TECHNICAL DATA SHEET

GRILAMID LV-30H V0

Product description

Grilamid LV-30H V0 is a heat stabilised, flame retardant, self-extinguishing engineering thermoplastic, reinforced with 30 % glass fibre (by weight) based on semi-crystalline Polyamide 12 (PA12). This injection moulding grade possesses the following attributes:

- low water absorption
- high dimensional stability
- good chemical resistance
- good UV stability

Grilamid LV-30H V0 is halogen and red phosphorus free. The non-pigmented material is of inherently light colour.

RoHS: Grilamid LV-30H V0 is in compliance with RoHS (2002/95/EC, Restriction of Hazardous Substances; 2011/65/EU, RoHS2).

WEEE: Parts produced from Grilamid LV-30H V0 are not subject to "selective treatment" acc. directive 2002/96/EC on Waste Electrical and Electronic Equipment.

Grilamid LV-30H V0 is particularly suited for technical injection moulded parts which require a flammability rating of V-0 acc. UL 94.

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PROPERTIES

Mechanical Properties		Standard	Unit	State	Grilamid LV-30H V0
Tensile E-modulus	1 mm/min	ISO 527	MPa	dry cond.	10000 9000
Tensile strength at break	5 mm/min	ISO 527	MPa	dry cond.	95 75
Elongation at break	5 mm/min	ISO 527	%	dry cond.	2.5 2.5
Impact strength	Charpy, 23°C	ISO 179/2-1eU	kJ/m^2	dry cond.	35 35
Impact strength	Charpy, -30°C	ISO 179/2-1eU	kJ/m^2	dry cond.	35 35
Notched impact strength	Charpy, 23°C	ISO 1792-/1eA	kJ/m^2	dry cond.	9 9
Notched impact strength	Charpy, -30°C	ISO 179/2-1eA	kJ/m^2	dry cond.	8 8
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	170 145
Thermal Properties					
Melting point	DSC	ISO 11357	°C	dry	176
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	160
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	105
Thermal expansion coefficient long.	23-55°C	ISO 11359	$10^{-6}/K$	dry	20
Thermal expansion coefficient trans.	23-55°C	ISO 11359	$10^{-6}/K$	dry	90
Maximum usage temperature	long term	ISO 2578	°C	dry	90-120
Electrical Properties					
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	44 43
Comparative tracking index	CTI	IEC 60112	-	cond.	600
Specific volume resistivity		IEC 60093	$\Omega \cdot m$	dry cond.	10^9 10^9
Specific surface resistivity		IEC 60093	Ω	cond.	10^{11}
General Properties					
Density		ISO 1183	g/cm^3	dry	1.22
Flammability (UL 94)	1.5 – 6.0 mm	ISO 1210	rating	-	V-0
Glow wire temperature (3mm)	IEC GWFI	IEC 60695-2-12	°C	-	960
	IEC GWIT	IEC 60695-2-13	°C		800
Water absorption	23°C/saturated	ISO 62	%	-	1.4
Moisture absorption	23°C/50% r.h.	ISO 62	%	-	0.6
Linear mould shrinkage	long.	ISO 294	%	dry	0.1
Linear mould shrinkage	trans.	ISO 294	%	dry	0.65

Product nomenclature: ISO 16396-PA12,GF30 FR,M1HLF2R,C18-100N

Processing information for the injection moulding of Grilamid LV-30H V0

This technical data sheet for Grilamid LV-30H V0 provides you with useful information on material preparation, machine requirements, tooling and processing.

MATERIAL PREPARATION

Grilamid LV-30H V0 is delivered dry and ready for processing in sealed packaging. Pre-drying is usually not necessary.

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

Drying
Grilamid LV-30H V0 is dried and packed with a moisture content of less than 0.10 %. Should the packaging become damaged or the material is left open too long, then the material must be dried. A too high moisture content can be shown by a foaming melt and silver streaks on the moulded part when injected freely into the atmosphere (free shot). With critical components it may be necessary to pre-dry the material to a lower moisture content

Drying can be done as follows:

Desiccant dryer

Temperature	max. 80°C
Time	4 - 12 hours
Dew point of the dryer	-30°C

Vacuum oven

Temperature	max. 100°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, the above mentioned minimal drying times will be sufficient.
Openly stored material which shows foaming, unusually easy flow or rough surfaces on the moulded part, needs max. drying times.

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

Drying temperature
Temperatures above 80°C for desiccant dryers and 100°C for vacuum ovens should be avoided. Visible yellowing of the material in light colours can be an indication of oxidative degradation. Here it can be useful to retain a small sample of granules for comparison at longer residence times in the hopper (over 1 hour) hopper heating or a hopper dryer (80°C) can be useful.

Use of regrind
Grilamid LV-30H V0 is a thermoplastic material. Hence, incomplete mouldings as well as sprues and runners can be reprocessed. When adding regrind, special care has to be taken by the moulder. The following points should be observed:

- Moisture absorption
- Grinding: Dust particles and particle size distribution
- Contamination through foreign material, dust, oil, etc.
- Quantity addition to original material
- Colour variation
- Reduction of mechanical properties
- Flame retardant properties might change

MACHINE REQUIREMENTS

Grilamid LV-30H V0 can be processed economically and without problems on all machines suitable for polyamides.

Screw
Wear and corrosion protected, 3-zone universal screws with check valves are recommended.

Screw

Length	18 D - 22 D
Compression ratio	2 - 2.5

Shot volume
The metering stroke (without decompression distance) must be longer than the length of the check valve.

Selecting the injection unit

Shot volume = 0.5 - 0.8 x
(max. shot volume)

Heating
At least three separately controllable heating zones, able of reaching cylinder temperatures up to 300°C. A 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)] in cavity pressure of 750 bar

TOOLING

The design of the mould tool should follow the general rules for flame-retarded glass fibre 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

Parts moulded from Grilamid LV-30H V0 showing excellent dimensional stability. Asymmetric demoulding and undercuts are to be avoided. It is favourable to foresee high numbers of large ejector pins or a stripper plate. Demoulding draft angles between 1 to 5° are acceptable. Following values can be considered:

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

To avoid premature solidification of the melt and difficult mould filing, 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 with dimensions of depth 0.02 mm and width 2 - 5 mm are recommended.

PROCESSING

Mould filling, post pressure and dosing

The best surface finish and a high weld line strength are 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 LV-30H V0, following basic settings are recommended:

Temperatures

Flange	70 - 90°C
Zone 1	240 - 260°C
Zone 2	250 - 270°C
Zone 3	260 - 280°C
Nozzle	260 - 280°C
Tool	70 - 90°C
Melt	260 - 290°C

Pressures / Speeds

Injection speed	medium - high
Hold-on pressure (spec.)	300 - 800 bar
Dynamic pressure (spec.)	50 - 100bar
Peripheral screw speed	5 - 15 m/min

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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