

DuPont™ Zytel® HTN LX

high performance polyamide resin

Smoothing the Path to Lead-free Assembly

To meet growing demand for electronic components that can withstand the higher temperatures required for board assembly with lead-free solders, DuPont scientists have developed the new LX series of DuPont™ ZYTEL® HTN high performance polyamide.

LX series resins have everything that it takes for successful part molding and subsequent assembly using lead-free solders. Their unique combination of resistance to higher reflow temperatures, toughness and superior flow during molding are unmatched by alternative polymer candidates.

- **Faster line speeds.** ZYTEL® HTN LX withstands higher peak reflow temperatures than PA46 and other similar PA6T polymer grades. Higher temperatures result in faster solder melting, thus enabling increased line speed.
- **Less part breakage.** Test data using actual connectors show more toughness for ZYTEL® HTN LX than PA9T and PPS polymer grades and greater weld line strength than PA9T, PPS and another PA6T. Increased toughness pays off with reduced damage of parts and assembled circuits during shipping, handling and service.
- **Water-controlled molds.** Molders can avoid the drawbacks of oil temperature control with ZYTEL® HTN LX. Unlike PA9T and another PA6T, it can produce fully crystallized parts when molded in water-controlled tooling.
- **Faster molding, more design freedom.** During molding, ZYTEL® HTN LX flows more easily than PA9T and other PA6T grades. Its superior flow can allow faster molding cycles, lower injection pressure, and successful molding of parts with thinner walls and/or longer flow paths.

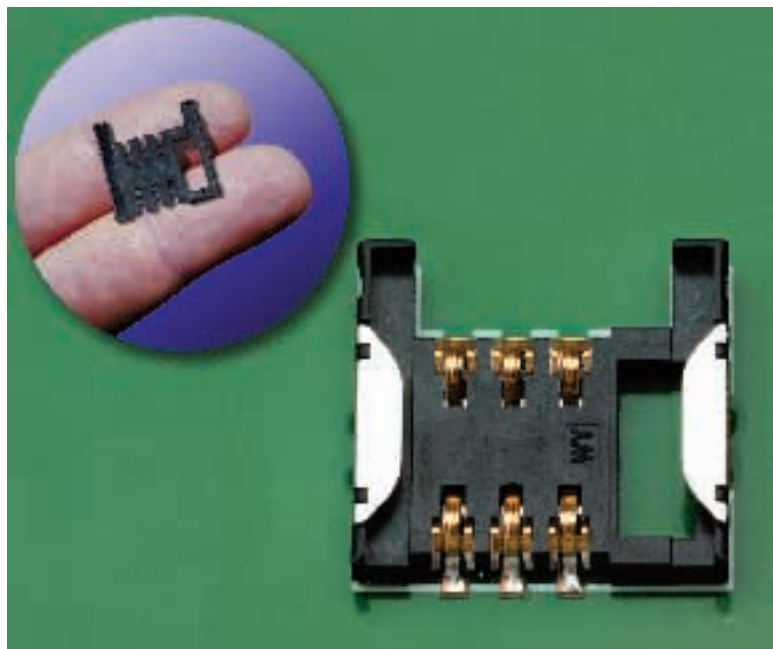
Several electronic manufacturers in Asia are already profiting from the use of ZYTEL® HTN LX. Commercial applications include a connector for SIM (subscriber identity module) cards in mobile phones surface-mount switches and I/O (input/output) connectors.

New LX series resins are glass-reinforced flame-retardant materials with a V-0 classification under the UL94 standard. Grades with glass-fiber content of 20, 30 and 45 per cent are available. For typical properties, see table on page 2.

Let's talk

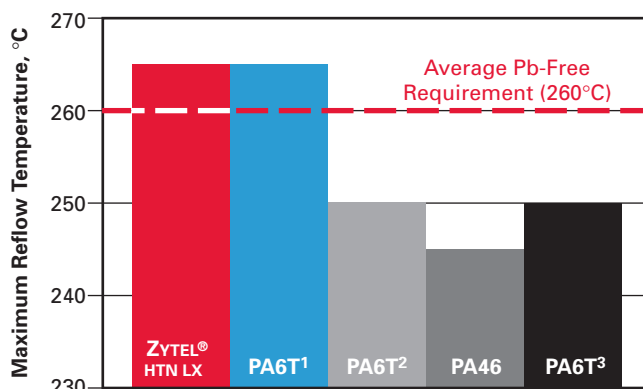
We have the right materials and the technical resources to help you make great electronic components for lead-free solder assembly.

Please contact the nearest DuPont representative in your country. For contact information, visit plastics.dupont.com on the Web.



In this SIM card connector for mobile phones, Wooyoung Company Ltd. of Korea benefits from the excellent performance of ZYTEL® HTN LX in surface-mount board assembly using lead-free solder.

