

Product Overview

AKRO-PLASTIC



AKRO-PLASTIC 

Think Polyamide

AKRO-PLASTIC GmbH

Member of the Feddersen Group

Compounds for All Your Needs

This brochure contains a compact technical overview of our broad range of products.

Please consult our application engineering department for questions or individual needs. Our engineers are able to offer competent advice on specific subjects, questions and problem solutions.

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You can find more detailed information on our Productfinder online:

www.akro-plastic.com/productfinder

Unreinforced Compounds

Typical values at 23 °C	Test specification	Test method	Unit	A3 HU natural (6382)		A3 1 L natural (4800)		A3 1 S3 black (1139)		A3 1 S3 black (21002)		A3 S1 black 950089 (1071)		B3 HU natural (6383)		B3 3 natural (5772)		B3 1 L black (4525)		B3 S1 black (3726)		C3 HU natural (6384)	
				PA 6.6	PA 6.6 + PP	PA 6.6-I	PA 6.6-I	PA 6.6-I	PA 6.6-I	PA 6.6-I	PA 6	PA 6	PA 6 + PP	PA 6-I	PA 6.6 + PA 6								
Description				PA 6.6		PA 6.6 + PP		PA 6.6-I		PA 6.6-I		PA 6.6-I		PA 6		PA 6		PA 6 + PP		PA 6-I		PA 6.6 + PA 6	
Product characterisation				heat stabilised material		easy flow, weight reduced		medium toughness		medium toughness, good price performance		highest toughness		heat stabilised material		nucleated material, fast cycling		easy flow, weight reduced		high toughness		heat stabilised material	
Mechanical properties				d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.
Tensile modulus	1 mm/min	ISO 527-2	MPa	3,200		2,300		2,700	1,300	2,300		2,000	900	3,200	1,000	3,200		2,300	1,200	2,000	550	2,800	
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	85/		55/		63/	45/	60/		50/	40/	84/	43/	80/		55/	40/	50/	45/	76/	
Strain at break	5 mm/min	ISO 527-2	%	>20		30		>35	>100	40		>50	>100	>30	>100	20		50	>50	>50	>100	65	
Flexural modulus	2 mm/min	ISO 178	MPa	2,800		2,100		2,500				1,950									1,500		
Flexural strength	2 mm/min	ISO 178	MPa	110		80		90													65		
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	n.b.		n.b.		n.b.	n.b.			n.b.	n.b.	n.b.	n.b.			n.b.	n.b.	n.b.	n.b.		
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	n.b.				n.b.	n.b.			n.b.	n.b.					n.b.	n.b.	n.b.	n.b.		
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	5		7		17	95	16		>80	>100	5	25			7	18	45	110		
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	2				10	13			35	35					5	4	20	20		
Electrical properties																							
Surface resistivity		IEC 60093	Ohm					1.0E+14				1.0E+14											
Comparative tracking index	Test solution A	IEC 60112		600				600				600											
Thermal properties				d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.	
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	262		262		262		260		262		222		220		220		222		222	
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	75		65		70				70		60				60		48			
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	215		150		213				152		160				140					
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C																				
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C																				
Flammability																							
Flammability	1.6 mm	UL 94	Class	V2				HB		HB		HB		V2						HB		V2	
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min			+		+		+		+		+			+		+		+		
GWFI	1.6 mm	IEC 60695-2-12	°C	850										825									
GWIT	1.6 mm	IEC 60695-2-13	°C	725										725									
General properties																							
Density	23 °C	ISO 1183	g/cm ³	1.14		1.04		1.1		1.1		1.07		1.13		1.13		1.04		1.07			
Content reinforcement / Content filler		ISO 1172	%																				
MVR	250/2.16	ISO 1133	cm ³ /10 min																				
Processing																							
Moulding shrinkage	flow	ISO 294-4	%	1.3–1.5		1.3–1.5		1.3–1.5		1.3–1.5		1.3–1.5		1.0–1.2		1.0–1.2		1.0–1.2		1.0–1.2		1.1–1.3	
Moulding shrinkage	transverse	ISO 294-4	%	1.5–1.7		1.5–1.7		1.5–1.7		1.5–1.7		1.5–1.7		1.1–1.3		1.1–1.3		1.1–1.3		1.1–1.3		1.3–1.5	

"cond." test values = conditioned, measured on test specimens stored according to DIN EN ISO 1110
 "d.a.m." = dry as moulded test values = residual moisture content <0.10 %
 n.b. = not broken + = passed


¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 = products with UL listing

Unreinforced Compounds

Reinforced Compounds

Typical values at 23 °C			Test specification	Test method	Unit	C3 1 S3 black (4297)	PK-VM natural (4774)	PK-HMT natural (5372)	P1 natural (7010)	P3 natural (7009)	A3 GF 30 1 black (2385)	A3 GF 30 HU black (6567)	A3 GF 30 4 6 black 950058 (13690)	A3 GF 30 6 black (6736)	A3 GF 30 1 L black (4436)							
Description						PA 6.6 + PA 6	PK	PK	PBT	PBT	PA 6.6 GF 30	PA 6.6 GF 30	PA 6.6 GF 30	PA 6.6 GF 30	PA 6.6 + PP GF 30							
Product characterisation						medium toughness, good flowability	standard, high elongation, good chemical resistance	higher heat deflection temperature	high flowability	medium flowability	standard	UL RTI listing	hydrolysis-stabilised	inorganic heat stabilised material	easy flow, weight reduced							
Mechanical properties						d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.							
Tensile modulus	1 mm/min	ISO 527-2	MPa	2,500	1,100	1,500	1,500	1,600	1,500	2,400	2,400	10,000	7,100	10,500	7,200	10,000	6,700	10,000		8,400	6,700	
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	65/	45/	60/	60/	65/	65/	55/	55/	/200	/130	/200	/130	/200	/130	/200		/150	/110	
Strain at break	5 mm/min	ISO 527-2	%	25	>100	>200	>200	>200	>200			3	≥6	3.1	6	3.5	7	3.2		3	4.4	
Flexural modulus	2 mm/min	ISO 178	MPa			1,900	1,500	2,100		2,600	2,500	8,800	7,200			9,500				8,200	7,000	
Flexural strength	2 mm/min	ISO 178	MPa			70	70	70	90	85	285	220			300					220	175	
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.	85	95	75		86	95	75			77	77	
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	n.b.		n.b.		n.b.			80				73					73		
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	7	20	10	10	12	12	3.5	4			12	16	12			12	17	15	16
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	6		3.5		5			11				10					13		
Electrical properties																						
Surface resistivity		IEC 60093	Ohm			1.0E+13	1.0E+10	1.0E+13		1E+12		1E+12		1.0E+12	1.0E+10			1.0E+13				
Comparative tracking index	Test solution A	IEC 60112				600					600		>600		600					600		
Thermal properties						d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	260		220		235		223		223		262		262		262		262		
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	60		100		120		55		50		255		255		253		255		
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	180		190		215						260		260		265				
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C											210		210					150	
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C											145		155				165		
Flammability																						
Flammability	1.6 mm	UL 94	Class	HB		HB		HB				HB		HB		HB						
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+		+			+		+		+		+		+		+		+	
GWFI	1.6 mm	IEC 60695-2-12	°C											650								
GWIT	1.6 mm	IEC 60695-2-13	°C																			
General properties																						
Density	23 °C	ISO 1183	g/cm ³	1.12		1.24		1.24		1.31		1.31		1.36		1.35		1.36		1.36		
Content reinforcement / Content filler		ISO 1172	%											30		30		30		30		
MVR	250/2.16	ISO 1133	cm ³ /10 min						62		38										30	
Processing																						
Moulding shrinkage	flow	ISO 294-4	%	1.1–1.3		1.4–1.6		1.4–1.6		1.7–1.9		1.7–1.9		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		
Moulding shrinkage	transverse	ISO 294-4	%	1.3–1.5		1.5–1.7		1.5–1.7		1.8–2.0		1.8–2.0		0.7–0.9		0.7–0.9		0.7–0.9		0.7–0.9		


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¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 = products with UL listing

