Carrying versatile solutions

Borealis' extensive portfolio of unique carrier resins for masterbatch and compound solutions

BOREALIS

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Contents

Borealis technologies: creating versatile carrier resins for high performing masterbatch and compound solutions

As a leading provider of innovative solutions in the fields of polyolefins, base chemicals and fertilizers, Borealis continues to develop its portfolio of proprietary technologies while building on the achievements and experience of more than 50 years in the industry.

With strong roots in Polyolefins, the Borealis technology portfolio covers the whole range from the catalyst, to process, product and application. Combining application expertise with leading technologies, Borealis develops tailor-made solutions designed for the best performance in the end-use application. This is achieved by understanding and interpreting the needs of the whole value chain from polymer to end user, resulting in the translation of customer requirements into polymer structures and ultimately into innovative products.

Our dedication to Value Creation through Innovation in all applications is proven through the constant development and expansion of our proprietary technology portfolio. Ongoing innovation is crucial to maintaining partnerships that yield long-term success for both Borealis and our customers.

Figure 1: Examples of leading proprietary Borealis technologies.

Understanding market trends – boosting your solution performance

Masterbatch and compound market trends

Masterbatch and compound manufacturers constantly seek new ways to add colour and functionality to plastics. Ongoing and accelerated product design and development are essential in order to establish and maintain differentiated masterbatch brands in diverse markets. Important trends currently driving the market include:

- Differentiation by way of tailor-made products
- Compliance with increasingly stringent regulations and standards
- Demand for new solutions towards more sustainable products
- Demand for circular solutions, delivering high quality base resins made from recycled feedstock under the brand of Bornewables™
- Demand for novel and enhanced functionalities

Borealis can contribute to your success in each of these areas by providing high-quality polyolefins for masterbatch carrier resins, innovative technologies, and the first-rate service our global customers have come to expect.

Profound end-user market expertise

At Borealis, we bundle the combined force of our market know-how, long-term partnerships along the value chain, and broad product portfolio to support the development of innovative colour and additive masterbatches and compounds. Carrier resins have a vital role to play when it comes to enabling design freedom, optimising manufacturing processes, improving end-use performance, and enhancing aesthetics. This is why we are dedicated to helping you select the right material to fulfil specific end-user needs. Borealis carrier resins for masterbatch and compound solutions have enabled customer success in a variety of industries, including consumer goods, packaging, fibre, wire and cable, healthcare and automotive.

