

TECHNICAL DATASHEET

GRILAMID 1SBVX-50H LDS BLACK

Product description

Grilamid 1SBVX-50H LDS black is a 50% glass fibre reinforced Polyamide 1010 injection moulding grade. This grade is specifically optimized for the Laser Direct Structuring technology of LPKF (LPKF-LDS®)*. The product enables selective plating and creation of electric/ electronic circuits or antennas on 3D injection-molded carriers.

Key properties of Grilamid 1SBVX-50H LDS black:

- Suited for Laser Direct Structuring (LDS)
- High stiffness and strength combined with high toughness
- Low moisture adsorption
- High dimensional stability
- Easy processing
- Excellent surface finish
- Outstanding chemical resistance
- Paintable
- Polymer primarily based on renewable resources

Applications

Grilamid 1SBVX-50H LDS black is suitable for thin-walled housings/ parts with integrated electrical and mechanical functions found mainly in areas such as telecommunication, electro/ electronics or automotive.

*based on joint development with LPKF Laser & Electronics AG



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PROPERTIES

Mechanical Properties		Standard	Unit	State	Grilamid 1SBVX-50H LDS black
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	13500 12000
Tensile strength at break	5 mm/min	ISO 527	MPa	dry cond.	145 120
Elongation at break	5 mm/min	ISO 527	%	dry cond.	1.9 2.0
Impact strength	Charpy, 23°C	ISO 179/1eU	kJ/m ²	dry cond.	50 50
Impact strength	Charpy, -30°C	ISO 179/1eU	kJ/m ²	dry cond.	50 45
Notched impact strength	Charpy, 23°C	ISO 179/1eA	kJ/m ²	dry cond.	10 10
Notched impact strength	Charpy, -30°C	ISO 179/1eA	kJ/m ²	dry cond.	7 6
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	205 180
Thermal Properties					
Melting point	DSC	ISO 11357	°C	dry	200
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	175
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	125
Thermal expansion coefficient long.	23-55°C	ISO 11359	10 ⁻⁴ /K	dry	0.1
Thermal expansion coefficient trans.	23-55°C	ISO 11359	10 ⁻⁴ /K	dry	0.8
Maximum usage temperature	long term	ISO 2578	°C	dry	90-110
Maximum usage temperature	short term	ISO 2578	°C	dry	150
Electrical Properties					
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	39 37
Comparative tracking index	CTI	IEC 60112	-	cond.	600
Specific volume resistivity		IEC 60093	Ω · m	dry cond.	10 ⁹ 10 ⁹
Specific surface resistivity		IEC 60093	Ω	cond.	10 ¹⁰
General Properties					
Density		ISO 1183	g/cm ³	dry	1.58
Flammability (UL94)	0.8 mm	ISO 1210	rating	-	HB
Water absorption	23°C/sat.	ISO 62	%	-	1.7
Moisture absorption	23°C/50% r.h.	ISO 62	%	-	0.9
Linear mould shrinkage	long.	ISO 294	%	dry	0.1
Linear mould shrinkage	trans.	ISO 294	%	dry	0.4

Product-nomenclature acc. ISO 1874: PA1010 + X, MH, 16-140, GF 50

Processing information for injection moulding of Grilamid 1SBVX-50H LDS black

This technical data sheet for Grilamid 1SBVX-50H LDS black provides you with useful information on material preparation, machine requirements, tooling and processing.

MATERIAL PREPARATION

Grilamid 1SBVX-50H LDS black is delivered dry and ready for processing in sealed packaging. Pre-drying is not necessary provided the packaging is un-damaged.

Storage

Sealed, undamaged bags can be kept over a period of time of at least one year when stored in storage facilities which are dry and protected from the influence of weather.

Handling and safety

Detailed information can be obtained from the "Material Safety Data Sheet" (MSDS) which can be requested with every material order.

Drying

Grilamid 1SBVX-50H LDS black is dried and packed with a moisture content of less than 0.10%. Should the packaging become damaged or if the material is left open too long, then the material must be dried. A too high moisture content becomes evident by a foaming melt and silver streaks on the moulded part when injected freely into the atmosphere (free shot).

Drying can be done as follows:

Desiccant dryer

Temperature	max. 80°C
Time	4 - 12 hours
Dew point of the dryer	-25°C

Vacuum oven

Temperature	max. 80°C
Time	4 - 12 hours

Drying time

If there is only little evidence of foaming of the melt or just slight silver streaks on the part, then the above mentioned minimal drying time will be sufficient. Material, which is stored open over days, which shows strong foaming, unusually easy flowing, streaks and rough surface on the moulded part, then the maximal drying time is required.



