




VESTAMID® HT *plus*

PA 6T/X and PA 10T/X product range and main properties



VESTAMID® HT*plus* base and unfilled polymers

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Process-ing	Tensile modulus [MPa]	Applications
M1000 natural color	PA6T/X	Medium viscosity, semicrystalline with aromatic segments	CO	3600	Manufacturing of compounds for injection molding
M3000 natural color 	PA10T/X	Medium viscosity, semicrystalline with aromatic segments; partly based on renewable raw materials	CO	2700	Manufacturing of compounds for injection molding
F2001 natural color 	PA10T/X	High viscosity, stabilized	EX	2700	Monofilaments
C2505 natural color 	PA10T/X	Low viscosity, stabilized	PO	2100	Fiber composites

Abbreviations:

CO = Compounding

EX = Extrusion

PO = Powder

Main properties of VESTAMID® HT *plus* base and unfilled polymers

Property	Test method	Unit	VESTAMID® HT <i>plus</i> M1000	VESTAMID® HT <i>plus</i> M3000	VESTAMID® HT <i>plus</i> F2001	VESTAMID® HT <i>plus</i> C2505 ¹⁾	
Physical, thermal, mechanical properties, and flammability							
Density	23 °C	ISO 1183	g/cm ³	1.2	1.1	1.11	1.11
Melting temperature DSC 2 nd heating		ISO 11357	°C	315	285	265	265
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa		ISO 75	°C °C	126 223	128 225		124 242
VICAT softening temperature Method A 10 N		ISO 306	°C	300	280		
Flammability acc. UL94 1.6 mm 3.2 mm		IEC 60695		HB HB	HB HB		
Water absorption 23 °C, saturation 23 °C, 50% rel. humidity		ISO 62	% %	8.0 0.3	3.0 0.15	3.0 0.15	3.0 0.15
Mold shrinkage in flow direction in transverse direction		ISO 294-4	% %	1.3 1.5	1.4 1.5		
Tensile test Stress at break Strain at break		ISO 527-1/2	MPa %	90 3	73 5	80 6	62 >100
Tensile modulus		ISO 527-1/2	MPa	3600	2700	2700	2100
CHARPY impact strength 23 °C -30 °C		ISO 179/1eU	kJ/m ² kJ/m ²	50 C 45 C	60 C 60 C		N <100
CHARPY notched impact strength 23 °C -30 °C		ISO 179/1eA	kJ/m ² kJ/m ²	7 C 5 C	6 C 6 C		18C 15C
Electrical properties							
Electric strength K20/P50		IEC 60243-1	kV/m m	30			
Comparative tracking index CTI		IEC 60112		550			
Volume resistivity		IEC 60093	Ω cm	2 x 10 ¹⁶			

C = complete break

¹⁾ Powder, based on C2000

Glass fiber reinforced VESTAMID® HT *plus* PA6T/X grades

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Process-ing	Tensile modulus [MPa]	Applications
M10315	PA6T/X, GF15	15% glass fibers, medium viscosity, stabilized; colors: natural, black	IM	7100	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery
M1033	PA6T/X, GF30	30% glass fibers, medium viscosity, stabilized; colors: natural, black	IM	11200	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery
M10345	PA6T/X, GF45	45 % glass fibers, medium viscosity, stabilized; colors: natural, black	IM	15500	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery, metal replacement
M1035	PA6T/X, GF50	50% glass fibers, medium viscosity, stabilized; colors: natural, black	IM	19000	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery, metal replacement
M1036	PA6T/X, GF60	60% glass fibers, medium viscosity, stabilized; colors: natural, black	IM	23000	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery, metal replacement

Abbreviations:





IM = Injection molding

Main properties of glass fiber reinforced VESTAMID® HTplus PA6T/X grades

Property	Test method	Unit	VESTAMID® HTplus M10315	VESTAMID® HTplus M1033	VESTAMID® HTplus M10345	VESTAMID® HTplus M1035	VESTAMID® HTplus M1036	
Physical, thermal, mechanical properties, and flammability								
Density	23 °C	ISO 1183	g/cm ³	1.31	1.43	1.58	1.64	1.77
Melting temperature 2 nd heating	DSC	ISO 11357	°C	315	315	315	315	315
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa		ISO 75	°C °C	280 303	290 305	292 305	293 305	293 305
VICAT softening temperature Method A 10 N		ISO 306	°C	308	308	311	314	314
Linear thermal expansion 23–55°C		ISO 11359	10 ⁻⁴ K ⁻¹				0.27	
Flammability acc. UL94 1.6 mm 3.2 mm		IEC 60695		HB HB	HB HB	HB HB	HB HB	HB HB
Water absorption 23 °C. saturation 23 °C. 50% rel. humidity		ISO 62	% %	7.2 0.3	5.6 0.2	4.4 0.2	4.0 0.2	3.2 0.2
Mold shrinkage in flow direction in transverse direction		ISO 294-4.	% %	0.6 0.9	0.2 0.9		0.1 0.7	<0.1 0.5
Tensile test Stress at break Strain at break		ISO 527-1/2	MPa %	110 2.0	190 2.0	240 1.9	260 1.9	260 1.5
Tensile modulus		ISO 527-1/2	MPa	7100	11000	15800	17000	23000
CHARPY impact strength 23 °C -30 °C		ISO 179/1eU	kJ/m ² kJ/m ²	19 C 18 C	35 C 27 C	54 C 45 C	65 C 45 C	60 C 40 C
CHARPY notched impact strength 23 °C 30 °C		ISO 179/1eA	kJ/m ² kJ/m ²	4 C 4 C	7 C 7 C	10 C 10 C	12 C 12 C	17 C 17 C
Electrical properties								
Electric strength		IEC 60243-1	kV/mm		29		28	
Volume resistivity		IEC 60093	Ω cm		7 x 10 ¹⁵		9 x 10 ¹⁵	

C = complete break

Glass fiber reinforced VESTAMID® HT *plus* PA10T/X grades

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Processing	Tensile modulus [MPa]	Applications
M30315 	PA10T/X, GF15	15% glass fibers, medium viscosity, stabilized; wide processing window; “green”, colors: natural, black	IM	6200	Dimension-stable, highly rigid technical parts for the use at high service temperatures and in contact with chemicals in automotives, electronics and machinery
M3033 	PA10T/X, GF30	30% glass fibers, medium viscosity, stabilized; wide processing window; “green”, colors: natural, black	IM	9400	Dimension-stable, highly rigid technical parts for the use at high service temperatures and in contact with chemicals in automotives, electronics and machinery
M3035 	PA10T/X, GF50	50% glass fibers, medium viscosity, stabilized; wide processing window; “green”, colors: natural, black	IM	15500	Dimension-stable, highly rigid technical parts for the use at high service temperatures and in contact with chemicals in automotives, electronics and machinery, metal replacement
M3036 	PA10T/X, GF60	60% glass fibers, medium viscosity, stabilized; wide processing window; “green”, colors: natural, black	IM	20100	Dimension-stable, highly rigid technical parts for the use at high service temperatures and in contact with chemicals in automotives, electronics and machinery, metal replacement

Abbreviations:

IM = Injection molding

Main properties of glass fiber reinforced VESTAMID® HT*plus* compounds

Property	Test method	Unit	VESTAMID® HT <i>plus</i> M30315	VESTAMID® HT <i>plus</i> M3033	VESTAMID® HT <i>plus</i> M3035	VESTAMID® HT <i>plus</i> M3036
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Physical, thermal, and mechanical properties, and flammability

