Product Information

VESTAKEEP® L 4000 G

HIGH VISCOSITY, UNREINFORCED POLYETHER ETHER KETONE

VESTAKEEP® L 4000 G is a high viscosity, unreinforced lubricated polyether ether ketone for injection molding and extrusion.

The semi-crystalline polymer features superior, thermal and chemical resistance. Parts made from VESTAKEEP® L4000G are of low flammability.

VESTAKEEP® L 4000 G can be processed by common machines for thermoplastics.

The additional lubrication agent improves the feeding process.

We recommend a melt temperature between 370°C and 380°C during the injection molding process. The mold temperature should be within a range of 160°C to 200°C, preferably 180°C.

VESTAKEEP® L 4000 G is supplied as granules in 25 kg boxes with moisture-proof polyethylene liners.

Inside the original and undamaged packaging, the product has a shelf life of at least 2 years when stored in dry rooms at temperatures not exceeding 30°C.

Pigmentation may affect values.

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

Key Features

Industrial Sector
Automotive and Mobility, Energy, Oil and Gas

Conformity
Food contact

Processing
Injection molding, Extrusion

Additives
Unfilled

Delivery form
Pellets, Granules

Mechanical properties ISO	dry	Unit	Test Standard
Tensile modulus	**3600**	MPa	ISO 527

Tensile strength	**96**	MPa	ISO 527
Yield stress	**94**	MPa	ISO 527
Yield strain	**5**	%	ISO 527
Nominal strain at break, tB	**30**	%	ISO 527
Charpy impact strength, +23°C	**N**	kJ/m²	ISO 179/1eU
Charpy impact strength, -30°C	**N**	kJ/m²	ISO 179/1eU
Charpy notched impact strength, +23°C	**7**	kJ/m²	ISO 179/1eA
Type of failure	**C**	-	-
Charpy notched impact strength, -30°C	**6**	kJ/m²	ISO 179/1eA
Type of failure	**C**	-	-
Flexural modulus, 23°C	**3450**	MPa	ISO 178
Flexural stress at conv. deflection, 23°C	**114**	MPa	ISO 178
Flexural strength, 23°C	**148**	MPa	ISO 178
Flexural strain at flexural strength, 23°C	**7**	%	ISO 178
Flexural stress at break, 23°C	**N**	MPa	ISO 178
Flexural strain at break, 23°C	**N**	%	ISO 178

Mechanical properties ASTM	**dry**	**Unit**	**Test Standard**
Tensile Modulus, var. test speed	**4070**	MPa	ASTM D 638
Yield stress, var. test speed	**96.5**	MPa	ASTM D 638
Yield strain, var. test speed	**6.5**	%	ASTM D 638
Stress at break, var. test speed	**89.6**	MPa	ASTM D 638
Nominal strain at break, var. test speed	**75**	%	ASTM D 638
tensile modulus, annealed	**4067.9**	MPa	ASTM D 638
Yield strain, 23°C, annealed	**6.4**	%	ASTM D 638
Yield stress, 23°C, annealed	**100**	MPa	ASTM D 638
Nominal strain at break, 23°C, annealed	**40**	%	ASTM D 638
Flexural Modulus, 23°C, annealed	**3690**	MPa	ASTM D 790

Flexural strength, 23°C, annealed	**179**	MPa	ASTM D 790
Flexural stress at 5% fiber strain, 23°C, annealed	**165**	MPa	ASTM D 790

Thermal properties	**dry**	**Unit**	**Test Standard**
Melting temperature	**340**	°C	ISO 11357-1/-3
Temp. of deflection under load A, 1.80 MPa	**155**	°C	ISO 75-1/-2
Temp. of deflection under load B, 0.45 MPa	**205**	°C	ISO 75-1/-2
Vicat softening temperature A, 10 N, 50 K/h	**335**	°C	ISO 306
Vicat softening temperature B, 50 N, 50 K/h	**305**	°C	ISO 306
Coeff. of linear therm. expansion, 23°C to 55 °C, parallel	**60**	E-6/K	ISO 11359-1/-2
Melting Temperature	**340**	°C	ASTM D 3418

Physical properties	**dry**	**Unit**	**Test Standard**
Density	**1300**	kg/m³	ISO 1183
Water absorption	**0.5**	%	Sim. to ISO 62
Humidity absorption	**0.3**	%	Sim. to ISO 62
Density	**1300**	kg/m³	ASTM D 792
Shore D hardness, 1s, annealed	**87**	-	ASTM D 2240