Reinforced Compounds

Typical values at 23 °C			Test specification	Test method	Unit	A3 GF 30 4 L black (4678)	A28 GF 30 1 GIT black (4619)	A28 GF 30 9 EN MCL black (5966)	A3 GF 40 1 black (2386)	A3 GF 40 1 LT black (5709)	A3 GF 50 1 black (2387)	A3 GF 50 HU black (6303)	A3 GF 50 1 EN black (5737)	A3 GF 50 4 black (7282)	A28 GF 50 1 GIT black (5029)						
Description						PA 6.6 + PP GF 30	PA 6.6 GF 30	PA 6.6 GF 30	PA 6.6 GF 40	PA 6.6 GF 40	PA 6.6 GF 50	PA 6.6 GF 50	PA 6.6 GF 50	PA 6.6 GF 50	PA 6.6 GF 50						
Product characterisation						hydrolysis-stabilised, weight reduced	easy flow, top surface, GIT/WIT	suitable for Mucell®	standard	laser transparent material	standard	UL RTI listing	electrical neutral, CoA (I, Br <1 ppm)	hydrolysis-stabilised	easy flow, top surface, GIT/WIT						
Mechanical properties						d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.
Tensile modulus	1 mm/min	ISO 527-2	MPa	8,600	7,000	9,500	7,000	9,600	13,100	9,800	13,000	9,800	16,700	12,600	18,000	12,700	16,700	12,600	16,900	13,000	17,500
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/150	/110	/195	/130	/200	/225	/160	/225	/160	/250	/180	/255	/180	/250	/180	/250	/180	/270
Strain at break	5 mm/min	ISO 527-2	%	2.8	4	3.5	7	3	3	4	3	4	2.5	3.5	2.8	3.5	2.5	3.5	3,0	4,0	3
Flexural modulus	2 mm/min	ISO 178	MPa	8,600		8,700			12,000	9,300	12,000	9,300	15,200	13,600			15,200	13,600	16,000		
Flexural strength	2 mm/min	ISO 178	MPa	220		300			360	260	360	260	380	310			380	310	380		
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	70	66	90	100	70	100	105	100	105	105	110	105		105	110	114	120	100
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²			70			95	95	95	95	105				105		110		
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	16	16	15	19	13	17	20	17	20	19	23	20		19	23	20	25	20
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²			13			15	15	15	15	16				16				
Electrical properties																					
Surface resistivity		IEC 60093	Ohm						1.0E+12	1.0E+10			1.0E+12	1.0E+10			1.0E+12	1.0E+10			
Comparative tracking index	Test solution A	IEC 60112							600	600	600	600	600	600	600	600	600	600	600	600	600
Thermal properties						d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	262		255		262	262		262		262		262		262		262		260
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	246		255			260		260		260		260		260		260		250
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C						260				260		260		260		260		
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C			180			225		225		235				235				
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C						145		145		145		155		145		160		
Flammability																					
Flammability	1.6 mm	UL 94	Class			HB			HB		HB		HB		HB		HB		HB		HB
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+		+			+		+		+		+		+		+		+
GWFI	1.6 mm	IEC 60695-2-12	°C						650				650		700		650				
GWIT	1.6 mm	IEC 60695-2-13	°C																		
General properties																					
Density	23 °C	ISO 1183	g/cm ³	1.26		1.36		1.36	1.46		1.46		1.57		1.56		1.57		1.57		1.57
Content reinforcement / Content filler		ISO 1172	%	30		30		30	40		40		50		50		50		50		50
MVR	250/2.16	ISO 1133	cm ³ /10 min																		
Processing																					
Moulding shrinkage	flow	ISO 294-4	%	0.1–0.3		0.1–0.3		0.1–0.3	0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3
Moulding shrinkage	transverse	ISO 294-4	%	0.7–0.9		0.7–0.9		0.7–0.9	0.6–0.8		0.6–0.8		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7


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 n.b. = not broken + = passed

¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 = products with UL listing

Reinforced Compounds

Typical values at 23 °C			Test specification	Test method	Unit	A3 GF 60 1 black (2395)	A3 GM 20/10 4 WIT black (4529)	A3 GM 20/10 S1 natural (1217)	B3 GF 15 black (2490)	B28 GF 15 natural (6940)	B3 GF 25 1 black (20013)	B28 GF 25 natural (6430)	B3 GF 25 1 L black (4637)	B3 GF 30 1 black (2485)	B3 GF 30 1 black (20000)								
Description						PA 6.6 GF 60	PA 6.6 GF 20 + GB 10	PA 6.6-I GF 20 + GB 10	PA 6 GF 15	PA 6 GF 15	PA 6 GF 25	PA 6 GF 25	PA 6 + PP GF 25	PA 6 GF 30	PA 6 GF 30								
Product characterisation						standard	hydrolysis-stabilised, good surface, low warpage, WIT	good toughness, good surface, low warpage	standard	easy flow, transportation sector	good price performance	easy flow, transportation sector	easy flow, weight reduced	standard	good price performance								
Mechanical properties						d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.								
Tensile modulus	1 mm/min	ISO 527-2	MPa	20,500	15,800	8,200	5,200	6,900	4,200	6,100	3,300	5,300	8,000	8,300	5,000	7,500	5,600	10,300	6,200	9,500	6,000		
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/260	/190	/175	/100	/130	/85	/120	/75	/120	/155	/162	/100	/135	/88	/185	/110	/175	/100		
Strain at break	5 mm/min	ISO 527-2	%	2	2.5	3.7	11.5	4	10	3	10	3	3	3.0	6.5	3.3	4.5	3	5.5	3	5		
Flexural modulus	2 mm/min	ISO 178	MPa	19,800		7,600	5,200	6,900		5,200		4,500						8,500		8,000			
Flexural strength	2 mm/min	ISO 178	MPa	400		260	170	205		180		210						270		260			
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	85	95	65	80	80	80	52	95	39		65		67		68	68	95	105	90	100
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	97		50	48	76		43								67	54	85	85	70	
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	19	22	9	9.5	15	16	7	11			10				15	15	13	18	12	15
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	19		7	6.5	8		6								13	10	12	12	9	
Electrical properties																							
Surface resistivity		IEC 60093	Ohm	1.0E+12	1.0E+10	1.0E+12	1.0E+10			1.0E+12	1.0E+10									1.0E+12	1.0E+10	1.0E+12	1.0E+10
Comparative tracking index	Test solution A	IEC 60112		600						600								600		600			
Thermal properties																							
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	262		262		262		220		220		220		220		220		220		220	
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	260		240		245		205		205		208		198		210		210		210	
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	260		260		260		220		220		220		217		220		220		220	
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C	235														150		150		150	
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C	145						145													
Flammability																							
Flammability	1.6 mm	UL 94	Class	HB		HB		HB		HB		HB		HB		HB							
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+		+		+		+		+		+		+		+		+		+	
GWFI	1.6 mm	IEC 60695-2-12	°C	650						650						725						650	
GWIT	1.6 mm	IEC 60695-2-13	°C													750							
General properties																							
Density	23 °C	ISO 1183	g/cm ³	1.71		1.36		1.31		1.23		1.23		1.31		1.31		1.22		1.36		1.36	
Content reinforcement / Content filler		ISO 1172	%	60		30		30		15				25		25		25		30		30	
MVR	250/2.16	ISO 1133	cm ³ /10 min																				
Processing																							
Moulding shrinkage	flow	ISO 294-4	%	0.1–0.3		0.3–0.5		0.4–0.6		0.2–0.4		0.2–0.4		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3	
Moulding shrinkage	transverse	ISO 294-4	%	0.4–0.6		0.7–0.9		0.9–1.1		0.6–0.8		0.6–0.8		0.55–0.75		0.55–0.75		0.55–0.75		0.5–0.7		0.5–0.7	


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 n.b. = not broken + = passed

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 = products with UL listing

Reinforced Compounds

Typical values at 23 °C	Test specification	Test method	Unit	B28 GF 30 natural (6941)		B3 GF 30 6 black (20009)		B28 GF 30 6 LT black (6931)		B+ GF 30 6 black (7387)		B3 GF 30 1 L black (4365)		B28 GF 30 S3 natural (4835)		B3 GF 30 S1 natural (1383)		B3 GF 30 S1 LA black (4446)		B3 GF 30 1 GIT black (4598)		B3 GF 30 1 PST black (6647)	
Description				PA 6 GF 30		PA 6 GF 30		PA 6 GF 30		PA 6 GF 30		PA 6 + PP GF 30		PA 6-I GF 30		PA 6-I GF 30		PA 6-I GF 30		PA 6 GF 30		PA 6 GF 30	
Product characterisation				easy flow, transportation sector		inorganic heat stabilised material		easy flow, inorganic heat stabilised material, laser transparent		high stiffness after conditioning, substitute PA 6.6		easy flow, weight reduced		easy flow, dry impact modified		cold impact modified		cold impact modified, laser markable		easy flow, top surface, GIT/WIT		optimised adhesion on metal, PST*	
Mechanical properties				d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.
Tensile modulus	1 mm/min	ISO 527-2	MPa	10,200		10,000	6,500	9,300	6,000	9,500	5,700	8,800	6,800	9,000	4,900	7,500	4,200	8,400		9,500	6,000	10,300	6,200
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/170		/180	/105	/180	/100	/180	/117	/140	/105	/160	/105	/125	/70	/150		/175	/110	/185	/110
Strain at break	5 mm/min	ISO 527-2	%	3		3	5	3	5.5	3.6	9	3	4.5	4.5	10	6	13	5		3.0	5.5	3	5.5
Flexural modulus	2 mm/min	ISO 178	MPa	8,400		8,000		8,000		9,200		8,800	6,200	7,500		6,400		8,000				8,500	
Flexural strength	2 mm/min	ISO 178	MPa	230		250		250		270		215	155	245		190		250				270	
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	74		80	90	75		86		70	70	100	100	110	135	105				95	105
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²							72		56	55	110		117		110				85	85
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²			13	18	12	18	14	19	15	16	20	30	34	42	23				13	18
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²							11	11	15	13	15		24		15				12	12
Electrical properties																							
Surface resistivity		IEC 60093	Ohm			1.0E+12	1.0E+10																
Comparative tracking index	Test solution A	IEC 60112											600										600
Thermal properties																							
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.	
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	220		220		220		220		220		220		222		222		220		220	
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	210		210		210		210		200		207		200		205		210		210	
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C	220																220		220	
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C														145					150	
Flammability																							
Flammability	1.6 mm	UL 94	Class	HB		HB		HB								HB		HB		HB		HB	
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+		+		+				+				+		+		+		+	
GWFI	1.6 mm	IEC 60695-2-12	°C																				
GWIT	1.6 mm	IEC 60695-2-13	°C																				
General properties																							
Density	23 °C	ISO 1183	g/cm ³	1.35		1.36		1.35		1.35		1.26		1.3		1.28		1.33		1.36		1.36	
Content reinforcement / Content filler		ISO 1172	%	30		30		30		30		30		30		30		30		30		30	
MVR	250/2.16	ISO 1133	cm ³ /10 min																				
Processing																							
Moulding shrinkage	flow	ISO 294-4	%	0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3		0.1–0.3	
Moulding shrinkage	transverse	ISO 294-4	%	0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7		0.5–0.7	


