processing guidelines

Typical Molding Conditions for Vydyne® Extrusion Grade Nylon

Optimal processing conditions depend on your machine size, screw design, material residence time, and other features of your operation. The settings and guidelines below will help you achieve optimal processing and excellent part quality. Measuring stock melt temperature with a hand-held pyrometer is one of the best methods for selecting optimal operating conditions.

Melt Temperature, °C 270 to 295

Suggested Machine Conditions	
Cylinder Settings, °C	250 to 295
Die Temperature, °C	270 to 295
Screw Design	General Purpose or Barrier
Extruder Die Back Pressure,* MPa	3.0 to 17.0
Quench Water Bath Temperature, °C	20 to 80

*Note: For monofilament applications, a meter pump is suggested. A screen pack of 40/80/40 mesh is appropriate.

Suggested Guidelines for Extrusion

1. Although you can use a twin-screw extruder to process Vydyne nylon, a single-screw extruder with a length-to-diameter ratio of 24 to 1 and a compression ratio of at least 3.5 to 1 is recommended to ensure the best melt quality. The preferred screw compression zone should be a minimum of four turns in length. Barrier screws have been successfully used with high-viscosity Vydyne grades.

2. Extruder temperature control is critical to ensure constant delivery of a homogeneous melt over the entire speed range. The extruder barrel should be equipped with at least four independent temperature control zones for heating. Cooling sections are not recommended. Vydyne nylon is noncorrosive, so no special material or construction is required for screws or barrels. DC drives or AC vector drives are recommended to provide precise speed control over the entire range. Circuit breakers should be used to prevent high torque conditions that could result in screw breakage. Nylon extruder drives require approximately 750 watts of power per 3.2 to 3.6 kg/hr. of throughput. Make sure you are using an uninterrupted power supply.

3. You can gain additional high-pressure protection by either of these methods:
- A rupture disc installed in the barrel between the end of the screw and the breaker plate
- A pressure transducer with a high-pressure cutout interlocked to the drive

4. Extruder output is typically given based on processing polystyrene. Nylon typically requires more heat input, melts more slowly, has lower viscosity, and develops less shear in the barrel. You can determine the approximate output of Vydyne nylon by multiplying the rated output for polystyrene by 0.67.

5. The feed throat should be water-cooled to prevent excessive heating of the resin, which can cause bridging in the feed hopper. Water-cooling of the throat also protects the drive bearings.

6. We recommend that you use a screen pack to remove impurities and unmelted resin from the melt stream. A screen pack of 40/80/40 mesh is appropriate. Finer filtration may be required for very low wall thicknesses or fine diameters. The screen packs also increase extruder back pressure, which ensures a more homogeneous melt and constant output pressures.

7. A melt-gear pump is recommended for maximum stability of output when throughput control is critical.

8. A 15- to 30-minute shutdown with nylon 6.6 remaining in the barrel causes a risk of polymer degradation. This is a function of individual setup and fabrication. For downtimes exceeding 30 minutes, we recommend completely emptying (purging) the barrel with a commercial purge compound, nylon 6, or acrylic. We recommend that you periodically dismantle and thoroughly clean the extruder screw, head, and die to ensure uniform quality of your end product.

9. Store Vydyne nylon resins in cool, dry conditions in their original factory-sealed packaging until you use them. Although they can be extruded straight from the factory-sealed bag, it is recommended that the resins be dried before extruding. This ensures uniform moisture levels (target moisture should be less than 0.10% by weight) to ensure consistent melt quality and superior dimensional control. It is recommended that Vydyne extrusion grades be dried in a dehumidified air-type drier (dessicant bed) with a maximum air temperature of 70°C for 1-3 hours.

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