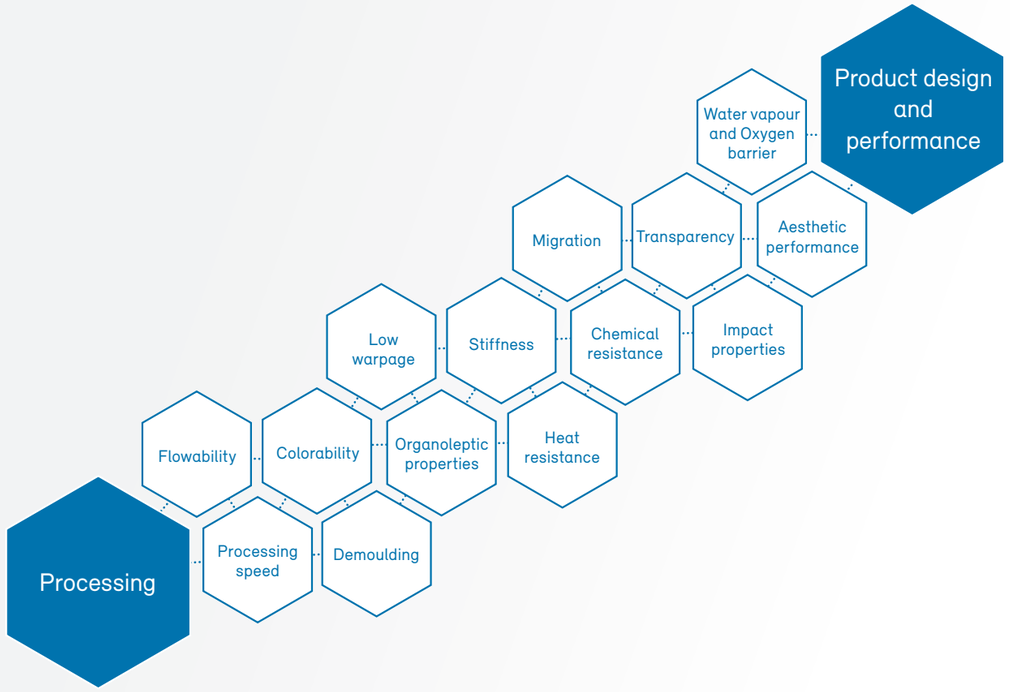


Figure 2: Borealis has profound knowledge and expertise in polyolefins and its conversion along the value chain.

A great example is our portfolio of Borealis Nucleation Technology based grades, delivering higher material and production efficiency with dimensional stability independent of the colour, facilitating the use of one mould for a variety of colours. This makes a perfect match for masterbatch or compound applications – just as the Borflow™ high MFR grades which allow the tailoring of viscosity.

Highly versatile masterbatch and compound carrier resins

Thanks to the broad Borealis portfolio of masterbatch and compound carrier resins, we can offer you a wide range of products that fulfil a variety of technical specifications: from narrow to broad molecular weight; from low- to high-flow; and flexibility in use of either universal or special carrier systems.

The high levels of pigment, additive, and filler loading made possible by excellent dispersion behaviour result in true compatibility for a wide range of applications.

The versatility of Borealis products has been employed/exploited to produce novel applications in consumer products, automotive, wire and cable, and other application areas in which a higher relative contribution of the carrier resin is required.

Borealis customers benefit from the advantages offered by the unique and extensive Borealis polyethylene (PE) and polypropylene (PP) families:

- Pelletized and powder (not stabilised)
- Easy handling
- No dust, easy conveying
- High bulk density
- Easy mixing with other pellets
- Long pellet shelf life
- High quality levels

Figure 3: Borealis offers you a wide portfolio of polyolefins and from that can offer versatile solutions for masterbatch and compound carrier resins.

Overview: sample selection of carrier resins for masterbatch and compound solutions

At Borealis, we offer you a wide range of carrier resin solutions for masterbatch and compound applications. The overview comprises mere examples for specific applications. In addition to these solution examples, masterbatchers and compounders can select individual grades of the comprehensive Borealis product portfolio to match specified Borealis grades in the value chain. For this purpose we are offering solutions for specification driven markets, for example Healthcare approved applications, solutions with brand owner approvals for food contact packing or pipe products for drinking water applications. The specified grades used, can be prescribed as the masterbatch or compound carrier, for example to add colour or additives.

Borealis PP high-flow solutions

Flow enhancers for production of masterbatch compounding and composites

- Highly-filled performance masterbatches with over 60% filler content
- Masterbatch systems genuinely compatible with melt blown applications
- Masterbatch systems with improved flow can broaden the window for injection moulding:
  - Enabling longer flow path injection lower machine tonnage
  - Decreasing pressure in mould and machine longer mould lifespan
  - Enabling lower injection temperature means energy reduction, with resulting CO_2 reduction and increased sustainability
- Carrier resins enabling improved wet-ability for better dispersion of fillers

Borealis PE carrier resins

Proven benefits in masterbatch compounding and end-use applications

- Narrow molecular weight, mid- to high-flow PE for use as universal carrier
- Autoclave film & Extrusion Coating grade mid flow LDPE, ideally suitable as masterbatch carrier resin

Queo™ POP and POE carrier resins

Compelling advantages for highly-filled performance masterbatches

The amorphous character of Queo Polyolefin Plastomers (POP) and Polyolefin Elastomers (POE) combines:

- High filler acceptance: > 80% filler
- Efficient filler wetting results
- Uniform filler dispersion
- Even with high filler content, Queo remains tough, with high residual mechanical properties
- Queo as masterbatch-carrier: easy handling (granulation, less dust formation) due to higher flexible behaviour compared to LDPE

