



Product portfolio for the recycling industry



NORDMANN



CirKular+™: block copolymers based on PS and PE/butylene rubber

CirKular+™ is a cost efficient, fully re-processable additive for polyolefinic and polystyrenic recycled streams, and difficult-to-recycle engineering polymers. These are multi-resin compatibilizers and performance enhancement additives for upcycling a wide range of post-consumer resin (PCR) and post-industrial resin (PIR) streams. Typical levels of CirKular+ addition range from 3 to 5% weight of the total formulation. CirKular+™ is a product of Kraton Corporation.

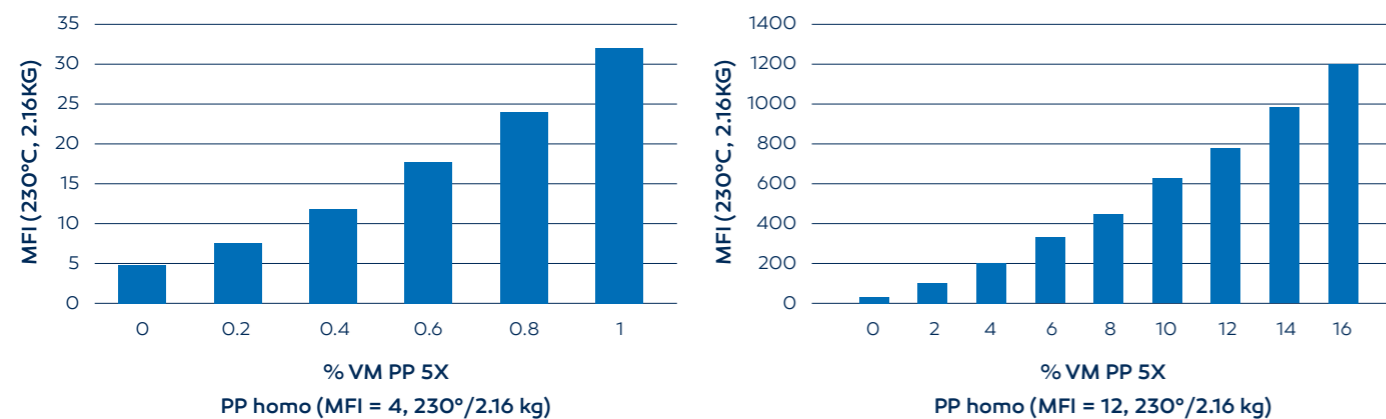
CirKular+™ Series	CirKular+™ Grade	Max Processing T°C	Melt Flow, 230°C/5kg (g/10min)	FDA Clearance ¹	Polyolefins: PP, HDPE, LDPE, MDPE, Polyolefinic Blends, mPE	PS, HIPS	EVA	EVOH, PVA	Wood Fiber & Cellulose	Polyactic Acid	PET	Polyamides & Nylons	ABS	PC
Compatibilization Series	C1000	280°C	22	•	•	•	•	•	•	•	•	•	•	•
	C1010	280°C	34	•	•	•	•	•	•	•	•	•	•	•
	C1010 (50% recycled)	280°C	34		•	•	•	•	•	•	•	•	•	•
Performance Enhancement Series	C2000	280°C	24	•	•	•	•	•						
	C3000	200°C	11	•	•	•								

¹ Please contact your sales manager for details / Melt Flow, 200°C/5kg (g/10min)

Flow Xpress: peroxide masterbatch

VM PP X masterbatches were specifically developed for decreasing and controlling polypropylene melt viscosity. VM PP X is particularly suitable for PP recycling by reducing the viscosity and homogenizing the molecular weight of the polymer. The masterbatch is available at 5%, 7.5% and 10%.

Examples of experimental results by extrusion at 230°C



Processing aids: stearates

Metal soaps are characterized not only by their excellent stabilizing properties, but also good sliding and mold-release effects. These are important qualities for virgin as well as recycled polymers.

Product	Application	Polymer	dosage
Ca-Stearate	Acid scavenger in POM, internal/external lubricant in PA, internal lubricant in PP	POM, PP, PA	0,2-0,5 %
Zn- Stearate	Mold release agent in HIPS, antistatic agent between non- expanded PS beads	PS	
Mg- Stearate	Internal/external lubricant, mold release in ABS Internal/external lubricant, mold release in ABS	ABS	

Processing aids: waxes

Waxes can be used as compatibilizers for different applications such as multilayer packaging or PC/ABS automotive parts based on recycled polymers. They can be used to improve melt flow, enhance the surfaces of molded parts and increase the compound output of recycled films.