Density	ISO 1183	g/cm ³	1.24	1.36	1.58	1.71
Melting temperature DSC 2 nd heating	ISO 11357	°C	285	285	285	285
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa	ISO 75	°C °C	248 279	266 286	276 288	276 288
VICAT softening temperature Method A 10 N	ISO 306	°C	284	289	292	292
Linear thermal expansion 23–55°C	ISO 11359	10 ⁻⁴ K ⁻¹				0.8
Flammability acc. UL94 1.6 mm 3.2 mm	IEC 60695		HB HB	HB HB	HB HB	HB HB
Water absorption 23 °C saturation 3°C. 50% rel. humidity	ISO 62	% %		2.1 0.11	1.5 0.08	1.2 0.06
Mold shrinkage in flow direction in transverse direction	ISO 294-4. processing acc. ISO 1874-2	% %		0.3 0.8	0.1 0.7	
Tensile test Stress at break Strain at break	ISO 527- 1/-2	MPa %	111 2.1	170 2.4	215 2.2	230 1.9
Tensile modulus	ISO 527- 1/-2	MPa	6200	9400	15500	20100
CHARPY impact strength 23 °C -30 °C	ISO 179/1eU	kJ/m ² kJ/m ²	24 C 24 C	56 C 52 C	83 71	90 88
CHARPY notched impact strength 23 °C -30 °C	ISO 179/1eA	kJ/m ² kJ/m ²	6 C 6 C	9 C 8 C	11 C 10 C	18 C 19 C

Electrical properties

Electric strength	IEC 60243- 1	kV/mm				
Volume resistivity	IEC 60093	Ω cm			10 ¹⁴	10 ¹³

C = complete break

Reinforced VESTAMID® HT *plus* grades for drinking water applications

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Process-ing	Tensile modulus [MPa]	Applications
M1633	PA6T/X, GF30	30% glass fibers, medium viscosity, stabilized, approvals for contact with drinking water; colors: natural, black	IM	11000	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery, metal replacement
M1634	PA6T/X, GF40	40% glass fibers, medium viscosity, stabilized, approvals for contact with drinking water; colors: natural, black	IM	14000	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery, metal replacement
M1635	PA6T/X, GF50	50 % glass fibers, medium viscosity, stabilized, approvals for contact with drinking water; colors: natural, black	IM	17000	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery, metal replacement
M1636	PA6T/X, GF60	60 % glass fibers, medium viscosity, stabilized, approvals for contact with drinking water; colors: natural, black	IM	23000	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery, metal replacement


Abbreviations:

IM = Injection molding

Main properties of reinforced VESTAMID® HT *plus* grades for drinking water applications

Property	Test method	Unit	VESTAMID® HT <i>plus</i> M1633	VESTAMID® HT <i>plus</i> M1634	VESTAMID® HT <i>plus</i> M1635	VESTAMID® HT <i>plus</i> M1636
Glass fiber content		%	30	40	50	60
Physical, thermal, and mechanical properties						
Density 23 °C	ISO 1183	g/cm ³	1.43	1.54	1.64	1.77
Water absorption 23 °C, saturation 23°C, 50% rel. humidity	ISO 62	%	5.6	4.8	4.0	3.2
		%	0.2	0.2	0.2	0.2
Tensile strength 23°C	ISO 527	MPa	200	220	240	260
Strain at break	ISO 527	%	2.1	1.9	1.7	1.6
Tensile modulus	ISO 527-1/2	MPa	11900	14200	18000	23000
CHARPY impact strength 23 °C -30 °C	ISO 179/1eU	kJ/m ² kJ/m ²	40	49	60	60
			30	35	40	40
CHARPY notched impact strength 23 °C -30 °C	ISO 179/1eA	kJ/m ² kJ/m ²	9	12	15	18
			9	12	15	18
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa	ISO 75	°C	290	290	293	293
		°C	305	305	305	305
VICAT softening point A (10 N)	ISO 306	°C	308	308	308	308
Flammability	UL94		HB	HB	HB	HB

Reinforced VESTAMID® HT*plus* grades for water / glycol applications

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Process- ing	Tensile modulus [MPa]	Applications
HY10333	PA6T/X, GF33	33% glass fibers, medium viscosity, stabilized ¹⁾ ; colors: black	IM	11000	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, machinery, and in contact with water / glycol
HY1034	PA6T/X, GF40	40% glass fibers, medium viscosity, stabilized ¹⁾ ; colors: black	IM	12700	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, machinery, and in contact with water / glycol
HY10345	PA6T/X, GF45	45% glass fibers, medium viscosity, stabilized ¹⁾ ; colors: black	IM		Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, machinery, and in contact with water / glycol
HY1035	PA6T/X, GF50	50% glass fibers, medium viscosity, stabilized ¹⁾ ; colors: black	IM		Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, machinery, and in contact with water / glycol
HY3034 	PA10T/X, GF40	40 % glass fibers, medium viscosity, stabilized ¹⁾ , wide processing window, colors: black	IM	14700	Dimension-stable, highly rigid technical parts for the use at high service temperatures in automotives, machinery, and in contact with water / glycol

