

Technical Data Sheet

Material Information: Flame retardant polyamide 6 for injection molding.

Notes: Halogen and phosphorus free flame retardant grade, compliance with RoHS derivatives, with rating UL94 V0 and glow-wire at 960°C, which is used in many sectors of industry and has excellent mechanical properties. This material is available in natural and colors on request.

| Properties | Test Method | Unit | Value |
|---------------------------------------|-------------|-------------------|------------|
| Physical properties | | | Dry |
| Density (23°C) | ISO 1183 | g/cm ³ | 1,18 |
| Ash content | ISO 3451-4 | % | |
| Determination of water content | ISO 15512 | % | 0,2 |
| Mold shrinkage- parallel/normal (3mm) | ISO 294-4 | % | 1,2/1,4 |

Mechanical properties

| | | | |
|--|-------------|-------------------|------|
| Tensile modulus (1mm/min) (23°C) | ISO 527-2 | MPa | 3800 |
| Tensile stress at break (5mm/min) (23°C) | ISO 527-2 | MPa | 65 |
| Tensile strain at break (5mm/min) (23°C) | ISO 527-2 | % | >10 |
| Flexural modulus (2mm/min) (23°C) | ISO 178 | MPa | 3300 |
| Flexural strength (2mm/min) (23°C) | ISO 178 | MPa | 100 |
| Notched izod impact (23°C) | ISO 180/1A | kJ/m ² | 5 |
| Unnotched izod impact (23°C) | ISO 180/1U | kJ/m ² | 50 |
| Notched charpy impact (23°C) | ISO 179/1eA | kJ/m ² | 6 |
| Unnotched charpy impact (23°C) | ISO 179/1eU | kJ/m ² | 55 |

Thermal properties

| | | | |
|---|------------|----|-----|
| Melting point | ISO 3146 | °C | 220 |
| Temp. of deflection under load (0,45 MPa) | ISO 75-2/B | °C | 190 |
| Temp. of deflection under load (1,80 MPa) | ISO 75-2/A | °C | 80 |

Flammability & electrical properties

| | | | |
|---|----------------|--------|----------|
| Flammability classification (0,8mm) - UL 94 | EN 60695-11-10 | - | V0 |
| Glow Wire - GWFI (0,8 mm) | EN 60695-2-12 | °C | 960 |
| Glow Wire - GWIT (1,6 mm) | EN 60695-2-13 | °C | 775 |
| Ball Pressure Test (125 ± 2 °C) | EN 60695-10-2 | - | < 2 |
| Comparative tracking index - CTI (Solution A) | EN 60112 | V | 600 |
| Surface resistivity | ASTM D257 | Ω/sq | 1,00E+13 |
| US-FMVSS 302 | ISO 3795 | mm/min | < 100 |

Test conditions

Laboratory conditions are 23 ±2°C and 45-55 % RH.

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EPLAMID 6 GRADES PROCESSING CONDITIONS

Injection moulding of EPLAMID 6

Polyamide 6 is easy to mould material, with a very wide processing window. A few general guidelines are given here.

Pre-drying

Polyamide is hygroscopic and moisture sensitive, so pre-drying is recommended as a matter of rule. Material that is not pre-dried to a moisture level below 0,1 % will degrade, causing surface defects, parts that are out of dimension and brittle parts. It is recommended to dry material for 4 hours at 80°C to 85°C in a desiccant dryer with more than one desiccant element.

A few tips to ensure proper operation of the dryer:

- * Ensure the thermocouple that regulates the temperature is placed immediately before the entry of the air into the dryer. There can be a significant temperature drop in the air-conveyance system.
- * The temperature of the air going out of the dryer silo should not be more than 30°C lower than the air entering the system. If this is the case, you have insufficient air capacity.
- * From time to time, monitor the dew point of the dry air to ensure the desiccant elements are functioning properly.
- * Often, less air runs through the very bottom part of a dryer silo. Therefore, it is recommended that you take the material out of the bottom of the dryer and feed back into the top when you start up your process.

Moulding temperatures

Polyamide 6 can be processed between 220 and 295°C, depending on the grade used.

The following barrel settings are recommended:

| Material | Zone 1 (Hopper) | Zone 2 | Zone 3 | Zone 4 (Nozzle) |
|-------------------|-----------------|-----------|-----------|-----------------|
| Unfilled Grades | 220-260°C | 225-270°C | 225-270°C | 225-275°C |
| Impact M. Grades | 220-265°C | 225-260°C | 225-265°C | 230-275°C |
| Flame Ret. Grades | 225-260°C | 230-260°C | 235-265°C | 235-265°C |
| Reinforced Grades | 240-280°C | 240-290°C | 240-290°C | 240-295°C |

Tool temperature

Mould temperature is always a compromise. Moreover, tool temperature should be as high as possible to give optimum crystallization, dimensional, good surface finish and excellent mechanical performance. On the other hand, lower tool temperature can significantly cut cycle time. For Polyamide 6, 80°C should be maintained as a minimum. For reinforced grades values of 90-110°C are preferred.

Pressure and speed

Injection pressure should generally be around 70 to 120 Mpa; this results in a minimum clamping force of the moulding machine in tonnes of 0,7 times the projected surface area in cm².

Holding pressure is generally in the area of 90 Mpa.

For glassfibre reinforced compounds, the screw speed should be kept low, a rough indication is as follows:

| Screw diameter (mm) | Maximum rpm |
|---------------------|-------------|
| 20 | 150 |
| 30 | 100 |
| 40 | 70 |
| 50 | 60 |
| 60 | 50 |
| 70 | 40 |
| 80 | 35 |
| >80 | 30 |

Back pressure should be kept to a practical minimum.

Use of regrind

Regrind sprues and runners can be used on most materials. It is not recommended to use regrind on FR grades. When regrind is used, observe these simple rules:

- * Use a constant ratio of regrind and virgin material. When a material has been processed once, its viscosity and fibre length have been decreased. Using varying ratios of regrind can lead to variations in dimensions, mechanical performance and processing characteristics.
- * Either feed the regrind straight back into the machine or pre-dry the regrind before usage.
- * Store regrind in a dry, clean place to avoid contamination and excess moisture.
- * Ensure sharp cutting blades to keep dust generation to a minimum; cut glass fibre reinforced material when it is still hot.
- * Clean the grinder regularly to avoid build up of dust.
- * Do not use splayed, discoloured or degraded parts and runners.

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