Product	Effect	Application
AC® 596P	Enhances the adhesion of PA 6 and/or EVOH recycled films for the polyethylene multi-layer barrier film recycling stream	Nylon/PE film
AC® 597A	Improves compatibility and extruder throughput; higher Izod impact; improves melt flow; better surfaces of molded parts	PC/ABS auto parts
AC® 540	Improved mechanical compounding of recycled films used as internal layers of new multilayer films; improves extrudate melt flow; facilitates higher compounding output	Multilayer film



CEVO®: wax blends

These additives work to improve flow properties and surface quality as well as filler and pigment dispersion. Products from the Plastic Recycling Series allow the production of particularly high-quality recyclates.

CEVO® additives can be used to solve processing- and application-related issues. For example, when it comes to fast injection, filling long flow paths, the avoidance of friction peaks, fast demoulding, or the process stabilization of the compound to be produced.

Product	Effect	Description	Polymer
CEVO®-process A-3110	Flow improvement, stabilisation, mold release	One-pack for thermally pre-stressed PA, synergistic mixture of fatty acid derivatives and stabilisers	PA
CEVO®-process B-3680	Improves the dispersion of fillers, mold release, lubrication, surface improvement	Wax combination for recycled and regrinded material	PE, PP (GF)
CEVO®-stab B-5200	Improves the homogeneity of the filler distribution, reduces degradation by friction peaks and leads to an improved surface quality, increases the thermo-oxidative stability of produced	Synergistic combination of different lubricating and dispersing agents as well as a balanced mixture of diverse stabilisers and co-stabilisers	PE, PP
CEVO®-stab F-5515	Minimization of thermo-oxidative effects during extrusion process, scavenger for formed formaldehyde.	Additive mixture, engineered especially for the recycling processes of POM Copolymer (reinforced and unreinforced) waste.	POM

Nord-MIN® MB: additive masterbatch

Plastic recyclates often exhibit unpleasant odors for a variety of reasons: food residue, microbial growth or degraded polymers. To eliminate these during processing, odor absorbers, antimicrobial agents or fragrance MBs can be used. **Odor absorbers** can be used to neutralize odors such as hydrogen sulfide, mercaptan, thioether, isovaleric acid, acid, amines and ammonia.

Fragrance MBs give products a completely new smell. These are colorless, available in six varieties and can be used for all common plastics.

To protect plastics from harmful microorganisms, using an **antimicrobial agent** is helpful. Agents with a high level of heat resistance are suitable for injection molding, extrusion, blow molding and other types of processing and can be used in household items, packaging, furniture surface, electrical applications, automotive parts and synthetic textiles.

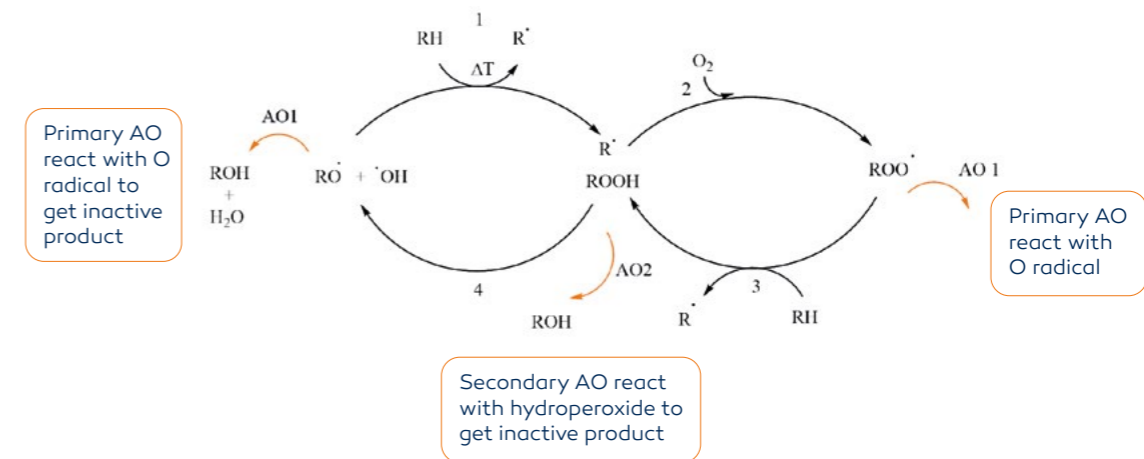
Having uncontrolled electrical charge that accumulates on plastic surfaces makes it difficult to produce plastic parts; films, fibers and tapes stick to each other, packaging becomes soiled due to dust build-up and electronic devices can be damaged.