¹⁾ for water / glycol contact

Abbreviations:

IM = Injection molding

Main properties of reinforced VESTAMID® HTplus grades for water / glycol contact

Property	Test method	Unit	VESTAMID® HTplus HY10333	VESTAMID® HTplus HY1034	VESTAMID® HTplus HY10345	VESTAMID® HTplus HY1035	VESTAMID® HTplus HY3034
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Physical, thermal, mechanical properties, and flammability

Density	23 °C	ISO 1183	g/cm ³				
Melting temperature 2 nd heating	DSC	ISO 11357	°C				
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa		ISO 75	°C °C				
VICAT softening temperature Method A 10 N		ISO 306	°C				
Linear thermal expansion 23–55°C		ISO 11359	10 ⁻⁴ K ⁻¹				
Flammability acc. UL94 1.6 mm 3.2 mm		IEC 60695					
Water absorption 23 °C. saturation 23 °C. 50% rel. humidity		ISO 62	% %				
Mold shrinkage in flow direction in transverse direction		ISO 294-4.	% %				
Tensile test Stress at break Strain at break		ISO 527-1/2	MPa %				
Tensile modulus		ISO 527-1/2	MPa				
CHARPY impact strength 23 °C -30 °C		ISO 179/1eU	kJ/m ² kJ/m ²				
CHARPY notched impact strength 23 °C 30 °C		ISO 179/1eA	kJ/m ² kJ/m ²				

Electrical properties

Electric strength		IEC 60243-1	kV/mm				
Volume resistivity		IEC 60093	Ω cm				

C = complete break

Under construction

Flame retardant VESTAMID® HT *plus* grades

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Processing	Tensile modulus [MPa]	Applications
M1900	PA6T/X	unreinforced, medium viscosity, flame retardant (UL94 V-0 from 0,4 mm), halogen free, free of red phosphorus, RoHS and WEEE conform colors: natural, black	IM	4000	Parts for the electric and electronics industry demanding UL94 V-0, suitable for industrial soldering. UL94 listed in file E100211. Parts fulfill RoHS 2002/95/EC, Restriction of Hazardous Substances. WEEE: Parts are not related to "selective recovery" according to Directive 2002/96/EC on waste electrical and electronic equipment.
M1933	PA6T/X, GF 30	30% glass fibers, medium viscosity, flame retardant (UL94 V-0 from 0,4 mm), halogen free, free of red phosphorus, RoHS and WEEE conform colors: natural, black	IM	10000	Parts for the electric and electronics industry demanding UL94 V-0, suitable for industrial soldering. UL94 listed in file E100211. Parts fulfill RoHS 2002/95/EC, Restriction of Hazardous Substances. WEEE: Parts are not related to "selective recovery" according to Directive 2002/96/EC on waste electrical and electronic equipment.

Abbreviations:

