Product Information

VESTAMID® Care ML-GB30

MICROGLASS BEAD-FILLED (30%) PA12 RESIN FOR THE INJECTION MOULDING OF RIGID, LOW-WARPAGE AND DIMENSIONALLY ACCURATE MOULDINGS

Biocompatibility of VESTAMID® Care ME

Biocompatiblity was tested following ISO10993-1 recommendations for a surface medical device with up to 30 days body contact.

The material fulfills the requirements of USP<88> class VI.

Tests were performed by independent, certified laboratories.

Biocompatibility tests for VESTAMID® Care:

Standard	Description
ASTM F756-08	Hemocompatibility
ISO 10993-5	Cytotoxicity
ISO 10993-10	Sensitization: Maximization test according to Magnusson and Kligman
ISO 10993-10	Irritation: Intracutaneous Reactivity
ISO 10993-11	Acute Systemic Toxicity
USP Class VI	Acute Systemic Toxicity Intracutaneous Reactivity Muscle Implantation

Key Features

Industrial Sector
Sustainable, Industry and Engineering, Medical Devices

Delivery form
Pellets, Granules

Sustainability
Sustainable electricity

Conformity
Biocompatibility, Medical application

Processing
Injection molding

Additives
Glass beads / spheres

LCA-values	dry	Unit	Test Standard
LCA name of certificate	VESTAMID® L GF medium	-	ISO 14040, 14044
LCA certifier	TÜV Rheinland	-	ISO 14040, 14044
Blue water consumption	**23.6**	kg	ISO 14040, 14044
Global Warming Potential incl. bio. C incl. LUC	**5.1**	kg CO_2 eq./kg	ISO 14040, 14044
Global Warming Potential excl. bio. C incl. LUC	**5.1**	kg CO_2 eq./kg	ISO 14040, 14044
Land use (ReCiPe 2016)	**0.1**	Annual crop eq. y	ISO 14040, 14044
GWP savings as compared to 2023 reference	**-2.3**	kg CO_2 eq./kg	ISO 14040, 14044

Mechanical properties ISO	dry / cond	Unit	Test Standard
Tensile modulus	**2100 / 1800**	MPa	ISO 527
Tensile strength	**47 / -**	MPa	ISO 527
Yield stress	**47 / 37**	MPa	ISO 527
Yield strain	**5 / 5**	%	ISO 527
Stress at break	**37 / ***	MPa	ISO 527
Nominal strain at break, tB	**20 / >50**	%	ISO 527
Tensile creep modulus, 0,5% Strain, 1h	*** / 1600**	MPa	ISO 899-1
Tensile creep modulus, 0,5% Strain, 1000h	*** / 1100**	MPa	ISO 899-1
Charpy impact strength, +23°C	**160 / N**	kJ/m²	ISO 179/1eU
Type of failure	**C / -**	-	-
Charpy impact strength, -30°C	**160 / N**	kJ/m²	ISO 179/1eU
Type of failure	**C / -**	-	-
Charpy notched impact strength, +23°C	**4.4 / 6**	kJ/m²	ISO 179/1eA
Type of failure	**C / C**	-	-
Charpy notched impact strength, -30°C	**6 / 6**	kJ/m²	ISO 179/1eA

Type of failure	**C / C**	-	-

Thermal properties	**dry / cond**	**Unit**	**Test Standard**
Melting temperature	**178 / ***	°C	ISO 11357-1/-3
Temp. of deflection under load A, 1.80 MPa	**55 / ***	°C	ISO 75-1/-2
Temp. of deflection under load B, 0.45 MPa	**150 / ***	°C	ISO 75-1/-2
Vicat softening temperature B, 50 N, 50 K/h	**155 / ***	°C	ISO 306
Coeff. of linear therm. expansion, 23°C to 55 °C, parallel	**130 / ***	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, 23°C to 55 °C, normal	**130 / ***	E-6/K	ISO 11359-1/-2
Melting Temperature	**178**	°C	ASTM D 3418

Physical properties	**dry / cond**	**Unit**	**Test Standard**
Density	**1250 / 1260**	kg/m³	ISO 1183
Water absorption	**1.1 / ***	%	Sim. to ISO 62
Humidity absorption	**0.5 / ***	%	Sim. to ISO 62
Density	**1250**	kg/m³	ASTM D 792

Burning Behav.	**dry / cond**	**Unit**	**Test Standard**
Burning behav. at 1.5 mm nom. thickn.	**HB / ***	class	IEC 60695-11-10
Thickness tested	**1.6 / ***	mm	-
Burnin behav. at thickness h	**HB / ***	class	IEC 60695-11-10
Thickness tested	**3.2 / ***	mm	-

Electrical properties	**dry / cond**	**Unit**	**Test Standard**
Volume resistivity, V	**>1E13 / 2E12**	Ohm*m	IEC 62631-3-1
Surface resistivity, E	*** / 1E15**	Ohm	IEC 62631-3-2
Relative permittivity, 100Hz	**4.1 / 5**	-	IEC 62631-2-1
Relative permittivity, 1MHz	**3.5 / 4**	-	IEC 62631-2-1
Dissipation factor, 100Hz	**310 / 600**	E-4	IEC 62631-2-1

