GRILAMID LV-3A H

Grilamid LV-3A H is a 30 % glass fibre reinforced PA12 for injection moulding.

Grilamid LV-3A H is very stiff and tough and offers an improved hydrolysis resistance compared to standard PA12 GF 30.

Grilamid®
EMS

PROPERTIES

Mechanical Properties

		Standard	Unit	State	Grilamid LV-3A H
Density		ISO 1183	g/cm^2	dry	1.22
Tensile E-Modulus	(1 mm/min)	ISO 527	MPa	cond.	5'700
Tensile strength at break	(50 mm/min)	ISO 527	MPa	cond.	110
Elongation at break	(50 mm/min)	ISO 527	%	cond.	6
Impact strength	(Charpy 23°C)	ISO 179/1eU	kJ/m^2	cond.	80
	(Charpy –30°C)	ISO 179/1eU	kJ/m^2	cond.	80
Notched impact strength	(Charpy 23°C)	ISO 179/1eA	kJ/m^2	cond.	25
	(Charpy –30°C)	ISO 179/1eA	kJ/m^2	cond.	15
Ball indentation hardness		ISO 2039-1	MPa	cond.	120
Shore hardness D		ISO 868	--		80

Thermal Properties

Heat deflection temperature	HDT A (1.8 MPa)	ISO 75	°C	dry	165
	HDT C (8.0 MPa)	ISO 75	°C	dry	90
Melting point		ISO 3146-C	°C	dry	180

Electrical Properties

Dielectric strength	(K20/P50)	VDE 0303-2	kV/mm	dry	
				cond.	32
Comparative tracking index	CTI	IEC 112	V	dry	
				cond.	575
Volume resistivity		IEC 93	Ω·cm	dry	
				cond.	10^{11}
Specific surface resistivity		IEC 93	Ω	dry	
		IEC 93	Ω	cond.	10^{12}

Behaviour towards external influences

Moisture absorption	(23°C/50% r.h.)	i.A. DIN 53495	%	0.6
Water absorption	(23°C/ sat.)	DIN 53495	%	1.4

PROCESSING INFORMATION FOR THE INJECTION MOULDING OF GRILAMID LV-3A H

PROCESSING

The processing of Grilamid LV-3A H is problem-free on all machines suitable for polyamides.

Processing preparation

Grilamid LV-3A H is delivered in granular form in air tight sealed packaging ready for processing. Pre-drying of the material is not necessary.

Storage

Sealed, undamaged bags can be kept over long time periods in storage facilities that are dry, protected from the influence of weather, and where the bags can be protected from damage.
Damaged packaging must be resealed immediately, or better still the contents put into an air tight metal container.

It is important to bear in mind that material should be brought into the injection moulding shop at least one day prior to its usage. This will prevent condensation of water on the granulate upon opening of the packaging.

Opening of the packaging should occur immediately prior to processing of the material. Material left exposed to the atmosphere for periods longer than one hour is likely to suffer the effects of moisture absorption on the surface of the granulate. If it is foreseen that only part of the material content of an opened bag is to be used, it is recommended to seal the remaining material in an air tight container. If long residence times in the machine hopper (over 1 hour) are anticipated, then hopper heating or use of a hopper dryer (80°C) is recommended.

Handling and safety

The packaging is air tight and light-proof and may only be reused for its original purpose.
Spilt granules can cause accidents (falls) and should be swept up immediately.
If granules are accidentally swallowed or enter breathing passages or eyes, immediate medical aid should be sought or a doctor consulted.

Drying

During its manufacturing process Grilamid LV-3A H is dried and packed with a moisture content of less than 0.1 %. Should the packaging get damaged, the material be left in the open too long, or moisture streaks appear during moulding (which indicates a too high moisture content of the material), then the material must be dried:

	Time	Temperature
Convection oven	4 - 16 hours	70 – 80°C
Vacuum oven	≥ 4 hours	max. 100°C

The minimal drying time results in success only when a low humidity level in the atmosphere is present, i.e. when the melt drools or is injected into free air, no or only slight foaming is noticeable, respectively no silver streaks are evident on moulded parts.

Attention: Silver streaks can also occur due to overheating of the material (over 300°C) or caused by excessive residence time of the melt in the barrel.

The maximum drying time is then necessary when the material has been exposed to the atmosphere for long time periods (days) or has been in contact with water.
This is indicated through strong foaming of the melt, streaks and a rough surface. The injected melt appears to have extremely low viscosity.

Grilamid LV-3A H is subject to the effects of oxidization at temperatures above 80°C. Therefore the drying temperature in air circulating ovens should not exceed this. In vacuum dryers, higher temperatures of 100°C are possible.

MOULDING MACHINE

Grilamid LV-3A H can be processed on all injection moulding machines which are suitable for processing polyamides.
The following points should be observed.

Screw

Universal screws with shut off nozzles, length approx. 18D - 22D, compression ratio approx. 2 - 2.5, treated for abrasion, are recommended.

Screw diameter

(maximum shot volume)

The screw should be so selected that the maximum shot volume does not exceed six times the actual shot volume (parts and sprue). The metering zone (without the decompression zone) must always be longer than the length of the shut-off nozzle.

Heating
At least three separately controllable heating zones, able to reach temperatures of 350°C are recommended. Separate nozzle heating is necessary. The cylinder flange must be temperature controllable (cooling).

Venting screws
This facility is offered by most machinery manufacturers, and is recommended for processing hydroscopic thermoplastic materials. As a raw material manufacturer we have to inform you that melting polyamide containing moisture in the first zone of the air evacuation unit can lead to damage to the polymer, which at higher temperatures, or with long residence times in the cylinder, can lead to further degradation to the polymer melt.

Nozzle
Needle shut off nozzles allowing easy flow are recommended. Open nozzles are simple, allow an easy flowing melt and are long lasting. Floating shut off nozzles are not recommended.
Open nozzles can cause problems with brown streaks caused by drawing air into the nozzle following retraction of the screw after injection.

Hold on pressure
Grilamid LV-3A H is an easy flowing thermoplastic. As a partially crystalline material it shows a relatively high volume shrinkage upon solidification of the melt. This must be compensated through sufficient post pressure.

With the production of components with accurate dimensions the post or hold on pressure should be about 800 bar.
As a rule of thumb the hold on pressure should be 0.75 t per cm^2 of the projected surface area.

TOOLING

The usual rules regarding the design of the mould tool should also be followed for Grilamid products. Tools for polyamides should have well proportioned and adequate heating installation.

Generally, in order to meet the requirements for mechanical loading, (flexing, compression), internal pressures of up to 800 bar should be allowed for. For the mould cavities common mould tool steel quality (e.g. hardened steel) which has been hardened to a level of 65 HRC is necessary.

Sprues and runners
To achieve an optimal mould fill and to avoid sink marks, a central gate in the thickest section of the moulding is recommended.

Pin point gates (direct) or tunnel gates are, however, more economical and more common with technical mouldings. In order to avoid premature solidification of the melt and difficult mould, filling the following points should be considered:

Sprue diameter	=	1.4 x thickest wall section; minimum 4 mm diameter maximum 12 mm diameter
Gate diameter	=	0.8 x thickest wall section

Also, the position of pin point gates should lie in the area of the thickest wall section. A free flowing mass should be avoided.

Temperatures

Cylinder:	240 – 300°C
Nozzle:	240 – 300°C
Melt temperature:	240 – 300°C
Mould temperature:	80°C
Injection speed:	middle
Injection pressure:	middle

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