# Torlon

Torlon is a poly (amide0imide) which exhibits exceptional physical and chemical properties. It has superior resistance to elevated temperatures, withstands continuous exposure to 475°F and severe stress conditions: provides better compressive strength and higher impact resistance than most high-performance thermoplastic materials.

Torlon's extremely low coefficient of thermal expansion and high creep resistance delivers excellent dimensional stability over a wide temperature range. Chemically, Torlon resists attack by aromatic and aliphatic hydrocarbons, chlorinated and fluorinated hydrocarbons, and most inorganic salt and acid solutions. Torlon is available in four grades.

## Torlon 4203

Torlon 4203 exhibits superior electrical insulation at elevated temperatures and is primarily designed for structural, electrical and electronic applications. In addition, Torlon 4203 displays excellent resistance to radiation.

## Torlon 4301

Retaining the same basic physical and chemical properties as 4203, Torlon 4301 is designed for bearing and wear applications such as non-lubricated bearings, seals, valve and compressor parts, piston parts, and bearing cages. It is used where high strength. resistance to wear, resistance to elevated temperatures, and solvent resistance are important application requirements. Torlon 4301 has a very low coefficient of friction and exhibits little or no slip-stick in bearing applications.

## Torlon 4275

Torlon 4275 retains the same basic properties as 4301, but offers even better wear resistance at higher speeds due to a greater concentration of graphite powder. As a result, Torlon 4275 is well-suited for bearings, thrust washers, wear pads, strips, piston rings, seals, vanes, and valve seats. Available on a custom basis only.

## Torlon 5030

Torlon 5030 is glass-reinforced to provide high rigidity (superior to Vespel) and good retention of stiffness at temperatures up to 475°F. It is an excellent replacement for metal in certain applications, weighing over 75% less while exhibiting equivalent strength and structural integrity. In addition, its low coefficient of thermal expansions nearly matches that of common metals. These properties make Torlon 5030 ideal for a broad range of applications in the electrical/electronic, business equipment, aerospace, transportation and heavy equipment industries.

# POLYAMIDE-IMIDE

## POSSIBLE TORLON SUBSTITUTE

# TECATOR™ (PAI)

PRODUCT DATA SHEET

Tecator™ is a high performance melt processable polyamide-imide that maintains its excellent mechanical and wear properties in temperature environments exceeding 500°F. Stock shapes from Ensinger Hyde are available in three grades:

- **Tecator™ TLN-5013** high strength structural grade features good electrical properties and strength, making it ideal for demanding applications at a broad range of temperatures.
- **Tecator™ TLB-5031** offers high PV capabilities in bearing applications, primarily at high loads and low speeds.
- **Tecator™ GF30 (XP142T)** is a 30% glass reinforced grade, compression molded, with superior stiffness and dimensional stability. It is available in a wide variety of custom tube, ring, rod and plate sizes.

## TYPICAL APPLICATIONS

Pump Parts

Valve Seats

Piston Rings

Seal Rings

Engine Transmission Parts

Bearing Cages

For the Semiconductor Industry as "Burn in" Test Sockets, Nests, Chassis and other applications

Welding Nozzle Tips

### ▲ Excellent weather and gamma radiation resistance

### ▲ Outstanding bearing and wear properties

At elevated temperatures, Tecator™ TLB-5031 offers superior wear rates.

### ▲ High strength and stiffness

### ▲ Excellent electrical values

Tecator™ TLN-5013 has a dielectric strength of 600 V/mil.

### ▲ Good chemical resistance

Tecator™ is not attacked by common solvents or fuels and is acceptable for use in contact with many acids.

### ▲ Maintains a high proportion of mechanical properties over a broad temperature spectrum - cryogenic to 500°F.

### ▲ Tecator™ TLN-5013 and TLB-5031 are available in a wide variety of metric sizes in rod and plate.

Note: Tecator™ has a high moisture absorption rate. Parts must be dry prior to rapid exposure to temperatures above 300°F.