Antistatic agents form a conductive path through which electrostatic charge dissipates. These effects do not depend on humidity, and the agents themselves are transparent, odorless and non-migrating. This makes them suitable for e.g. blown film, extrusion, casting, mixing process, injection molding and rotation molding.

Product	Description
Odor absorber	Neutralizes odors
Antistatic agent	Dissipates electrical charge
Antimicrobial agent	Helps prevent spread and transfer of microorganisms
Fragrance	Six different scent varieties

NORANTOX®: Nordmann antioxidants and UV stabilizers

Virgin plastics and recycled materials both need to be stabilized in order to prevent molecular degradation and inhibit oxidation. Recycled polyolefins usually contain relatively low levels of residual stabilizers, which does not protect polymers from degradation (chain scission). New additives are therefore required to protect recyclates during processing.



Product	Classification	Polymer
NORANTOX® 1010	Antioxidant	PE, PP, EVA, PUR, PA, PMMA, PET, PBT, SBS, POM
NORANTOX® 1076	Antioxidant	PE, PP, PA, PC, ABS, PMMA, PET, PBT, SBS
NORANTOX® 1098	Antioxidant	PE, PP, PA, POM, SBS
NORANTOX® 168	Secondary antioxidant	PE, PP, PC, ABS, PET, PBT
NORANTOX® UV 622	UV stabilizer	PP, PA, PC, ABS, PET, PBT, POM, SBS
NORANTOX® UV 770	UV stabilizer	PP, PA, PC, ABS, PET, PBT, POM, SBS
NORANTOX® UV 944	UV stabilizer	PE, EVA, PA
NORANTOX® UV P	UV absorber	PC, ABS, PMMA, PET, PBT
NORANTOX® UV 326	UV absorber	PE, PP

