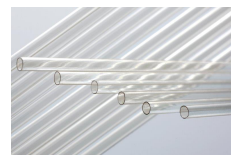


Product Information

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**

Biocompatibility 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

Processing of VESTAMID® Care

For information about processing of VESTAMID®, please follow the general commendations about "[Processing of VESTAMID® compounds](#)".

The values presented are typical or average values, they do not constitute a specification.

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/m ²	ISO 179/1eU
Type of failure	C / -	-	-
Charpy impact strength, -30°C	160 / N	kJ/m ²	ISO 179/1eU
Type of failure	C / -	-	-
Charpy notched impact strength, +23°C	4.4 / 6	kJ/m ²	ISO 179/1eA
Type of failure	C / C	-	-
Charpy notched impact strength, -30°C	6 / 6	kJ/m ²	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

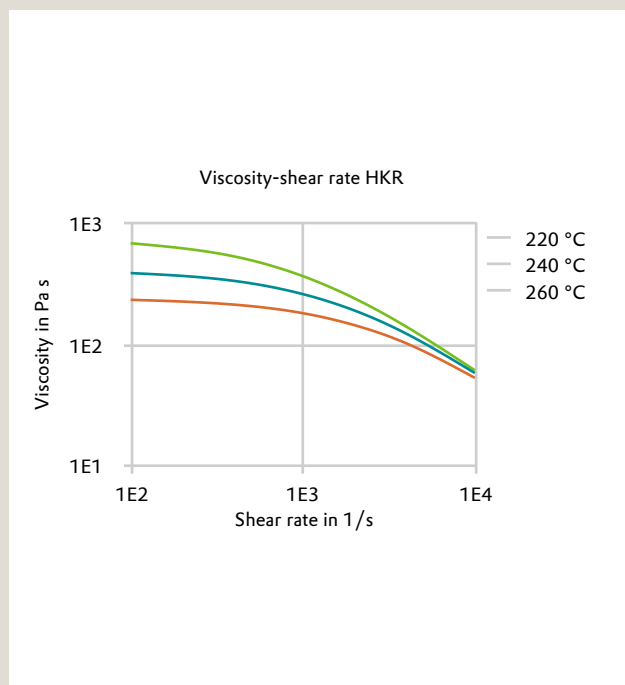
Dissipation factor, 1MHz	230 / 370	E-4	IEC 62631-2-1
Dielectric strength, AC, S20/S20, t. 1 mm	- / 36	kV/mm	IEC 60243-1
Dielectric strength, AC, S20/P50	31 / -	kV/mm	Sim. to IEC 60243-1
CTI, test solution A, 50 drops value	600 / 600	-	IEC 60112
Assessment of the insulation group	I	-	DIN EN 60664-1

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	-

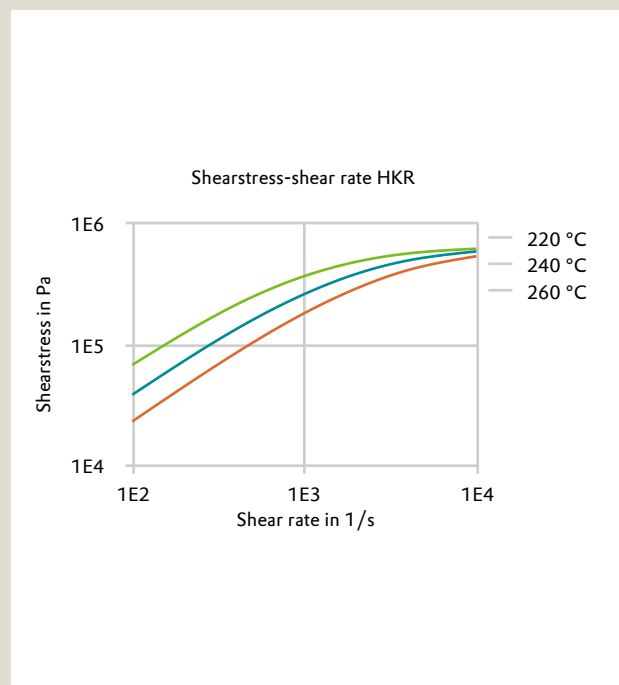
Test specimen production	dry	Unit	Test Standard
Injection Molding, melt temperature	250	°C	ISO 294
Injection Molding, mold temperature	80	°C	ISO 294
Injection Molding, injection velocity	200	mm/s	ISO 294
Injection Molding, pressure at hold	70	MPa	ISO 294

