

# Solutions for the global Automotive Industry



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### Borealis and Borouge — leading, innovative plastics providers

**Borealis** is a leading provider of chemical and innovative plastics solutions that create value for society. With sales of EUR 4.7 billion in 2009, customers in over 120 countries, and 5,200 employees worldwide, Borealis is owned 64% by the International Petroleum Investment Company (IPIC) of Abu Dhabi and 36% by OMV, the leading energy group in the European growth belt. Borealis is headquartered in Vienna, Austria, and has production locations, innovation centers and customer service centers across Europe and the Americas. Through Borouge, a joint venture between Borealis and the Abu Dhabi National Oil Company (ADNOC), one of the world's major oil and gas companies, the company's footprint reaches out to the Middle East, Asia Pacific, the Indian sub-continent and Africa, where it is also Borealis' exclusive distributor. Established in 1998, Borouge employs approximately 1,600 people, has customers in more than 50 countries and its headquarters are in Abu Dhabi in the UAE and Singapore.

Borouge and Borealis are committed to the principles of Responsible Care® and proactively contribute to addressing the world's water and sanitation challenges through their Water for the World™ initiative.

**The Business Unit Mobility** specialises in supplying advanced polyolefin plastics to leading manufacturers in the automotive component industry. Through leading Borealis technologies and an extensive product portfolio including Daplen™, Borcom™, Nepol™ and Xmod™, Borealis has established a leading position on the automotive market across Europe, South America and Asia. Borealis believes that customer-driven innovation is the only way to achieve and sustain progress. Through foresight and focus on customer needs, we continue to provide innovative solutions for the automotive industry that add real value throughout the value chain. We also know the high value that our customers in the automotive industry place on quality and product consistency. We pride ourselves on the performance of our products, and through ongoing investment in upgrades and new plant programmes, we continue to set new records for output efficiency and product reliability. Borealis believes that responsiveness is the foundation of fruitful customer partnerships. Business Unit Mobility ensures this through the resources of strategically placed Borealis hubs across Europe: Borealis Belgium, Borealis Central Europe and Monza (Italy) and 2 compounding facilities in Brazil, as well as innovation centres in Linz/Austria and Itatiba/Brazil, a strong global sales force and close cooperation with its joint venture partner Borouge for Middle East and Asia and their compounding facility in Shanghai/China.

