Comparative Table Technical Thermoplastics

Grilamid (PA 12, PA amorphous)
Grivory (partial aromatic PA)
Grilon (PA 6, PA 66, PA 6+PA 66 CoPA)

This comparative table contains the most important general, physical and mechanical properties of injection moulding and extrusion compounds produced by EMS-GRIVORY.

The quoted data constitute standard values, which may be applied for the selection of suitable moulding grades. These values, however, can, in no way, replace tests to be carried out on the finished part. Comparisons with the data of competitive products can be misleading, since some standard specifications permit considerable variations concerning the test methods. Besides, the terms «dry» and «conditioned» are interpreted rather indiscriminately and without accurate definition.

The basic values refer – if not otherwise indicated – to natural types. Black or coloured types may exhibit different values. This is particularly true for impact strength and electrical properties. Please contact us when you have a particular application in mind.

Please request our specific literature on long-term test values, concerning behaviour of the products under mechanical stress, temperature, humidity, chemicals, etc. There are additional data available for a large selection of products listed.

We shall be pleased to assist you.

EMS-GRIVORY

Nomenclature

Structure of the nomenclature

This nomenclature is made up of three blocks. These three blocks describe the basis grades, viscosity, type and amount of reinforcement, additives and properties of the product.

Grilamid	A registered trade mark for polyamide 12 injection moulding and extrusion materials from EMS-GRIVORY	
Block 1	L	Unreinforced polyamide 12 grades
	LC	Polyamide 12 grades reinforced with carbon fibres
	LV	Polyamide 12 grades reinforced with glass-fibres
	LKN	Polyamide 12 grades reinforced with glass beads
	TR	Transparent
	TRV	Transparent, glass-fibre reinforced
	ELY	Polyamide elastomer
	MB	Masterbatch
Block 2	16	Low viscosity
	20	Normal viscosity
	25	High viscosity
	–3 to –5	30 % to 50 % reinforcement
	3287	4-digit number (for MB and ELY products)
Block 3	A	Hydrolysis resistant
	G	Lubricant and demoulding agent
	EC	Electrically conductive
	L	UV resistant
	LF	Low sliding friction
	H	Heat stabilised
	HV	Adhesion modified
	FR	Flame retardant
	M	Finely crystalline
	W20	Semi-flexible
	W40	Flexible
	NZ	Extremely high impact strength
	UV	Stabilised for resistance to weathering
	X	Impact resistant
	ESD	Electrostatic/conductive
	Y	High impact strength
	Z	Very high impact strength
Only for Grilamid TR products		
	LX/LY	Resistant to stress cracking
	LZ	Stress cracking and impact resistant
Only for masterbatches		
	LUV	Weathering stabiliser for polyamide 12 grades
	LH	Heat stabiliser for polyamide 12 grades
	LC	Colour masterbatch for polyamide 12 grades
	LS	Polyamide 12 grades, antiblock
	BR	Optical brightener

Grilon	Registered trade mark for polyamide 6 and polyamide 66 and polyamide 66+6 injection moulding and extrusion materials from EMS-GRIVORY	
Block 1	A	Polyamide 66
	B	Polyamide 6
	C	Copolyamide (PA6/12)
	TS	PA66 + PA6-alloy
Block 2 unreinforced	S	Standard injection moulding
	Z	Impact resistant modified
	R	Extrusion/Raw
	F	Film quality

	EB	Blow moulding type
	BM	Barrier polyamide
	MB	Masterbatch
reinforced with	G	Glass fibres
	K	Glass beads
	M	Mineral
	C	Carbon fibres
	GM	Glass fibres/Mineral
	GK	Glass fibres/Glass beads
	EB	Extrusion blow moulding type
	..Z	Impact resistant modified
Block 3	1..	Low impact strength modified
unreinforced	2..	Impact strength modified
	3..	High impact strength modified
	.23	Low viscosity
	.34, .40	Medium viscosity
	.47, .50	High viscosity
	.../Y	Variant Y
reinforced with	–15 bis –50	15–50%
	.../Y	Variant Y
Block 4	S	Good surface quality
	H	Special heat stabilizer
	UV	UV resistant
	V0	Self-extinguishing according to UL 94
	FR	Flame retardant
	HM	Adhesion modified
	W	Containts plasticiser
	EC	Electrically conductive
	LF	Low sliding friction
	FA	Suitable for foodstuffs
	LW	Laser writable
	ELX	PA6 elastomer
	X	No further information

Grivory Registered trade mark for partially aromatic polyamide injection moulding and extrusion materials from EMS-GRIVORY

Block 1	G	Extrusion grade
	GTR	Transparent injection moulding grade
	GV	Glass-fibre reinforced injection moulding grade
	GVS	Good surface quality
	GVN	Glass-fibre reinforced, impact resistant injection moulding grade
	GC	Carbon-fibre reinforced injection moulding grade
	GM	Mineral-reinforced injection moulding grade
	HT2	Polymer type PPA, PA6T/66
	HTV	High temperature, glass-fibre reinforced
	HTM	High temperature, mineral reinforced
	HT2V	High temperature, glass-fibre reinforced, good surface quality
Block 2	16	Low viscosity
	21	Normal viscosity
	–3 to –6	30 to 60% reinforcement
Block 3	H	Heat stabilised
	HL	Heat and light stabilised, weather resistant
	X	Heat stabilised, suitable for foodstuffs
	V0	Self-extinguishing according to UL-94
	1	Polymer type PPA, PA6T/6I

Properties					1. Transparent injec	
					Grilamid TR 55	Grilamid TR 90
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	2200	1600
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	75	60
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	9	6
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	50	45
Elongation at break	50 mm/min	ISO 527	%	dry cond.	>50	>50
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	>100	>100
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	>100	>100
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	8	13
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	7	12
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	120	90
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	160[1)]	155[1)]
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	130	115
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	145	135
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	–	–
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.8	0.9
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.8	0.9
Maximal usage temperature	long term	ISO 2578	°C	dry	80–100	80–100
Maximal usage temperature	short term	ISO 2578	°C	dry	120	120
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	31	34
Comparative tracking index	CTI	IEC 60112	—	cond.	600	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11}	10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{12}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.06	1.00
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	3.5	3
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	1.5	1.5
Linear mould shrinkage	long.	ISO 294	%	dry	0.60	0.65
Linear mould shrinkage	trans.	ISO 294	%	dry	0.70	0.75
Product description according to ISO 1874					PA12/MACMI, GT, 11-020	PA MACM 12, GT, 14-020