**POSSIBLE TORLON SUBSTITUTE**

# TYPICAL PROPERTY VALUES: POLYAMIDE-IMIDE

| | | ASTM Test Method | Units | Tecator™ TLN-5013 | Tecator™ TLB-5031 | Tecator™ GF30 (XP142T) |
|---|---|---|---|---|---|---|
| **MECHANICAL PROPERTIES** | | | | | | |
| Tensile Strength, 73°F | | D-638 | psi | 21,000 | 19,000 | 17,000 |
| Tensile Elongation, 73°F | | D-638 | % at break | 15 | 10 | 2 |
| Flexural Strength, 73°F | | D-790 | psi | 33,000 | 23,000 | 21,000 |
| Flexural Modulus, 73°F | | D-790 | psi | 711,000 | 870,000 | 821,000 |
| Compressive Strength, 73°F | | D-695 | psi | 30,000 | — | — |
| Izod Impact Strength (Notched), 73°F | | D-256 | ft-lb/in | 2.3 | 2.0 | .75 |
| Rockwell Hardness, 73°F | | D-785 | M Scale | M119 | M109 | M116 |
| **THERMAL PROPERTIES** | | | | | | |
| Heat Deflection Temperature, 264 psi | | D-648 | °F | 532 | 534 | — |
| Coefficient of Linear Thermal Expansion | | E-831 | in/in°F | $1.66 \times 10^{-5}$ | — | $2.11 \times 10^{-5}$ |
| Continuous Service Temperature, Air | | - | °F | 500 | 500 | 500 |
| Flammability (ASTM Method) | | UL94 | — | 94V0 | 94V0 | 94V0 |
| **ELECTRICAL PROPERTIES** | | | | | | |
| Dielectric Strength | | D-149 | V/mil | 600 | — | 450 |
| Dielectric Constant, | $10^6$ hertz | D-150 | — | 3.9 | — | 3.8 |
| | 20 ghz | D-2520 | — | 3.2 | 3.8 | 4.3 |
| | 30 ghz | D-2520 | — | 3.7 | 3.9 | 4.4 |
| Surface Resistivity | | D-257 | ohms | $5.0 \times 10^{16}$ | — | — |
| Dissipation Factor, | $10^6$ hz | D-150 | — | .009 | — | .006 |
| | 20 ghz | D-2520 | — | .009 | .012 | .005 |
| | 30 ghz | D-2520 | — | .005 | .018 | .008 |
| **PHYSICAL PROPERTIES** | | | | | | |
| Specific Gravity, 73°F | | D-792 | gm/cc | 1.41 | 1.46 | 1.58 |
| Water Absorption, 73°F – 24 hr. | | D-570 | % | 0.3 | — | — |



MEMBER IAPD

# COMPARISON OF
# TECATOR GF30 AND TORLON 5530
## (Typical Values)

| Property | Tecator GF30 | Torlon 5530 |
|---|---|---|
| Specific Gravity | 1.58 | 1.61 |
| Tensile Strength | 17000psi | 14000psi |
| Elongation | 2.0% | 3.0% |
| Flexural Strength | 21000psi | 20000psi |
| Flexural Modulus | 821,000psi | 800,000psi |
| Izod Impact | .70 ft – lbs/in | .70 ft – lbs/in |
| Rockwell Hardness | M116 | M120 |
| CLT | 2.11 x 10-5 | 2.50 x 10-5 |
| Dielectric Strength | 450 v/mil | 700 v/mil |
| Dielectric Constant (10 to $6^{th}$ hz) | 3.8 | 6.3 |
| Dissipation Factor | .006 | .22 |

Torlon is a trademark of the Solvay Polymers Corp.

7/11/02

# COMPARISON
# OF
# TECATOR TLN TO TORLON 4203

| Property | Tecator TLN | Torlon 4203 |
|---|---|---|
| Sp. Gr | 1.41 | 1.41 |
| Tensile Str. | 21000 psi | 18000 psi |
| Elongation | 15% | 5% |
| Flexural Str. | 33000 psi | 24000 psi |
| Flex. Modulus | 711,000 psi | 600,000 psi |
| Compressive Str. | 30,000 psi | 28,000 psi |
| Rockwell Hardness | M119 | M120 |
| Izod Impact | 2.3 ft/lbs/in | 2.0 ft/lbs/in |
| Coefficient of linear Thermal Expansion | 1.66 x 10-5 | 1.70 x 10-5 |
| Heat Deflection Temp (264 psi) | 532 degrees F | 532 degrees F |
| Water Absorption | | |
| 24 hr | 0.4% | 0.4% |
| Saturation | 1.7% | 1.7% |
| Continuous Service Temp (in air) | 500 degrees F | 500 degrees F |
| Dielectric Strength | 600 volts/mil | 580 volts/mil |
| Dielectric Constant @ 10 6hz | 3.9 | 3.9 |
| Dissipation Factor @ 10 6hz | .009 | .030 |