For colour masterbatch and additive systems:

- Increased colour strength due to increased dispersion quality
- Temperature-sensitive additives can be processed at lower temperatures

Unique PP and PE solutions in powder form

Offering possibility of reactive compounding for grafted systems

Particularly suited for:

- Highly loaded colour and performance masterbatches
- Organoleptic applications
- High porosity allowing shorter peroxide soaking times
- Ideal for pre mixing for difficult to disperse additives/ colours

Please contact your Borealis Sales Representative for assistance in identifying and developing the right masterbatch or compound carrier resin for your specific product needs.

Figure 4: Example of a face mask made of a dedicated Borealis melt blown non-woven PP grade. Select from a portfolio of melt blown non-woven PP grades for example as flow enhancer in your masterbatch or compound carrier resin.

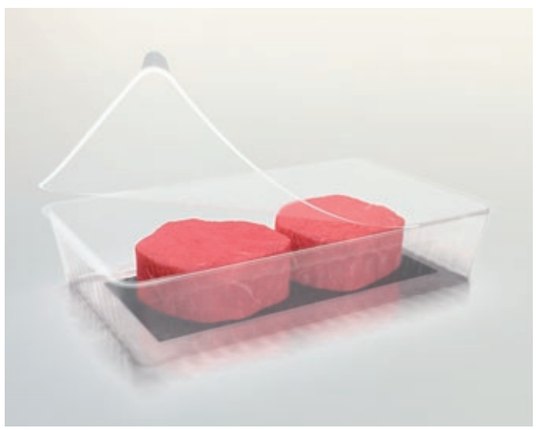


Figure 5: Example of a flexible food packaging made of Borealis dedicated food contact flexible packaging PP grade. Such packaging grades are available for masterbatch producers to match the resin of the final product.

Figure 6: Examples of Wire & Cable insulation and flame retardant compounds made of Borealis dedicated grades and compounds.

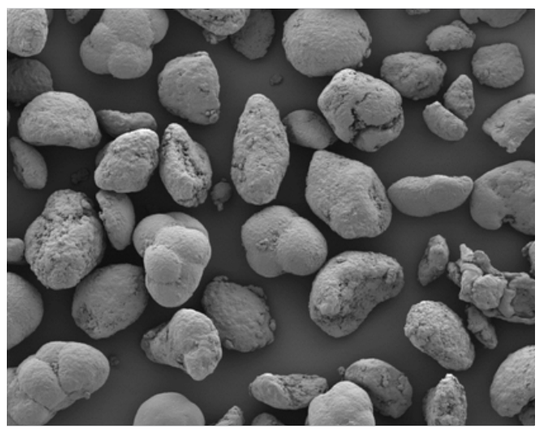


Figure 7: SEM microscopy image of Borealis HC001A-B1 grade, available in powder form.