[1)] Glass transition temperature

tion moulding and extrusion grades

	Grilamid TR 55 LX	Grilamid TR 55 LY	Grilamid TR 55 LZ	Grilamid TR 70 LX	Grilamid TR 90 LX	Grilamid TR 90 UV	Grivory GTR 45			
	1900	1900	1600	2300	1500	1600	3000 3000			
	70	70	55	75	60	60	100 100			
	6	6	6	6	6	6	5 5			
	40	40	40	55	40	45	50 50			
	>50	>50	>50	>50	>50	>50	>50 >50			
	>100	>100	>100	>100	>100	>100	>100 >100			
	>100	>100	>100	>100	>100	>100	>100 >100			
	9	9	20	6	9	13	8 8			
	8	8	8	4	12	12	2 2			
	110	110	90	125	110	90	145 145			
	110[1)]	110[1)]	110[1)]	190[1)]	125[1)]	155[1)]	125[1)]			
	80	80	75	150	80	115	105			
	90	90	85	165	100	135	115			
	–	–	–	–	–	–	–			
	0.9	0.9	1.1	0.8	0.9	0.9	0.6			
	0.9	0.9	1.1	0.8	0.9	0.9	0.6			
	80	80	80	80–100	80	80–100	80			
	95	95	95	140	95	120	70			
	32	32	32	28	35	34	27			
	600	600	600	600	600	600	600			
	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{11}	10^{12}			
	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{13}			
	1.04	1.04	1.02	1.05	1.00	1.00	1.18			
	HB	HB	HB	V2	HB	HB	V2			
	2.5	2.5	2.5	4.0	3	3	7			
	1	1	1	2.0	1.5	1.5	2			
	0.50	0.60	0.65	0.85	0.45	0.65	0.35			
	0.60	0.70	0.75	0.95	0.45	0.75	0.45			
	PA12/MACMI, +PA 12, GHLT, 14-020	PA12/MACMI, +PA 12, GHLT, 14-020	PA12/MACMI-HI, +PA 12-HI, GHLT, 12-020	PA MACMI/12 +PA MACM 12, GHT, 11-020	PA MACM 12 +PA 12, GHLT, 18-020	PA MACM 12, GTL, 14-020	PA 6I/6T, FT, 11-030			

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					2. Injection mouldi	
					Grilamid TRV-4X9	Grilamid LKN-3H
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	9 000	1 600
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.		45
Elongation at yield	50 mm/min	ISO 527	%	dry cond.		10
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	130•	35
Elongation at break	50 mm/min	ISO 527	%	dry cond.	2•	25
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	45	>100
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	45	45
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	14	5
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	13	3
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	160	75
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	155[2)]	178
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	135	50
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	–	–
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	125	35
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.2	1.2
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.8	1.2
Maximal usage temperature	long term	ISO 2578	°C	dry	90–110	90–120
Maximal usage temperature	short term	ISO 2578	°C	dry	125	150
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	27	35
Comparative tracking index	CTI	IEC 60112	—	cond.	600	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11}	10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{12}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.32	1.21
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	1.5	1.2
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	0.8	0.6
Linear mould shrinkage	long.	ISO 294	%	dry	0.05	0.95
Linear mould shrinkage	trans.	ISO 294	%	dry	0.40	1.00
Product description according to ISO 1874					PA MACM12, MH, 12-090,GF 40	PA 12, MHR, 18-020, GB 30

• Testing speed 5 mm/min

ng grades reinforced

	Grilamid LKN-5H	Grilamid LC-3H	Grilamid LV-2H	Grilamid LV-2A NZ	Grilamid LV-23 ESD schwarz	Grilamid LV-3H	Grilamid LV-3A H	Grilamid LV-5H		
	2 300	12 000	4 400	3 500	5 000	6 000	6 000	11 500		
	45									
	7									
	40	140•	90•	80•	95•	105•	105•	160•		
	25	3•	10•	15•	5•	8•	8•	5•		
	>100	60	70	>100	70	80	80	80		
	65	60	70	>100	40	80	80	80		
	5	13	20	30	8	20	20	20		
	4	8	15	20	6	15	15	15		
	100	130	105	95	110	120	120	155		
	178	178	178	178	178	178	178	178		
	65	165	150	130	150	160	160	165		
	–	–	165	160	–	–	–	–		
	40	125	80	75	80	90	90	125		
	1.2	0.1	0.3	0.4	0.2	0.2	0.2	0.15		
	1.2	1.3	1.5	1.5	1.5	1.5	1.5	1.2		
	90–120	90–120	90–120	90–120	90–120	90–120	90–120	90–120		
	150	150	150	150	150	150	150	150		
	35	–	35	35	–	35	35	35		
	600	–	600	600	–	600	600	600		
	10^{11}	100	10^{11}	10^{11}	100	10^{11}	10^{11}	10^{11}		
	10^{12}	<50	10^{12}	10^{12}	10^{4}	10^{12}	10^{12}	10^{12}		
	1.44	1.15	1.16	1.12	1.19	1.22	1.22	1.47		
	HB	HB	HB	HB	HB	HB	HB	HB		
	0.8	1.1	1.2	1.1	1.0	1.1	1.1	0.8		
	0.4	0.6	0.6	0.5	0.5	0.6	0.6	0.4		
	0.80	0.05	0.10	0.30	0.10	0.10	0.10	0.10		
	0.90	0.30	0.70	1.00	0.70	0.75	0.65	0.50		
	PA 12, MHR, 18-020, GB 50	PA 12, MHR, 18-120, CF 30	PA 12, MHR, 18-050, GF 20	PA 12, MHR, 22-040, GF 20	PA 12, MHRZ, 18-050 (GF+C) 23	PA 12, MHR, 18-060, GF 30	PA 12, MHR, 22-060, GF 30	PA 12, MHR, 18-120, GF 50		