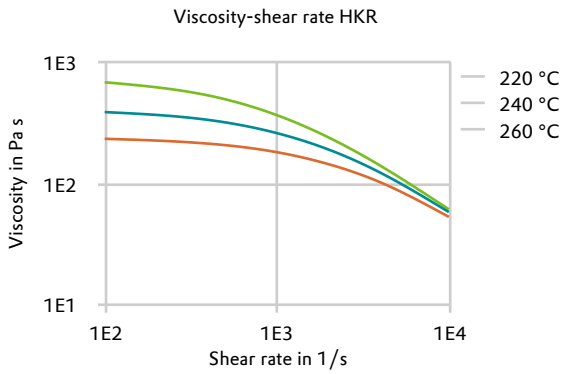
Dissipation factor, 1MHz	**230 / 370**	E-4	IEC 62631-2-1
Dielectric strength, AC, S20/S20, t. 1 mm	**- / 36**	kV/mm	IEC 60243-1
Dielectric strength, AC, S20/P50	**31 / -**	kV/mm	Sim. to IEC 60243-1
CTI, test solution A, 50 drops value	**600 / 600**	-	IEC 60112
Assessment of the insulation group	**I**	-	DIN EN 60664-1

Rheological properties	**dry / cond**	**Unit**	**Test Standard**
Melt volume-flow rate, MVR	**100 / ***	cm^3/10min	ISO 1133
Temperature	**275 / ***	°C	-
Load	**5 / ***	kg	-
Molding shrinkage, parallel	**0.6 / ***	%	ISO 294-4, 2577
Molding shrinkage, normal	**0.7 / ***	%	ISO 294-4, 2577
Mold temperature	**80 / ***	°C	-
Melt temperature	**250 / ***	°C	-

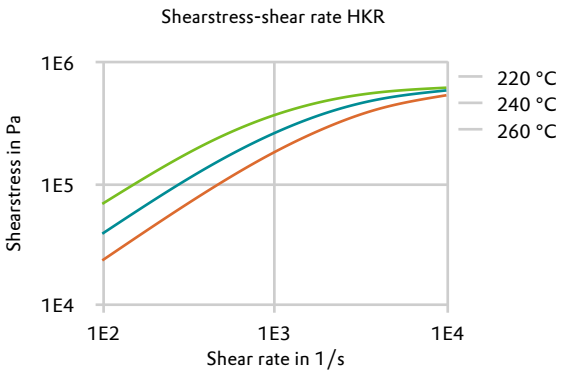
Test specimen production	**dry**	**Unit**	**Test Standard**
Injection Molding, melt temperature	**250**	°C	ISO 294
Injection Molding, mold temperature	**80**	°C	ISO 294
Injection Molding, injection velocity	**200**	mm/s	ISO 294
Injection Molding, pressure at hold	**70**	MPa	ISO 294

