

Product Information

VESTAKEEP® i4 3DF

IMPLANTABLE-GRADE POLYETHER ETHER KETONE FILAMENT FOR PERMANENT SURGICAL IMPLANTS



VESTAKEEP® i4 3DF is a filament extruded from natural colored, high viscosity VESTAKEEP® i4 G polyether ether ketone (PEEK) resin. The material is especially designed for long term implantable medical devices.

Proven Biocompatibility of VESTAKEEP® i-Grades

The extra high purity and extended quality measures make VESTAKEEP® i-grade materials an excellent choice for permanent implants.

The biocompatibility of the base resin VESTAKEEP® i4 G has been tested following ISO 10993-1 recommendations for permanent tissue/bone contact and USP Class VI. A summary of biocompatibility test results is available upon request.

VESTAKEEP® i4 3DF filaments are compliant to ASTM F2026 "Standard Specification for Polyether ether ketone (PEEK) Polymers for Surgical Implant Applications".

Biocompatibility test reports available for VESTAKEEP® i4 G

Delivery of VESTAKEEP® i4 3DF

VESTAKEEP® i4 3DF filament has a diameter of 1.75 mm (+/- 0.02 mm*) and is supplied on TROGAMID® spools with 250g or 500g. The spools are packaged in double bags to facilitate transfer into clean areas.

The properties listed are for information only and only apply to the VESTAKEEP® i4 G resin used in the manufacture of VESTAKEEP® i4 3DF. The performance and the purity of any parts manufactured from VESTAKEEP® i4 3DF are highly dependent on any 3D- or additive-printing processes, or any other processing, to which the filament is subjected. Only density and filament diameter apply to VESTAKEEP® Care i4 3DF directly.

*Diameters are tested by a multi-axis laser gauge. The diameter is the average of these axis.

FOR FURTHER INFORMATION PLEASE CONTACT US AT EVONIK-HP@EVONIK.COM OR VISIT OUR PRODUCT AT WWW.EVONIK.COM/MEDICAL-TECHNOLOGY

Mechanical properties ISO	dry	Unit	Test Standard
Tensile Modulus	3500	MPa	ISO 527
Tensile Strength	94	MPa	ISO 527
Yield stress	94	MPa	ISO 527
Yield strain	5	%	ISO 527
Stress at break	76	MPa	ISO 527

Charpy impact strength, +23°C	N	kJ/m ²	ISO 179/1eU
Charpy impact strength, -30°C	N	kJ/m ²	ISO 179/1eU
Charpy notched impact strength, +23°C	6	kJ/m ²	ISO 179/1eA
Type of failure	C	-	-
Charpy notched impact strength, -30°C	9.1	kJ/m ²	ISO 179/1eA
Type of failure	C	-	-

Thermal properties	dry	Unit	Test Standard
Melting temperature	338	°C	ISO 11357-1/-3
Glass transition temperature	152	°C	ISO 11357-1/-2
Temp. of deflection under load A, 1.80 MPa	150	°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

Physical properties	dry	Unit	Test Standard
Density	1300	kg/m ³	ISO 1183
Filament Diameter	1.75	mm	-

Burning Behav.	dry	Unit	Test Standard
Burnin behav. at thickness h	V-0	class	IEC 60695-11-10
Thickness tested	3.2	mm	-

Rheological properties	dry	Unit	Test Standard
Melt volume-flow rate, MVR	12	cm ³ /10min	ISO 1133
Temperature	380	°C	-
Load	5	kg	-

Characteristics

Key Feature, Industrial Sector

Medical

Key Feature, Processing

3D printing

Key Feature, Resistance to

Heat (Thermal Stability), Hydrolysis / Hot water, Wear / Abrasion

Key Feature, Certificate / Licence

Medical Application

Key Feature, Additives

Unfilled

Applications

Monofilament

Processing

Fused Deposition Molding

Special Characteristics

Semi-crystalline

Features

General Chemical Resistance

Ecological valuation

US Pharmacopeia Class VI Biocompatibility

Color

Natural Color

Delivery form

Monofilament

Chemical Resistance

Acid Resistance, Alkali Resistance, Solvent Resistance, Grease Resistance, Hydrolytically Stable, Oil Resistance

Other extrusion

Drying recommendations

We recommend to dry the filament prior to usage to avoid stringing, bubbles, or other defects.

- a) Filament on spool: minimum 12 hours at 80°C to 100°C. 100°C must not be exceeded to avoid distortion of the spool.
- b) Filament removed from spool: minimum 4 hours at 130°C to 140°C.

The maximum drying temperature of the filament is 140°C. Please also pay attention to the instructions of your drying device.

Spool dimensions

For dimensions of the spool, please see drawing below. All dimensions are given in millimeter (mm).

This information and all technical and other advice are based on Evonik's present knowledge and experience. However, Evonik assumes no liability for such information or advice, including the extent to which such information or advice may relate to third party intellectual property rights. Evonik reserves the right to make any changes to information or advice at any time, without prior or subsequent notice. Evonik disclaims all representations and warranties, whether express or implied, and shall have no liability for, merchantability of the product or its fitness for a particular purpose (even if Evonik is aware of such purpose), or otherwise. EVONIK SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INDIRECT OR INCIDENTAL DAMAGES (INCLUDING LOSS OF PROFITS) OF ANY KIND. It is the customer's sole responsibility to arrange for inspection and testing of all products by qualified experts. Reference to trade names used by other companies is neither a recommendation nor an endorsement of the corresponding product, and does not imply that similar products could not be used.

® is a registered trademark of Evonik Industries AG or one of its subsidiaries

Evonik Operations GmbH
Smart Materials
High Performance Polymers
45772 Marl / Germany
Tel: +49 2365 49-9878
evonik-hp@evonik.com
www.plastics-database.com