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					2. Injection mouldi	
					Grivory GV-2H	Grivory GV-4H
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	8 200 7 200	14 000 13 000
Tensile strength at break	5 mm/min	ISO 527	MPa	dry cond.	135 130	230 210
Elongation at break	5 mm/min	ISO 527	%	dry cond.	3 3	3 3
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	50 50	90 90
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	35 35	70 70
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	7 7	13 13
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	6 6	11 11
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	225 200	255 230
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	260	260
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	230	235
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	65	145
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.1	0.15
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	1.0	0.9
Maximal usage temperature	long term	ISO 2578	°C	dry	100–120	100–120
Maximal usage temperature	short term	ISO 2578	°C	dry	180	180
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	33 33	33 33
Comparative tracking index	CTI	IEC 60112	—	cond.	575	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{12} 10^{12}	10^{12} 10^{12}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{13}	10^{13}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.28	1.47
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	5	4.5
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	1.5	1.4
Linear mould shrinkage	long.	ISO 294	%	dry	0.15	0.10
Linear mould shrinkage	trans.	ISO 294	%	dry	0.75	0.60
Product description according to ISO 1874					PA 66+PA 6I/6T, MH, 14-080, GF 20	PA 66+PA 6I/6T, MH, 14-140, GF 40

ng grades reinforced

	Grivory GV-5H	Grivory GV-6H	Grivory GVN-35H	Grivory GC-4H	Grivory GM-4H	Grivory GVS-5H	Grivory GV-5HL			
	18 000 17 000	22 000 21 000	11 500 9 500	31 000 28 000	7 000 6 000	18 000 17 000	18 000 17 000			
	250 220	260 240	200 155	260 225	100 80	250 220	220 200			
	2.5 2.5	2 2	4 5	1.5 2	3 5	2.5 2.5	2 2			
	90 90	80 80	80 80	55 60	80 100	90 80	70 60			
	80 80	80 80	80 80	45 50	75 90	75 60	50 40			
	15 15	14 14	14 14	7 7	6 6	15 15	14 13			
	13 13	13 13	13 13	4 4	4 4	15 15	15 14			
	280 255	315 290	215 185	280 260	225 200	280 255	270 250			
	260	260	260	260	260	260	255			
	235	235	235	235	105	240	230			
	165	175	70	175	60	185	170			
	0.15	0.15	0.15	0.1	0.9	0.15	0.15			
	0.9	0.9	0.9	0.8	0.9	0.7	0.7			
	100 – 120	100 – 120	100 – 120	100 – 120	100 – 120	100 – 120	100 – 120			
	180	180	180	180	180	180	180			
	33 33	33 33	35 35	– –	26 26	33 33	29 28			
	600	600	575	–	600	600	225			
	10^{12} 10^{12}	10^{12} 10^{12}	10^{12} 10^{12}	<50 <50	10^{12} 10^{12}	10^{12} 10^{12}	10^{12} 10^{12}			
	10^{13}	10^{13}	10^{13}	<50	10^{13}	10^{13}	10^{13}			
	1.56	1.69	1.40	1.34	1.45	1.58	1.60			
	HB	HB	HB	HB	HB	HB	HB			
	4	3.5	4.5	4.5	4.5	4	4			
	1.4	1.2	1.5	1.4	1.4	1.4	1.4			
	0.05	0.05	0.15	0.05	0.80	0.05	0.05			
	0.40	0.30	0.45	0.20	0.85	0.50	0.50			
	PA 66+PA 6I/6T, MH, 14-190, GF 50	PA 66+PA 6I/6T, MH, 14-220, GF 60	PA 66+PA 6I/6T, MH, 14-110, GF 35	PA 66+PA 6I/6T, MH, 14-250, CF 40	PA 66+PA 6I/6T, MH, 14-070, MD 40	PA 66+PA 6I/6T, MH, 14-190, GF 50	PA 66+PA 6I/6T, MHL, 14-190, GF 50			

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					2. Injection mouldi	
					Grivory HTV-3H1 black 9205	Grivory HTV-4H1 black 9205
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	11 000 11 000	14 500 14 000
Tensile strength at break	5 mm/min	ISO 527	MPa	dry cond.	190 170	220 210
Elongation at break	5 mm/min	ISO 527	%	dry cond.	2 2	2 2
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	50 50	70 70
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	50 50	70 70
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	7 7	8 8
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	7 7	8 8
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	280 270	310 300
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	325	325
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	280	280
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	155	200
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.20	0.15
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.50	0.50
Maximal usage temperature	long term	ISO 2578	°C	dry	150	150
Maximal usage temperature	short term	ISO 2578	°C	dry	250	250
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	35 35	35 35
Comparative tracking index	CTI	IEC 60112	—	cond.	575	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11} 10^{11}	10^{11} 10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{12}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.44	1.53
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	3.5	3.5
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	1.8	1.5
Linear mould shrinkage	long.	ISO 294	%	dry	0.20	0.10
Linear mould shrinkage	trans.	ISO 294	%	dry	0.70	0.55
Product description according to ISO 1874					PA 6T/6I, MH, 12-110, GF 30	PA 6T/6I, MH, 12-140, GF 40

ng grades reinforced

	Grivory HTV-45H1 black 9205	Grivory HTV-5H1 black 9205	Grivory HTV-6H1 black 9205	Grivory HTM-4H1	Grivory HTV-4X1 black 9205	Grivory HTV-5X1 black 9205	Grivory HTV-6X1 black 9205			
	16 500 16 000	18 000 17 500	23 000 22 500	7 500 7 500	14 500 14 000	18 000 17 500	23 000 22 500			
	235 230	250 240	260 250	105 105	220 210	250 240	260 250			
	2 2	2 2	1.5 1.5	1.5 1.5	2 2	2 2	1.5 1.5			
	75 75	80 80	75 75	50 50	70 70	80 80	75 75			
	75 75	80 80	75 75	20 25	70 70	80 80	75 75			
	12 12	11 11	11 11	5 5	8 8	11 11	11 11			
	12 12	10 10	10 10	3 4	8 8	10 10	10 10			
	325 320	340 340	360 360	260 260	310 300	340 340	360 360			
	325	325	325	325	325	325	325			
	285	285	290	145	280	285	290			
	205	210	215	115	200	210	215			
	0.15	0.15	0.15	0.50	0.15	0.15	0.15			
	0.45	0.40	0.40	0.50	0.50	0.40	0.40			
	150	150	150	140	140	140	140			
	250	250	250	250	250	250	250			
	35 35	35 35	35 35	32 32	35 35	35 35	35 35			
	600	600	600	575	600	600	600			
	10^{11} 10^{11}	10^{11} 10^{11}	10^{11} 10^{11}	10^{11} 10^{11}	10^{11} 10^{11}	10^{11} 10^{11}	10^{11} 10^{11}			
	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}			
	1.59	1.65	1.78	1.55	1.53	1.65	1.78			
	HB	HB	HB	HB	HB	HB	HB			
	3.3	3.0	3.0	3.5	3.5	3.0	3.0			
	1.4	1.3	1.2	1.5	1.5	1.3	1.2			
	0.05	0.05	0.05	0.70	0.10	0.05	0.05			
	0.50	0.45	0.25	0.85	0.55	0.45	0.25			
	PA 6T/6I, MH, 12-160, GF 45	PA 6T/6I, MH, 12-190, GF 50	PA 6T/6I, MH, 12-220, GF 60	PA 6T/6I, MH, 12-070, GM 40	PA 6T/6I, MH, 12-140, GF 40	PA 6T/6I, MH, 12-190, GF 50	PA 6T/6I, MH, 12-220, GF 60			