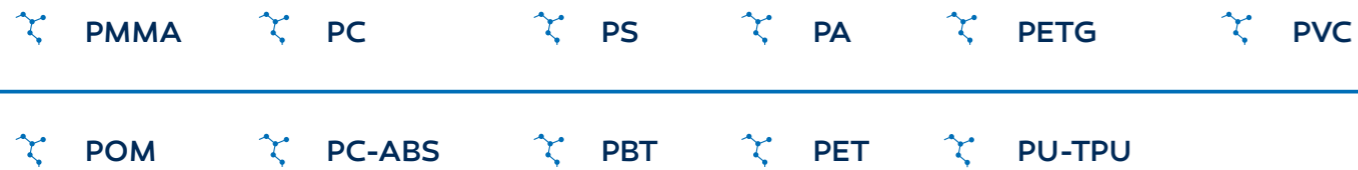


bFI: flow improver

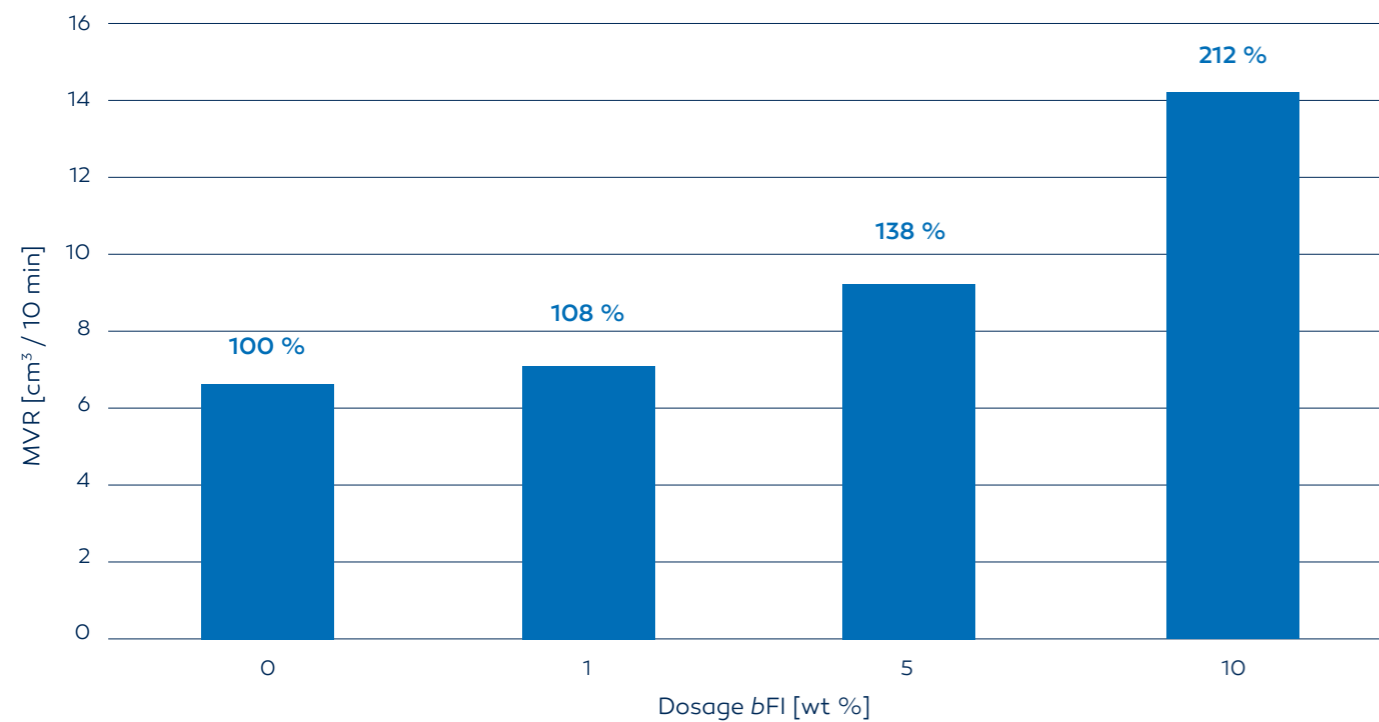
Today's recycling facilities face the increasing challenge of handling different streams of materials with varying flow properties. Large differences in viscosity are expressed by the melt volume-flow rate (MVR). Acrylate-based flow improver bFI, however, can homogenize the MVR of different recyclates, achieve the desired viscosities and allow highly viscous recyclates to be processed very softly with lower temperatures and finally lower energy consumption. This leads, in turn, to a higher number of possible recycling cycles. The branching of bFI conducts in lower glass transition points, better flowabilities, reduced energy requirements, increased production output and reduced cycle time during downstream processing. In addition to these benefits, all other desired mechanical and physical properties in virgin range of the recycling grade are kept. bFI is a product of Polytives GmbH.

The key advantages of using bFI include saving energy, reducing costs, optimizing manufacturing processes, allowing products to remain recyclable and overcoming technical limitations.

Addressable Polymers:



melt flow improved PMMA [230° C / 3,8 kg]



Sustainable plastic solutions

Product	Description
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Bio-Compounds

BIOFIBRE®	Compounds based on various sustainable and petrochemical polymers with natural fibre reinforcements. Partly bio-degradable qualities available.
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Certified renewable polymers

TOTALENERGIES PE	ISCC Plus certified by mass balance. Complete range of TOTALENERGIES portfolio available.
TOTALENERGIES PP	ISCC Plus certified by mass balance. Complete range of TOTALENERGIES portfolio available.
TOTALENERGIES PS	ISCC Plus certified by mass balance. Complete range of TOTALENERGIES portfolio available.

Polylactic Acid (PLA)

TOTALENERGIES CORBION LUMINY® High heat PLA	Film-, injection molding, thermoforming and fibers. Higher heat resistance compared to standard PLA's. Various melt-viscosities available. Products can be used as pure polymer and for compounding.
TOTALENERGIES CORBION LUMINY® Low heat PLA	Medium and high viscosity polymers. Typically used in hot seal layer of multi-layer film extrusion.
TOTALENERGIES CORBION LUMINY® Standard PLA	Highly viscous, amorphous and transparent. Applicable for film extrusion, thermoforming and fibre.

Recycling

DINALON® Recycling compounds	Post consumer (PCR) and post industrial (PIR) recyclate based injection molding compounds with various reinforcements and modifications.
TOTALENERGIES Circular rPE	Post consumer recyclate (PCR) based LDPE and HDPE grades
TOTALENERGIES Circular rPP	Post consumer (PCR) and post industrial recyclate (PIR) grades, filled / unfilled and reinforced

All stated details as well as the applications-technology advice are founded on practical experience and careful examinations. However, they are to be considered as non-committal advice only. No liability can be assumed for the results obtained during processing. We therefore strongly recommend to carry out individual tests before using our products. Existing patents with regard to the final product created after processing our product, as well as any legal regulations applicable thereto, have to be observed by the purchaser at his own risk. The sale of our products is effected as provided in our General Terms of Sale and Delivery.

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