TECHNICAL DATA SHEET

GRILAMID L 20A HL NZ
NATURAL

General product description

Grilamid L 20A HL NZ natural is a medium viscosity heat and UV stabilized Polyamide 12 with very high impact strength at low temperature.

The main features of Grilamid L 20A HL NZ natural are:

- Very high cold impact strength
- Good UV resistance
- Good chemical resistance
- Good surface finish
- Good dimensional stability
- Very low water absorption
- Low density

Applications examples

Grilamid L 20A HL NZ natural is particularly suitable for winter sport goods subject to high impact and fatigue requirements at low temperature. Further the product can be used for automotive tubes or profiles, for cable sheathing.

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PROPERTIES

Mechanical Properties

		Standard	Unit	State	Grilamid L 20A HL NZ natural
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	1000 750
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	30 30
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	13 18
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	* *
Elongation at break	50 mm/min	ISO 527	%	dry cond.	>50 >50
Impact strength	Charpy, 23°C	ISO 179/2-1eU	kJ/m²	dry cond.	no break no break
Impact strength	Charpy, -30°C	ISO 179/2-1eU	kJ/m²	dry cond.	no break no break
Notched impact strength	Charpy, 23°C	ISO 179/2-1eA	kJ/m²	dry cond.	85 85
Notched impact strength	Charpy, -30°C	ISO 179/2-1eA	kJ/m²	dry cond.	60 40
Shore-D hardness		ISO 868	-	dry cond.	65 65

*****not relevant according to ISO 10350-1

Thermal Properties

Melting point	DSC	ISO 11357	°C	dry	179
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	45
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	70
Thermal expansion coefficient long.	23-55°C	ISO 11359	10^{-6}/K	dry	170
Thermal expansion coefficient trans.	23-55°C	ISO 11359	10^{-6}/K	dry	210
Maximum usage temperature	long term	EMS	°C	dry	90 - 100
Maximum usage temperature	Short term	EMS	°C	dry	150

Electrical Properties

Dielectric strength		IEC 60243-1	kV/mm	dry cond.	40 40
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^{11}

General Properties

Density		ISO 1183	g/cm³	dry	0.98
Flammability (UL94)	0.8 mm	ISO 1210	rating	-	HB
Water absorption	23°C/sat.	ISO 62	%	-	1.3
Moisture absorption	23°C/50% r.h.	ISO 62	%	-	0.6
Linear mould shrinkage	long.	ISO 294	%	dry	1.00
Linear mould shrinkage	Trans.	ISO 294	%	dry	1.60

Product-nomenclature acc. ISO 1874: PA12-HI, GHL, 18-010

Processing information for injection moulding of Grilamid XE 4158 natural

This technical data sheet for Grilamid L 20A HL NZ natural provides you with useful information on material preparation, machine requirements, tooling and processing.

MATERIAL PREPARATION

Grilamid L 20A HL NZ natural is delivered dry and ready for processing in sealed, air tight packaging. Pre-drying is not necessary.

Storage

Sealed, undamaged bags can be kept over a period of time of at least one year when stored in 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 L 20A HL NZ natural 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 reduces the optical (streaks) and mechanical (embrittlement) qualities of the final product.

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 temperature

Polyamides are subject to the effects of 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. In order to detect oxidation it is advised to keep a small amount of granulate (light colour only!) as a comparison sample.

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

MACHINE REQUIREMENTS

Grilamid L 20A HL NZ natural can be processed economically and without problems on all machines suitable for polyamides.

Basic machine settings

Grilamid L 20A HL NZ natural 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

Shot volume = 0.5 - 0.8 x
(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 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)] 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 L 20A HL NZ natural show excellent dimensional stability. 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.

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).

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)

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.

Temperatures

Flange	40°C
Zone 1	220°C-230°C
Zone 2	225°C-235°C
Zone 3	230°C-240°C
Nozzle	230°C-250°C
Tool	40°C
Melt	240°C-250°C

Pressures / Speeds

Injection speed	low-medium
Hold-on pressure (spec.)	300 - 800 bar
Dynamic pressure (spec.)	50 - 100 bar
Screw speed	5 -10 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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