"cond." test values = conditioned, measured on test specimens stored according to DIN EN ISO 1110
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¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 = products with UL listing
 PST * = Plasmatreat PST cooperative development, adhesion metal plastic

Reinforced Compounds

Typical values at 23 °C	Test specification	Test method	Unit	B3 GF 30 RM-M black (3016)	B3 GK 30 black (1827)	B3 GM 10/20 1 L black (4646)	B28 GM 10/20 1 LA black (4790)	B3 GF 40 1 black (20016)	B3 GF 40 black (3383)	B3 GM 20/20 1 grey (5486)	B3 GF 45 1 black (5744)	B3 GF 50 1 black (2488)	B3 GF 50 1 black (20008)									
Description				PA 6 + X GF 30	PA 6 GB 30	PA 6 + PP GF 10 + GB 20	PA 6 GF 10 + GB 20	PA 6 GF 40	PA 6 GF 40	PA 6 GF 20 + GB 20	PA 6 GF 45	PA 6 GF 50	PA 6 GF 50									
Product characterisation				very high stiffness after conditioning	low warpage	weight reduced, good surface	easy flow, laser markable	good price performance	top strength, airbag type	low warpage, good surface	top surface	standard	good price performance									
Mechanical properties				d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.									
Tensile modulus	1 mm/min	ISO 527-2	MPa	11,000	7,100	4,500	2,000	5,100	3,300	5,700	3,000	12,500	8,000	12,800	8,200	8,500	14,000	17,000	10,300	17,000	11,000	
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/165	/110	/75	/40	/88	/55	/110	/60	/195	/120	/210	/130	/120	/200	/230	/145	/210	/140	
Strain at break	5 mm/min	ISO 527-2	%	2.6	4.5	>3.5	>25	3.4	6	2.6	10	3	5	4	5	2.5	4.5	2.5	4.5	3	5	
Flexural modulus	2 mm/min	ISO 178	MPa	9,600		3,300		4,700		5,000				10,300			13,000		14,900		16,500	11,000
Flexural strength	2 mm/min	ISO 178	MPa	250		110		130		170				300			315		340		330	230
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	70	70	20	40	46	44	30	80	95	100	110	110	50	110	110	100	110	100	100
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	65	60			43	42	30				110			95		90			
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	12	15	3	5	7	9	4	7	15	21	18	23		22		20	26	18	23
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	10	10			4	4	4				14			18		16			
Electrical properties																						
Surface resistivity		IEC 60093	Ohm					1.0E+5		1.0E+12	1.0E+10								1.0E+12	1.0E+10	1.0E+12	1.0E+10
Comparative tracking index	Test solution A	IEC 60112		>600												550			600		600	
Thermal properties				d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.									
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	222	222	220	222	220	220	222	220	225	220	220	220	220	220	220	220	220	220	220
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	210	70	165	200	210	215	200	200	220	220									
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C		185	208		220		220	220	220	220									
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C	160				165			145	185	185									
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C																			
Flammability																						
Flammability	1.6 mm	UL 94	Class	HB	HB		HB	HB	HB	HB		HB	HB									
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+	+	+	+	+	+	+		+	+									
GWFI	1.6 mm	IEC 60695-2-12	°C				650					650	650									
GWIT	1.6 mm	IEC 60695-2-13	°C																			
General properties																						
Density	23 °C	ISO 1183	g/cm ³	1.41	1.34	1.26	1.35	1.46	1.45		1.5	1.56	1.56									
Content reinforcement / Content filler		ISO 1172	%	30	30	30	30	40	40	40	45	50	50									
MVR	250/2.16	ISO 1133	cm ³ /10 min																			
Processing																						
Moulding shrinkage	flow	ISO 294-4	%	0.1–0.3	0.8–1.0	0.3–0.5	0.3–0.5	0.1–0.3	0.1–0.3	0.2–0.4	0.1–0.3	0.1–0.3	0.1–0.3									
Moulding shrinkage	transverse	ISO 294-4	%	0.5–0.7	0.9–1.1	0.6–0.8	0.6–0.8	0.5–0.7	0.5–0.7	0.6–0.8	0.45–0.65	0.4–0.6	0.4–0.6									


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 = products with UL listing

Reinforced Compounds

Typical values at 23 °C		Test specification	Test method	Unit	B+ GF 50 6 black (7389)	B3 GF 50 4 RM-M black (3221)	B28 GF 50 9 natural (6570)	B28 GF 50 1 GIT black (4732)	B3 GF 60 1 black (4644)	C3 GF 30 1 black (4363)	C3 GF 30 5 XTC natural (4499)	C3 GF 35 5 XTC black (5552)	C3 GF 50 1 black (4401)	C3 GF 50 5 XTC natural (4946)								
Description					PA 6 GF 50	PA 6 + X GF 50	PA 6 GF 50	PA 6 GF 50	PA 6 GF 60	PA 6.6 + PA 6 GF 30	PA 6.6 + PA 6 GF 30	PA 6.6 + PA 6 GF 35	PA 6.6 + PA 6 GF 50	PA 6.6 + PA 6 GF 50								
Product characterisation					very high stiffness after conditioning, substitute PA 6.6	very high stiffness after conditioning	easy flow, top surface	easy flow, top surface	easy flow, good surface, pedals	alternative to PA 6.6	best heat aging stability	best heat aging stability	alternative PA 6.6	best heat aging stability								
Mechanical properties					d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.
Tensile modulus	1 mm/min	ISO 527-2	MPa	16,500	10,000	16,500	13,000	17,000	16,700	10,500	21,000	13,500	9,300	6,500	9,500	6,000	11,500	8,000	16,000	11,000	17,500	10,500
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/231	/164	/210	/160	/250	/235	/150	/250	/160	/185	/120	/185	/115	/195	/135	/240	/165	/250	/160
Strain at break	5 mm/min	ISO 527-2	%	3.1	5	2	2.7	3	3	4.5	2.5	3.5	3	5.5	3.5	6.5	3.5	6.5	2.5	4	3	5
Flexural modulus	2 mm/min	ISO 178	MPa	16,500		16,800					19,000		9,200						16,200		17,000	
Flexural strength	2 mm/min	ISO 178	MPa	365		320					370		275						360		420	
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	106		75	75	115	105	105	90	95	75	90	95	95	100		95	100	125	140
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	105		60	60				90		60								130	
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	23	28	20	20	22	20	25	20	25	11	14	13	13	18	19	20	20	25	30
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	19	21	16	20				20		10						20		25	
Electrical properties																						
Surface resistivity		IEC 60093	Ohm			1.0E+12							1.0E+12	1.0E+10	1.0E+12	1.0E+10	1.0E+12		1.0E+12	1.0E+10	1.0E+12	1.0E+10
Comparative tracking index	Test solution A	IEC 60112				600							600		600				600			
Thermal properties					d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	220		225		220		220		220		260		245		245		260		245
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	210		205		220		220		220		247		230				250		230
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	218				220		220		220		257		250						
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C			165		185						204					220			195
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C																			
Flammability																						
Flammability	1.6 mm	UL 94	Class					HB		HB		HB		HB		HB		HB		HB		HB
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min			+		+		+		+		+		+		+		+		+
GWFI	1.6 mm	IEC 60695-2-12	°C																			
GWIT	1.6 mm	IEC 60695-2-13	°C																			
General properties																						
Density	23 °C	ISO 1183	g/cm ³	1.56		1.6		1.56		1.55		1.7		1.36		1.36				1.57		
Content reinforcement / Content filler		ISO 1172	%	50		50		50		50		60		30		30		35		50		50
MVR	250/2.16	ISO 1133	cm ³ /10 min																			
Processing																						
Moulding shrinkage	flow	ISO 294-4	%	0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3
Moulding shrinkage	transverse	ISO 294-4	%	0.4-0.6		0.4-0.6		0.4-0.6		0.4-0.6		0.3-0.5		0.6-0.8		0.6-0.8		0.55-0.75		0.4-0.6		0.4-0.6


