TECHNICAL DATASHEET

GRILAMID XE 3959
NATURAL

Product description

Grilamid XE 3959 natural is a high viscosity Polyamide 610 especially suitable for extrusion applications.
This PA610 product is to a large extent based on renewable raw materials and its eco-profile is very favourable when compared to similar products based on crude oil.

The main features of Grilamid XE 3959 natural are:

- Low volume expansion of tubes under pressure
- Good cold impact behaviour
- High heat and chemical resistance
- Easy processing

Grilamid XE 3959 natural can be processed on standard tube-extrusion lines suitable for polyamides.

Application examples

Grilamid XE 3959 natural was specially developed for automotive tubing applications for which a high long term usage and peak temperature are required. Grilamid XE 3959 natural has an excellent volume expansion behaviour and is particularly suitable for hydraulic clutch tubes.

GreenLine

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PROPERTIES

Mechanical Properties		Standard	Unit	State	Grilamid XE 3959 natural
Tensile E-Modulus	1 mm/min	ISO 527	MPa	dry cond.	2200 1200
Tensile strength at yield	50 mm/min	ISO 527	MPa	dry cond.	60 45
Elongation at yield	50 mm/min	ISO 527	%	dry cond.	5 18
Tensile strength at break	50 mm/min	ISO 527	MPa	dry cond.	40 60
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.	8 18
Notched impact strength	Charpy, -30°C	ISO 179/2-1eA	kJ/m²	dry cond.	9 8
Ball indentation hardness		ISO 2039-1	MPa	dry cond.	120 70

Thermal Properties					
Melting point	DSC	ISO 11357	°C	dry	220
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	55
Heat deflection temperature HDT/B	0.45 MPa	ISO 75	°C	dry	150
Thermal expansion coefficient long.	23-55°C	ISO 11359	10^{-4}/K	dry	1.1
Thermal expansion coefficient trans.	23-55°C	ISO 11359	10^{-4}/K	dry	1.1
Maximum usage temperature	long term	ISO 2578	°C	dry	110 - 130
Maximum usage temperature	short term	ISO 2578	°C	dry	160

Electrical Properties					
Dielectric strength		IEC 60243-1	kV/mm	dry cond.	34
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	1.07
Flammability (UL94)	0.8 mm	ISO 1210	rating	-	HB
Water absorption	23°C/sat.	ISO 62	%	-	3.3
Moisture absorption	23°C/50% r.h.	ISO 62	%	-	1.6
Linear mould shrinkage	long.	ISO 294	%	dry	0.9
Linear mould shrinkage	trans.	ISO 294	%	dry	0.9

Product-nomenclature acc. ISO 1874: PA610, EH; 22-010

Information for extrusion processing of Grilamid XE 3959 natural

This technical data sheet for Grilamid XE 3959 natural provides you with useful information on material preparation, machine requirements, tooling and processing.

MATERIAL PREPARATION

Grilamid XE 3959 natural is delivered dry and ready for processing in sealed, air tight packaging. Predrying is not necessary provided the packaging is undamaged.

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 XE 3959 natural is dried and packed with a moisture content of ≤ 0.10 %. Should the packaging become damaged or be left open too long, then the material must be dried. A too high moisture content can be recognized by a foaming melt, excessive nozzle drool and silver streaks on the moulded part.

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 affects of oxidation at temperatures above 80°C in the presence of oxygen. Visible yellowing of the material is an indication of oxidation. 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 as a comparison sample.

With longer residence times (over 0.5 hour) hopper heating or a hopper dryer (80°C) is useful.

MACHINE REQUIREMENTS

Grilamid XE 3959 natural can be processed economically and without problems on all machines suitable for polyamides.

Screw

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

Screw

Length	24 D - 25 D
Compression ratio	2.0:1 - 3.0:1

Grooved Feeding Zone

A grooved bush is usually not recommended for the extrusion of polyamides grades. In order to obtain a higher through-put by using a grooved bush the depth of the grooves should not exceed 0.5 mm.

PROCESSING

Basic machine settings

In order to start up the machine for processing Grilamid XE 3959 natural, the following basic settings are recommended:

Temperatures

Hopper zone	60 - 90°C
Feeding zone	230 - 260°C
Compression zone	230 - 260°C
Metering zone	230 - 260°C
Head	230 - 260°C
Nozzle	230 - 260°C
Melt	230 - 260°C

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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