Sample selection of PP carrier resin solutions

Product name	MFR (230 °C/2.16 kg) (g/10 min)	Tensile modulus (MPa)	Charpy NIS @ 23 °C (kJ/m²)	Melting point (°C)	Additives	Features	Master Batch Carrier	Compounding
PP homopolymers								
BE50	0.3	1650	7	165	AO/AS/N	BWMD, high HDT and high thermal aging		•
HA507MO	0.8	1500	6	164	AO/AS	Excellent stress resistance and a good resistance to chemicals		•
HB600TF	2	1300	3	163	AO/AS	Very good processability and melt stability	•	
HC001A-B1	2.7	1350	3.5	162	–	Powder, no anti-oxidants	•	
HC101BF	3.2	1350	3.5	161	AO/AS	Excellent optical properties	•	
HC205TF	4	1700	5	163	AO/AS/BNT	Nucleated polypropylene		•
HD905CF	6.5	2300	3	167	AO/AS/BNT	Nucleated, high crystalline polypropylene homopolymer film resin		•
HD120MO	8	1500	4	162	AO/AS	Good mechanical properties	•	
HD204CF	8	1500	4	162	AO/AS/CR	polypropylene homopolymer film resin	•	
HD601CF	8	1700	3	162	AO/AS	polypropylene homopolymer film resin		
HE125MO	12	1550	3.5	167	AO/AS	Suitable for high-speed injection moulding	•	•
HE370FB	12	1550	3	160	AO/AS	Easy processability	•	
HF420FB	19	1500	2	161	AO/AS	Controlled rheology, Easy processability	•	
HF136MO	20	1500	3	163	AO/AS/CR	NMWD, low warpage	•	
HF955MO	20	2200	2.5	168	AO/AS/BNT	BNT nucleated, very stiff polypropylene homopolymer		•
HG565FB	23	1500	2	164	GF/AS/UV	Easy processability, Gas fading free formulation	•	
HG385MO	25	1750	3	164	AO/AS/SA/AA/BNT/CR	BNT nucleated, very stiff polypropylene homopolymer		•
HG430MO	25	1400	3	161	AO/AS/SA/AA/N	homopolymer with superior impact resistance		
HG475FB	27	1350	2	165	AG/AS	Easy processability, Anti-gasfading stabilisation	•	
HH450FB	37	1350	2	161	AG/AS/CR	Easy processability, Anti-gasfading stabilisation	•	
HJ325MO	50	1650	2	164	AO/AS/AA/N	NMWD, low warpage		•
HJ120UB	75	1800	1	162	AO/AS	Special low viscosity polypropylene homopolymer		•
HK060AE	125	1550	1	161	AO/AS	Special low viscosity polypropylene homopolymer for Glass Matt reinforced Thermoplastics	•	
HL504FB	450	1550	1	161	AO/AS/CR	Controlled rheology, easy processability	•	
HL708FB	800	1500	1	158	AO/AS/CR	Controlled rheology, easy processability	•	
HL712FB	1,200	1400	1	158	AO/AS/CR	Controlled rheology, easy processability	•	
PP heterophasic copolymers								
BA202E	0.3	1200	50	163	AO/AS	HMW, very high impact strength		•
BA204E	0.8	1100	35	164	AO/AS	HMW, very high impact strength		•
BB213CF	1.2	1100	30	166	AO/AS/CR	High toughness, excellent low temperature impact		•
BB125MO	1.3	1300	50 PB	165	AO/AS/AA/N	Excellent stress-cracking and chemical resistances		•
BC245MO	3.5	1350	15	165	AO/AS/AA/N	Good stiffness and impact strength ballance		•

BNT: Borstar Nucleation Technology
AO: Anti-Oxidant
AG: Anti-gasfading stabilisation

GF: Gas fading free formulation
AS: Acid Scavengers
SA: Slip and Anti-block Agent

