEGOL™ TA)
- Types for automotive interior with low emissions and high scratch resistance





# TIVILON™ TPV Compounds

TIVILON™ is a family of TPE products based on dynamically Vulcanized Thermoplastic Elastomers (TPVs). It provides high elasticity at low and high temperatures, excellent compression set, UV resistance and high melt flow.

TIVILON™ is particularly well-suited to bonding with other materials for co-molding and co-extrusion with polyolefins and their compounds. The improved processability of the TIVILON™ range means that it is easier to transform both for molding and extrusion compared to traditional TPV products. The creation of customized grades highlights other impressive features of this product such as its resistance to scratches and solvents, its performance when exposed to fire, its increased thermo-resistance, and the ability to produce it in a wide range of colors.

## Typical characteristics:

- Large range of hardnesses (30 ShA–60 ShD)
- High temperature resistance
- Excellent compression set
- Chemical resistance to acids and bases
- Oil resistance better than MEGOL™ and APIGO™
- Co-molding to polyolefinic substrates
- Extrusion and injection molding transformation



# APILON™ 52

## TPU Polymers and Compounds

APILON™ 52 is a line of thermoplastic polyurethanes with excellent mechanical properties, high elasticity, and superior resistance to low temperatures. They are very durable and suitable for applications where a high level of resistance to abrasion, oils, and fats is necessary, and can be customized to suit specific application requirements.

APILON™ 52 is divided into polyester-based and polyether-based series with a scale of hardnesses from 40 Shore A to 75 Shore D, and are available in a range of formulations based on the performance required. The range includes:

- Plasticized APILON™ 52 – with optimum flexibility even at low temperatures, medium-low range of hardnesses and easy processability.
- Modified APILON™ 52 – as polymeric alloys of soft materials ideal for co- and overmolding or extrusion, where a rubberier haptic and grippy surface is required while maintaining high mechanical performance.
- Special APILON™ 52 is a customized formula with properties designed to meet the needs of specific applications (e.g. increased resistance to hydrolysis, microbes, and aging).
- Bio-based grades, both ether and ester, with the same mechanical properties and durability of traditional grades, and a high content of renewable resources (up to 70%)

Automotive customers can use APILON™ 52 products for applications such as scratch-resistant interior surfaces, gaskets, abrasion-resistant tubes and cables, bellows, impact protections, etc. Modified APILON™ 52 grades (because of their optimum bonding properties with various structural techno-polymers) are used as the soft component in items that are constructed from a combination of materials with different hardnesses. They fit wherever the desired effect is to combine the superior durability of TPU with the appearance and haptics of rubber.

### Typical characteristics:

- Large range of hardnesses (30 ShA–60 ShD)
- High temperature resistance
- Good compression set
- Chemical resistance to acids and bases – better oil resistance than compared to MEGOL™ and APIGO™
- Co-molding to polyolefinic substrates
- Extrusion and injection molding transformation
- Excellent abrasion resistance

