Nylon N6050L, N6050HL and N6050HSL

This family of nylon 6 engineering thermoplastic polymers exhibits a viscosity suitable for general-purpose injection molding applications.

For molded parts, which may be exposed to high temperatures for prolonged periods of time, one of the heat stabilized grades should be selected. **N6050HSL** contains a conventional stabilizer system, which provides excellent protection against thermal aging, but can slightly tint the natural color, normally to a greenish hue. For applications where preservation of natural color is important, especially for precision color matches, the use of **N6050HL**, which incorporates an effective stabilizer system free from color effects, is recommended. The properties of these heat-stabilized grades are similar to those of the general-purpose product, with the exception of elongation to break, which may be slightly reduced.

Each formulation offers the high flow, easy processing and outstanding surface appearance that is characteristic of nylon 6 resins, and is lubricated for improved feed and mold release.

Nylon 6 exhibits a unique combination of strength, rigidity and practical toughness, including resistance to repeated impact loads, excellent dynamic fatigue resistance, low coefficient of friction, outstanding abrasion and wear performance even in harsh environments, and resistance to the effects of a very wide range of chemicals and solvents.

TYPICAL PROPERTIES
DRY AS MOLDED

	ASTM	ENGLISH		S.I.	
PROPERTY	**TEST METHOD**	**UNITS**	**VALUE**	**UNITS**	**VALUE**
Melting Range	D789	°F	420-437	°C	210-225
Specific Gravity	D792	-	1.13	-	1.13
Water Absorption (24 hours immersion)	D570	%	1.6	%	1.6
Heat Deflection Temperature at 264 lbs/in^2 (1.82 MPa)	D648	°F	149	°C	65
Mold Shrinkage Guideline* (Flow Direction)	1/8" section	%	1.3-1.6	%	1.3-1.6
Tensile Strength at Yield	D638	lbs/in^2	12,200	MPa	84
Elongation at Break	D638	%	30-50	%	30-50
Flexural Strength	D790	lbs/in^2	15,800	MPa	109
Flexural Modulus	D790	lbs/in^2	405,000	MPa	2,793
Izod Impact Strength (Notched, 1/8" specimen)	D256	ft. lbs/in of notch	0.9 – 1.1	J/m	48 - 59
Rockwell Hardness	D785	R scale	R120	-	-

***Please review shrinkage projections for specific applications with an MDE Technical Representative.**

All data generated using test specimens injection molded from natural color material. Inclusion of color pigments or other additives may change some or all of these test results. Test specimens are stored in a moisture proof container immediately after molding and contain less than 0.2% moisture; tests are conducted at 23°C and 50% relative humidity unless otherwise stated.

These mechanical property test data have been developed using injection molded specimens tested under standardized conditions; furthermore, many of the mechanical properties of thermoplastic materials can be influenced by changes in processing conditions, environmental factors such as temperature and humidity, and rate of application of stress. Therefore, these test results, which characterize typical production material, should not be used either to establish specification limits or alone as the basis for engineering design.

N6050L, N6050HL and N6050HSL Processing Guidelines

Drying

Nylon compounds from MDE are shipped in moisture resistant packaging, dried to less than 0.25% moisture. Most processors will further dry nylon resins and compounds, especially after exposure of virgin resin to ambient air for more than an hour, or when a proportion of reground material is being used.

The use of dehumidifying dryers is strongly preferred. The dew point of the drying air stream should be no more than -20°F, and preferably lower. The drying air temperature must be high enough to achieve a pellet temperature of 175-180°F. If using a hopper drier, depending on air hose length and insulation of hoses and hopper, the drying air temperature may need to reach 200-220°F to achieve the required material temperature.

If the pellet temperature reaches 180°F, a residence time of 4 hours is generally adequate to ensure that the material is ready to be processed. Only if residence times are limited to 2 hours should a pellet temperature of 200°F be considered; at 200°F, there is a risk of material oxidation, with associated yellowing of natural color and loss of part performance.

Nylon compounds usually demonstrate visual evidence of unacceptably high moisture levels. This includes splay or silver streaking on the molded part surface, or an unstable melt or nozzle drool at the machine. Additional drying time is indicated if these characteristics are observed.

If moisture analysis equipment is available, an acceptable moisture content range for normal processing is 0.1% to 0.25% maximum. Mold-in-color parts with critical cosmetic requirements may require drying to < 0.1%.

Temperature Guidelines

The following temperature guidelines are suggested for general use **if a machine can be selected where shot size is 40-70% of nominal machine capacity.**

Tool Surface	Melt Temperatures (°F)			Typical Cylinder Temperatures (°F)		
Temperature (°F)	Max.	Preferred	Min.	Front	Center	Rear
140-180	540	470-510	460	470	480	490

- A "reverse" temperature profile helps ensure a homogeneous melt, improves screw recovery and helps to optimize cycle times.
- A mold surface temperature in the suggested range improves surface appearance, helps consistency of mold fill and therefore consistency of dimensions, minimizes the effect of weld lines and also helps realize best molded part performance.
- A medium to fast injection speed maximizes weld line strength, minimizes molded in stress, and also contributes to achievement of best surface appearance. Good venting of cavities is essential to allow fast fill without burning.

Screw Forward Time

Adequate screw forward time under follow-up pressure is important to ensure proper packing before gate freeze, during which time it is essential to maintain a "cushion" of 1/8"-1/4". Optimum screw forward time can be judged by a part weight vs. forward time plot. Avoid overpacking, which can generate molded-in stresses.

Screw Recovery

It is recommended that back pressure of about 50 p.s.i. gauge be applied to the screw to help development of a homogeneous melt, and to ensure consistent shot volume. Screw rotation should also be as slow as possible consistent with cycle time goals, usually 40-80 r.p.m.

Mold Shrinkage

Standard ASTM test specimens are used to develop shrinkage guidelines. Test specimens are end-gated, 1/8 inch thickness, and molded at conditions recommended for this formulation. **Actual shrinkage in molded parts will depend on several variables including processing conditions, part configuration and gate location, both of which influence material flow direction, and wall section thickness.**