

## Nylon

### Nylon – Polyamide

Nylons were the very first of the engineering thermoplastics resins - developed in the late 1930's. They are the “workhorse” materials of choice for many mechanical and industrial applications. Nylons exhibit a wide range of physical, electrical and thermal characteristics and include several major “types” - providing properties suited to specific performance / applications requirements.

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### Nylon 6/6

The most widely used nylon, nylon 6/6 is known for its toughness, low coefficient of friction, excellent bearing properties, chemical resistance and relatively high service temperatures. However, nylon 6/6 materials exhibit a high level of moisture absorption. There are various 6/6 nylon specialty grades - including glass filled for increased mechanical strength and higher service temperatures, heat stabilized for extended service at elevated temperatures, “toughened” and MDS filled for improved wear life.

**Tensile Strength / Yield PSA DAM:** 25,000  
**Dielectric Strength, Volts/Mil:** 475  
**Max. Continuous Service Temp (F.):** 220  
**Elongation % at Break, DAM:** 60  
**Comparative Cost:** Moderate

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### Nylon Type 6

Nylon type 6 is the second most widely used nylon. Type 6 nylon absorbs moisture more rapidly than type 6/6, has a lower melting point and has higher impact resistance than type 6/6 nylon. While type 6/6 is the primary nylon used in North America, type 6 nylon holds that position in Europe and other regions.

**Tensile Strength / Yield PSA / DAM:** 16,000  
**Dielectric Strength V 10-3 /MM:** 420 / 1.65 x 10 / 4  
**Heat Deflection Temp. - 66 lb. psi:** 365 F / 185 C  
**Elongation % at Break, DAM:** 200%  
**Comparative Cost:** Moderate

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## Nylon Types 11 and 12

Nylons 11 and 12 have improved dimensional stability and electrical properties because these materials absorb less moisture than most other nylons. Nylons 11 and 12 are more costly than types 6 and 6/6. Nylon 11 materials are also available plasticized to provide greater flexibility and ductility. Some nylon 12 materials are amorphous, clear, and can be used in instrument and sight glass applications and can also provide superior performance in hot water.

### Nylon Type 11

<b>Tensile Strength / Break - lb / sq. in.:</b>	7.8 x 10 <sup>3</sup>
<b>Dielectric Strength - V / 10 -3/in.:</b>	750
<b>Heat Deflection Temperature -66 lb/ sq. in.:</b>	315 F / 157 C
<b>Elongation % at Break / DAM:</b>	310%
<b>Comparative Cost:</b>	High

### Nylon Type 12

<b>Tensile Strength / Break - lb sq. in.:</b>	9.5 x 10 <sup>3</sup>
<b>Dielectric Strength - V/ 10-3 in.:</b>	750
<b>Heat Deflection Temperature - 66 lb. / sq. in.:</b>	215 F/ 135 C
<b>Elongation % at Break / DAM:</b>	300%
<b>Comparative Cost:</b>	High

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## Nylon 612

Nylon 612 absorbs much less moisture and as a result, provides much better dimensional stability and electrical properties than types 6 and 6/6 nylons - as well as superior chemical resistance. 612 nylons are considerably less expensive than types 11 and 12.

<b>Tensile Strength / Break - lb / sq. in.:</b>	8.8 x 10 <sup>3</sup>
<b>Dielectric Constant 10/6 Hz:</b>	3.5
<b>Heat Deflection Temperature - 66 lb / sq. in.:</b>	330 F / 165 C
<b>Elongation % at Break DAM:</b>	150%
<b>Comparative Cost:</b>	High

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## Thermoformable Nylons

Pennite® 4508 and Pennite® 4512 are Penn Fibre Plastics trade names for the recently introduced impact modified thermoformable nylons. These Pennite ® glass filled type 6 nylons provide continuous service temperature of @ 284 degrees F. Pennite® 4508 and 4512 nylons are widely used in applications requiring high heat and impact resistance. Pennite® 4515 provides these performance characteristics plus a U.L Flammability rating of 94 V O. Pennite® thermoformable nylons are ideally suited for many “under the hood” applications, including engine and radiator shrouds, covers and ducts.

<b>Tensile Strength / Break - 73 F - D 638:</b>	15,900 PSI
<b>Heat Deflection Temperature @ 264 psi / D 648:</b>	386 F / 197 C
<b>Elongation % at Break - D 638 / 73 F:</b>	3
<b>Comparative Cost:</b>	Moderate 1