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					2. Injection mouldi	
					Grivory HT2V-3H	Grivory HT2V-45H
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	11 000 11 000	16 000 15 500
Tensile strength at break	5 mm/min	ISO 527	MPa	dry cond.	200 175	240 215
Elongation at break	5 mm/min	ISO 527	%	dry cond.	2.5 2.5	2.0 2.0
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	50 50	75 75
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	45 45	65 65
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	9 9	13 13
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	9 9	12 12
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	275 265	315 310
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	310	310
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	280	285
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	200	235
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.20	0.15
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.70	0.60
Maximal usage temperature	long term	ISO 2578	°C	dry	140	140
Maximal usage temperature	short term	ISO 2578	°C	dry	240	240
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	38 37	38 37
Comparative tracking index	CTI	IEC 60112	—	cond.	600	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{10} 10^{10}	10^{10} 10^{10}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{12}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.42	1.56
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	5.0	4.0
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	1.8	1.4
Linear mould shrinkage	long.	ISO 294	%	dry	0.15	0.10
Linear mould shrinkage	trans.	ISO 294	%	dry	0.80	0.75
Product description according to ISO 1874					PA 6T/66, MH, 12-110, GF 30	PA 6T/66, MH, 12-160, GF 45

ng grades reinforced

	Grivory HT2V-5H									
	17 500 17 000									
	250 225									
	2.0 2.0									
	85 85									
	70 70									
	13 13									
	13 13									
	325 325									
	310									
	285									
	240									
	0.15									
	0.55									
	140									
	240									
	38 37									
	600									
	10^{10} 10^{10}									
	10^{12}									
	1.62									
	HB									
	3.5									
	1.2									
	0.10									
	0.70									
	PA 6T/66, MH, 12-190, GF 50									

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					2. Injection mouldi	
					Grilon BK-50	Grilon BG-30 S
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	6 100 1 700	9 500 6 000
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	95 45	
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	4 8	
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	80• 40•	185• 125•
Elongation at break	50 mm/min	ISO 527	%	dry cond.	10• 30•	5• 10•
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	60 –	75 90
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	35 –	65 70
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	4 4	11 20
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	3 3	8 9
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	225 90	210 100
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	222	222
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	95	205
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	–	–
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	45	135
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.7	0.2
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	0.7	0.1
Maximal usage temperature	long term	ISO 2578	°C	dry	90–110	90–110
Maximal usage temperature	short term	ISO 2578	°C	dry	160	160
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	36 29	40 37
Comparative tracking index	CTI	IEC 60112	—	cond.	450	500
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11} 10^{9}	10^{12} 10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{10}	10^{12}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.55	1.35
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	5	7
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	1.5	2
Linear mould shrinkage	long.	ISO 294	%	dry	0.70	0.10
Linear mould shrinkage	trans.	ISO 294	%	dry	0.75	0.85
Product description according to ISO 1874					PA6, MHR, 18-060, GB 50	PA6, MH, 14-090, GF 30

• Testing speed 5 mm/min

ng grades reinforced

	Grilon BG-50 S	Grilon BGZ-30/2	Grilon BGZ-50/2	Grilon BG-50H	Grilon BG-15 HM	Grilon BG-30 HM	Grilon BG-40 HM	Grilon BG-50 HM	Grilon TSG-30	Grilon TSM-30	Grilon TSGK-30X
	17 500 11 500	8 500 5 500	16 000 10 000	17 500 11 500	5 500 3 800	8 700 6 500	12 000 8 500	14 000 10 000	9 700 6 000	5 800 2 300	8 500 5 000
	245• 165•	150• 105•	230• 150•	245• 165•	105• 70•	140• 95•	150• 130•	175• 100•	175• 120•	75• 45•	155• 85•
	3• 6•	4• 8•	3• 6•	3• 6•	4• 10•	3• 5•	3• 5•	3• 5•	3• 6•	3• 15•	3• 10•
	90 95	80 95	95 130	90 95	55 60	60 60	70 70	40 45	75 85	45 >100	50 75
	85 90	80 85	90 95	85 90	60 60	50 45	65 65	40 25	65 65	35 35	45 45
	15 25	15 25	15 25	15 25	10 12	12 14	15 20	12 16	13 20	5 7	8 13
	11 12	11 12	11 12	11 12	5 5	9 9	12 12	10 10	10 10	5 3	7 7
	270 155	170 85	280 170	270 155	150 90	180 120	200 130	210 140	210 110	170 90	200 100
	222	222	222	222	222	222	222	222	260	260	260
	210	200	210	210	160	170	195	200	220	110	215
	–	–	–	–	–	–	–	–	–	–	–
	170	85	165	170	65	95	130	140	155	70	80
	0.15	0.2	0.15	0.15	0.2	0.3	0.15	0.2	0.2	0.8	0.6
	1	1.2	1	1	1.3	1.1	1	1.2	1.1	0.8	0.8
	90–110	90–120	90–120	120–140	90–110	90–110	90–110	90–110	90–110	90–110	90–110
	160	160	160	160	160	160	160	160	180	180	180
	40 37	41 38	41 38	36 33	38 32	40 38	41 38	40 38	25 24	27 27	24 23
	575	550	550	475	600	600	550	600	600	525	425
	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{10}	10^{12} 10^{10}	10^{12} 10^{10}
	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{11}	10^{11}	10^{11}
	1.58	1.30	1.57	1.58	1.14	1.26	1.36	1.49	1.34	1.37	1.34
	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB
	5	7	5	5	5.5	5	5	3.5	6.5	6.5	7.5
	1.5	2	1.5	1.5	2	1	1.5	1.0	2.0	2.0	2.0
	0.05	0.10	0.05	0.05	0.15	0.10	0.10	0.05	0.10	0.75	0.10
	0.50	0.60	0.35	0.50	0.50	0.30	0.40	0.25	0.65	0.80	0.60
	PA6, MH, 14-190, GF 50	PA6-HI, MH, 18-080, GF 30	PA6-HI, MH, 18-160, GF 50	PA6, MH, 14-190, GF 50	PA6-HI, MH, 18-040, GF 15	PA6-HI, MH, 18-090, GF 30	PA6-HI, MH, 18-120, GF 40	PA6-HI, MH, 18-140, GF 50	PA66+PA6, MHR, 14-100 N, GF 30	PA66+PA6, MHR, 14-060 N, MD 30	PA66+PA6, MHR, 14-080 N, (GF+GB) 30 X