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 = products with UL listing

Reinforced Compounds

Typical values at 23 °C	Test specification	Test method	Unit	PK-VM GF 30 natural (4706)	PK-VM GF 50 black (5394)	PK-VM GF 60 black (5993)	P3 GF 15 natural (6942)	P3 GF 30 black (6924)	P3 GF 40 natural (6943)	P3 GF 50 black (6925)	K GF 30 black (7249)	K GF 50 black (7250)	V GF 30 black (7015)										
Description				PK GF 30	PK GF 50	PK GF 60	PBT GF 15	PBT GF 30	PBT GF 40	PBT GF 50	PBT-PET GF 30	PBT-PET GF 50	PBT-ASA GF 30										
Product characterisation				standard, good chemical resistance	standard, good chemical resistance	standard, good chemical resistance	high dimensional and chemical resistance	narrowest specifications		narrowest specifications		top mechanics, good surface	low warpage, PBT blend										
Mechanical properties				d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.		
Tensile modulus	1 mm/min	ISO 527-2	MPa	8,000	7,700	14,500	14,000	16,700	16,200	6,000		10,000		13,500		17,000		9,800		17,400		9,400	
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/115	/100	/160	/140	/170	/150	/110		/145		/175		/175		/150		/178		/130	
Strain at break	5 mm/min	ISO 527-2	%	2	2	1.8	1.8	2	2	3.5		3.2		2.5		1.9		3.1		2		2.4	
Flexural modulus	2 mm/min	ISO 178	MPa	8,200		13,500		18,000		5,500		10,500		12,500		16,500							
Flexural strength	2 mm/min	ISO 178	MPa	165		210		235		175		230		270		285							
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	45	35	50	35	60	45	40		68		70		60		68		66		60	
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	45																			
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	15	15	15	15	13	13	6.5		11		13		12		10		11		9	
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	12																			
Electrical properties																							
Surface resistivity		IEC 60093	Ohm	1.0E+12	1.0E+10																		
Comparative tracking index	Test solution A	IEC 60112				600				300				300									
Thermal properties				d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.										
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	220	220	220	225	225	225	225	225	223											
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	215	220	215	205	205	215	215	215	205											
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C																				
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C																				
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C																				
Flammability				HB	HB	HB	HB	HB	HB	HB	HB	HB	HB										
Flammability	1.6 mm	UL 94	Class	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB										
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+	+	+	+	+	+	+	+	+	+										
GWFI	1.6 mm	IEC 60695-2-12	°C	725	725		725	725	725	725	725	725											
GWIT	1.6 mm	IEC 60695-2-13	°C	750																			
General properties																							
Density	23 °C	ISO 1183	g/cm ³	1.48	1.65	1.8	1.4	1.53	1.59	1.71	1.55	1.72											
Content reinforcement / Content filler		ISO 1172	%	30	50	60	15	30	40	50	50	30											
MVR	250/2.16	ISO 1133	cm ³ /10 min				14	9	5	2		5											
Processing																							
Moulding shrinkage	flow	ISO 294-4	%	0.2-0.4	0.1-0.3	0.1-0.3	0.5-0.7	0.2-0.4	0.1-0.3	0.1-0.3	0.1-0.3	0.2-0.4	0.1-0.3	0.2-0.4									
Moulding shrinkage	transverse	ISO 294-4	%	0.6-0.8	0.3-0.5	0.2-0.4	0.9-1.1	0.8-1.0	0.6-0.8	0.5-0.7	0.7-0.9	0.5-0.7	0.5-0.7										


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 = products with UL listing

Reinforced Compounds

Typical values at 23 °C	Test specification	Test method	Unit	W GF 30 black (7181)	S3 GF 15 5 black (6062)	S3 GF 30 1 L black (4657)	S3 GF 50 1 black (3441)	D3 GF 30 1 black (5392)	D3 GF 30 1 LT black (5391)	PP GFM 25/15 LA black (3143)	PP GFM 25/15 natural (2118)	PP GFM 25/15 black (1415)
Description				PBT-ABS GF 30	PA 610 GF 15	PA 610 + PP GF 30	PA 610 GF 50	PA 6.12 GF 30	PA 6.12 GF 30	PP GF 25 + M 15	PP GF 25 + M 15	PP GF 25 + M 15
Product characterisation					quick connector, substitute PA 12 GF 23	weight reduced, good chemical resistance	good chemical resistance	quick connector	quick connector, laser transparent material	housing, laser markable	housing	housing
Mechanical properties				d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.
Tensile modulus	1 mm/min	ISO 527-2	MPa	9,100	5,500	8,200 6,700	14,500 11,000	9,500 7,000	9,200 6,700	6,250	6,400	6,400
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/125	/120	/130 /106	/200 /150	/180 /120	/170 /120	73/	75/	74/
Strain at break	5 mm/min	ISO 527-2	%	2.7	4	3.1 3.8	3.5 4.5	3.5 4.4	3.5 4.6	3.6	3.5	3.6
Flexural modulus	2 mm/min	ISO 178	MPa				13,800			6,600	6,600	6,600
Flexural strength	2 mm/min	ISO 178	MPa				310			105	105	103
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	60		60 56	100 100	95 80	85 87	44	47	45
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²				105			44	45	45
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	10		15 14	20	15 15	13 19	11	11	11
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²				16					
Electrical properties												
Surface resistivity		IEC 60093	Ohm									
Comparative tracking index	Test solution A	IEC 60112								600	600	600
Thermal properties				d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C		220	220	220	215	215	167	167	167
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C			182	205	200	200	150	150	150
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C							163	163	163
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C				170					
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C									
Flammability												
Flammability	1.6 mm	UL 94	Class	HB						HB	HB	HB
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min		+	+	+	+	+	+	+	+
GWFI	1.6 mm	IEC 60695-2-12	°C									
GWIT	1.6 mm	IEC 60695-2-13	°C									
General properties												
Density	23 °C	ISO 1183	g/cm ³	1.42	1.18	1.23	1.51	1.31	1.31	1.21	1.21	1.21
Content reinforcement / Content filler		ISO 1172	%	30	15	30	50	30	30	40	40	40
MVR	250/2.16	ISO 1133	cm ³ /10 min	4								
Processing												
Moulding shrinkage	flow	ISO 294-4	%	0.2–0.4	0.4–0.6	0.2–0.4	0.1–0.3	0.3–0.5	0.3–0.5	0.1–0.3	0.1–0.3	0.1–0.3
Moulding shrinkage	transverse	ISO 294-4	%	0.5–0.7	0.9–1.1	0.7–0.9	0.6–0.8	0.8–1.0	0.7–0.9	0.4–0.6	0.4–0.6	0.4–0.6


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¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 = products with UL listing

Carbon Fibre Reinforced Compounds

Typical values at 23 °C	Test specification	Test method	Unit	A3 ICF 10 black (5117)	A3 ICF 15 black (5056)	A3 ICF 20 black (5102)	A3 ICF 30 black (5021)	A3 CGM 10/20 4 black (5870)	B3 ICF 10 1 black (6194)	B3 ICF 20 1 L black (5296)	B3 ICF 40 black (5020)	B3 CGM 15/20 1 black (5489)	P3 ICF 10 black (6946)										
Description				PA 6.6 CF 10	PA 6.6 CF 15	PA 6.6 CF 20	PA 6.6 CF 30	PA 6.6 CF 10 + GF 20	PA 6 CF 10	PA 6 + PP CF 20	PA 6 CF 40	PA 6 CF 15 + GF 20	PBT CF 10										
Product characterisation				carrier center console	clutch pedals, 10 % less weight to PA 6 GF 30, SPE Award	painting aid, good mechanical and electrical conductivity		fuel filter housing	good surface, engine cover	weight reduced, very good strength		fuel filter housing											
Mechanical properties				d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.										
Tensile modulus	1 mm/min	ISO 527-2	MPa	9,000	6,000	12,000	7,400	16,000	9,500	24,000	15,000	14,500		8,500	3,500	14,200	9,700	32,000	13,600	18,000	9,600	7,500	
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/145	/100	/170	/110	/190	/135	/240	/170	/190		/125	/50	/140	/120	/220	/135	/195	/115	/100	
Strain at break	5 mm/min	ISO 527-2	%	3	6	3	5	2.5	4	1.8	3.5	2.2		3.5	12	2.5	4.5	1.7	3	2	4	4.7	
Flexural modulus	2 mm/min	ISO 178	MPa	7,000	5,500	10,400	7,000	14,000		22,000	14,000			7,000	3,400	13,000	9,700	25,000	17,000	13,500	10,200	7,500	
Flexural strength	2 mm/min	ISO 178	MPa	200	150	250	170	280		370	265			200	100	230	170	320	215	250	180	175	
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	30	70	45	65	50	60	55	70	65		45	95	50	60	60	65	60		30	
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	30		35		42		55				40		45		50		60			
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	3	4.5	5	6	6	8	8	11			4	9	9	11	10	15	10		3.5	
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	3		4		4		6				3		6		8		8			
Electrical properties																							
Surface resistivity		IEC 60093	Ohm	1.0E+10	1.0E+10	1.0E+5	1.0E+5	1.0E+4	1.0E+4	1.0E+4	1.0E+4	3E+5		1.0E+11		10E5		1.0E+3	1.0E+3	1.0E+4		1.0E+12	
Comparative tracking index	Test solution A	IEC 60112																					
Thermal properties				d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.										
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	262	262	262	262	262	262	262	262	262	225										
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	245	245	250	254	254	254	254	254	254	205										
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C																				
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C																				
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C																				
Flammability																							
Flammability	1.6 mm	UL 94	Class	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB										
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+									+										
GWFI	1.6 mm	IEC 60695-2-12	°C										725										
GWIT	1.6 mm	IEC 60695-2-13	°C																				
General properties																							
Density	23 °C	ISO 1183	g/cm ³	1.14	1.2	1.23	1.28	1.28	1.33	1.17	1.15	1.31	1.34										
Content reinforcement / Content filler		ISO 1172	%	10	15	20	30	30	30	10	20	40	10										
MVR	250/2.16	ISO 1133	cm ³ /10 min										23										
Processing																							
Moulding shrinkage	flow	ISO 294-4	%	0.3–0.5	0.2–0.4	0.2–0.4	0.1–0.3	0.1–0.3	0.1–0.3	0.3–0.5	0.1–0.3	0.1–0.3	0.4–0.6										
Moulding shrinkage	transverse	ISO 294-4	%	0.8–1.0	0.7–0.9	0.6–0.8	0.5–0.7	0.7–0.9	0.7–0.9	0.6–0.8	0.4–0.6	0.5–0.7	0.9–1.1										