# Overmolding Data

| Rigid substrate | TPEs               |           |                    |                    |              | VDI 2019           |
|-----------------|--------------------|-----------|--------------------|--------------------|--------------|--------------------|
|                 | TPE classification | ISO 18064 | Product brand name | Product series     | Shore A      | Peel Strength N/mm |
| ABS             | TPE-S              | TPS       | MEGOL™             | DP2375/XXSVP       | 30           | 1.5 (B)            |
|                 | TPE-S              | TPS       | MEGOL™             | I A XX SV/P        | 50           | 5.0 (A/D)          |
|                 |                    |           |                    |                    | 60           | 7.5 (A)            |
|                 |                    |           |                    |                    | 70           | 3.0 (B)            |
|                 | TPE-S              | TPS       | MEGOL™             | HT1 XX SVP         | 50           | 5.0 (A/D)          |
|                 | TPE-S              | TPS       | MEGOL™             | DP2433             | 70           | 3.5 (A)            |
|                 | TPE-U              | TPU       | APILON™ 52         | XX11               | 60           | 2.8 (A)            |
|                 |                    |           |                    |                    | 70           | 3.0 (A)            |
| PC/ABS          | TPE-S              | TPS       | MEGOL™             | DP2375/XXSVP       | 30           | 1.5 (C)            |
|                 | TPE-S              | TPS       | MEGOL™             | I A XX SV/P        | 50           | 7.5 (A)            |
|                 |                    |           |                    |                    | 60           | 7.0 (A)            |
|                 | TPE-S              | TPS       | MEGOL™             | HT XX SVP          | 80           | 7.5 (A)            |
|                 | TPE-U              | TPU       | APILON™ 52         | XX11               | 60           | 3.0 (A)            |
|                 |                    |           |                    |                    | 70           | 3.2 (A)            |
|                 |                    |           |                    |                    | 80           | 3.5 (A)            |
|                 | ABS/PA             | TPE-S     | TPS                | MEGOL™             | DP2375/XXSVP | 30                 |
| TPE-S           |                    | TPS       | MEGOL™             | I A XX SV/P        | 50           | 6.0 (A)            |
|                 |                    |           |                    |                    | 60           | 6.0 (A)            |
| PC              | TPE-S              | TPS       | MEGOL™             | DP2375/XXSVP       | 30           | 2.0 (C)            |
|                 | TPE-S              | TPS       | MEGOL™             | HT1 XX SVP         | 50           | 5.0 (D)            |
|                 |                    |           |                    |                    | 60           | 5.5 (A)            |
|                 | TPE-S              | TPS       | MEGOL™             | I A XX SV/P        | 50           | 3.5 (A)            |
|                 |                    |           |                    |                    | 60           | 4.0 (B)            |
|                 | TPE-U              | TPU       | APILON™ 52         | XX11               | 60           | 2.5 (A)            |
|                 |                    |           |                    |                    | 70           | 3.0 (A)            |
|                 |                    |           |                    |                    | 80           | 3.0 (A)            |
| PBT             | TPE-S              | TPS       | MEGOL™             | DP2433             | 70           | 4.0 (A)            |
| POM             | TPE-S              | TPS       | MEGOL™             | DP2718/1           | 65           | 3.2 (A)            |
|                 | TPE-S              | TPS       | MEGOL™             | DP2718/2           | 65           | 3.0 (A)            |
| PP              | TPE-S              | TPS       | MEGOL™             | DP2985             | 30           | 4.0 (C)            |
|                 | TPE-S              | TPS       | MEGOL™             | I A XX C UG        | 60           | 4.6 (D)            |
|                 |                    |           |                    |                    | 70           | 7.5 (A)            |
|                 | TPE-S              | TPS       | MEGOL™             | I A XX P UG        | 70           | 7.5 (A)            |
|                 |                    |           |                    |                    | 90           | 9.0 (D)            |
|                 | TPE-O              | TPO       | APIGO™             | 9121NL             | 70           | 5.5 (D)            |
|                 | TPE-O              | TPO       | NEOGOL™            | AXX 0 Z025/FC/L1/Z | 60           | 7.0 (B)            |
| TPE-O           | TPO                | NEOGOL™   | AXX 0 Z003/FC/L/Z  | 80                 | 5.5 (C)      |                    |