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					3. Injection mouldi	
					Grilamid L20 HFR	Grivory XE 3818
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	1 500	12 500 12 500
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	40	
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	10	
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	35	150• 145•
Elongation at break	50 mm/min	ISO 527	%	dry cond.	>50	1.5• 1.5•
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	>100	40 35
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	7	13 13
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	178	310
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	50	285
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	130	–
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	–	215
Maximal usage temperature	long term	ISO 2578	°C	dry	90–110	120–140
Maximal usage temperature	short term	ISO 2578	°C	dry	150	240
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	34	31 31
Comparative tracking index	CTI	IEC 60112	—	cond.	600	400
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{12}	10^{11} 10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{13}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.05	1.67
Flammability (UL 94)	0.8 mm 1.6 mm 3.2 mm	ISO 1210	rating rating rating	– – –	V2 V2 V2	V0 V0 V0
Oxygen index		ISO 4589-2	%		>26	>40
Glow wire temperature	1 mm 3 mm	IEC 60695	°C °C		960 960	960 960
Water absorption	23 °C/sat,	ISO 62	%	–	1.4	3.5
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	0.7	1.3
Linear mould shrinkage	long.	ISO 294	%	dry	0.55	0.10
Linear mould shrinkage	trans.	ISO 294	%	dry	0.75	0.65
Product description according to ISO 1874					PA 12, MHF, 18-010	PA 6T/66, MHF, 11-120, GF 30

• Testing speed 5 mm/min

ng grades self-extinguishing

	Grivory XE 3819	Grilon BS V0	Grilon AS V0	Grilon TS V0	Grilon BGM 65 X V0					
	16 000 16 000	3 700 1 200	3 900 2 000	3 600 1 600	11 500 7 100					
		90 45	90 55	85 50						
		3 15	4 12	4 15						
	185• 180•	70 55	80 50	75 –	120• 90•					
	1.5• 1.5•	4 >50	9 >50	10 >50	1• 3•					
	35 35	>100 >100	65 >100	75 >100	25 25					
	12 12	3 15	4 8	4 15	3 3					
	310	222	260	260	222					
	290	70	75	70	160					
	–	170	225	210	–					
	235	–	–	–	75					
	120–140	80–110	90–110	90–110	80–110					
	240	160	200	180	160					
	31 31	32 29	31 28	28 26	33 29					
	400	575	600	600	500					
	10^{11} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{11} 10^{9}	10^{12} 10^{11}					
	10^{13}	10^{12}	10^{12}	10^{10}	10^{12}					
	1.76	1.16	1.16	1.16	1.69					
	V0 V0 V0	V0 V0 V0	V0 V0 V0	V0 V0 V0	V2 V0 V0					
	>40	>32	>32	>35	~65					
	960 960	960 960	960 960	960 960	960 960					
	3.0	8	7	8	5					
	1.0	2.5	2	2.5	1.5					
	0.10	0.85	0.95	0.70	0.25					
	0.55	0.90	1.10	0.75	0.55					
	PA 6T/66, MHF, 11-160, GF 40	PA 6, MFHR, 14-040 N	PA 66, MFHR, 14-040	PA 66+PA 6, MHFR, 14-040 N	PA 6, MFHR, 14-110 MD+GF					

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

					Grilamid L 20 G	Grilamid L 20 EC
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	1 100	1 900
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	40	50
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	12	10
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	50	40
Elongation at break	50 mm/min	ISO 527	%	dry cond.	>50	30
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	>100	>100
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	>100	50
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	7	2
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	6	2
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	70	75
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	178	178
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	45	65
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	115	135
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	–	–
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	1.2	1.2
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	1.4	1.3
Maximal usage temperature	long term	ISO 2578	°C	dry	90–110	90–110
Maximal usage temperature	short term	ISO 2578	°C	dry	150	150
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	32	–
Comparative tracking index	CTI	IEC 60112	—	cond.	600	–
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11}	1
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	100
Universal properties						
Density		ISO 1183	g/cm³	dry	1.01	1.16
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	1.5	1.1
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	0.7	0.6
Linear mould shrinkage	long.	ISO 294	%	dry	0.80	1.25
Linear mould shrinkage	trans.	ISO 294	%	dry	0.85	1.40
Product description according to ISO 1874					PA 12, MHR, 18-010	PA 12, MHLRZ, 18-020, CD 25

* no tensile limit attained

ng grades unreinforced

	Grilamid L 20 LF	Grilon BS/2	Grilon BZ 1/2	Grilon BZ 3/2	Grilon BT 40 Z	Grilon AS/2	Grilon AZ 3/2	Grilon TSZ 1	Grilon TSS	
	2 000	3 300 1 100	2 700 900	1 800 600	2 400 1 600	3 700 1 700	1 700 700	2 400 750	2 700 750	
	45	90 45	65 35	50 25	70 50	95 60	45 *	65 35	70 40	
	12	3 15	4 15	4 15	6 7	4 12	5 *	4 20	4 15	
	40	70 55	45 55	40 40	50 45	80 50	45 40	40 60	45 60	
	40	5 >50	>50 >50	>50 >50	15 >50	10 >50	>50 >50	25 >50	25 >50	
	>100	>100 >100	>100 >100	>100 >100	>100 >100	>100 >100	>100 >100	>100 >100	>100 >100	
	>100	>100 30	>100 >100	>100 >100	>100 >100	>100 >100	>100 >100	>100 >100	>100 >100	
	4	4 20	10 25	65 115	15 20	4 12	90 120	11 45	8 35	
	3	4 3	6 6	15 15	10 12	4 4	20 20	10 8	6 7	
	75	140 60	120 55	95 40	120 80	150 85	95 55	125 45	135 45	
	178	222	222	222	222	260	260	260	260	
	65	55	55	50	105	75	65	55	55	
	140	170	160	130	135	225	170	160	140	
	–	–	–	–	–	–	–	50	45	
	0.8	0.7	0.9	1.3	0.7	0.5	1.5	1.2	0.8	
	1.3	1.0	1.2	1.5	1.0	1.0	1.5	1.5	1.2	
	90–110	70–90	80–110	80–110	80–110	70–90	90–110	80–110	80–110	
	150	160	160	160	130	200	200	180	180	
	21	30 28	40 35	42 39	37 34	29 27	29 27	31 27	26 25	
	225	600	600	600	550	600	600	600	600	
	10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{10}	10^{11} 10^{9}	
	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{11}	10^{10}	
	1.08	1.14	1.10	1.06	1.06	1.14	1.07	1.12	1.14	
	HB	HB	HB	HB	HB	HB	HB	HB	HB	
	1.5	9	9	9	6	8	8	8.5	9	
	0.7	3	3	3	2.5	2	2	2.5	3	
	0.40	0.80	0.85	1.10	0.70	0.75	1.60	1.25	1.15	
	0.55	0.95	1.35	1.45	0.90	1.20	1.80	1.35	1.30	
	PA 12, MHZ, 18-020, CD 12	PA 6, MR, 18-030 N	PA 6-HI, MHR, 18-020 N	PA 6-HI, MHR, 18-020 N	PA 6-HI+PA 12/X, MH, 18-020 N	PA 66, MR, 14-040 N	PA 66-HI, MH, 14-040 N	PA 66+PA 6/HI, MHR, 14-020 N	PA 66+PA 6, MHR, 14-030 N	