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Carbon Fibre Reinforced Compounds


Typical values at 23 °C	Test specification	Test method	Unit	P3 ICF 20 black (6947)		P3 ICF 30 black (6948)		P3 ICF 40 black (6949)		PA ICF 40 black (5270)		PARA ICF 40 black (6128)		T1 ICF 30 black (5148)		T5 ICF 30 black (6410)		T1 CGM 15/10 S1 black (6431)		PK-VM CF 10 TM black (6135)		PK-VM ICF 15 black (6074)	
Description				PBT CF 20		PBT CF 30		PBT CF 40		PA 6.6 + PA 6I/6T CF 40		PARA CF 40		PPA CF 30		PPA CF 30		PPA-I CF 15 + GF 10		PK CF 10		PK CF 15	
Product characterisation										high stiffness, low water absorption		highest stiffness, top surface		high stiffness, good chemical resistance, Tg 100 °C		high stiffness, good chemical resistance, Tg 130 °C		connector, good chemical resistance, antistatic		very high elongation and excellent tribological performance		good sliding properties	
Mechanical properties				d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.
Tensile modulus	1 mm/min	ISO 527-2	MPa	16,000		23,500		31,000		35,000	32,000	39,000	38,000	27,000	27,000	27,000		15,000	15,000	3,500		9,000	
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/150		/175		/190		/250	/230	/280	/255	/240	/240	/260		/185	/175	56/41		/90	
Strain at break	5 mm/min	ISO 527-2	%	3		2.1		1.2		1.5	1.5	1.0	1.0	1.2	1.2	1.2		1.5	2	>30		1.5	
Flexural modulus	2 mm/min	ISO 178	MPa	15,000		32,500		32,500		35,000	33,000	37,000	35,000	25,000	24,500	25,000		15,500	15,500			8,600	
Flexural strength	2 mm/min	ISO 178	MPa	250		300		300		400	360	420	360	340	340	390		275	260			120	
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	50		50		50		50	50	30		35	38	45		50	40	112		30	
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²							50				33				45					
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	7.5		7		7		8	8	5		5	5			8	7	7			
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²							7				5				5					
Electrical properties																							
Surface resistivity		IEC 60093	Ohm	1.0E+03		1.0E+03		1.0E+03		1.0E+4	1.0E+4	1.0E+4	1.0E+4	1.0E+4	1.0E+4			1.0E+5		1.0E+12		2E+4	
Comparative tracking index	Test solution A	IEC 60112																					
Thermal properties				d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.		d.a.m.	
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	225		225		225		255		235		313		325		313		220		220	
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	205		215		215		235				258				266					
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C																				
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C																				
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C																				
Flammability																							
Flammability	1.6 mm	UL 94	Class	HB		HB		HB		HB		HB		HB		HB		HB		HB		HB	
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+		+		+		+		+								+			
GWFI	1.6 mm	IEC 60695-2-12	°C	725		725		725															
GWIT	1.6 mm	IEC 60695-2-13	°C																				
General properties																							
Density	23 °C	ISO 1183	g/cm ³	1.37		1.41		1.44		1.35		1.4		1.34		1.34		1.29		1.27		1.26	
Content reinforcement / Content filler		ISO 1172	%	20		30		40		40		40		30		30		25		10		15	
MVR	250/2.16	ISO 1133	cm ³ /10 min	17		10		8															
Processing																							
Moulding shrinkage	flow	ISO 294-4	%	0.3–0.5		0.2–0.4		0.1–0.3		0.1–0.3		0.0–0.2		0.1–0.3		0.1–0.3		0.1–0.3		1.4–1.6		0.3–0.5	
Moulding shrinkage	transverse	ISO 294-4	%	0.8–1.0		0.6–0.8		0.5–0.7		0.3–0.5		0.2–0.4		0.4–0.6		0.4–0.6		0.55–0.75		1.5–1.7		0.8–1.0	

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 = products with UL listing


Typical values at 23 °C			Test specification	Test method	Unit	PA GF 30 black (6415)	PA GF 35 S1 black (7121)	PA GF 40 black (6416)	PA GF 50 black (6507)	PA GF 50 black (6546)	PA GF 60 black (6418)	PA GF 60 black (6765)	PARA GF 50 1 natural (5750)	PARA GF 60 1 natural (6165)							
Description						PA 6.6 + PA 6I/6T GF 30	PA 6.6 + PA 6I/6T-I	PA 6.6 + PA 6I/6T GF 40	PA 6.6 + PA 6I/6T GF 50	PA 6.6 + PA 6I/6T GF 50	PA 6.6 + PA 6I/6T GF 60	PA 6.6 + PA 6I/6T GF 60	PARA GF 50	PARA GF 60							
Product characterisation						high stiffness after conditioning	impact modified material	high stiffness after conditioning	very high stiffness after conditioning	easy flow, high transverse forces	very high stiffness after conditioning	easy flow, high transverse forces	top surface and strength	top surface and strength							
Mechanical properties						d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.		
Tensile modulus	1 mm/min	ISO 527-2	MPa	9,800	9,000	11,000	10,500	13,000	12,500	17,000	15,500	16,000	15,500	21,000	20,000	20,000	19,500	19,000	19,000	24,000	24,000
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/200	/135	/195	/160	/235	/160	/265	/190	/250	/190	/275	/225	/290	/240	/310	/280	/320	/290
Strain at break	5 mm/min	ISO 527-2	%	2.8	2.8	2.8	3	2.8	2.8	2.7	2.7	2.5	2.5	2.4	2.4	2.1	2.1	2.3	2.3	2.0	2.0
Flexural modulus	2 mm/min	ISO 178	MPa	9,500	9,500			12,500	12,500	16,500	15,000	17,500	16,000	21,000	21,000	20,000		20,000	20,000		
Flexural strength	2 mm/min	ISO 178	MPa	280	230			330	245	385	285	400	390	410	360	420		445	410		
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	65	65	95	95	95	95	105	105	100		100	100	90	90	100	100	80	85
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	60	60			75	75	95	95			95	95						
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	11	11	15	15	15	15	17	17	20		19	19			19	18		
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	10	10			13	13	17	17			18	18						
Electrical properties																					
Surface resistivity		IEC 60093	Ohm																		
Comparative tracking index	Test solution A	IEC 60112																			
Thermal properties						d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	255		262		255		255		255		255		255		238		238	
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	235		240		237		245		245		245		235		230			
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C																		
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C					173		185				193				200		205	
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C	150				150		150		150		150		150					
Flammability																					
Flammability	1.6 mm	UL 94	Class	HB		HB		HB		HB		HB		HB		HB		HB		HB	
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+		+		+		+		+		+		+		+		+	
GWFI	1.6 mm	IEC 60695-2-12	°C																		
GWIT	1.6 mm	IEC 60695-2-13	°C																		
General properties																					
Density	23 °C	ISO 1183	g/cm ³	1.36		1.4		1.47		1.56		1.57		1.69		1.69		1.65		1.76	
Content reinforcement / Content filler		ISO 1172	%	30		35		40		50		50		60		60		50		60	
MVR	250/2.16	ISO 1133	cm ³ /10 min																		
Processing																					
Moulding shrinkage	flow	ISO 294-4	%	0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.1-0.3		0.0-0.2		0.0-0.2	
Moulding shrinkage	transverse	ISO 294-4	%	0.5-0.7		0.45-0.65		0.4-0.6		0.3-0.5		0.3-0.5		0.2-0.4		0.2-0.4		0.2-0.4		0.2-0.4	

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Typical values at 23 °C	Test specification	Test method	Unit	T1 GF 40 black (3464)	T1 GF 40 9 black (3499)	T1 GF 50 black (3101)	T1 GF 50 9 black (3257)	T5 GF 50 black (6247)	PEEK TM black (5051)	PEEK GF 30 9 natural (5567)	PEEK GF 60 9 natural (5425)	PEEK CF 10 TM black (5050)									
Description				PPA GF 40	PPA GF 40	PPA GF 50	PPA GF 50	PPA GF 50	PEEK	PEEK GF 30	PEEK GF 60	PEEK CF 10									
Product characterisation				standard, easy flow, Tg 100 °C	low priced variant, good surface	standard, easy flow, Tg 100 °C	low priced variant, good surface	standard, Tg 130 °C	PTFE modified with excellent processing, improved friction and wear	improved flow for thin wall applications	top mechanics, low priced	improved friction and wear behaviour									
Mechanical properties				d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.	d.a.m. cond.									
Tensile modulus	1 mm/min	ISO 527-2	MPa	15,500	15,500	15,000	14,000	20,000	20,000	5,000	5,100	12,000	12,000	24,000	23,500	13,500	13,500				
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/240	/220	/240	/220	/270	/255	/275	/250	/280	/280	/75	/75	/205	/190	/230	/210	/160	/150
Strain at break	5 mm/min	ISO 527-2	%	2.4	2.4	2.4	2.6	2	2	2	2.1	2.1	2.1	2.6	2.6	2.8	2.8	1.5	1.4	2.0	2.0
Flexural modulus	2 mm/min	ISO 178	MPa	14,500		14,500		18,000		17,000		19,000	19,000	6,000		11,700	11,200	24,000		13,000	
Flexural strength	2 mm/min	ISO 178	MPa	345		360		380		390		440	380	135		310	290	360		235	
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	75		70		90	85	90		90	83	35	35	75	70	55	45	35	35
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²	60		55		70		80		75	75								
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	11		11		14		14		13	13	3	3	10	10	10	10	4	6
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²	11		11		14		12		11									
Electrical properties																					
Surface resistivity		IEC 60093	Ohm																		
Comparative tracking index	Test solution A	IEC 60112		600	600	600	600														
Thermal properties				d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.									
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	313	308	313	308	325	342	342	342	342									
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	285	275	285	275	280	155	>280	>280	>280									
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	310		310															
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C	205	195	230	205	237	145	225	265	175									
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C	165	165	165	155														
Flammability																					
Flammability	1.6 mm	UL 94	Class	HB	HB	HB	HB	HB	V0	V0	V0	V0									
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+	+	+	+	+													
GWFI	1.6 mm	IEC 60695-2-12	°C	960	675	960	700														
GWIT	1.6 mm	IEC 60695-2-13	°C				725														
General properties																					
Density	23 °C	ISO 1183	g/cm ³	1.5	1.52	1.62	1.62	1.65	1.42	1.5	1.85	1.44									
Content reinforcement / Content filler		ISO 1172	%	40	40	50	50	50		30	60	10									
MVR	250/2.16	ISO 1133	cm ³ /10 min																		
Processing																					
Moulding shrinkage	flow	ISO 294-4	%	0.1–0.3	0.1–0.3	0.1–0.3	0.1–0.3	0.1–0.3	0.9–1.1	0.2–0.4	0.1–0.3	0.4–0.6									
Moulding shrinkage	transverse	ISO 294-4	%	0.5–0.7	0.5–0.7	0.4–0.6	0.4–0.6	0.4–0.6	1.2–1.4	0.8–1.0	0.4–0.6	0.8–1.0									