IM = Injection molding

Main properties of flame retardant VESTAMID® HT*plus* grades

Property		Test method	Unit	VESTAMID® HT <i>plus</i> M1900	VESTAMID® HT <i>plus</i> M1933
Physical, thermal, mechanical properties, and flammability					
Density	23 °C	ISO 1183	g/cm ³	1.22	1.45
Melting temperature DSC	2 nd heating	ISO 11357	°C	315	315
Temp. of deflection under load Method A Method B	1.8 MPa 0.45 MPa	ISO 75	°C °C	135 250	275 300
VICAT softening temperature Method A	10 N	ISO 306	°C	300	303
Flammability acc. UL94 mm mm	0.4 0.8	IEC 60695		V-0 V-0	V-0 V-0
Water absorption	23 °C, saturation 23°C, 50% rel. humidity	ISO 62	% %	5.8 0.2	3.9 0.2
Mold shrinkage in flow direction in transverse direction		ISO 294-4	% %	1.3 1.6	0.2 0.9
Tensile test Stress at break Strain at break		ISO 527-1/2	MPa %	70 2.0	140 1.9
Tensile modulus		ISO 527-1/2	MPa	4000	10000
CHARPY impact strength	23 °C -30 °C	ISO 179/1eU	kJ/m ² kJ/m ²	34 C 27 C	40 C 30 C
CHARPY notched impact strength	23 °C -30 °C	ISO 179/1eA	kJ/m ² kJ/m ²	3 C 3 C	6 C 6 C
Electrical properties					
Electric strength	K20/P50	IEC 60243-1	kV/mm	32	32
Comparative tracking index	CTI	IEC 60112			600
Volume resistivity		IEC 60093	Ω cm	10 ¹⁶	10 ¹⁶

C = complete break

Rubber bondable reinforced VESTAMID® HTplus grades

VESTAMID® HTplus	Description acc. ISO 1874-1	Characterization	Processing	Tensile modulus [MPa]	Applications
R1033	PA6T/X, GF30	30% glass fibers, medium viscosity, stabilized, adhesive modified for plastic-rubber composites, high heat resistance colors: black	IM	11000	Plastic-rubber composites (K&K): Bonding to rubber without adhesive, e.g., to ACM, FPM, H-NBR; dimension-stable, highly rigid parts for use at high service temperatures
R1133	PA6T/X, GF30	30% glass fibers, medium viscosity, stabilized, adhesive modified for plastic-rubber composites especially with EPDM, high heat resistance colors: black	IM	10500	Plastic-rubber composites (K&K): Bonding to rubber without adhesive, especially to EPDM, AEM; dimension-stable, highly rigid parts for use at high service temperatures
R1035	PA6T/X, GF50	50 % glass fibers, medium viscosity, stabilized, adhesive modified for plastic-rubber composites, high heat resistance colors: black	IM	17000	Plastic-rubber composites (K&K): Bonding to rubber without adhesive, e.g., to ACM, FPM, H-NBR; dimension-stable, highly rigid parts for use at high service temperatures

Abbreviations:

IM = Injection molding

Main properties of rubber bondable reinforced VESTAMID® HT *plus* grades

Property	Test method	Unit	VESTAMID® HT <i>plus</i> R1033	VESTAMID® HT <i>plus</i> R1133	VESTAMID® HT <i>plus</i> R1035
Physical, thermal, mechanical properties, and flammability					
Density 23 °C	ISO 1183	g/cm ³	1.43	1.40	1.64
Melting temp. DSC 2 nd heating	ISO 11357	°C	315	315	315
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa	ISO 75	°C °C	290 305	244 296	290 305
VICAT softening temp. Method A 10 N	ISO 306	°C	308	300	308
Flammability acc. UL94 1.6 mm 3.2 mm	IEC 60695		HB HB	HB HB	HB HB
Water absorption 23 °C, saturation 23 °C, 50% rel. humidity	ISO 62	% %	5.6 0.2	5.0 0.2	4.0 0.2
Mold shrinkage in flow direction in transverse direction	ISO 294-4	% %	0.2 0.9	0.2 0.9	0.1 0.7
Tensile test Stress at break Strain at break	ISO 527-1/2	MPa %	180 2	140 1.5	260 1.8
Tensile modulus	ISO 527-1/2	MPa	11000	10500	17000
CHARPY impact strength 23 °C -30 °C	ISO 179/1eU	kJ/m ² kJ/m ²	45 C 30 C	29 C 23 C	70 C 50 C
CHARPY notched impact strength 23 °C -30 °C	ISO 179/1eA	kJ/m ² kJ/m ²	7 C 7 C	6 C 6 C	12 C 12 C