Comparing Reflow Soldering Performance (Connectors with 0.4 mm pitch)



Notes: All materials evaluated are V-0 with 30 or 33% glass fiber. 1: Another supplier's PA6T candidate for lead-free soldering; 2 and 3: Standard PA6T grades from another supplier
Test Conditions: Sample conditioning 40°C, 95% RH, 96 h
Mold Temperatures: PA6T alternatives, 130°C; others, 95°C

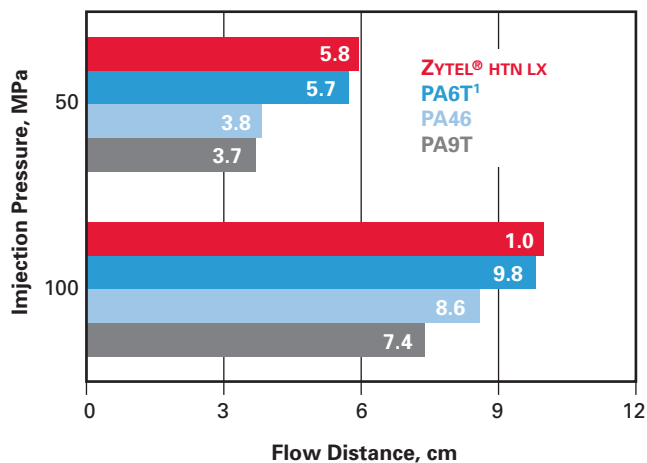
Typical Properties of ZYTEL® HTNFR52...GLX Series Resins

Property ¹	Test Method	Units	FR52G20LX	FR52G30LX	FR52G45LX
MECHANICAL					
Stress at break	ISO 527-1/-2	MPa	160	175	180
Strain at break	ISO 527-1/-2	%	2.4	2.4	1.7
Tensile modulus	ISO 527-1/-2	MPa	8000	10900	17000
Flexural strength	ISO 178	MPa	215	260	290
Flexural modulus	ISO 178	MPa	7900	11500	15500
Notched Charpy impact	ISO 179/1eA	kJ/m ²	9	11.2	14
THERMAL					
Deflection temperature, at 1.80 MPa	ISO 75-1/-2	°C	280	283	286
Melting temperature	ISO 3146C	°C	310	310	310
ELECTRICAL					
Relative permittivity (1 MHz)	IEC 60250	—	—	3.85	—
Dissipation factor	IEC 60250	—	—	0.015	—
Arc resistance	UL 746A	V	—	118	—
Dielectric strength	IEC 60243-1	kV/mm	—	21.6	—
Volume resistivity	IEC 60093	ohm-cm	—	1.12×10^{15}	—
Surface resistivity	IEC 60093	ohm-cm	—	3.26×10^{15}	—
OTHER					
Density	ISO 1183	kg/m ³	1590	1630	1790
Water absorption ²	ASTM D4019	%	—	0.21	—
Mold shrinkage, flow	ISO 294-4	%	—	0.3	—
Mold shrinkage, transverse	ISO 294-4	%	—	0.8	—
Flammability, 0.8 mm thickness	UL 94	—	V-0	V-0	V-0

1: Preliminary data; properties measured on black (BK337) dry-as-molded (DAM) samples at 23°C unless otherwise indicated.

2: Immersion, 24 h.

Better Flow in Molding

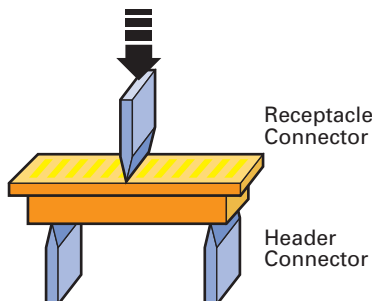
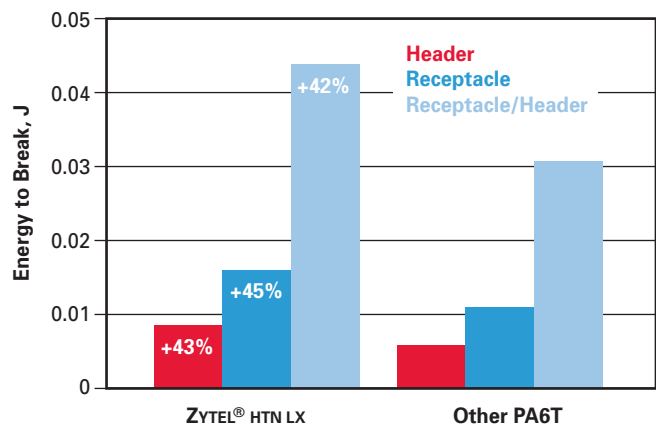


Notes: All materials evaluated are UL94 V-0 with 30 or 33% glass fiber. 1: Another supplier's PA6T candidate for lead-free soldering.

Test Conditions: Melt temperatures: PA46, 305°C, others, 325°C

Mold Temperatures: PA46, 100°C, others, 120°C

More Resistance to Breakage



Notes: Both materials are V-0 PA6T resins with 30% glass fiber. The other PA6T is another supplier's candidate for lead-free soldering. Mold temperatures used were 120°C for ZYTEL® HTN LX, and 130°C for the other PA6T.

The information provided in this documentation corresponds to our knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such material used in combination with any other materials or additives or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specification limits nor used alone as the basis of design; they are not intended to substitute for any testing you may need to conduct to determine for yourself the suitability of a specific material for your particular purposes. Since DuPont cannot anticipate all variations in actual end-use conditions DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent rights.

Caution: Do not use this product in medical applications involving permanent implantation in the human body. For other medical applications see "DuPont Medical Caution Statement".