Diagrams

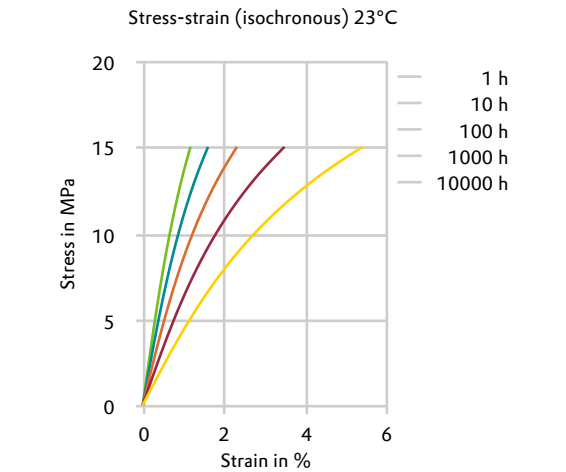
Viscosity-shear rate HKR



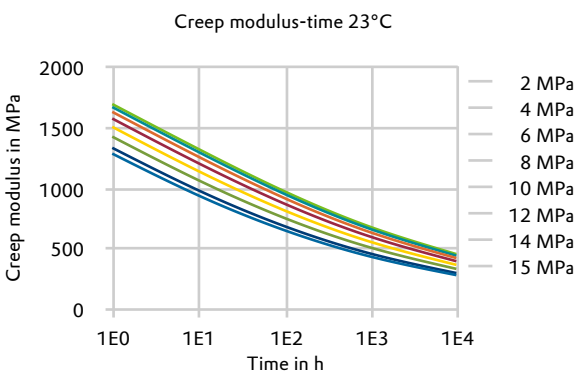
Shearstress-shear rate HKR



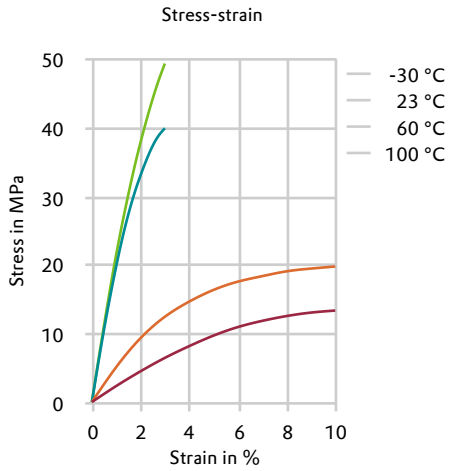
Stress-strain (isochronous) 23°C



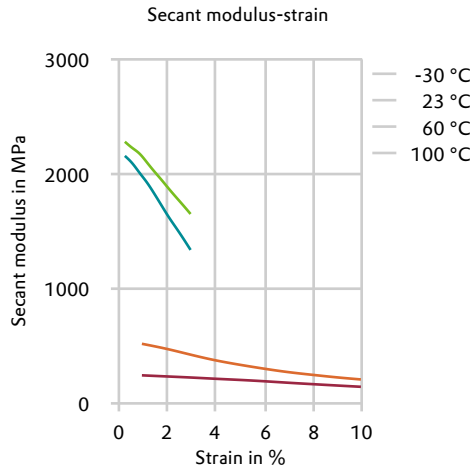
Creep modulus-time 23°C



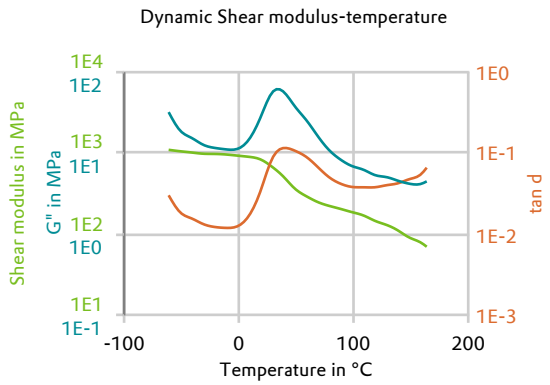
Stress-strain



Secant modulus-strain



Dynamic Shear modulus-temperature



VESTAMID® Care

Characteristics

Applications
Encapsulation

Regulatory
US Pharmacopeia Class VI conformity

Chemical Media Resistance

Acids

- ✔ Acetic Acid (5% by mass) (23°C)
- ✔ Citric Acid solution (10% by mass) (23°C)

Bases

- ✔ Sodium Hydroxide solution (35% by mass) (23°C)
- ✔ Sodium Hydroxide solution (1% by mass) (23°C)
- ✔ Ammonium Hydroxide solution (10% by mass) (23°C)

Alcohols

- ✔ Isopropyl alcohol (23°C)
- ✔ Methanol (23°C)
- ✔ Ethanol (23°C)

Hydrocarbons

- ✔ n-Hexane (23°C)
- ✔ Toluene (23°C)
- ✔ iso-Octane (23°C)

Ketones

- ✔ Acetone (23°C)

Ethers

- ✔ Diethyl ether (23°C)

Mineral oils

- ✔ SAE 10W40 multigrade motor oil (23°C)
- ✔ Insulating Oil (23°C)

Standard Fuels

- ✔ ISO 1817 Liquid 1 (60°C)
- ✔ ISO 1817 Liquid 2 (60°C)

- ✔ ISO 1817 Liquid 3 (60°C)
- ✔ ISO 1817 Liquid 4 (60°C)
- ✔ Standard fuel without alcohol (pref. ISO 1817 Liquid C) (23°C)
- ✔ Standard fuel with alcohol (pref. ISO 1817 Liquid 4) (23°C)
- ✔ Diesel fuel (pref. ISO 1817 Liquid F) (23°C)
- ✔ Diesel fuel (pref. ISO 1817 Liquid F) (90°C)
- ✔ Diesel EN 590 (100°C)

Salt solutions

- ✔ Sodium Chloride solution (10% by mass) (23°C)
- ✔ Sodium Carbonate solution (20% by mass) (23°C)
- ✔ Sodium Carbonate solution (2% by mass) (23°C)
- ✔ Zinc Chloride solution (50% by mass) (23°C)

Other

- ✔ Ethyl Acetate (23°C)
- ✔ Hydrogen peroxide (23°C)
- ✔ DOT No. 4 Brake fluid (120°C)
- ✔ Water (23°C)

Rheological calculation properties	dry	Unit	Test Standard
Density of melt	**1090**	kg/m³	-
Thermal conductivity of melt	**0.28**	W/(m K)	-
Spec. heat capacity of melt	**2400**	J/(kg K)	-
Ejection temperature	**180**	°C	-
Min. mold temperature	**30**	°C	-
Max. mold temperature	**100**	°C	-
Min. melt temperature	**230**	°C	-
Max. melt temperature	**270**	°C	-