Diagrams

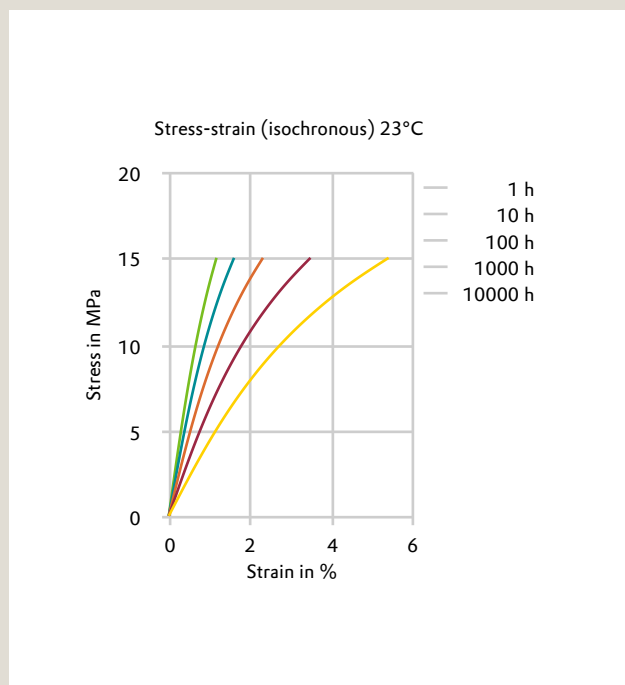
Viscosity-shear rate HKR



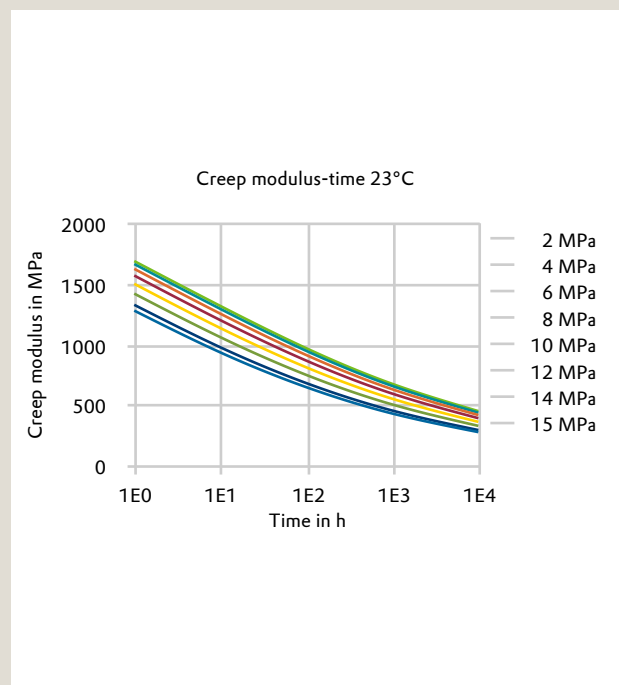
Shearstress-shear rate HKR



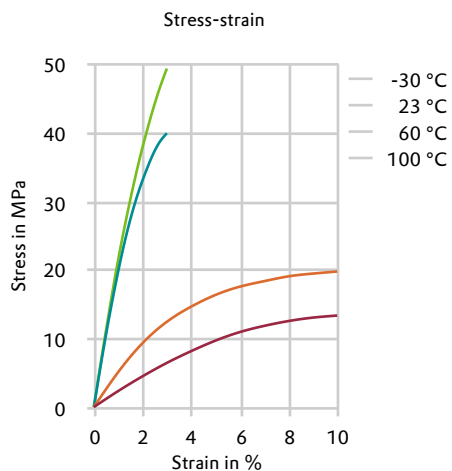
Stress-strain (isochronous) 23°C



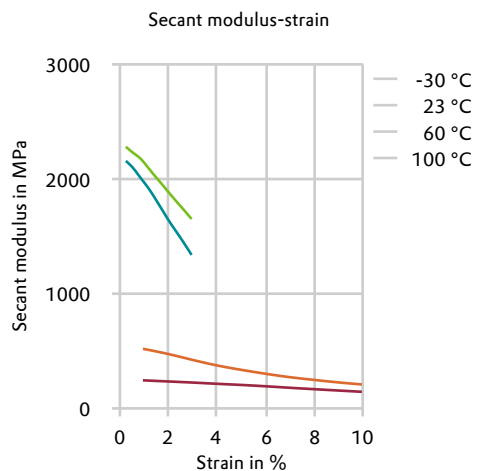
Creep modulus-time 23°C



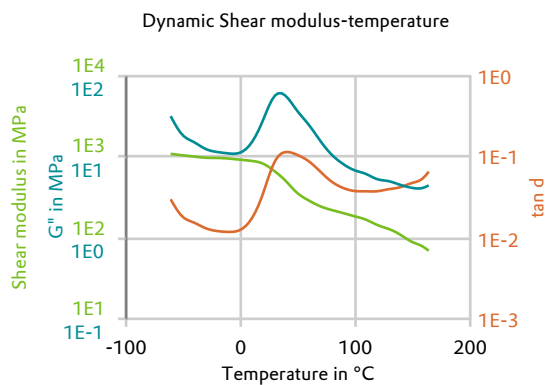
Stress-strain



Secant modulus-strain



Dynamic Shear modulus-temperature



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/m ³	-
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	-