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## Automotive – interior

Trade/Grade name	Filler content [% indic.]	Density [kg/m <sup>3</sup> ]	MFR 230°C/2.16 kg [g/10 min]	Stress at yield [N/mm <sup>2</sup> ]	Tensile modulus [MPa]	Impact, charpy notched 23°C [kJ/m <sup>2</sup> ]	Impact, charpy notched -20°C [kJ/m <sup>2</sup> ]	HDTB, (0.45 MPa) [°C]	Shrinkage(*) indication [%]	Scratch resistance low med. high dL (fine grain 10 N)	Gloss low med. high fine grain, 60°	Typical applications
<b>Copolymer</b>												
BC612WG	-	900	5	24	1100	9	4	70	1.6	•	•	Under the bonnet applications
BE677AI	-	905	14	26	1500	8	4	100	1.5	•	•	Door and other interior claddings
BF970MO	-	905	20	27	1500	8.5	4.5	105	1.5	•	•	Door and other interior claddings
BH345MO	-	904	45	26	1400	6.5	4	95	1.4	•	•	Trunk claddings
<b>Microcomposite</b>												
Borcom™ BG055AI	-	920	22	35	2000	3.5	1.5	108	1.5	•	•	Climate control housings, trunk claddings
<b>Homo mineral</b>												
MD231U	20	1050	6	36	2900	3	1.2	125	1.1	•	•	Under bonnet covers, heater cases
ME212U	20	1050	12	32	3300	2.5	1.2	125	1.1	•	•	Climate control units, interior trims
MS64T20	20	1070	22.5	32	3100	2.5	1.2	120	1.1	•	•	Cowl vent grills
PS65T20	20	1040	23	32	2600	2.5	1.2	126	1.1	•	•	Door inserts, trunk claddings
MG302AI	30	1140	24	31	3300	1.5	1.2	125	0.9	•	•	Door inserts, trunk claddings
MD441U	40	1220	6	32	3800	3	1.2	132	0.9	•	•	Under the bonnet parts
<b>Copo mineral</b>												
MG160AI	10	950	22	25	1950	7.5	4	110	1.4	•	•	Door panels, interior trims
ME266U	20	1050	12	28	2500	6	2.5	115	1.1	•	•	Centre consoles, interior trims
ME268AI	20	1050	12	26	2400	6	2.4	105	1.1	•	•	Centre consoles, interior trims
PSC63T20	20	1070	22	25.6	2400	4	2.6	109	1.2	•	•	Interior panels
FSC65T30	30	1150	5	24	3000	7	2.5	125	0.9	•	•	Interior panels
<b>TPO compound</b>												
Daplen™ EE168AI	10	990	14	20	1700	25	5	97	1.1	•	•	Dashboards, door panels
Daplen™ EE158AI	15	980	11	23	1700	25	5	95	0.9	•	•	Dashboards, door panels
Daplen™ EE165AI	15	1010	10	20	1750	35	4.5	92	0.9	•	•	Door panels
Daplen™ EE189AI	15	1030	11	21	1850	16	4.5	100	1	•	•	Dashboards, door panels
Daplen™ EE188HP	15	1020	13	22	1850	22	3.5	95	0.9	•	•	Dashboards, door panels
Daplen™ EE189HP	15	1010	16	22	1750	26	3.5	94	0.9	•	•	Dashboards, door panels
Daplen™ EF198HP	15	1020	17	22	1900	20	3.5	95	0.9	•	•	Dashboards, door panels
Daplen™ EG103AI	15	1020	26	22	1800	15	3	105	0.9	•	•	Door panels
Daplen™ EE288HP	20	1040	12	23	2050	16	3	95	0.9	•	•	Door panels
Daplen™ EE250AI	20	1040	13	21	1750	35	3.5	93	0.7	•	•	Dashboards, center consoles
Daplen™ EE260AI	20	1070	14	23	1800	30	4	97	1	•	•	Dashboards, interior trims
Daplen™ EF261AI	20	1040	14	18	1700	43	4.6	94	0.6	•	•	Dashboards, door claddings
Daplen™ EG263AI	20	1035	22	21	2000	30	3	-	0.85	•	•	Dashboards, door claddings
Daplen™ EG265HP	20	1040	21	18	1700	55	8	97	0.7	•	•	Dashboards, door claddings

\* Shrinkage values are measured on injection moulded plaques, data on other items may vary because of other moulding conditions. These values should not be used for design of tools, pre-trials on similar moulds are strictly recommended.

\*\* Shrinkage data available for glass fibre grades on request

n. r.: not relevant

## Automotive – battery case material

Trade/Grade name	Filler content [% indic.]	Density [kg/m <sup>3</sup> ]	MFR 230°C/2.16 kg [g/10 min]	Stress at yield [N/mm <sup>2</sup> ]	Tensile modulus [MPa]	Impact, charpy notched 23°C [kJ/m <sup>2</sup> ]	Impact, charpy notched -20°C [kJ/m <sup>2</sup> ]	HDTB, (0.45 MPa) [°C]	Shrinkage(*) indication [%]	Typical applications	Special proerties
<b>Copolymer</b>											
BC545MO	-	908	3.5	25	1250	12	6	90	1.5	Lead acid battery cases	Excellent impact strength, good processability, good chemical resistance and low stress whitening
BD310MO	-	905	8	28	1400	9	4.5	92	1-2	Lead acid battery case	Good impact strength and high stiffness. Shows excellent antistatic performance
<b>TPO compound</b>											
Daplen™ EE247UB	-	1040	10	22	2200	16	4.1	110	0.9	AGM battery case	Material suitable for battery case and lid. Long term heat stabilised with good dimensional stability, easy processability and good surface quality