Silver streaks can also be caused by overheating of the material or by too long melt residence time in the barrel.

Drying temperature

Polyamides are affected by oxidation at temperatures above 80°C in the presence of oxygen. Visible yellowing of the material is an indication of oxidation. Hence temperatures above 80°C for desiccant dryers and temperatures above 100°C for vacuum ovens should be avoided.

At longer residence times (over 1 hour) a hopper dryer (80°C) is useful.

Use of regrind

Grilamid 1SBVX-50H LDS black is a thermoplastic material. Hence, incomplete mouldings as well as sprues and runners can be reprocessed. The following points should be observed:

- No thermal degradation in the previous last processing
- No contamination through foreign material, dust, oil, etc.
- Reduction of mechanical properties
- Regrind has to be dry

When adding regrind, special care has to be taken by the moulder. For high-quality technically parts only virgin material has to be used.

MACHINE REQUIREMENTS

Grilamid 1SBVX-50H LDS black can be processed economically and without problems on all machines suitable for polyamides.

Screw

Wear protected, universal screws (3 zones) with back flow valve are recommended.

Screw

Length	18 D - 22 D
Compression ratio	2 - 2.5

Shot volume

The metering stroke must be longer than the length of the back flow valve (without decompression distance).

Selecting the injection unit

$$\text{Shot volume} = 0.5 - 0.8 \times (\text{max. shot volume})$$

Heating

At least three separately controllable heating zones with the capacity to heat up to 300°C and separate nozzle heating is required. The cylinder flange temperature must be controllable (cooling).

Nozzle

Open nozzles are simple, allow an easy melt flow and are long lasting. There is however the danger that during retraction of the screws following injection of the melt, air may be drawn into the barrel (decompression). For this reason, needle shut-off nozzles are often used.

Clamping force

As a rule of thumb the clamping force can be estimated using the following formula:

Clamping force

$$7.5 \text{ kN}^{1)} \times \text{projected area (cm}^2\text{)}$$

¹⁾ cavity pressure of 750 bar

TOOLING

The design of the mould tool should follow the general rules for reinforced thermoplastics.

For the mould cavities common mould tool steel quality (e.g. hardened steel) which has been hardened to a level of 56 HRC is necessary. We recommend additional wear protection in areas of high flow rates in the tool (e.g. pin point gates, hot runner nozzles).

Demoulding / Draft angle

Parts moulded from Grilamid 1SBVX-50H LDS black show excellent dimensional stability. Asymmetric demoulding and undercuts have to be avoided. Easy ejection can be achieved with many large ejector pins or a stripper plate. Demoulding draft angles between 1 to 5° is usually sufficient. Textured surfaces require a larger draft angle. Rule of thumb: 1° per 0.025 mm depth of roughness.

Gate and runner

To achieve an optimal mould-fill and to avoid sink marks, a central gate at the thickest section of the moulding is recommended. Pin point (direct) or tunnel gates are more economical and more common with technical moulding.

To avoid premature solidification of the melt and difficult mould filling, the following points should be considered:

Gate diameter

0.8 x thickest wall section of the injection moulding part

Runner diameter

1.4 x thickest wall section of the injection moulding part (but minimum 4 mm)

VENTING

In order to prevent burn marks and improve weld line strength, proper venting of the mould cavity should be provided (venting channels on the parting surface dimensions: Depth <0.01 mm, shoulder width 1.5 - 2 mm, groove 2 - 5 mm).

PROCESSING

Mould filling, post pressure and dosing

The best surface finish and a high weld line strength is achieved with a high injection speed and when a sufficiently long post pressure is employed.

The injection speed should be regulated so as to reduce towards the end of the filling cycle in order to avoid burning. For dosing at low screw revolutions and pressure the cooling time should be fully utilised.

Basic machine settings

In order to start up the machines for processing Grilamid 1SBVX-50H LDS black, following basic settings are recommended:

Temperatures

Flange	40 - 60°C
Zone 1	260°C
Zone 2	265°C
Zone 3	270°C
Nozzle	265°C
Tool	80 - 100°C
Melt	260 - 290°C

Pressures / Speeds

Injection speed	medium - high
Hold-on pressure (spec.)	300 - 800 bar
Dynamic pressure (spec.)	50 - 100 bar
Screw speed	0.1 - 0.3 m/s

CUSTOMER SERVICES

EMS-GRIVORY is a specialist for polyamide synthesis and polyamide-processing. Our customer services are not only concerned with the manufacturing and supply of engineering thermoplastics but also provide a full of technical support program:

- Rheological design calculation / FEA
- Prototype tooling
- Material selection
- Processing support
- Mould and component design

We are happy to advice you. Simply call one of our sales offices.

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