| Rigid substrate | TPEs               |           |                    |                |         | VDI 2019           |
|-----------------|--------------------|-----------|--------------------|----------------|---------|--------------------|
|                 | TPE classification | ISO 18064 | Product brand name | Product series | Shore A | Peel Strength N/mm |
| PA6 GF30        | TPE-S              | TPS       | MEGOL™             | DP1741/XXSVPA  | 25      | 2.0 (A)            |
|                 |                    |           |                    |                | 50      | 5.0 (D)            |
|                 |                    |           |                    |                | 60      | 6.0 (C/D)          |
|                 |                    |           |                    |                | 70      | 4.0 (A)            |
|                 |                    |           |                    |                | 80      | 4.0 (A)            |
|                 | TPE-S              | TPS       | MEGOL™             | DP2586/XXSVPA  | 60      | 5.0 (C/D)          |
|                 | TPE-S              | TPS       | MEGOL™             | DP2339         | 60      | 4.0 (A)            |
|                 | TPE-U              | TPU       | APILON™ 52         | D-             | 80      | 1.5 (A)            |
|                 |                    |           |                    |                | 90      | 1.5 (A)            |
|                 | TPE-U              | TPU       | APILON™ 52         | T L            | 80      | 1.5 (A)            |
| PA 66 GF30      | TPE-S              | TPS       | MEGOL™             | DP2154         | 20      | 1.5 (A)            |
|                 |                    |           |                    |                | 30      | 1.5 (A)            |
|                 |                    |           |                    |                |         |                    |
|                 |                    |           |                    |                |         |                    |
|                 |                    |           |                    |                |         |                    |
|                 | TPE-S              | TPS       | MEGOL™             | DP1741/XXSVPA  | 25      | 2.5 (A)            |
|                 |                    |           |                    |                | 50      | 5.0 (D)            |
|                 |                    |           |                    |                | 60      | 5.5 (D)            |
|                 |                    |           |                    |                | 70      | 4.0 (A)            |
|                 |                    |           |                    |                | 80      | 6.5 (A)            |
| PA 66 GF50      | TPE-S              | TPS       | MEGOL™             | DP2586/XXSVPA  | 60      | 6.0 (C/D)          |
|                 |                    |           |                    |                | 70      | 6.0 (B/D)          |
|                 | TPE-U              | TPU       | APILON™ 52         | D-             | 30      | 3.0 (A)            |
|                 | TPE-U              | TPU       | APILON™ 52         | T L            | 82      | 2.0 (A)            |
|                 |                    |           |                    |                | 35      | 4.0 (A)            |
|                 | TPE-S              | TPS       | MEGOL™             | DP1741/XXSVPA  | 60      | 5.5 (C)            |
|                 |                    |           |                    |                | 70      | 2.0 (A)            |
| PA12            | TPE-S              | TPS       | MEGOL™             | DP2268/XXPA12  | 60      | 5.5 (C/D)          |
|                 |                    |           |                    |                | 70      | 3.5 (B)            |
|                 | TPE-U              | TPU       | APILON™ 52         | T L            | 30      | 2.0 (A)            |
|                 |                    |           |                    |                |         |                    |



# About Trinseo

## A strong track record – a bold direction

Trinseo is a global materials solutions provider and manufacturer of plastics and latex binders with a focus on delivering innovative, sustainable, and value-creating products that are intrinsic to our daily lives. Trinseo is dedicated to making a positive impact on society by partnering with like-minded stakeholders, and supporting the sustainability goals of our customers in a wide range of end-markets including automotive, consumer electronics, appliances, medical devices, packaging, footwear, carpet, paper and board, and building and construction.

## Global resources

Trinseo delivers an unmatched combination of global reach, operational excellence, expertise, leading intellectual property, world-scale assets, and global R&D presence.

\$4.8 B

IN NET SALES IN 2021



3,400

EMPLOYEES



11

R&D FACILITIES



26

MANUFACTURING SITES



The principles of Responsible Care® and sustainability influence the production of printed literature for Trinseo PLC and its affiliated companies. As a contribution toward the protection of our environment, Trinseo's printed literature is produced in small quantities and on paper containing recovered/post-consumer fiber and using 100 percent soy-based ink whenever possible.

#### Product Stewardship

Trinseo and its affiliated companies have a fundamental concern for all who make, distribute, and use their products and for the environment in which we live. This concern is the basis for our Product Stewardship philosophy by which we assess the safety, health, and environmental information on our products so that appropriate steps may be taken to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Trinseo products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

#### Customer Notice

Customers are responsible for reviewing their manufacturing processes and their applications of Trinseo products from the standpoint of human health and environmental quality to ensure that Trinseo products are not used in ways for which they are not suitable. Trinseo personnel are available to answer questions and to provide reasonable technical support. Trinseo product literature, including safety data sheets, should be consulted prior to the use of Trinseo products. Current safety data sheets are available from Trinseo.

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