

TECHNICAL DATA SHEET

GRIVORY G 21

Product Description

Grivory G 21 is a high viscosity amorphous copolyamide. It is suitable for injection-stretch blow moulding, injection blow moulding, extrusion blow moulding, the manufacture of coextruded blown film and mono- or coextruded cast film and coextrusion of tubes. Grivory G 21 is also used as an additive for polyamide 6 and different copolyamides to improve film properties.

The key properties of Grivory G 21 are:

- Highly transparent and high surface gloss
- Very good chemical resistance
- Very good abrasion resistance
- Excellent resistance to heat distortion
- Excellent flavour and aroma barrier
- Low transmission of UV-radiation
- Improved gas and aroma barrier at elevated relative humidity

Application Examples

Barrier layer for mono- or coextruded rigid packaging (EBM or ISBM bottles), barrier tubes, barrier layer in multilayer films for flexible food and cosmetics packaging, barrier layer modifier for flexible meat/cheese or any other foodstuff packaging.

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PROPERTIES

Thermal Properties		Standard	Unit	State	Grivory G 21
Glass transition temperature	DSC	ISO 11357	°C	dry	125
Melt volume rate (MVR)	275°C / 5 kg	ISO 1133	cm ³ /10 min	dry	25

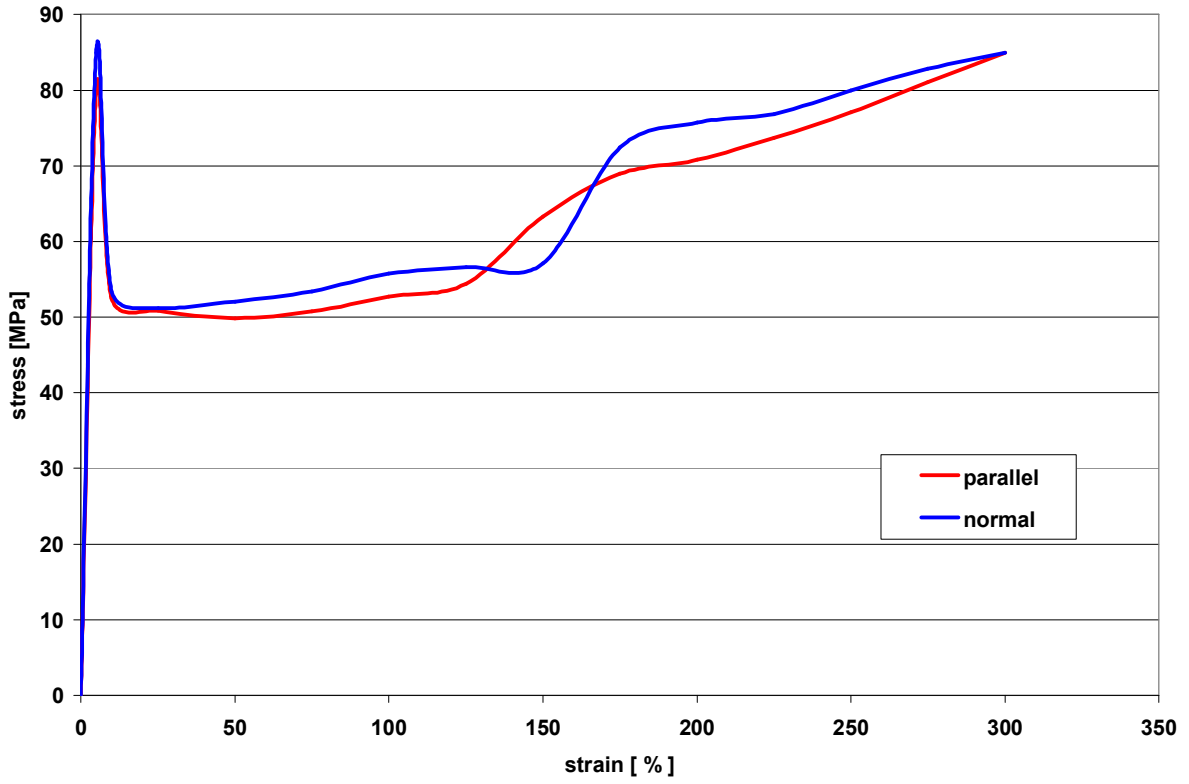
General Properties					
Density		ISO 1183	g/cm ³	dry	1.18
Water absorption	23°C / saturated	ISO 62	%	-	7
Moisture absorption	23°C / 50% r.h.	ISO 62	%	-	2
Gloss	60°	ISO 2813	-	-	160

Barrier Properties (50 µm films)					
O ₂ -Transmission rate	23°C / 0% r.h.	DIS/ISO 15105-1	cm ³ /m ² 24h bar	-	30
	23°C / 85% r.h.				10
CO ₂ -Transmission rate	23°C / 0% r.h.	DIS/ISO 15105-2	cm ³ /m ² 24h bar	-	90
	23°C / 85% r.h.				40
Moisture vapour transmission rate	23°C / 85% r.h.	DIS/ISO 15106-1	g/m ² 24h	-	7

