Nylon N612G33L BK99 and N612G33HSL BK99

N612G33L BK99 is a nylon 6.12 compound, reinforced with 33% glass fiber. Nylon 6.12 resins and compounds exhibit substantially reduced moisture absorption compared with nylons 6 or 6.6, minimizing the effects of environmental humidity changes on mechanical and electrical properties, and significantly improving dimensional stability.

N612G33L exhibits outstanding strength and rigidity, and excellent practical toughness, combined with resistance to exposure to an even wider range of chemicals, oils and solvents than nylon 6 or 6.6. For applications which require resistance to the effects of extended exposure to high temperatures, the use of the heat-stabilized grade, **N612G33HSL BK99**, is recommended.

Although the use of dye black eliminates concerns about the effects of carbon black on electrical properties, and on suitability for food content, it provides no UV protection. These formulations are therefore not recommended for applications where resistance to the effects of UV light is required.

Reinforced nylon 6.12 compounds offer a wide processing latitude, and exhibit excellent molded part surface appearance.

TYPICAL PROPERTIES
DRY AS MOLDED

	ASTM	ENGLISH		S.I.	
PROPERTY	**TEST METHOD**	**UNITS**	**VALUE**	**UNITS**	**VALUE**
Melting Range	D789	ºF	400-415	ºC	205-215
Specific Gravity	D792	-	1.32	-	1.32
Water Absorption (24 hours immersion)	D570	%	0.16	%	0.16
Heat Deflection Temperature at 264 lbs/in^2 (1.82 MPa)	D648	ºF	383	ºC	195
Mold Shrinkage Guideline* (Flow Direction)	1/8” section	%	0.2-0.4	%	0.2-0.4
Tensile Strength at Break	D638	lbs/in^2	24,000	MPa	166
Elongation at Break	D638	%	3-4	%	3-4
Flexural Strength	D790	lbs/in^2	35,500	MPa	245
Flexural Modulus	D790	lbs/in^2	1,200,000	MPa	8,275
Izod Impact Strength (Notched, 1/8” specimen)	D256	ft. lbs/in of notch	2.4	J/m	128

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

All data generated using test specimens injection molded from black material. Inclusion of 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 23ºC 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.

N612G33L BK99 and N612G33HSL BK99 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 Temperature (°F)	Melt Temperatures (°F)			Typical Cylinder Temperatures (°F)		
	Max.	Preferred	Min.	Front	Center	Rear
160-200	560	530-540	510	520	530	540

- 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 and minimizes molded in stress. Good venting of cavities is essential to allow fast fill without burning.
- Due to the self-lubricating qualities of this compound, easy part ejection can be expected, with associated possible cycle time benefits.

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 be applied to the screw to help development of a homogenous melt, and to ensure consistent shot volume. For these reinforced grades, limiting back pressure to about 50 psi gauge will minimize the risk of mechanical damage to the glass fibers with consequent loss of part performance. 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.**