AA: Antistatic Agent
CR: Controlled Rheology
N: Nucleated

Product name	MFR (230 °C/2.16 kg) (g/10 min)	Tensile modulus (MPa)	Charpy NIS @ 23 °C (kJ/m²)	Melting point (°C)	Additives	Features	Master Batch Carrier	Compounding
PP heterophasic copolymers								
BC250MO	4	1200	25 PB	165	AO/AS/AA/N	Very good processability, high melt stability		•
BD212CF	5	1300	7	164	AO/AS/CR	Excellent low temperature impact, high seal strength	•	•
BD712CF	7	1300	7	164	AO/AS	Easy processability, excellent low temperature impact	•	
BD310MO	8	1400	9	164	AO/AS/AA/N	Good impact strength, high stiffness, excellent antistatic properties	•	•
BE961MO	12	1200	13	167	AO/AS/AA/BNT	High stiffness, high impact strength, low creep performance		•
BE170CF	13	1250	8	164	AO/AS	Good processability, low taste & odour	•	•
BF970MO	20	1500	8	166	AO/AS/AA/BNT	High stiffness, high impact strength		•
BH381MO	35	1700	6.5	167	OA/AS/AA/BNT	High impact strength, very good flow behaviour		•
BH345MO	45	1400	6	165	AO/AS/AA/N	Excellent antistatic properties, high impact strength		•
BH374MO	45	1500	6	165	OA/AS/AA/BNT	Superior flow behaviour, high impact strength, excellent antistatic properties		•
BH348MO	50	1150	10	165	AO/AS/AA/BNT	High potential for cycle time reduction		•
BJ368MO	70	1500	5.5	166	OA/AS/AA/BNT	Very good stiffness and impact balance, reduced cycle time and increased output		•
BJ998MO	100	1400	5	165	OA/AS/AA/BNT	Good gloss, excellent antistatic properties		•
PP random copolymers								
RA130E	0.25	800	6	142	AO/AS	Low melt flow rate, natural in colour, random polypropylene		•
RB307MO	1.5	900	25	147	AO/AS/N	Good transparency, high heat distortion temperature		•
RB707CF	1.5	1000	–	145	AO/AS/N	High gloss, low haze, heat sterilisable		•
RB501BF	1.9	800	–	140	AO/AS	Excellent optical properties, good shrink performance	•	
RD204CF	8	900	4	150	OA/AS/CR	High gloss, low haze	•	
RD208CF	8	750	7	140	OA/AS/CR	High gloss, low haze	•	
RD734MO	8	1150	6	148	AO/AS/SA	Good impact strength		•
RE420MO	13	1100	5	149	AO/AS/AA/N	Improved gloss and excellent transparency, low blooming		•
RF365MO	20	1150	5.5	150	AO/AS/AA/N	Excellent antistatic properties, good impact strength		•
PP specialities								
SA233CF	0.8	500	58	140	AO/AS	Superior softness, outstanding mechanical properties		•
PP1121	3.5	1350	15	166	AO/AS/N	Good stress crack resistance, high melt stability, very low post extrusion shrinkage		•
TD310BF	6	–	–	130	AO/AS/SA/CR	High seal strength and hot tack force, wide sealing window	•	
SD233CF	7	500	7	140	AO/AS/CR	Very high softness, excellent heat seal properties, high toughness		•
WG341C	25	1050	–	161	AO/AS/CR	High grease resistance, high temperature resistance		•

The property values shown are based on a limited number of tests and, therefore, should not be construed as product specifications.
Masterbatch carrier resins might also be suitable for compounding.

Sample selection of Queo™ POP/POE, EVA and PE carrier resin solutions

Product name	MFR (190 °C/2.16 kg) g/10 min)	MFR (190 °C/5 kg) (g/10 min)	Density (kg/m³)	Melting point (°C)	Tensile modulus (MPa)	Features	Master Batch Carrier	Compounding
mULDPE								
Queo™ 6201LA-P	1	–	862	35	4	low Anti-Oxidant package / Talcum Dusted		•
Queo™ 6800LA	0.5	–	868	47	8	low Anti-Oxidant package		•
Queo™ 7001LA	1	–	870	56	9	low Anti-Oxidant package		•
Queo™ 7007LA	6.6	–	870	48	8	low Anti-Oxidant package		•
Queo™ 8210	10	–	883	75	21	Contains AO	•	
Queo™ 8230	30	–	883	76	25	low Anti-Oxidant package	•	
Queo™ 0210	10	–	902	97	60	Contains AO	•	
Queo™ 0230	30	–	902	97	65	low Anti-Oxidant package	•	
LDPE								
FA3200	0.25	–	925	–	210	Autoclave LDPE	•	
FT6230	2	–	923	110	180	Tubular LDPE	•	
Borlink™ LE7190	2	–	923	–	–	Grinded LDPE	•	
CA7230	4.5	–	923	110	–	Autoclave LDPE	•	
CA8200	7.5	–	920	107	156	Autoclave LDPE	•	
CA9150	15	–	915	104	124	Autoclave LDPE	•	
EVA								
OE5118I	0.7	–	940	87	46	18 w% VA		•
OE5325I	2	–	948	79	24	25 w% VA		•
OE5328I	3	–	950	73	18	28 w% VA		•
HDPE								
BB2541	0.3	1.2	954	–	–	Contains AO/AS	•	•
BB2581	0.3	1.2	958	–	–	Contains AO/AS	•	
HE3366	0.75	–	947	–	–	Contains AO		•
HE1878*	3.3	–	956	–	–	Contains AO	•	
CG8410	7.5	–	941	129	–	HPDE Extrusion coating grade, contains AO	•	
Borcoat™ HE3465	12	–	963	–	–	Contains AO/AS	•	