## Automotive – exterior

Trade/Grade name	Filler content [% indic.]	Density [kg/m <sup>3</sup> ]	MFR 230°C/2.16 kg [g/10 min]	Stress at yield [N/mm <sup>2</sup> ]	Tensile modulus [MPa]	Impact charpy notched 23°C [kJ/m <sup>2</sup> ]	Impact charpy notched -20°C [kJ/m <sup>2</sup> ]	HDTB, [0.45] [°C]	Shrinkage (*) indication [%]	CLTE [-30, +80°C] [µm/mK]	Typical applications	Special properties
<b>Copolymer</b>												
EE002AE	-	905	11	19	950	65	9	76	1.45	100	Bumpers, exterior trims	Well balanced mechanical properties and good surface quality
EF015AE	-	900	18	17	840	33	7	68	1.5	86	Bumpers, exterior trims	Excellent flowability, good surface quality
<b>TPO compound</b>												
Daplen™ EE103AE	10	950	12	19	1400	50	7	92	1.1	72	0-gap bumpers	Excellent paint adhesion and high stiffness
Daplen™ EF005AE	10	950	25	16	1060	52	6	85	0.8	65	0-gap painted bumpers	Low CLTE, excellent surface appearance, good processing behaviour
Daplen™ EH104AE	10	980	40	16	1150	31	5.5	80	0.8	68	Bumpers, exterior trims, spoilers, exterior unpainted trims	Flow line/tiger stripes free, UV stabilised, scratch resistant
Daplen™ EH106AE	12	970	40	18	1500	-	6	100	0.8	70	Bumpers, rocker panels	Excellent surface appearances, scratch resistant
Daplen™ EF150HP	15	1010	22	23	2000	23	5	-	0.7	54	Exterior body panels, bumpers, exterior trims	Excellent stiffness at low density, high surface aesthetics
Daplen™ ED213AE	20	1020	8	17	1750	29	10	102	0.6	70	Exterior trims and rocker panels	Outstanding paint adhesion, low expansion over broad temperature scale
Daplen™ ED230HP	20	1050	10	19.5	1800	30	4	105	0.8	52	Exterior body panels	Excellent paintability, shrinkage like PC/PBT
Daplen™ ED260AE	20	1070	13	23	1900	24	3.5	97	0.9	55	Bumpers, body side mouldings and exterior body panels	Excellent scratch resistance and surface
Daplen™ EH221AE	20	1010	30	21	2100	30	5	-	0.68	50	0-gap bumpers, body panels	Excellent flowability, very low CLTE
Daplen™ EE209AE	20	1040	13	16	1400	65	20	93	0.5	43	0-gap painted bumpers	Very low CLTE, high impact
Daplen™ EH227AE	20	1050	40	16	1450	42	6	86	0.55	56	Exterior unpainted trims	Flow line/tiger stripes free, UV stabilised
Daplen™ EF109AE	20	1050	20	16	1400	38	5	90	0.7	47	0-gap painted bumpers	Very low CLTE, high flowability
Daplen™ EF209AE	20	1040	22	17	1600	60	6.5	95	0.65	45	0-gap bumpers	Very high flow, impact/stiffness balance
Daplen™ EF210AE	20	1040	22	17	1600	60	6.5	95	0.65	45	Bumpers, exterior trims	Low CLTE, UV stabilised, excellent surface appearance, high scratch resistance
Daplen™ EE340AE	30	1140	12	16	1500	49	4.6	101	0.5	30	Rocker bumpers, body panels	High flowability, very low CLTE
Daplen™ EF341AE	30	1145	15	25	3100	7.5	2.5	123	0.75	54	Fenders, exterior body panels	Excellent processability, high stiffness, class-A surface, very low CLTE
<b>Microcomposites</b>												
Borcom™ WE007AE	-	925	12	20	1200	35	5.5	89	0.8	65	Bumper, rocker panels, body panels	Good impact/stiffness balance – similar to TPO T10 with much lower density, excellent paintability
Borcom™ WH107AE	13	985	40	19	1600	-	6	98	0.8	70	Bumpers, rocker panels, exterior body panels	High flow and low density for lightweight applications, excellent surface quality