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 "d.a.m." = dry as moulded test values = residual moisture content <0.10 %
 n.b. = not broken + = passed


¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 = products with UL listing

PEEK

LGF

Typical values at 23 °C	Test specification	Test method	Unit	PEEK CF 30 black (5049)	PEEK CF 30 black (5448)	PEEK CF 50 9 black (5447)	A28 LGF 50 1 natural (5997)	B28 LGF 40 1 L black (6155)	C28 LGF 50 5 XTC natural (5574)	PA LGF 40 natural (6535)	PA LGF 50 natural (5504)						
Description				PEEK CF 30	PEEK CF 30	PEEK CF 50	PA 6.6 LGF 50	PA 6 + PP LGF 40	PA 6.6 + PA 6 LGF 50	PA 6.6 + PA 6I/6T LGF 40	PA 6.6 + PA 6I/6T LGF 50						
Product characterisation				good combination of cost and function	high stiffness	high carbon fibre reinforced PEEK	long fibre, good cold impact performance	long fibre, weight reduced, low H ₂ O absorption	long fibre, best heat aging stability, electrical neutral	long fibre, improved hydrolysis resistance	long fibre, top notched impact strength						
Mechanical properties				d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.						
Tensile modulus	1 mm/min	ISO 527-2	MPa	25,500	25,000	30,000	30,000	40,000	40,000	20,000	12,000	9,500	20,000	12,000	16,000	20,500	20,000
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/235	/230	/270	/265	/240	/230	/310	/200	/150	/300	/190	/290	/290	/265
Strain at break	5 mm/min	ISO 527-2	%	1.4	1.3	1.6	1.5	0.9	0.8	2.2	2.5	2.5	2.4	2.8	2.5	2.3	2.3
Flexural modulus	2 mm/min	ISO 178	MPa	22,800	28,000	28,000	37,000			8,000	19,000					18,500	
Flexural strength	2 mm/min	ISO 178	MPa	345	370	365	370			220	450					445	
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	42	38	50	45	35	32	110	100	100	120	130	110	115	110
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²								80		80			90	
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	6	6	8	8	5	5	52	35	35	50	55	40	45	45
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²								35		55			45	
Electrical properties																	
Surface resistivity		IEC 60093	Ohm														
Comparative tracking index	Test solution A	IEC 60112															
Thermal properties				d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.						
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	342	342	342	342	262	220	245	255	255					
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	>280	>280	>280	>280		200	230		230					
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C														
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C	230			270		190	200		200					
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C														
Flammability																	
Flammability	1.6 mm	UL 94	Class	V0	V0	V0	V0			HB		HB					
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min							+							
GWFI	1.6 mm	IEC 60695-2-12	°C														
GWIT	1.6 mm	IEC 60695-2-13	°C														
General properties																	
Density	23 °C	ISO 1183	g/cm ³	1.4	1.4	1.48	1.48	1.57	1.36	1.58	1.47	1.59					
Content reinforcement / Content filler		ISO 1172	%	30	30	50	50	50	40	50	40	50					
MVR	250/2.16	ISO 1133	cm ³ /10 min														
Processing																	
Moulding shrinkage	flow	ISO 294-4	%	0.1–0.3	0.1–0.3	0.0–0.2	0.0–0.2	0.3–0.5	0.3–0.5	0.3–0.5	0.3–0.5	0.3–0.5					
Moulding shrinkage	transverse	ISO 294-4	%	0.4–0.6	0.4–0.6	0.3–0.5	0.3–0.5	0.6–0.8	0.6–0.8	0.6–0.8	0.6–0.8	0.6–0.8					


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 = products with UL listing

Compounds for Water Contact

Typical values at 23 °C			Test specification	Test method	Unit	PK-VM 8 black (6466)	PK-HM 8 black (6246)	PK-VM GF 5 8 black (7322)	PK-VM GF 10 8 black (6990)	PK-VM GF 15 8 black (6991)	PK-VM GF 20 8 black (6993)	PK-VM GF 30 8 black (6994)	PK-VM GF 40 8 black (6995)	PK-VM GF 50 8 black (6936)							
Description						PK	PK	PK GF 5	PK GF 10	PK GF 15	PK GF 20	PK GF 30	PK GF 40	PK GF 50							
Product characterisation						KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)							
Mechanical properties						d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.		
Tensile modulus	1 mm/min	ISO 527-2	MPa	1,700	1,700	1,600		2,300	2,300	3,200	3,100	4,500	4,300	5,800	5,600	8,400	8,100	11,000	10,500	14,500	14,000
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	60/	60/	60/		/65	/60	/65	/60	/95	/85	/100	/90	/126	/110	/150	/135	/170	/150
Strain at break	5 mm/min	ISO 527-2	%	>100	>100	>300		>10	>10	5	5	3.2	3.2	2.5	2.5	2.5	2.5	2.3	2.3	2.5	2.5
Flexural modulus	2 mm/min	ISO 178	MPa			1,700															
Flexural strength	2 mm/min	ISO 178	MPa			62															
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	n.b.	n.b.	n.b.		55	55	50	45	55	50	50	45	45	35	50	40	50	35
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²																		
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	12	12	21		10	10	10	10	10	10			12	12	16	16	18	18
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²																		
Electrical properties																					
Surface resistivity		IEC 60093	Ohm	1.0E+13																	
Comparative tracking index	Test solution A	IEC 60112																			
Thermal properties				d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.							
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	220	220	220		220	220	220	220	220	220	220							
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	100	100			205	210	210	210	215	220	220							
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C																		
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C																		
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C																		
Flammability				HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB							
Flammability	1.6 mm	UL 94	Class	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB							
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min	+	+	+	+	+	+	+	+	+	+	+							
GWFI	1.6 mm	IEC 60695-2-12	°C																		
GWIT	1.6 mm	IEC 60695-2-13	°C																		
General properties																					
Density	23 °C	ISO 1183	g/cm ³	1.24	1.24	1.28		1.32	1.32	1.35	1.4	1.48	1.56	1.65							
Content reinforcement / Content filler		ISO 1172	%			5		10	10	15	20	30	40	50							
MVR	250/2.16	ISO 1133	cm ³ /10 min																		
Processing																					
Moulding shrinkage	flow	ISO 294-4	%	1.4-1.6	1.4-1.6	0.95-1.15		0.5-0.7	0.5-0.7	0.4-0.6	0.3-0.5	0.2-0.4	0.1-0.3	0.1-0.3							
Moulding shrinkage	transverse	ISO 294-4	%	1.5-1.7	1.5-1.7	1.2-1.4		0.9-1.1	0.9-1.1	0.85-1.05	0.8-1.0	0.6-0.8	0.4-0.6	0.3-0.5							


