

# CLOSED LOOP COMPOUNDS

## The solution for innovative circular-economy

Sustainable, economical, high-quality



**WIPAG Closed Loop Compounds allow customers' own production waste to be processed and re-used. Having this high degree of certainty with regard to the quality of the homogeneous input material means excellent potential for re-using the recycled compound in equivalent applications.**

WIPAG's proprietary, patented, and economically efficient Closed Loop recycling process makes it possible to process thermoplastic waste for potential re-use in challenging applications. This potential is made possible by our special technologies, such as for composite separation and paint removal. Various selective separation processes (density, optical and electrostatic separation, demetallization) and our use of fine melt filters help us produce exceptionally high-quality compounds.

Using our Closed Loop products makes it possible to reduce new materials usage. Our customers mix these WIPAG compounds in at ratios of up to 60%. Replacement components can even be manufactured using 100% recycled compounds. This approach translates to significant cost savings in raw materials procurement. To this end, we have developed the concept of Recycling-as-a-Service (RaaS®).

RaaS® was developed in context of ensuring that our customers remain the owners of their materials; WIPAG merely bills customers for the agreed recycling services. Depending on individual customers' waste material flows, WIPAG can provide and combine a wide range of processing technologies.

Today, our standard services include processing multi-layered composites and complex production waste made of PP, PP/EPDM, PA6, PA66, ABS and PC/ABS. Application-specific solutions based on other polymers or filler combinations can be developed as well. Moreover, re-using processed production waste creates excellent CO<sub>2</sub>-savings potential.

| Product   | PP EPDM TV from paint removal (Closed Loop)                 |
|---|---|
| Energy consumption - Prime [kWh/kg]                   | 8,71  |
| Presumed energy provider                              | German electricity mix (2017): 0,486 kgCO <sub>2</sub> /kWh |
| Energy consumption - WIPAG [kWh/kg]                   | 0,02  |
| Energy provider                                       | hydropower: 0,013 kgCO <sub>2</sub> /kWh                    |
| CO <sub>2e</sub> emissions savings per kg of compound | <b>8,7</b>  |

Today, the Closed Loop process is primarily employed in the automotive industry, which has very high standards of quality for the products it uses. The compounds can be transferred to other industries easily.

Previously realized Closed Loop applications (RaaS®) include:

- Bumpers, rocker panels – paint stripping of PP, PP/EPDM
- Instrument boards, side cladding for doors – composite separation
- Headlight covers – paint stripping of PC
- Window enclosures – paint stripping of ABS, PC/ABS

### WIPAG Closed Loop Compounds (RaaS®): Advantages at a glance

- Customer retains ownership of materials
- Re-using known materials means greater quality assurance
- Can be used in equivalent components

### Comparison of properties – new materials vs. recycled compounds

|  | New product<br>PP/PEDM | Recycled compound<br>PP/EPDM |
|--|------------------------|------------------------------|
| Color  | black                  | black                        |
| Filler content (talcum)<br>[%]<br>ISO 3451-1                       | 20                     | 20                           |
| MVR<br>[cm <sup>3</sup> /10min]<br>ISO 1133                        | 13                     | 14                           |
| Tensile modulus<br>[MPa]<br>ISO 527                                | 1450                   | 1600                         |
| Tensile strength<br>[MPa]<br>ISO 527                               | 15                     | 16                           |
| Impact strength 23°C<br>[kJ/m <sup>2</sup> ]<br>ISO 179/1eU        | NB                     | NB                           |
| Charpy impact strength 23°C<br>[kJ/m <sup>2</sup> ]<br>ISO 179/1eA | 53                     | 48                           |

#### HEAD OFFICE

WIPAG Deutschland GmbH  
Nördliche Grünauer Straße 31  
86633 Neuburg an der Donau  
Tel.: +49 8431 4336-20  
info@wipag.de · www.wipag.de

The information contained in this publication is based on our current knowledge and experience. However, due to the large number of factors that can influence our products when they are processed and used, it does not exempt processors from carrying out their own investigations and tests. Legally binding assurances of specific properties or of suitability for a specific purpose cannot be derived from our information. The recipient of our products is responsible for observing any applicable industrial rights as well as the existing laws and regulations.