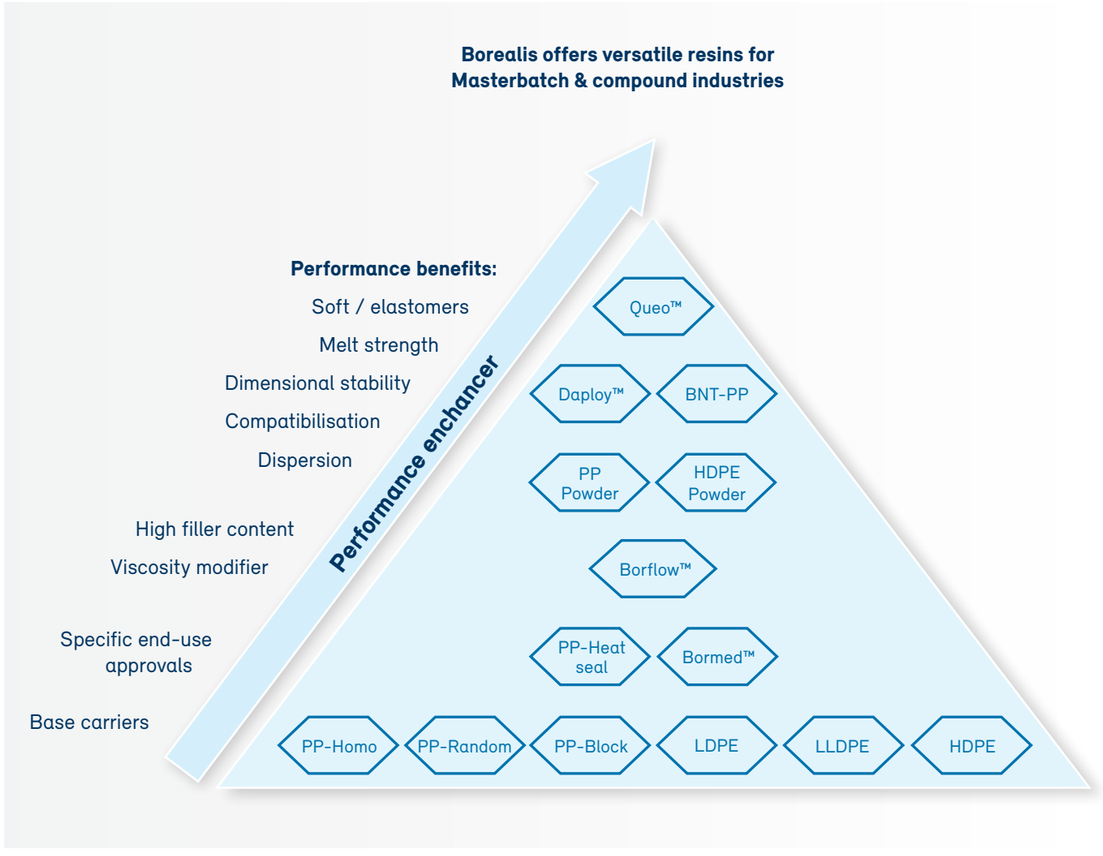
*MFR at 190 °C/21.6 kg

AO: Anti-Oxidant
AS: Acid Scavengers

The property values shown are based on a limited number of tests and, therefore, should not be construed as product specifications.

Overview performance enhancer classes

Borealis proprietary technologies enable a variety of different potential carrier resins. To provide a good overview on how these product solutions can enhance the performance of your masterbatches or compounds, we clustered the products in performance classes to help you make the right choice.



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