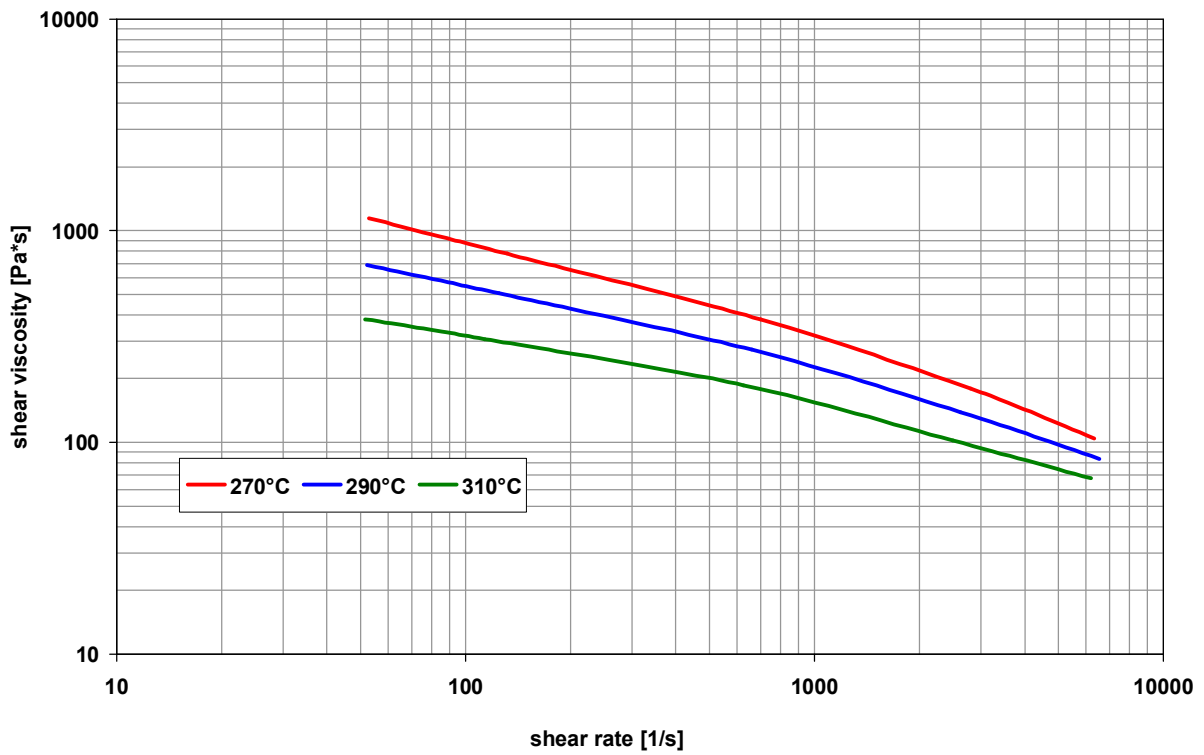
Mechanical Properties					
Tensile E-modulus	4 mm test bar	ISO 527-2	MPa	cond.	3000
Stress at yield	parallel	ISO 527-3	MPa	cond.	85
	normal				85
Strain at yield	parallel	ISO 527-3	%	cond.	5
	normal				5
Stress at break	parallel	ISO 527-3	MPa	cond.	85
	normal				85
Strain at break	parallel	ISO 527-3	%	cond.	300
	normal				300
Tear resistance	parallel	ISO 6383-1	N/mm	cond.	5
	normal				5
Elmendorf tear resistance	parallel	ISO 6383-2	N	cond.	10
	normal				10
Notched impact strength	Charpy, 23°C	ISO 179 /2-1eA	kJ/m ²	dry	8
				cond.	8
Notched impact strength	Charpy, -30°C	ISO 179 /2-1eA	kJ/m ²	dry	8
				cond.	2

Product designation according to ISO 1874: PA 6I/6T, FT, 11-030

Stress & Strain of Grivory G 21 (50 µm films)



Viscosity function of Grivory G 21



Processing information for extrusion of Grivory G 21

This technical data sheet for Grivory G 21 provides you with useful information on material preparation, machine requirements and processing.

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

MATERIAL PREPARATION

Grivory G 21 is delivered dry and ready for processing in sealed packaging. Predrying is not necessary.

Storage

Sealed, undamaged bags can be kept for 6 months 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

Grivory G 21 is dried and packed with a moisture content of less than 0.10 %. The processing of moist material reduces the optical and mechanical quality of the application. A too high moisture content can result in fish eyes, streaks and brittleness.

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 slight evidence of foaming of the melt or just traces of silver streaks on the part, then the above mentioned minimal drying time will be sufficient. Material, which is stored in open over days, which shows strong foaming, is unusually easy flowing or shows streaks on the article, then the maximal drying time is required.

Drying temperature

Polyamides are affected by 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.

MACHINE REQUIREMENTS

Grivory G 21 can be processed economically and without problems on all extrusion lines suitable for polyamides.

Screw

Wear protected, 3-zone universal screws are recommended.

Screw

Length	24 D - 30 D
Compression ratio	2.5 - 3.5

Heating

At least three separately controllable heating zones, capable of reaching cylinder temperatures of up to 270°C are recommended. The cylinder flange and adapter must be able to be heated.

PROCESSING

Temperatures

In order to start up the machine for processing Grivory G 21, the following parameters are recommended:

Temperatures

Hopper zone	25 - 60°C
Zone 1	245 - 255°C
Zone 2	255 - 265°C
Zone 3	255 - 265°C
Adapter	255 - 265°C
Mould	255 - 265°C
Die	255 - 265°C
Melt	255 - 270°C

In cases where the use of grooved feeding zones is employed it is recommended to keep this zone at a constant temperature between 80 and 160°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

For further details concerning injection moulding and extrusion of EMS-GRIVORY polyamides please refer to our technical information brochures "Injection moulding machine" and "Tube Extrusion" available from your EMS-GRIVORY representatives.

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

The recommendations and data given are based on our experience to date, however, no liability can be assumed in connection with their usage and processing.

Generated / updated: EBM / 03.2008

This version replaces all previous product specific data sheets.

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