Product Information

Nylon RN66N50HL

RN66N50HL is a nylon 6.6 formulation, nucleated to accelerate crystallization and enable very fast cycle times to be realized, especially in multi-cavity tooling; a special lubricant system is also incorporated for ease of mold release. Compared with a general-purpose product such as RN6650L, this nucleated grade exhibits higher strength and rigidity, but lower practical toughness. Mold shrinkage is also lower, and more isotropic, often resulting in reduced tendency for warpage.

RN66N50HL is Recognized by Underwriters' Laboratories under File No. E 148796; details of Relative Thermal Indices, and electrical PLC values, are available from Michael Day Enterprises, or on line at www.ul.com/plastics.

RN66N50HL has also been evaluated according to the requirements of U.L. 1446 and IEC Standard 61857 and is Recognized under U.L. File No. E164279 for use as the Ground Insulation in both Class 130 and Class 155 Electrical Insulation Systems. Full details are available from Michael Day Enterprises, or from UL at data.ul.com/systems.

RN66N50HL has a non-tinting heat stabilizer incorporated into the formulation enabling it to be used for applications where preservation of natural color is critical.

Nylon 6.6 offers a unique combination of strength and toughness, excellent static and dynamic fatigue resistance, natural lubricity and resistance to the effects of a broad range of chemicals, oils and solvents, and is therefore used in such markets as electrical, electronics, communications or appliances where this performance combined with Underwriters' Laboratories Recognition is required.

TYPICAL PROPERTIES
DRY AS MOLDED

	ASTM	ENGLISH		S.I.	
PROPERTY	**TEST METHOD**	**UNITS**	**VALUE**	**UNITS**	**VALUE**
Melting Range	D789	°F	482-509	°C	250-265
Specific Gravity	D792	-	1.14	-	1.14
Water Absorption (24 hours immersion)	D570	%	1.2	%	1.2
Heat Deflection Temperature at 264 lbs/in^2 (1.82 MPa)	D648	°F	194	°C	90
Mold Shrinkage Guideline* (Flow Direction)	1/8" section	%	1.0 - 1.4	%	1.0 - 1.4
Tensile Strength at Yield	D638	lbs/in^2	14,000	MPa	96
Elongation at Break	D638	%	15-25	%	15-20
Flexural Strength	D790	lbs/in^2	18,500	MPa	128
Flexural Modulus	D790	lbs/in^2	460,000	MPa	3,172
Izod Impact Strength (Notched, 1/8" specimen)	D256	ft. lbs/in of notch	0.8-0.9	J/m	43-48
Tensile Impact Strength (Type S Specimen)	D1822	ft. lbs/in^2	150	kJ/m^2	300
Rockwell Hardness	D785	R scale	R123	-	-
Flammability (all colors)** (0.75mm min. thickness	UL94				V-2

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

**This laboratory rating of flammability characteristics is not intended either to predict behavior or to reflect hazards that may be presented by this or any other material under actual fire conditions

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.

RN66N50HL
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 (ºF)			Typical Cylinder Temperatures (ºF)		
Temperature (ºF)	Max.	Preferred	Min.	Front	Center	Rear
140-180	560	530-550	520	530	535	540

- A "reverse" temperature profile helps ensure a homogeneous melt, improves screw recovery and helps to optimize cycle times. When achievement of very short cycle times is required, especially for a multi-cavity tool configuration which requires the use of over 50% of barrel capacity, much higher rear zone set temperatures (in the range 560-570ºF) can be necessary to ensure development of a good quality melt.
- 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 fast injection speed maximizes weld line strength and minimizes molded-in stress. **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., although speeds as high as 150-200 r.p.m. have been successfully used to minimize overall cycle time. Special screw designs are normally required if rotation speeds over 200 r.p.m. are to be considered.

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.**