

**Polyamide 66**

**Technical Data Sheet**

**Material Information:** Polyamide 66, reinforced with 20% of carbon fiber, heat stabilized, lubricated for injection moulding.

**Notes:** Eplamid 66 carbon fiber reinforced compounds are used in all sectors of industry, offering a good balance of thermal and mechanical properties.

| Properties                                      | Test Method    | Unit              | Value      |             |
|---|----------------|-------------------|------------|-------------|
| <b>Physical properties</b>                      |                |                   | <b>Dry</b> | <b>Cond</b> |
| Density (23°C)                                  | ISO 1183       | g/cm <sup>3</sup> | 1,22       |             |
| Humidity absorption (equilibrium)               | ISO 62         | %                 | 1,9        |             |
| Water absorption(saturation)                    | ISO 62         | %                 | 6,9        |             |
| Mold shrinkage- parallel/normal (2mm)           | ISO 294-4      | %                 | 0,4/0,7    |             |
| <b>Mechanical properties</b>                    |                |                   |            |             |
| Tensile modulus (1mm/min) (23°C)                | ISO 527-2      | MPa               | 16700      | 14500       |
| Tensile stress at break (5mm/min) (23°C)        | ISO 527-2      | MPa               | 200        | 140         |
| Tensile strain at break (5mm/min) (23°C)        | ISO 527-2      | %                 | 2          | 4           |
| Flexural modulus (2mm/min) (23°C)               | ISO 178        | MPa               | 15200      | 13500       |
| Flexural strength (2mm/min) (23°C)              | ISO 178        | MPa               | 260        | 210         |
| Notched izod impact (23°C)                      | ISO 180/1A     | kJ/m <sup>2</sup> | 7          | 9           |
| Unnotched izod impact (23°C)                    | ISO 180/1U     | kJ/m <sup>2</sup> | 55         | 65          |
| Notched charpy impact (23°C)                    | ISO 179/1eA    | kJ/m <sup>2</sup> | 8          | 10          |
| Unnotched charpy impact (23°C)                  | ISO 179/1eU    | kJ/m <sup>2</sup> | 60         | 70          |
| <b>Thermal properties</b>                       |                |                   |            |             |
| Melting point (10°K/min)                        | ISO 11357/1-/3 | °C                | 260        |             |
| Temp. of deflection under load (0,45 MPa)       | ISO 75-2/B     | °C                | 255        |             |
| Temp. of deflection under load (1,80 MPa)       | ISO 75-2/A     | °C                | 250        |             |
| <b>Flammability &amp; electrical properties</b> |                |                   |            |             |
| Flammability classification (0,8mm) - UL 94     | EN 60695-11-10 | -                 | HB         |             |
| Comparative tracking index - CTI (Solution A)   | EN 60112       | V                 | 100        |             |
| Surface resistivity                             | ASTM D257      | Ω/sq              | 1,00E+03   |             |

**Test conditions**

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

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**EPLAMID 66 GRADES PROCESSING CONDITIONS**

**Injection moulding of EPLAMID 66**

Polyamide 66 is easy to mould material, which is not particularly sensitive to moulding conditions. 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**

For polyamide 66, the melt temperature must be kept below 300°C. Any higher temperature will cause rapid degradation, which can be recognized by foaming of the material or splash marks on the surface of the part.

The following barrel settings are recommended:

| Material          | Zone 1 (Hopper) | Zone 2    | Zone 3    | Zone 4 (Nozzle) |
|-------------------|-----------------|-----------|-----------|-----------------|
| Impact M. Grades  | 260-275°C       | 260-280°C | 270-280°C | 275-285°C       |
| Flame Ret. Grades | 260-280°C       | 260-280°C | 270-280°C | 275-285°C       |
| Unfilled Grades   | 260-295°C       | 270-295°C | 275-290°C | 275-295°C       |
| Reinforced Grades | 270-290°C       | 270-295°C | 270-295°C | 275-295°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, 60°C-80°C should be the standard range. For highly reinforced grades values of up to 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 cm<sup>2</sup>.

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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