

# Product Information

## Nylon NST60G43L and NST60G43HSL

**NST60G43L** is a high impact ("super-tough") nylon 6 polymer reinforced with 43% glass fiber. For molded parts which are to be exposed to high temperatures for prolonged periods of time, the use of **NST60G43HSL**, which contains an effective heat stabilizer, is recommended. Each product incorporates a lubricant for ease of mold release.

These compounds have been developed for applications which demand exceptional practical toughness, combined with high strength and rigidity. Typical of the performance of semi-crystalline polymers, they exhibit excellent resistance to the effects of exposure to a wide range of chemicals, solvents, oils, and greases and therefore can be used in harsh or aggressive environments.

**NST60G43L** formulations exhibit excellent melt stability during injection molding and can be processed successfully using a wide range of melt and molding tool temperatures to suit a variety of tool configurations and production requirements.

### PRELIMINARY PROPERTIES DRY AS MOLDED

| <u>PROPERTY</u>  | <u>ASTM</u>        | <u>ENGLISH</u>         |              | <u>S.I.</u>    |              |
|--|--------------------|------------------------|--------------|----------------|--------------|
|  | <u>TEST METHOD</u> | <u>UNITS</u>           | <u>VALUE</u> | <u>UNITS</u>   | <u>VALUE</u> |
| Melting Range  | D789               | <sup>0</sup> F         | 410-428      | <sup>0</sup> C | 210-220      |
| Specific Gravity   | D792               | -                      | 1.41         | -              | 1.41         |
| Water Absorption<br>(24 hours immersion)                             | D570               | %                      | 0.8          | %              | 0.8          |
| Heat Deflection Temperature<br>at 264 lbs/in <sup>2</sup> (1.82 MPa) | D648               | <sup>0</sup> F         | 410          | <sup>0</sup> C | 210          |
| Mold Shrinkage Guidelines*<br>(Flow Direction)                       | 1/8" section       | %                      | 0.3          | %              | 0.3          |
| Tensile Strength at Break  | D638               | lbs/in <sup>2</sup>    | 23,500       | MPa            | 163          |
| Elongation at Break  | D638               | %                      | 4-6          | %              | 4-6          |
| Flexural Strength  | D790               | lbs/in <sup>2</sup>    | 36,000       | MPa            | 248          |
| Flexural Modulus   | D790               | lbs/in <sup>2</sup>    | 1,200,000    | MPa            | 8,275        |
| Izod Impact Strength<br>(Notched, 1/8" specimen)                     | D256               | ft. lbs/in<br>of notch | 4.0          | J/m            | 214          |

\* 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.

## NST60G43L and NST60G43HSL Processing Guidelines

## Drying

Nylon compounds from MDE are shipped in moisture-resistant packaging, dried and ready to be processed. If drying is required after, for example, exposure of virgin resin to humid air for more than one hour, or for reground material, the use of dehumidifying dryers is strongly preferred.

The dew point of the drying air stream should be no more than  $-20^{\circ}\text{F}$ , and preferably lower. The drying air temperature must be high enough to achieve a pellet temperature of  $175\text{-}180^{\circ}\text{F}$ . If using a hopper dryer, depending on air hose length and insulation of hoses and hopper, the drying air temperature may need to reach  $200\text{-}220^{\circ}\text{F}$  to achieve the required material temperature.

If the pellet temperature reaches  $180^{\circ}\text{F}$ , 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  $200^{\circ}\text{F}$  be considered; at  $200^{\circ}\text{F}$ , there is a risk of material oxidation, with associated yellowing and loss of part performance.

Nylon compounds usually demonstrate visual evidence of unacceptably high moisture levels, such as uncontrollable nozzle drool, or splay or silver streaks on the molded part. Additional drying time is indicated if these characteristics are observed.

If moisture analysis equipment is available, an acceptable moisture content range for processing is 0.1% to 0.25% maximum.

## 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. Both melt and tool surface temperatures are generally slightly higher for this "super-tough" modified formulation, which exhibits a stiffer melt viscosity compared with the general purpose grades.

| <u>Tool Surface<br/>Temperature (<math>^{\circ}\text{F}</math>)</u> | <u>Melt Temperatures (<math>^{\circ}\text{F}</math>)</u> |                  |             | <u>Typical Cylinder<br/>Temperatures (<math>^{\circ}\text{F}</math>)</u> |               |             |
|---|--|------------------|-------------|--|---------------|-------------|
|   | <u>Max.</u>  | <u>Preferred</u> | <u>Min.</u> | <u>Front</u>   | <u>Center</u> | <u>Rear</u> |
| 170-220   | 550  | 510-525          | 480         | 500  | 510           | 520         |

- A "reverse" temperature profile helps ensure a homogeneous melt, improves screw recovery and by accelerating the transition from solid pellets to a melt significantly reduces abrasive wear on screw and barrel surfaces.
- 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 gloss. 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  $1/8\text{-}1/4\text{'}$ . 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.**