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

					Grilamid ELY 2694	Grilamid ELY 60
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	450	350
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	25	20
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	20	20
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	45	25
Elongation at break	50 mm/min	ISO 527	%	dry cond.	>50	>50
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	>100	>100
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	>100	>100
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	n.b.	n.b.
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	8	4
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	35	25
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	176	160
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	55	45
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	75	55
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	–	–
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	1.6	1.4
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	1.7	1.5
Maximal usage temperature	long term	ISO 2578	°C	dry	80–100	80–100
Maximal usage temperature	short term	ISO 2578	°C	dry	140	130
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	31	38
Comparative tracking index	CTI	IEC 60112	—	cond.	600	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11}	10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{12}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.01	1.01
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	1.5	1.3
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	0.7	0.5
Linear mould shrinkage	long.	ISO 294	%	dry	0.65	0.40
Linear mould shrinkage	trans.	ISO 294	%	dry	0.85	0.85
Product description according to ISO 1874					PA 12/X, GH, 18-004	PA 12/X, GH, 14-003

n.b. = no break

ng grades unreinforced, flexible

	Grilamid ELY 2475	Grilamid ELY 2702	Grilamid ELY 20 NZ							
	300	200	250							
	15	15	15							
	20	20	25							
	35	40	35							
	>50	>50	>50							
	>100	n.b.	n.b.							
	>100	n.b.	n.b.							
	n.b.	n.b.	n.b.							
	20	n.b.	n.b.							
	30	25	25							
	167	162	160							
	45	45	45							
	75	65	75							
	–	–	–							
	1.4	1.3	1.6							
	1.6	1.9	1.9							
	80–100	80–100	80–100							
	140	140	140							
	32	32	32							
	600	600	600							
	10^{11}	10^{10}	10^{10}							
	10^{12}	10^{11}	10^{12}							
	1.02	1.02	0.99							
	HB	HB	HB							
	1.5	1.3	1.4							
	1.0	0.9	0.5							
	0.70	0.45	0.75							
	0.95	0.70	1.15							
	PA 12/X, GH, 18-003	PA 12/X, GH, 18-002	PA 12/X, GH, 18-002							

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					Grilamid L 20 HL	Grilamid L 20 LM
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	1 100	1 100
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	40	40
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	12	12
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	50	50
Elongation at break	50 mm/min	ISO 527	%	dry cond.	>50	>50
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m^2	dry cond.	>100	>100
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m^2	dry cond.	>100	>100
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m^2	dry cond.	7	4
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m^2	dry cond.	6	3
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	70	70
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	178	178
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	45	50
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	115	125
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	–	–
Thermal expansion coefficient long.	23–55 °C	ISO 11359	$10^{-4}/K$	dry	1.2	1.2
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	$10^{-4}/K$	dry	1.4	1.4
Maximal usage temperature	long term	ISO 2578	°C	dry	100–120	90–110
Maximal usage temperature	short term	ISO 2578	°C	dry	150	150
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	32	32
Comparative tracking index	CTI	IEC 60112	—	cond.	550	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11}	10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{12}
Universal properties						
Density		ISO 1183	g/cm^3	dry	1.01	1.01
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	1.5	1.5
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	0.7	0.7
Linear mould shrinkage	long.	ISO 294	%	dry	–	–
Linear mould shrinkage	trans.	ISO 294	%	dry	–	–
Product description according to ISO 1874					PA 12, EHL, 18-010	PA 12, MHLR, 18-010 N

• Testing speed 5 mm/min
* no tensile limit attained

and blow moulding types unreinforced and reinforced

	Grilamid L 25	Grilamid L 25 H	Grilon BRZ 340 H	Grilon R 50 HNZ	Grilon RVZ-15 H.1	Grilon EB 50 H	Grilon EB 50 HDZ	Grilon EBV-15 H		
	1 100	1 100	2 800 700	1 800 600	5 500 2 400	2 800 800	2 300 700	5 600 2 700		
	40	40	70 35	50 *		75 40	60 35			
	12	12	4 15	5 *		4 20	4 20			
	50	50	40 45	45 50	95• 60•	50 50	50 45	110• 65•		
	>50	>50	40 >50	>50 >50	6• 25•	50 >50	50 >50	5• 25•		
	>100	>100	>100 >100	>100 >100	90 >100	>100 >100	>100 >100	80 >100		
	>100	>100	>100 >100	>100 >100	90 90	>100 >100	>100 >100	80 80		
	10	10	13 >125	95 >125	20 35	11 >100	70 >100	15 30		
	7	7	11 7	25 25	9 9	10 9	20 20	6 8		
	70	70	130 45	90 30	140 65	135 55	100 40	145 70		
	178	178	222	222	222	222	222	222		
	45	45	55	45	160	55	50	165		
	115	115	130	105	–	140	90	–		
	–	–	–	–	50	–	–	50		
	1.2	1.2	0.9	1.3	0.35	0.9	1.2	0.5		
	1.4	1.4	1.2	1.4	1.2	1.2	1.4	1.2		
	90–110	90–110	100–120	100–120	100–120	100–120	100–120	100–120		
	150	150	160	160	160	160	160	160		
	32	32	40 35	– –	40 37	28 24	27 24	26 22		
	600	600	600	475	600	425	425	325		
	10^{11}	10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{12} 10^{11}	10^{11} 10^{9}	10^{11} 10^{9}	10^{11} 10^{9}		
	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{10}	10^{10}	10^{10}		
	1.01	1.01	1.10	1.07	1.19	1.11	1.10	1.21		
	HB	HB	HB	HB	HB	HB	HB	HB		
	1.5	1.5	9	9	8	9	9	8		
	0.7	0.7	3	3	2.5	3	3	2.5		
	–	–	–	–	–	–	–	–		
	–	–	–	–	–	–	–	–		
	PA 12, E, 24-010	PA 12, EH, 24-010	PA 6-HI, GHR, 27-020 N	PA 6-HI, GH, 34-020	PA 6-HI, GH, 27-050, GF 15	PA 6-HI, DH, 34-030	PA 6-HI, DH, 34-020	PA 6-HI, DH, 27-060, GF 15		