C = complete break

Tribological modified VESTAMID® HT*plus* grades

VESTAMID® HT<i>plus</i>	Description acc. ISO 1874-1	Characterization	Process- ing	Tensile modulus [MPa]	Applications
M1533	PA6T/X, GF30	30% glass fibers, medium viscosity, stabilized, lubricated, low wear, colors: natural, black	IM	11000	Tribological loaded parts at high service temperatures, e.g. sliding bearings, pivot bushings, bearing cups, slide rails, sliding parts

Abbreviations:

IM = Injection molding

Main properties of tribological modified VESTAMID® HT *plus* grades

Property	Test method	Unit	VESTAMID® HT <i>plus</i> M1533
Density 23 °C	ISO 1183	g/cm ³	1.53
Melting temp. DSC 2 nd heating	ISO 11357	°C	315
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa	ISO 75	°C °C	255
VICAT softening temp. Method A 10 N	ISO 306	°C	
Flammability acc. UL94 1.6 mm 3.2 mm	IEC 60695		HB HB
Water absorption 23 °C, saturation 23°C, 50% rel. humidity	ISO 62	% %	5.6 0.2
Mold shrinkage in flow direction in transverse direction	ISO 294-4	% %	0.2 0.9
Tensile test Stress at break Strain at break	ISO 527-1/2	MPa %	175 2
Tensile modulus	ISO 527-1/2	MPa	11000
CHARPY impact strength 23 °C -30 °C	ISO 179/1eU	kJ/m ² kJ/m ²	45 C
CHARPY notched impact strength 23 °C -30 °C	ISO 179/1eA	kJ/m ² kJ/m ²	8 C

C = complete break

Mineral reinforced VESTAMID® HT *plus* grades

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Processing	Tensile modulus [MPa]	Applications
M10525	PA6T/X, MD25	25% mineral, medium viscosity, stabilized, anisotropic, colors: black	IM	8600	Dimension-stable, anisotropic technical parts for the use at high service temperatures in automotives, electronics and machinery, glossy surface
M1054	PA6T/X, MD40	40% mineral, medium viscosity, stabilized, anisotropic, colors: black	IM	12800	Dimension-stable, anisotropic technical parts for the use at high service temperatures in automotives, electronics and machinery, glossy surface
M10465	PA6T/X, GMD65	65% mineral and glass fiber, medium viscosity, stabilized, anisotropic, colors: black	IM	20800	Dimension-stable, highly rigid and anisotropic technical parts for the use at high service temperatures in automotives, electronics and machinery, glossy surface

Abbreviations:

IM = Injection molding

Main properties of mineral reinforced VESTAMID® HT *plus* grades

Property	Test method	Unit	VESTAMID® HT <i>plus</i> M10525	VESTAMID® HT <i>plus</i> M1054	VESTAMID® HT <i>plus</i> M10465
Physical, thermal, mechanical properties, and flammability					
Density 23 °C	ISO 1183	g/cm ³	1.41	1.57	1.88
Melting temp. DSC 2 nd heating	ISO 11357	°C	315	315	315
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa	ISO 75	°C °C	220 287	240 290	290 307
VICAT softening temp. Method A 10 N	ISO 306	°C			
Flammability acc. UL94 1.6 mm 3.2 mm	IEC 60695				
Water absorption 23 °C, saturation 23°C, 50% rel. humidity	ISO 62	% %			
Mold shrinkage in flow direction in transverse direction	ISO 294-4	% %			
Tensile test Stress at break Strain at break	ISO 527-1/2	MPa %	133 2.4	148 1.9	190 1.2
Tensile modulus	ISO 527-1/2	MPa	8600	12800	20800
CHARPY impact strength 23 °C -40 °C	ISO 179/1eU	kJ/m ² kJ/m ²	34 C 30 C	52 C 37 C	37 C 31 C
CHARPY notched impact strength 23 °C -40 °C	ISO 179/1eA	kJ/m ² kJ/m ²	3.6 C 2.6 C	3.7 C 3.1 C	5.1 C 4.8 C

C = complete break

Carbon fiber reinforced VESTAMID® HT*plus* grades

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Process- ing	Tensile modulus [MPa]	Applications
M1063	PA6T/X, CF30	30% carbon fibers, medium viscosity, stabilized, antistatic, low wear, conductive; colors: black	IM	25000	Dimension-stable, exhibiting high stiffness, highly rigid technical parts for the use at high service temperatures in automotives, electronics and machinery