Burning Behav.	**dry**	**Unit**	**Test Standard**
UL Yellow Card available	yes	-	-
Burning behav. at 1.5 mm nom. thickn.	**V-0**	class	IEC 60695-11-10
Thickness tested	**1.6**	mm	-
Yellow Card available	yes	-	-
Burnin behav. at thickness h	**V-0**	class	IEC 60695-11-10
Thickness tested	**3.2**	mm	-
Oxygen index	**38**	%	ISO 4589-1/-2
Limiting Oxygen Index	**38**	%	ASTM D 2863
Hot Wire Ignition (HWI)	**1**	PL-Klasse	IEC 60695-2-20

HWI - thickness tested	**3.2**	mm	-

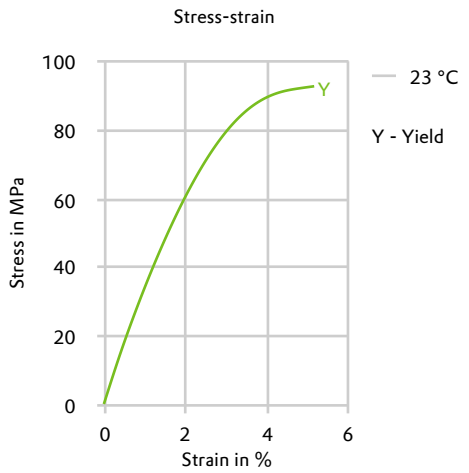
Electrical properties	**dry**	**Unit**	**Test Standard**
Volume resistivity, V	**>1E13**	Ohm*m	IEC 62631-3-1
Surface resistivity, E	**1E15**	Ohm	IEC 62631-3-2
Relative permittivity, 100Hz	**2.8**	-	IEC 62631-2-1
Relative permittivity, 1MHz	**2.8**	-	IEC 62631-2-1
Dissipation factor, 1MHz	**50**	E-4	IEC 62631-2-1
CTI, test solution A, 50 drops value	**200**	-	IEC 60112
Assessment of the insulation group	**III a**	-	DIN EN 60664-1
CTI, Performance Level Categories, PLC	**3**	class	ASTM D 3638

Rheological properties	**dry**	**Unit**	**Test Standard**
Melt volume-flow rate, MVR	**12**	cm^3/10min	ISO 1133
Temperature	**380**	°C	-
Load	**5**	kg	-
Molding shrinkage, parallel	**0.9**	%	ISO 294-4, 2577
Molding shrinkage, normal	**1.1**	%	ISO 294-4, 2577

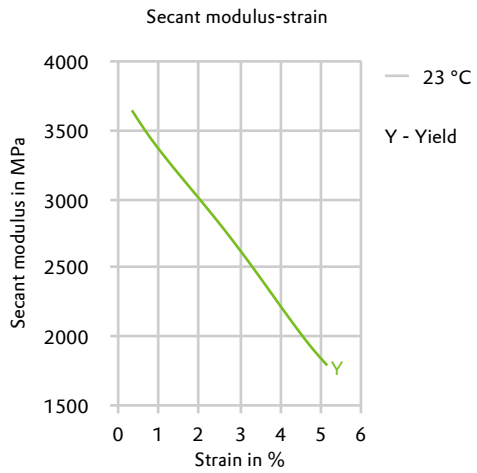
Test specimen production	**dry**	**Unit**	**Test Standard**
Injection Molding, melt temperature	**380**	°C	ISO 294
Injection Molding, mold temperature	**180**	°C	ISO 294
Injection Molding, injection velocity	**200**	mm/s	ISO 294
Injection Molding, pressure at hold	**120**	MPa	ISO 294

Diagrams

Stress-strain



Secant modulus-strain



Characteristics

Applications
Electrical and Electronical

Processing
Film extrusion, Profile extrusion

Chemical Media Resistance

Acids

- ✔ Acetic Acid (5% by mass) (23°C)
- ✔ Citric Acid solution (10% by mass) (23°C)
- ✔ Hydrochloric Acid (36% by mass) (23°C)
- ✖ Nitric Acid (40% by mass) (23°C)
- ✔ Sulfuric Acid (38% by mass) (23°C)
- ✔ Sulfuric Acid (5% by mass) (23°C)
- ✔ Chromic Acid solution (40% 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

- ✔ 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)

Salt solutions

- ✔ Sodium Chloride solution (10% by mass) (23°C)
- ✔ Sodium Hypochlorite 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)

- ✔ Ethylene Glycol (50% by mass) in water (108°C)
- ✔ Water (23°C)
- ✔ Deionized water (90°C)

Rheological calculation properties	dry	Unit	Test Standard
Thermal conductivity of melt	**0.18**	W/(m K)	-
Spec. heat capacity of melt	**2110**	J/(kg K)	-
Min. mold temperature	**160**	°C	-
Max. mold temperature	**200**	°C	-
Min. melt temperature	**360**	°C	-
Max. melt temperature	**380**	°C	-