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

					Grilamid L 16 LM	Grilamid L 20 W 20
Mechanical properties						
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	1 100	500
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	45	30
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	15	20
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	50	40
Elongation at break	50 mm/min	ISO 527	%	dry cond.	>50	>50
Impact strength	Charpy, 23 °C	ISO 179/1eU	kJ/m²	dry cond.	n.b.	n.b.
Impact strength	Charpy, –30 °C	ISO 179/1eU	kJ/m²	dry cond.	n.b.	n.b.
Notched impact strength	Charpy, 23 °C	ISO 179/1eA	kJ/m²	dry cond.	7	40
Notched impact strength	Charpy, –30 °C	ISO 179/1eA	kJ/m²	dry cond.	6	3
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	70	40
Thermal properties						
Melting point	DSC	ISO 11357	°C	dry	178	174
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	50	45
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	125	100
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	–	–
Thermal expansion coefficient long.	23–55 °C	ISO 11359	10^{-4}/K	dry	1.2	1.4
Thermal expansion coefficient trans.	23–55 °C	ISO 11359	10^{-4}/K	dry	1.4	1.6
Maximal usage temperature	long term	ISO 2578	°C	dry	90–110	80–100
Maximal usage temperature	short term	ISO 2578	°C	dry	150	150
Electrical properties						
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	32	32
Comparative tracking index	CTI	IEC 60112	—	cond.	600	600
Volume resistivity		IEC 60093	Ω · m	dry cond.	10^{11}	10^{11}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}	10^{12}
Universal properties						
Density		ISO 1183	g/cm³	dry	1.01	1.03
Flammability (UL 94)	0.8 mm	ISO 1210	rating	–	HB	HB
Water absorption	23 °C/sat.	ISO 62	%	–	1.5	1.5
Moisture absorption	23 °C/50 % r.h.	ISO 62	%	–	0.7	0.7
Linear mould shrinkage	long.	ISO 294	%	dry	0.80	0.85
Linear mould shrinkage	trans.	ISO 294	%	dry	0.85	1.00
Product description according to ISO 1874					PA 12, EHLS, 14-010 N	PA 12-P, GHL, 18-005

n.b. = no break
* no tensile limit attained

▲ Stress at 50% strain

flexible

	Grilamid L 25 W 20 X	Grilamid L 25 W 20 Y	Grilamid L 25 W 40	Grilamid L 25 W 40 X	Grilamid L 25 W 40 ESD	Grilamid L 25A NZ	Grilamid L 25 NZ ESD	Grilon BRZ 247 W	Grilon BRZ 347 W	Grilon BRZ 334 H
	450	450	400	360	350	750	1 000	650 380	600 350	950 300
	30	30	25	25	25	30	35	* *	* *	* *
	20	25	20	20	20	15	12	* *	* *	* *
	35	40	40	40	35	40	40	30▲ 25▲	30▲ 25▲	40▲ 20▲
	>50	>50	>50	>50	>50	>50	>50	>50 >50	>50 >50	>50 >50
	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.	n.b. n.b.	n.b. n.b.	n.b. n.b.
	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.	n.b.	n.b. n.b.	n.b. n.b.	n.b. n.b.
	n.b.	n.b.	n.b.	n.b.	n.b.	100	80	120 n.b.	110 n.b.	n.b. n.b.
	6	7	4	13	9	75	20	7 10	15 15	n.b. n.b.
	35	40	35	30	35	40	40	35 25	35 25	90 30
	174	178	173	173	173	178	178	215	215	222
	45	45	45	45	45	45	45	40	40	45
	95	95	95	95	95	80	95	75	80	55
	–	–	–	–	–	–	–	–	–	–
	1.4	1.4	1.4	1.4	1.4	1.2	1.3	1.4	1.5	1.2
	1.8	1.8	1.8	1.8	1.8	1.4	1.5	1.5	1.6	1.4
	80–110	80–110	80–110	80–110	90–110	90–100	90–110	80–110	80–110	80–110
	150	150	150	150	150	150	150	150	150	150
	32	32	32	32	– –	– –	– –	31 29	– –	26 22
	600	600	600	600	–	–	–	500	600	600
	10^{11}	10^{11}	10^{11}	10^{11}	10^{3}	10^{11}	10^{3}	10^{12} 10^{11}	10^{12} 10^{11}	10^{11} 10^{8}
	10^{12}	10^{12}	10^{12}	10^{12}	10^{6}	10^{12}	10^{6}	10^{12}	10^{12}	10^{9}
	1.02	1.02	1.03	1.02	1.04	0.98	1.02	1.12	1.07	1.00
	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB
	1.5	1.5	1.4	1.4	1.1	1.3	1.1	8	8	5
	0.7	0.7	0.7	0.7	0.6	0.6	0.6	2.5	2.5	1.5
	0.8	0.8	0.9	–	1.1	1.0	1.15	–	–	–
	1.25	1.20	1.30	–	1.40	1.60	1.35	–	–	–
	PA 12-HIP, EHL, 22-005	PA 12-HIP, EHL, 22-005	PA 12-P, EHL, 22-004	PA 12-HIP, EHL, 22-004	PA 12-HIP, EHLZ, 22-004	PA 12-HI, EH, 24-007	PA 12-HI, EHZ, 24-010	PA 6-HIP, GH, 32-007	PA 6-HIP, GHL, 32-005	PA 6-HI, GHR, 24-010 N

The test values «conditioned» were attained on test pieces stored according to ISO 1110.

