PROCESSING DATA
RAVAMID A STANDARD GRADES (UNFILLED & FILLED)
STANDARD GRADES

PRODUCT LIST

RAVAMID A STANDARD GRADES (UNFILLED & FILLED)

MATERIAL DESCRIPTION

Ravamid A is a PA66 industrial compound for injection molding, available unfilled or with glass filler (From 10% to 50%).

DRYING

PA resins are hygroscopic but the water absorption is a reversible process. They absorb water from direct immersion and from humid air. The amount of water absorbed normally depends on the exposure time, the air temperature and the relative humidity; the maximum moisture level absorbed is normally 3.5% (saturated in air at 23 °C, 50% R.H.)
At the temperatures used to mould PA, moisture levels can cause visual flaws and also brittleness of the molded part. Therefore, it is recommended that resin moisture content be limited to 0.12% when processing RAVAMID™.

DRIYNG EQUIPMENT AND CONDITIONS

Hopper dryers that incorporate dehumidifying units are recommended for drying RAVAMID™. It is recommended to dry RAVAMID™ in dehumidifying dryers for 2-4 hours at 85°C (the required drying time will depend on the moisture level of the material). Closed hot-air systems are not recommended for use. It is very difficult to fully dry polyamide in circulating air ovens at temperatures below 90 °C; at lower temperatures the moisture content of the air can even lead to the granules absorbing more moisture (achieving a state of equilibrium with the moisture content of the circulating air). For this reason, only dehumidifying/desiccant dryers are used for polyamides.
Drying PA above 95°C for longer than 2 hours will cause yellowing of the granules due to oxidation.

MOULD DESIGN; DIMENSIONING THE GATE

The chief criteria to dimension a gate are: weight of the molded part (volume), flow length and wall thickness. These affect the pressure requirements, the thermal stressing that prevails during filling and the shear stress. Filling behavior relating to wall thickness or sudden changes in wall thickness, are decisive for surface quality.
An ideal diameter of a round gate should be no less than half of the maximum thickness (In case a round gate is not permissible, the area of the square should be the same of the round's area).

MACHINE SELECTION

The size of the machine to be used is determined by the volume of plastic required to fill the mould cavity. A sufficient screw length (approximately 20 D) is required in order to ensure homogeneous melting, given the constantly increasing requirements on the plasticizing flow in both quantitative and qualitative terms. It has also been seen, however, that the length of an injection molding screw cannot be increased at will. With screws that have an L/D ratio in excess of 22, material damage can result through long residence times. Three-section screws with an L/D ratio of 18 : 1 to 22 : 1, a flight depth ratio of 2 : 1 to 2.5 : 1 and a pitch of 1 D have proved suitable for processing RAVAMID™.
It is recommended to avoid a shot size more than 85% and less than 15% of the machine shot capacity.
Standard steel nozzles can be used.

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MELT TEMPERATURE

The molding machine should be set up to deliver a melt temperature between 270 to 290°C, with an aim of 280°C. The optimum temperature profile depends on many variables such as the ratio of machine capacity to shot size, screw design, mould/part design, and cycle time. Reverse temperature profiles are used occasionally to compensate for improper screw design, to reduce machine amperage or torque requirements, and to compensate for machines with short L/D ratios.
Keeping a uniform melt temperature within the recommended range is essential to ensure part performance and color matching to mating component parts. Melt temperatures in the upper end of the recommended range may be necessary when processing thin wall parts, difficult to fill parts, parts with very small gates and parts with long flow lengths. Excessive melt temperatures may result in thermal degradation and a loss of performance, properties and aesthetics. Lower processing temperatures reduce the risk of thermal degradation and shorten the necessary cooling time. However, excessively low melt temperatures may result in high residual molded in stress and poor homogenization.

MOULD TEMPERATURE

The mould temperature range recommended for PA materials is 70 to 90°C. Cooling time is important for part performance and cycle time optimization. A low mould temperature could cause warpage problems due to post-crystallization of PA. Using a mould temperature controller will minimize temperature variations. Higher mould temperatures in the upper recommended range generally provide better surface finish, less molded in stress because of slower cooling and easier filling of thin wall parts and parts with long flow lengths. RAVAMID™ resins with different viscosity rates have different processing windows. In general, resins having higher melt flow rates allow the use of lower mould and melt temperatures. The higher melt flow rates are easier to process and their lower molding temperatures allow for shorter cycle times.

Processing

PARAMETER VALUES

Barrel Temperatures:
Rear (Hopper) 250-260°C**;** Intermediate 260-270°C**;** Front 280-290°C**;** Nozzle 280-285°C

Mold Temperature:
70-90°C

Pressure:
Back Pressure 4-8 Bar
Injection Pressure Adjust to control part weight & dimensions
Hold/Pack Pressure 60-80 Bar
Cushion 3.0-6.0 mm

Rate:
Injection Speed Adjust to control appearance

Plasticizing Conditions:
A moderate screw speed of 50-80 RPM is recommended for RAVAMID™ resins.

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Injection Conditions:
The appropriate injection speed for RAVAMID™ resins is determined largely by gate design. For parts gated into a visible surface it may be necessary to run the machine at a slow injection speed as possible.
During the packing phase, the material in the cavity is shrinking. To compensate for this shrinkage additional material must be supplied to the cavity until gates freeze off. A small melt cushion provides a ready source of additional melt to use during packing.
If the screw is allowed to "bottom out," the packing pressure cannot be transferred through the polymer to pack out the cavity. This will result in poor part consistency due to short shots, poor dimensional stability, excessive sink marks or poor aesthetics.
It is generally recommended that a small cushion size be employed to minimize heat history on the polymer, reducing the potential for polymer degradation.

CONDITIONING

Before testing any molded PA sample it is important to condition it (i.e. making it absorb the equilibrium humidity percentage of 3-4 %).
Time of conditioning depends on the thickness of the part, on the temperature and the humidity of the air.
To achieve this level of absorption it is possible to use different methods:
- In controlled hot and humid air (50°C, 80-90 % humidity)
- In boiling water
- In potassium acetate solution
- At room temperature

All the methods have different procedures and time.

REGRIND

Regrind can be used with RAVAMID™ resins, in a maximum of 25%, if care is taken to avoid cross contamination and moisture pick-up; like virgin resin, regrind must be dried. Large particle sizes of regrind may require longer drying times. However, parts that were rejected because they were molded with wet resin or degraded parts cannot be regrind and reused.

PURGING

Cleaning the barrel and nozzle equipment effectively is essential; PEHD or PP resin can be easily used.

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