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Compounds for Water Contact

Typical values at 23 °C		Test specification	Test method	Unit	T5 8 black (6454)	T5 GF 10 8 black (6455)	T5 GF 20 8 black (6456)	T5 GF 30 8 black (6457)	T5 GF 40 8 black (6458)	T5 GF 50 8 black (6205)				
Description					PPA	PPA GF 10	PPA GF 20	PPA GF 30	PPA GF 40	PPA GF 50				
Product characterisation					KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)	KTW hot water (GF 0 % -50 %)				
Mechanical properties					d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.				
Tensile modulus	1 mm/min	ISO 527-2	MPa	3,800		6,000	6,000	8,500	8,500	11,500	15,000	15,000	19,000	19,000
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	75		/110	/110	/160	/160	/210	/245	/230	/270	/270
Strain at break	5 mm/min	ISO 527-2	%	2		2	2	3	3	2.3	2.4	2.4	2.1	2.1
Flexural modulus	2 mm/min	ISO 178	MPa								15,600	15,000	18,500	18,500
Flexural strength	2 mm/min	ISO 178	MPa										410	350
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	40		25	30	40	40	65	80	80	85	85
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²										75	75
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²								11	11	13	13
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²											
Electrical properties														
Surface resistivity		IEC 60093	Ohm											
Comparative tracking index	Test solution A	IEC 60112												
Thermal properties					d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.	d.a.m.				
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	325		325	325	325	325	325				
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C						280	280				
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C											
Temp. of deflection under load, HDT/C	8 MPa	ISO 75	°C	100				155	180					
Temperature index for 50 % loss of tensile strength	5,000 h	IEC 60216	°C											
Flammability														
Flammability	1.6 mm	UL 94	Class	HB		HB	HB	HB	HB	HB				
Burning rate (<100 mm/min)	>1 mm thickness	FMVSS 302	mm/min						+					
GWFI	1.6 mm	IEC 60695-2-12	°C											
GWIT	1.6 mm	IEC 60695-2-13	°C											
General properties														
Density	23 °C	ISO 1183	g/cm ³	1.23		1.27	1.34	1.43	1.5	1.61				
Content reinforcement / Content filler		ISO 1172	%	-		10	20	30	40	50				
MVR	250/2.16	ISO 1133	cm ³ /10 min											
Processing														
Moulding shrinkage	flow	ISO 294-4	%	1.1-1.3		0.4-0.6	0.3-0.5	0.2-0.4	0.1-0.3	0.1-0.3				
Moulding shrinkage	transverse	ISO 294-4	%	1.3-1.5		0.9-1.1	0.7-0.9	0.6-0.8	0.5-0.7	0.4-0.6				

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Flame Retardant Compounds

Typical values at 23 °C	Test specification	Test method	Unit	A3 1 FR black (3051)				B3 1 FR black (6580)				C3 1 FR black (4361)				C3 1 FR gray (4298)				A3 K1 FR natural (2312)				A3 GF 30 FR natural (7087)				A3 GF 30 FR-EN black (6654)								
Description				PA 6.6 FR (30)				PA 6 FR (30)				PA 6.6 + PA 6 FR (30)				PA 6.6 + PA 6 FR (30)				PA 6.6 GF 25 FR (30+40)				PA 6.6 GF 30 FR (40)				PA 6.6 GF 30 FR (40)								
Product characterisation				UL 94 V0 at 0.8 mm with good strength and flow				V0 at 0.4 mm with good strength				V0 at 0.4 mm good flow and strain at break, optimised for hinges				V0 at 0.4 mm good flow and strain at break, optimised for hinges				V0 and good GWFI and GWIT good strain at break				V0 at 0.4 mm with optimised corrosion prevention				V0 at 0.4 mm with optimised corrosion prevention								
Mechanical properties				d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.	d.a.m.	cond.							
Tensile modulus	1 mm/min	ISO 527-2	MPa	3,500	1,500	3,400	1,300	3,300	1,300	3,500	1,300	9,200	6,500	10,000	7,600	10,500	7,600																			
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	83/	55/	75/	40/	75/	45/	80/	45/	/140	/100	/145	/105	/150	/107																			
Strain at break	5 mm/min	ISO 527-2	%	>5	>20	9	>50	>10	>50	>14	>50	3	4	3	5	2.7	3.9																			
Flexural modulus	2 mm/min	ISO 178	MPa			3,500	1,300	3,000	1,300			9,000	7,000			11,500																				
Flexural strength	2 mm/min	ISO 178	MPa			115	45	110	45			220	170			230																				
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	70	n.b.	78		100		>100	n.b.	65	70	79		67	70																			
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²					90		90		65				61																				
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²	4.5	7	4.5		4		4		11	13			10	13																			
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²					3		3						9																				
Electrical properties																																				
Dielectric strength	1 mm	IEC 60243	kV/mm	19 (3 mm)				10				10								15				15												
Comparative tracking index	test solution A	IEC 60112/ASTM D3638	V	>600/0				>600/0				>600/0				>600/0				>600/0				>600/0												
Thermal properties				d.a.m.				d.a.m.				d.a.m.				d.a.m.				d.a.m.				d.a.m.												
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	260				220				260				260				262				260				262								
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	80				60				70				70				246				245				246								
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	220				180				210				210				261				261				261								
Flammability																																				
Specimen thickness				mm	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2
Flammability				Class	V2	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0	V0
High amperage arc ignition (HAI)				PLC		0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hot wire ignition (HWI)				PLC		4			4	4	0	0	4	4	0	0	4	4	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0
GWFI				°C	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960
GWIT				°C	775	775	775	775	775	775	775	750	775	775	750	775	775	775	775	750	775	775	775	775	750	750	750	775	750	750	750	775	750	750	750	775
Relat. thermal index (RTI), electrical				°C		65			65	65	65	65	65	65	65	65	65	65	65	65		65			65	65	65	65	65	65	65	65	65	65	65	65
Relat. thermal index (RTI), mech. strength				°C		65			65	65	65	65	65	65	65	65	65	65	65	65		65			65	65	65	65	65	65	65	65	65	65	65	65
Relat. thermal index (RTI), mech. impact				°C		65			65	65	65	65	65	65	65	65	65	65	65	65		65			65	65	65	65	65	65	65	65	65	65	65	65
Limiting oxygen index (LOI)				°C	32				34				34				34				34															
Requirement sets for railway				Class					R22/23/24/26 HL3				R22 HL2 R23/24/26 HL3				R22 HL2 R23/24/26 HL3				R24 HL3															
General properties																																				
Density	23 °C	ISO 1183	g/cm ³	1.18				1.19				1.16				1.17				1.34				1.37				1.39								
Content reinforcement / Content filler																				25				30				30								
Processing																																				
Moulding shrinkage	flow	ISO 294-4	%	1.3–1.5				1.0–1.2				1.1–1.3				1.1–1.3				1.3–1.5				0.1–0.3				0.1–0.3								
Moulding shrinkage	transverse	ISO 294-4	%	1.5–1.7				1.1–1.3				1.3–1.5				1.3–1.5				1.5–1.7				0.7–0.9				0.7–0.9								

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 "d.a.m." = dry as moulded test values = residual moisture content <0.10 %
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¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 UU = products with UL listing

Flame Retardant Compounds

Typical values at 23 °C	Test specification	Test method	Unit	A3 K22 FR black (5598)				B3 K8 9 FR black (3942)				B3 GF 25 FRT natural (6910)				B3 GF 30 FR black (7459)				B3 GF 30 FRT black (6665)				C3 GF 25 1 FR black (7246)				C28 GF 25 FRT natural (7332)											
Description					PA 6.6 GK 30 FR (40)				PA 6 GF 20 FR (30)				PA 6 GF 25 FR (30+40)				PA 6 GF 30 FR (40)				PA 6 GF 30 FR (40)				PA 6.6 + PA 6 GF 25 FR (40)				PA-Blend GF 25 FR (40)										
Product characterisation					V0 with isotropic shrinkage				V2 with good GWFI for switch-gear				Optimised for small to mid-sized parts in trains				V0 with good toughness and GWFI				Optimised for small parts in trains				V0, good GWFI/GWIT, easy flow, good strain at break				Optimised for big parts in trains										
Mechanical properties				d.a.m.	cond.			d.a.m.	cond.			d.a.m.	cond.			d.a.m.	cond.			d.a.m.	cond.			d.a.m.	cond.			d.a.m.	cond.										
Tensile modulus	1 mm/min	ISO 527-2	MPa	5,000	2,400			6,000	3,000			10,000	5,500			10,500	6,500			10,000				8,900	5,600			11,300											
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/60	/36			/100	/55			/130	/90			/135	/90			/150				/140	/90			/165											
Strain at break	5 mm/min	ISO 527-2	%	6	28			4	>10			3	7			2.7	6.0			3				3	6			2.2											
Flexural modulus	2 mm/min	ISO 178	MPa																					8,800	6,000														
Flexural strength	2 mm/min	ISO 178	MPa																					225	160														
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	38	75			60				70				65	67			75				67	75			48											
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²																																				
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²					6				11	16			11	14			12				11	15														
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²																																				
Electrical properties																10								12															
Dielectric strength	1 mm	IEC 60243	kV/mm																																				
Comparative tracking index	test solution A	IEC 60112/ASTM D3638	V	>600				400								>600/0								>600/0				>600											
Thermal properties				d.a.m.				d.a.m.				d.a.m.				d.a.m.				d.a.m.				d.a.m.				d.a.m.											
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	262				220				222				220				220				220				260				238							
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C									170																225				230							
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C									212																				251				251			
Flammability																																							
Specimen thickness			mm	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2	0.4	0.8	1.6	3.2				
Flammability	UL 94		Class	V0	V0	V0	V0	V2	V2	V2	V2	V1	V1	V0	V0	V0	V0	V0	V0	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB					
High amperage arc ignition (HAI)	UL 746 A		PLC																																				
Hot wire ignition (HWI)	UL 746 A		PLC																																				
GWFI	IEC 60695-2-12		°C	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960	960																				
GWIT	IEC 60695-2-13		°C	725	700	700	700																																
Relat. thermal index (RTI), electrical	UL 746 B		°C																																				
Relat. thermal index (RTI), mech. strength	UL 746 B		°C																																				
Relat. thermal index (RTI), mech. impact	UL 746 B		°C																																				
Limiting oxygen index (LOI)	ISO 4589-1/2		°C									>32								>32																			
Requirement sets for railway	EN 45545-2		Class									R22 HL2 R21/23/24 HL3								R24 HL3								R6 HL2											
General properties																																							
Density	23 °C	ISO 1183	g/cm ³	1.40				1.30				1.37				1.43				1.39				1.37				1.43											
Content reinforcement / Content filler	ISO 1172		%	30				20				25				30				30				25				25											
Processing																																							
Moulding shrinkage	flow	ISO 294-4	%	1.3–1.5				1.0–1.2				0.1–0.3				1.0–1.2				0.1–0.3				0.1–0.3				0.1–0.3											
Moulding shrinkage	transverse	ISO 294-4	%	1.5–1.7				1.1–1.3				0.55–0.75				1.1–1.3				0.5–0.7				0.65–0.85				0.65–0.85											


