

# Closed Loop Compounds

**WIPAGs solution for innovative  
circular-economy**

Sustainable, economical, high-quality



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**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.



## 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**

PRODUCT	PP/EPDM TV FROM PAINT REMOVAL (CLOSED LOOP)
GWP [kg CO <sub>2</sub> eq.] CML2001 prime	2.06
Presumed energy provider	German electricity mix (2017): 0.486 kg CO <sub>2</sub> / kWh
GWP [kg CO <sub>2</sub> eq.] CML2001 WIPAG	0.82
Energy provider	hydropower: 0.013 kg CO <sub>2</sub> / kWh
Einsparung CO <sub>2</sub> e Emissionen pro kg Compound	1.24

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

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

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

These are guide values and not a specification. The test values mentioned are representative values only and not binding minimum or maximum figures. These test values have been determined on standardised test specimens and can be affected by pigmentation, mould design and processing conditions. ALTECH IQ and ECO differ in the degree of specification options. Any information given on the chemical and physical characteristics of our products, including, without limitation, technical advice on applications, whether verbally, in writing or by testing the product, is given to the best of our knowledge and in good faith and does not exempt the buyer from carrying out their own investigations and tests in order to ascertain the product's specific suitability for the purpose intended. The buyer is solely responsible for confirming the suitability of the product for a particular application, its utilization and processing and must observe any applicable laws and government regulations. NO EXPRESS OR IMPLIED RECOMMENDATION OR WARRANTY IS GIVEN WITH REGARD TO THE SUITABILITY OF THE PRODUCT FOR A PARTICULAR APPLICATION, SUCH AS, BUT NOT LIMITED TO; SAFETY-CRITICAL COMPONENTS OR SYSTEMS.

**Important:** Irrespective of product type or designation, WIPAG does not recommend or support the use of any products it supplies which fall in the following medical, pharmaceutical or diagnostic application categories.

- risk class III applications according to EU directive 93/42/EEC
- any bodily implant applications for greater than 30 days
- any critical component in any medical device that supports or sustains human life.

At all times, our standard terms and conditions of sale apply.

**Additional Information:**

In general the existence of residual amounts of ferrous and non-ferrous metals cannot be completely ruled out in recycle feed stocks. In order to minimize potential negative effects of such inclusions, WIPAG employs extensive metal (and non-metal) detection and separation systems in the production of its ALTECH IQ/ECO compounds. However, even the highest product quality assurance processes cannot guarantee zero levels of ferrous and non-ferrous metal in the final product. To further reduce risk, moulders are therefore advised to deploy their own detection and separation techniques. In particular, special measures are advised to be employed with