## Automotive – structural components

Trade/Grade name	Filler content [% indic.]	Density [kg/m <sup>3</sup> ]	MFR 230°C/2.16 kg [g/10 min]	Stress at yield [N/mm <sup>2</sup> ]	Tensile modulus [MPa]	Impact charpy notched 23°C [kJ/m <sup>2</sup> ]	Impact charpy notched -20°C [kJ/m <sup>2</sup> ]	HDTB, [0.45] [°C]	Shrinkage (*) indication [%]	CLTE [-30, +80°C] [µm/mK]	Typical applications	Special properties
<b>Glass fibre reinforced</b>												
GB205U	20	1040	2	75	4800	10	8	154	(**)	24/102	Engine covers, fans and shrouds, bumper brackets	Long-term heat resistance
Xmod™ K65G2	20	1040	6	85	5500	8	7	160	(**)	24/105	Climate controls, pump housings	Increased stiffness, low emission
Xmod™ GE277AI	20	1040	12	85	4900	11	9.5	157	(**)	-	Window frames, instrument panel carriers, thin wall structural carriers	Excellent foamability, very simple processing also at low wall thickness, good impact/stiffness ratio
GB311U	30	1120	2	97	6800	11	9	159	(**)	-	Air filter cases, lamp housings	Excellent dimensional stability
GD310U	30	1130	7	105	7200	10	9	159	(**)	-	Under the bonnet parts	High flowability
Xmod™ GD301HP	30	1170	4	110	8000	10	9	152	(**)	18/100	Pedal carriers, under the bonnet parts	Excellent mechanical balance
Xmod™ GD302HP	30	1160	3.3	65	5600	24	13	156	(**)	-	Seat structures, interior structural parts	High impact performance
Xmod™ GD301FE	30	1140	4	110	7500	12	10	158	(**)	-	Frontend carriers, door module carriers, fans and shrouds, pump housings, pedal carriers, airbag housings	Excellent mechanical properties
Xmod™ GB306SAF	35	1180	2	118	9000	11	10	160	(**)	16/110	Air intake manifolds, shrouds	Excellent mechanical properties, copper resistance, good acoustic behaviour
Xmod™ GB477HP	40	1219	2.7	130	10000	11.5	11	161	(**)	-	Structural parts, gear housings, pedal and pedal carriers, under the bonnet applications	Excellent stiffness, low emission values
Xmod™ WC377HP	Hybrid GF/MF	1150	5	70	6250	7	-	155	(**)	-	Airbag containers, engine covers, air filter housings	Good level of surface aesthetics, high heat stabilisation
Xmod™ WE380HP	Hybrid GF/MF	1130	13	56	4950	13	10	155	(**)	-	Gear housings, airbag containers, engine covers	High impact performance, excellent flowability and surface quality
Xmod™ WD300UB	Hybrid GF/MF	1130	5	-	6000	7	6.4	158	(**)	-	Air filter housings, engine covers	High stiffness and dimensional stability, long term heat stabilisation, good level of surface aesthetics
<b>Long glass fibre reinforced</b>												
Nepol™ GB215HP	20	1040	2	105	5300	19	22	158	(**)	-	Instrument panel carriers	Excellent foamability
Nepol™ GB303HP	30	1120	2	125	7400	23	26	165	(**)	18/100	Frontend carriers, seat structures, door module carrier, instrument panel carriers	Excellent stiffness/impact balance, very high dimensional stability
Nepol™ GB402HP	40	1240	2	140	9000	28	32	166	(**)	-	Frontend carriers, dashboard carriers, door module carriers, rear/front seat carriers, under the bonnet applications	High strength, high stiffness and excellent impact behaviour even at high temperature
Nepol™ GB601HP	60	1480	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	(**)	n.r	Frontend carriers, door module carriers, instrument panel carriers	PP-LGF concentrate, dilution technology
BJ100HP	n.r.	904	90	25	1300	4.5	2.2	88	(**)	100	Compounds for direct LFT and PP-LGF dilution	Low viscosity, excellent fibre-matrix coupling, high heat resistance