"cond." test values = conditioned, measured on test specimens stored according to DIN EN ISO 1110
 "d.a.m." = dry as moulded test values = residual moisture content <0.10 %
 n.b. = not broken + = passed

¹ = yield stress and elongation at break: test speed 50 mm/min for non-reinforced compounds
 UL = products with UL listing

Flame Retardant Compounds

Typical values at 23 °C	Test specification	Test method	Unit	C3 GF 30 1 FR black (7243)				PA K17 FR black (5762)			
Description				PA 6.6 + PA 6 GF 30 FR (40)				PA 6.6 + X GF 35 FR (30+40)			
Product characterisation				V0, good GWFI/GWIT, easy flow, good strain at break				Strong and stiff, V0, easy flow, low smoke density and toxicity, aircraft			
Mechanical properties				d.a.m.		cond.		d.a.m.		cond.	
Tensile modulus	1 mm/min	ISO 527-2	MPa	10,500	7,500	12,500	9,200				
Stress at Yield ¹ /Stress at break	5 mm/min	ISO 527-2	MPa	/150	/105	/160	/115				
Strain at break	5 mm/min	ISO 527-2	%	2.7	3.9	2.5	3.0				
Flexural modulus	2 mm/min	ISO 178	MPa								
Flexural strength	2 mm/min	ISO 178	MPa								
Charpy impact strength	23 °C	ISO 179-1/1eU	kJ/m ²	74		60	60				
Charpy impact strength	-30 °C	ISO 179-1/1eU	kJ/m ²								
Charpy notched impact strength	23 °C	ISO 179-1/1eA	kJ/m ²			12	12				
Charpy notched impact strength	-30 °C	ISO 179-1/1eA	kJ/m ²								
Electrical properties											
Dielectric strength	1 mm	IEC 60243	kV/mm	25							
Comparative tracking index	test solution A	IEC 60112/ASTM D3638	V	>600/0				600			
Thermal properties				d.a.m.							
Melting temperature	DSC, 10 K/min	DIN EN 11357-1	°C	262				260			
Temp. of deflection under load, HDT/A	1.8 MPa	ISO 75	°C	225				250			
Temp. of deflection under load, HDT/B	0.45 MPa	ISO 75	°C	251							
Flammability											
Specimen thickness			mm	0,4	0,8	1,6	3,2	0,4	0,8	1,6	3,2
Flammability		UL 94	Class	V0	V0	V0	V0		V0	V0	V0
High amperage arc ignition (HAI)		UL 746 A	PLC	0	0	0	0				
Hot wire ignition (HWI)		UL 746 A	PLC	0	0	0	0				
GWFI		IEC 60695-2-12	°C	960	960	960	960				
GWIT		IEC 60695-2-13	°C	775	725	725	750				
Relat. thermal index (RTI), electrical		UL 746 B	°C	65	65	65	65				
Relat. thermal index (RTI), mech. strength		UL 746 B	°C	65	65	65	65				
Relat. thermal index (RTI), mech. impact		UL 746 B	°C	65	65	65	56				
Limiting oxygen index (LOI)		ISO 4589-1/2	°C								
Requirement sets for railway		EN 45545-2	Class								
General properties											
Density	23 °C	ISO 1183	g/cm ³	1.42				1.50			
Content reinforcement / Content filler		ISO 1172	%	30				35			
Processing											
Moulding shrinkage	flow	ISO 294-4	%	0.1–0.3				0.2–0.4			
Moulding shrinkage	transverse	ISO 294-4	%	0.6–0.8				0.6–0.8			

"cond." test values = conditioned, measured on test specimens stored according to DIN EN ISO 1110
 "d.a.m." = dry as moulded test values = residual moisture content <0.10 %
 n.b. = not broken + = passed

¹ = yield stress and elongation at break:
 test speed 50 mm/min for non-reinforced compounds
 = products with UL listing

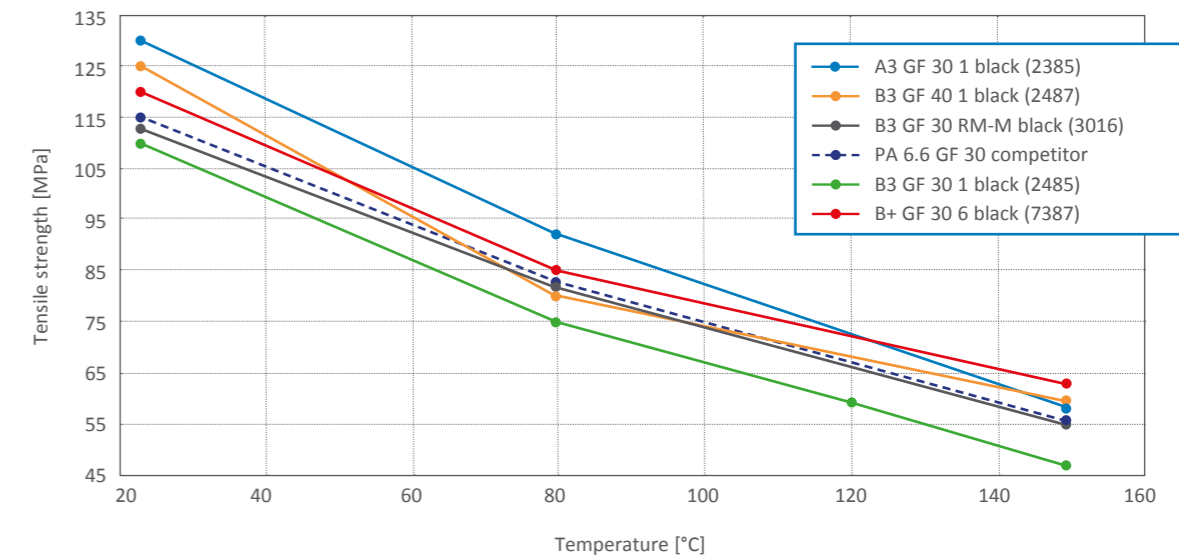
Technical Information

Nomenclature

1 2 3 4 5 6 7 8
A3 GF 50 1 EN black (5737)

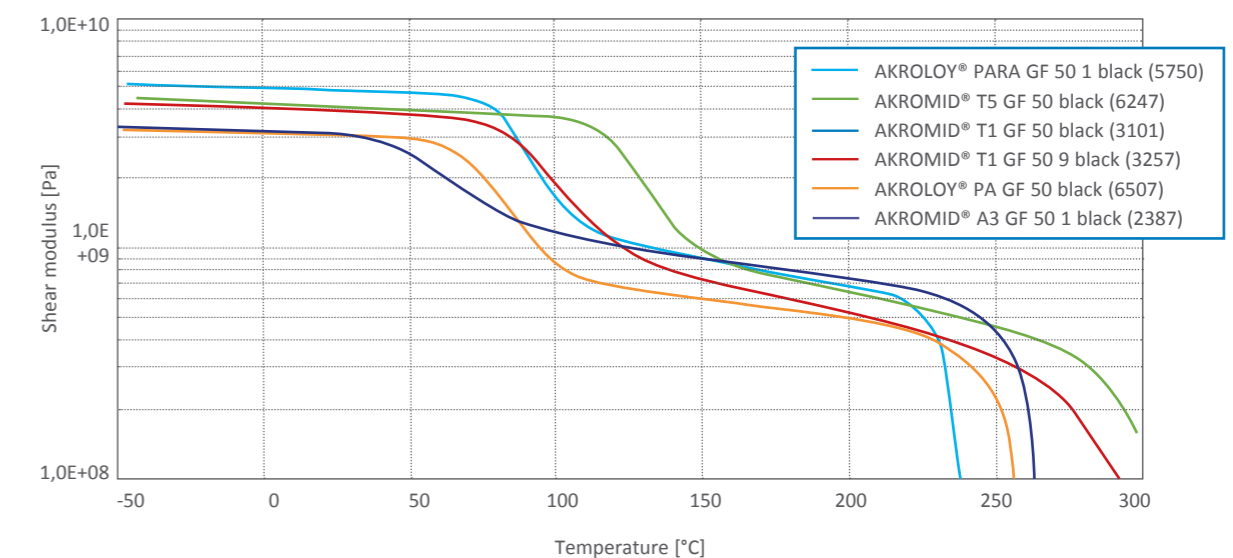
- 1 Polymer
- 2 Viscosity
- 3 Type of reinforcement
- 4 % of reinforcement
- 5 Additive
- 6 Modification
- 7 Color
- 8 Formulation no.

Tensile Strength over Temperature – Conditioned State (acc. to ISO 1110)



The picture illustrates tensile strength in conditioned state at multiple temperatures of different glass fibre reinforced polyamide compounds.

Shear Modulus – d.a.m.



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