PROVISIONAL DATA SHEET

GRILON EBGM-30 HX BLACK 9992

Product description

Grilon EBGM-30 HX is a specially heat stabilised PA66+PA6 injection moulding grade with 30% glass fibres.

Grilon EBGM-30 HX has the following important properties:

- High heat resistance
- High stiffness
- Good flowability
- Good welding behaviour

Application examples

Grilon EBGM-30 HX is especially suitable for production of technical parts in the application fields of:

- Charged air ducts
- Connectors for air ducts
- Applications under the bonnet
- All applications with high heat resistance

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PROPERTIES

Mechanical Properties		Standard	Unit	State	Grilon EBGM-30 HX black 9992
Tensile E-modulus	1 mm/min	ISO 527	MPa	dry cond.	9'500 5500
Tensile strength at break	5 mm/min	ISO 527	MPa	dry cond.	155 90
Elongation at break	5 mm/min	ISO 527	%	dry cond.	3 6
Impact strength	Charpy, 23°C	ISO 179/2-1eU	kJ/m^2	dry cond.	70 70
Impact strength	Charpy, -30°C	ISO 179/2-1eU	kJ/m^2	dry cond.	65 65
Notched impact strength	Charpy, 23°C	ISO 179/2-1eA	kJ/m^2	dry cond.	10 11
Notched impact strength	Charpy, -30°C	ISO 179/2-1eA	kJ/m^2	dry cond.	7 7
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	210 105
Thermal Properties					
Melting point	DSC	ISO 11357	°C	dry	260
Heat deflection temperature HDT/A	1.8 MPa	ISO 75	°C	dry	225
Heat deflection temperature HDT/C	8.0 MPa	ISO 75	°C	dry	155
Thermal expansion coefficient long.	23-55°C	ISO 11359	$10^{-4}/K$	dry	0.2
Thermal expansion coefficient trans.	23-55°C	ISO 11359	$10^{-4}/K$	dry	0.8
Maximum usage temperature	long term	ISO 2578	°C	dry	130 -150
Maximum usage temperature	short term	ISO 2578	°C	dry	230
Electrical Properties					
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	38 34
Comparative tracking index	CTI	IEC 60112	-	cond.	500
Specific volume resistivity		IEC 60093	$\Omega \cdot m$	dry cond.	10^{10} 10^{09}
Specific surface resistivity		IEC 60093	Ω	cond.	10^{12}
General Properties					
Density		ISO 1183	g/cm^3	dry	1.37
Flammability (UL94)	0.8 mm	ISO 1210	rating	-	HB
Water absorption	23°C/saturated	ISO 62	%	-	5.5
Moisture absorption	23°C/50% r.h.	ISO 62	%	-	2
Linear mould shrinkage	long.	ISO 294	%	dry	0.205
Linear mould shrinkage	trans.	ISO 294	%	dry	0.80

Product-nomenclature acc. ISO 1874: PA66+PA6, MH, 14-100, GF30

Information for the injection moulding of Grilon EBGM-30 HX

This technical data sheet for Grilon EBGM-30 HX provides you with useful information on material preparation, machine requirements, tooling and processing.

MATERIAL PREPARATION

Grilon EBGM-30 HX is delivered dry in sealed, air tight packaging.

Storage

Sealed, undamaged bags can be kept over a long period of time in storage facilities which are dry, protected from the influence of weather and where the bags can be protected from damage.

Handling and safety

For the processing of Grilon TS XE 3966 a good ventilation/suck off in the working area is recommended. Additional detailed information can be obtained from the "Material Safety Data Sheet" (MSDS) which can be requested with every material order.

Drying

Grilon EBGM-30 HX has to be processed in a dry state due to its hygroscopic character of a polyamide and the resulting water absorption. It is recommended to dry the material prior to processing, although the material is delivered dry. The permissible water content is 0.06%. For the processing the recommended water content is 0.01-0.03%.

Drying can be done as follows:

Desiccant dryer

Temperature	60 - 80°C
Time	6 - 8 hours
Dew point	-30°C

Vacuum oven

Temperature	max. 100°C
Time	4 - 12 hours

With longer residence times of the material in environmental air over more than 30 minutes (also in the hopper) has to be avoided.

Use of regrind

Grilon EBGM-30 HX is a thermoplastic material. Due to this incomplete mouldings as well as sprues and runners can be reprocessed.

To be sure that the processing and the material properties are not changed too much the processor ahs to take care on the following points:

- Avoid the moisture absorption of the regrind or the regrind has to be dried again
- Regrind with low dust and a uniform particle size distribution
- Avoid contamination through foreign material, dust, oil, etc.
- Constant level of virgin material and regrind

When adding regrind, special care has to be taken by the moulder that the properties are not changed too much. When the material is used for high temperature applications, it has to be checked if regrind could be used.

MACHINE REQUIREMENTS

Grilon EBGM-30 HX can be processed on all machines suitable for polyamides.

Screw

Wear protected, universal screws are recommended (3 zones).

Screw

Length	18 D - 22 D
Compression ratio	2 - 2.5

Shot volume

The dosing stroke (less decompression distance) must be bigger than diameter of the screw.

Selecting the injection unit

Shot volume = 0.4 - 0.8 x
(max. shot volume of injection unit)

Heating

At least three separately controllable heating zones, capable of reaching cylinder temperatures up to 350°C. Separate nozzle heating is necessary. 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 maybe 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 kN[1)] x projected area (cm^2)

[1)] for a 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 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

Asymmetric demoulding and undercuts are to be avoided if possible. Generous provision should be made for ejection with many large pins or a stripper plate. Draft angles for the inner and outer wall between 0.5 and 3° is usually sufficient. Textured surfaces require a larger draft angle (1° per 0.025 mm depth of roughness).

(VDI 3400)	12	15	18	21	24	27
Depth of roughness (µm)	0.4	0.6	0.8	1.1	1.6	2.2
Demoulding angle (%)	1	1	1.1	1.2	1.3	1.5

(VDI 3400)	30	33	36	39	42	45
Depth of roughness (µm)	3.2	4.5	6.3	9	13	18
Demoulding angle (%)	1.8	2	2.5	3	4	5

Gate and runner

To achieve the best mould filling and 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 burning marks and improve weld line strength, proper venting of the mould cavity should be provided (venting channels on the parting surface dimensions: Depth 0.02 mm, width 2 - 5 mm). Especially for Grilon EBGM-30 HX a good venting at flow lines is recommended.

PROCESSING

Mould filling, post pressure and dosing

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

To get the best material properties the injection speed should not be too high. The injection speed should be regulated so as to reduce towards the end of the filling cycle in order to avoid burning. For dosing the cooling time should be fully utilised.

Basic machine settings

In order to start up the machine for processing Grilon EBGM-30 HX, the following basic settings are recommended:

Temperatures

Flange	60 - 80°C
Zone 1	270-300°C
Zone 2	270-300°C
Zone 3	270-300°C
Nozzle	270-300°C
Tool	80 - 100°C
Melt	270 - 300°C

Pressures / Speeds

Injection speed	slow-medium
Hold-on pressure (spec.)	300 - 800 bar
Dynamic pressure (hydr.)	5 - 15 bar
Screw speed	50 - 100 min^{-1}

CUSTOMER SERVICES

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

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

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

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