Properties					8. Extrusion grades	
					Grivory G 16	Grivory G 21
Thermal properties						
Melting point	DSC		ISO 11357	°C	125[1)]	125[1)]
MVR 275 °C/2.16 kg	MVR		ISO 1133	cm^3/10 min		
MVR 275 °C/5 kg	MVR		ISO 1133	cm^3/10 min	100	20
Universal properties						
Density			ISO 1183	g/cm^3	1.18	1.18
Water absorption			ISO 62	%	7	7
Moisture absorption			ISO 62	%	2	2
Gloss			ISO 2813	–	160	160
Barrier properties						
O_2 transmission rate	23 °C/0% r.h. 23 °C/85% r.h.		DIS/ISO 15105-1	cm^3/m^2 24 h bar	30 10	30 10
CO_2 transmission rate	23 °C/0% r.h. 23 °C/85% r.h.		DIS/ISO 15105-2	cm^3/m^2 24 h bar	90 40	90 40
Moisture vapour transmission rate	23 °C/85% r.h.		DIS/ISO 15106-1	g/m^2 24 h	7	7
Mechanical properties						
Tensile E-Modulus		1 mm/min	ISO 527	MPa	3 000	3 000
Tensile strength at yield	long. trans.	100 mm/min	ISO 1184	MPa MPa	85 85	85 85
Elongation at yield	long. trans.	100 mm/min	ISO 1184	% %	5 5	5 5
Tensile strength at break	long. trans.	100 mm/min	ISO 1184	MPa MPa	80 80	85 85
Elongation at break	long. trans.	100 mm/min	ISO 1184	% %	200 200	300 300
Weiterreissfestigkeit ((engl.))	long. trans.	200 mm/min	ISO 6383-1	N/mm	5 5	5 5
Elmendorf Weiterreissfestigkeit ((e))	long. trans.		ISO 6383-2	g	10 10	10 10
Fallbolzenprüfung ((engl.))	A B		ISO 7765-1	g		
Dynamischer Reibungskoeff. ((engl.))	long.		ISO 8295	–		
Product description according to ISO 1874					PA 6I/6T, FT, 09-030	PA 6I/6T, FT, 11-030

[1)] Glass transition temperature

(copolyamides)

	Grilon CR 9	Grilon CR 8	Grilon CR 9 HV	Grilon CF 85	Grilon CF 6 S	Grilon CA 6 E	Grilon CF 7	Grilon BM 13 SBG	Grilon BM 17 SBG	Grilon BM 20 SBG
	200	190	200	200	130	130	125	130	170	200
								60		
	120	120	30		180	250	100		40	40
	1.10	1.10	1.10	1.10	1.05	1.06	1.08	1.09	1.09	1.09
	9	8	9	8	5	5	7	10	10	6
	2	2	2	2	2	2	2	3	3	2.5
	130	130	130	130	130	130	130	100	130	130
	55 75	80 90	55 75	60 85	120 200	150 250	110 130	50 100	65 45	25 70
	200 350	300 800	200 350	300 750	400 800	450 850	400 800	130 500	200 470	80 250
	15	15	15	15	15	20	15	15	18	20
	550	500	550	500	400	350	400	300	600	650
	30 30	28 28	30 30	30 30	30 28	20 18	30 28	20 20	30 30	30 28
	10 10	10 10	10 10	10 10	15 8	15 15	15 8	15 10	10 8	10 10
	80 75	70 70	80 75	75 75	85 55	90 60	95 50	70 55	70 65	70 60
	800 900	900 900	800 900	900 900	800 900	900 900	800 900	900 900	700 900	900 900
	65 65	65 65	65 65	65 65	65 65	65 65	65 65	60 60	40 40	50 75
	20 20	20 20	20 20	20 20	80 80	80 80	80 80	80 80	15 15	20 20
	PA 6/12, FT, 16-020	PA 6/12, FT, 16-020	PA 6/12, FT, 22-020	PA 6/12, FT, 16-020	PA 6/12, FT, 16-007	PA 6/12-P, FT, 14-004	PA 6/12, FT, 18-010	PA 6/69, FT, 18-010	PA 6/66/6I, FT, 16-020	PA 66/610, FT, 18030

The recommendations and data given are based on our experience to data. No liability can be assumed in connection with their usage and processing.

Domat/Ems, September 2002

EMS-GRIVORY worldwide
www.emsgrivory.com

EMS-GRIVORY Europe

Switzerland
EMS-CHEMIE AG
Business Unit EMS-GRIVORY Europe
Via Innovativa 1
7013 Domat/Ems
Switzerland
Phone +41 81 632 78 88
Fax +41 81 632 76 65
welcome@emsgrivory.com

Germany
EMS-CHEMIE (Deutschland) Vertriebs GmbH
Warthweg 14
64823 Gross-Umstadt
Deutschland
Phone +49 6078 783 0
Fax +49 6078 783 416
welcome@de.emsgrivory.com

France
EMS-CHEMIE (France) S.A.
855 Avenue Roger Salengro
Boîte postale 16
92370 Chaville
France
Phone +33 1 41 10 06 10
Fax +33 1 48 25 56 07
welcome@fr.emsgrivory.com

Great Britain
EMS-CHEMIE (UK) Ltd.
Darfin House, Priestly Court
Staffordshire Technology Park
Stafford ST18 0AR
Great Britain
Phone +44 1785 283 739
Fax +44 1785 283 722
welcome@uk.emsgrivory.com

EMS-GRIVORY,
a business unit of the EMS Group

Italy
EMS-CHEMIE (Italia) S.r.l.
Viale Innocenzo XI n. 77
22100 Como (CO)
Italia
Phone +41 81 632 75 25
Fax +41 81 632 74 54
welcome@it.emsgrivory.com

EMS-GRIVORY Asia

China
EMS-CHEMIE (China) Ltd.
227 Songbei Road
Suzhou Industrial Park
Suzhou City 215126
Jiangsu Province
P.R. China
Phone +86 512 8666 8180
Fax +86 512 8666 8210
welcome@cn.emsgrivory.com

EMS-CHEMIE (Suzhou) Ltd.
227 Songbei Road
Suzhou Industrial Park
Suzhou City 215126
Jiangsu Province
P.R. China
Phone +86 512 8666 8181
Fax +86 512 8666 8183
welcome@cn.emsgrivory.com

Taiwan
EMS-CHEMIE (Taiwan) Ltd.
36, Kwang Fu South Road
Hsin Chu Industrial Park
Fu Kou Hsiang
Hsin Chu Hsien 30351
Taiwan, R.O.C.
Phone +886 3 598 5335
Fax +886 3 598 5345
welcome@tw.emsgrivory.com

Korea
EMS-CHEMIE (Korea) Ltd.
#817 Doosan Venturedigm,
415 Heungan Daero,
Dongan-gu, Anyang-si,
Gyeonggi-do, 431-755
Republic of Korea
Phone +82 31 478 3159
Fax +82 31 478 3157
welcome@kr.emsgrivory.com

Japan
EMS-CHEMIE (Japan) Ltd.
EMS Building
2-11-20 Higashi-koujiya
Ota-ku, Tokyo 144-0033
Japan
Phone +81 3 5735 0611
Fax +81 3 5735 0614
welcome@jp.emsgrivory.com

EMS-GRIVORY America

United States of America
EMS-CHEMIE (North America) Inc.
2060 Corporate Way
P.O. Box 1717
Sumter, SC 29151
USA
Phone +1 803 481 61 71
Fax +1 803 481 61 21
welcome@us.emsgrivory.com

EMS-GRIVORY

2.002 e 09.2002 3000 ADE