Abbreviations:

IM = Injection molding

Main properties of carbon fiber reinforced VESTAMID® HT *plus* grades

Property	Test method	Unit	VESTAMID® HT <i>plus</i> M1063
Density 23 °C	ISO 1183	g/cm ³	1.32
Melting temp. DSC 2 nd heating	ISO 11357	°C	315
Temp. of deflection under load Method A 1.8 MPa Method B 0.45 MPa	ISO 75	°C °C	282
VICAT softening temp. Method A 10 N	ISO 306	°C	
Flammability acc. UL94 1.6 mm 3.2 mm	IEC 60695		
Water absorption 23 °C, saturation 23°C, 50% rel. humidity	ISO 62	% %	
Mold shrinkage in flow direction in transverse direction	ISO 294-4	% %	
Tensile test Stress at break Strain at break	ISO 527-1/2	MPa %	285 1.6
Tensile modulus	ISO 527-1/2	MPa	25000
CHARPY impact strength 23 °C -30 °C	ISO 179/1eU	kJ/m ² kJ/m ²	
CHARPY notched impact strength 23 °C -30 °C	ISO 179/1eA	kJ/m ² kJ/m ²	
Electrical properties			
Surface resistance R _{OA}	IEC60093	Ohm	1000

C = complete break

VESTAMID® HT*plus* grades for Laser Direct Structuring (LDS)

VESTAMID® HT <i>plus</i>	Description acc. ISO 1874-1	Characterization	Processing	Tensile modulus [MPa]	Applications
LDS1031	PA6T/X, GF10	10% glass fibers, mineral reinforced, medium viscosity, stabilized, qualified for LPKF LDS process, optimized shrinkage, suitable for lead-free solders	IM	11500	Three-dimensional interconnect devices in electrical applications, specially adapted for the LDS process. Dimension-stable, glossy surface
LDS3031	PA10T/X, GF10	10% glass fibers, mineral reinforced, medium viscosity, stabilized, qualified for LPKF LDS process, optimized shrinkage, suitable for lead-free solders. Partly biobased and eco-friendly	IM	9600	Three-dimensional interconnect devices in electrical applications, specially adapted for the LDS process. Dimension-stable, glossy surface



Abbreviations:

IM = Injection molding

Main properties of VESTAMID® HTplus grades for Laser Direct Structuring

Property		Test method	Unit	VESTAMID® HTplus LDS1031	VESTAMID® HTplus LDS3031
Physical, thermal, mechanical properties, and flammability					
Density	23 °C	ISO 1183	g/cm ³	1.62	1.56
Melting temperature DSC	2 nd heating	ISO 11357	°C	315	285
Temp. of deflection under load Method A Method B	1.8 MPa 0.45 MPa	ISO 75	°C °C		
VICAT softening temperature Method A Method B	10 N 50 N	ISO 306	°C	302 260	279 243
Flammability acc. UL94 mm mm	0.4 0.8	IEC 60695			
Water absorption	23 °C, saturation 23°C, 50% rel. humidity	ISO 62	% %		
Mold shrinkage in flow direction in transverse direction		ISO 294-4	% %		
Tensile test Stress at break Strain at break		ISO 527-1/2	MPa %	121 1.6	84 1.1
Tensile modulus		ISO 527-1/2	MPa	11 500	9600
CHARPY impact strength	23 °C -30 °C	ISO 179/1eU	kJ/m ² kJ/m ²	29 C 24 C	21 C 20 C
CHARPY notched impact strength	23 °C -30 °C	ISO 179/1eA	kJ/m ² kJ/m ²	2.7 C 2.7 C	2.3 C 2.3 C
Electrical properties					
Electric strength	K20/P50	IEC 60243-1	kV/mm		
Comparative tracking index	CTI	IEC 60112			
Volume resistivity		IEC 60093	Ω cm		

Integrated expertise: direct contacts in every region

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September 2012

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