Collaborate with INVISTA on evaluating a new transparent nylon: Novadyn™ DT/DI.

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Face any of the following challenges? Start a discussion with INVISTA.

- Are you seeking alternatives to traditional clear thermoplastics such as polycarbonate?
- Are you looking for lower-cost materials to replace expensive transparent nylon-12 based systems, while meeting minimum application performance requirements?
- Do you have corporate or customer sustainability goals that can be met by using materials with recycled content?
- Do you currently use a transparent nylon that misses application requirements for higher temperature resistance, stiffness or moisture absorption, leaving your only choice as a much higher-priced material?
- Are you limited by the current range of transparent nylons and desire to expand your design options with a new and differentiated offering?

Performance

Novadyn™ DT/DI has very good chemical and stress crack resistance in many hydrocarbon environments where polycarbonate fails. Transparent nylons also have excellent processability, mold shrinkage, dimensional stability, molding characteristics, and colorability.

Compared with low-cost transparent nylons such as nylon 6I/6T, Novadyn™ DT/DI provides improved thermal properties (T_g and HDT), lower moisture absorption, higher stiffness, and better scratch resistance.

Cost effectiveness

INVISTA is committed to becoming the transparent nylon cost leader, building upon its integrated low-cost raw material position.

Recycled content

Novadyn™ DT/DI's unique combination of properties is derived from DYTEK® A Amine, a monomer which is used in many high performance polyamides. DYTEK® A Amine is typically 99% pure and manufactured from recovered and refined materials that would otherwise be burned with heat recovery, giving Novadyn™ DT/DI at least 43% recycled content.[1]

[1] Recycled content is defined by ISO 14021, section 7.8.

Transparent thermoplastic comparison

	POLYCARBONATE	LOW-COST TRANSPARENT NYLONS (E.G., NYLON 6I/6T)	NOVADYN™ DT/DI	HIGH-COST TRANSPARENT NYLONS (E.G., AMORPHOUS NYLON 12)
Relative cost	$	$$$	$$	$$$$
Heat resistance	+++	+	++	+++
Moisture resistance	+++	+	+	++
Transparency	++	++	++	+++
Chemical resistance: some hydrocarbons and fuels	–	++	++	++
Scratch Resistance	–	+	++	

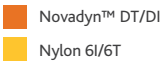
Where: – Poor, + Good, ++ Very Good, +++ Excellent

Comparison of Novadyn™ DT/DI to low-cost transparent nylon

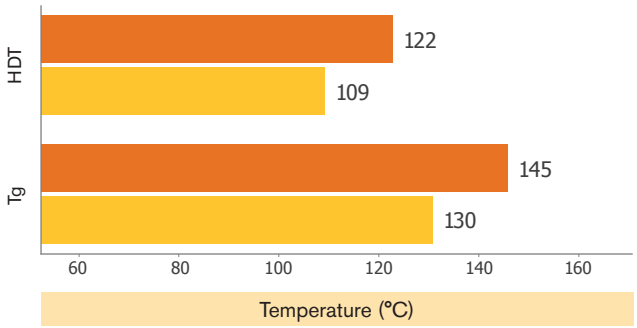
PROPERTY	TEST METHOD	NOVADYN™ DT/DI DAM[2]	COMPETITIVE NYLON 6I/6T[3] DAM	NOVADYN™ DT/DI COND[4]
Glass transition temperature (°C)	DSC	145	130	–
HDT @ 1.8 MPa (°C)	ISO 75	122	109	–
Flexural modulus (GPa)	ISO 178	2.7	2.6	3.1
Flexural strength (MPa)	ISO 178	123	120	130
Tensile modulus (GPa)	ISO 527	3.3	2.8	3.5
Tensile strength (MPa)	ISO 527	105	99	110
Elongation @ break (%)	ISO 527	10.6	48	6
Notched Charpy impact strength (kJ/m^2)	ISO 180	5.8	8.4	5.5
Unnotched Charpy impact strength (kJ/m^2)	ISO 180	100	No break	127
Water absorption, 24-hour full immersion (%)	ISO 62	0.97	1.28	–
Moisture absorption, equilibrium (%)	ISO 1110	4.2	4.0	–
Transmission, visible (%)[5]	ASTM D1003	91.6	92.1	–
Haze (%)	ASTM D1003	2.8	1.3	–
Density (g/cm^3)	ISO 1183	1.18	1.18	1.19

[2] DAM – dry as molded; all mechanical tests performed at 23°C.
[3] Nylon 6I/6T commercially available competitive resins.
[4] COND – Conditioning per ISO 1110 (70°C / 62% RH).
[5] Novadyn™ DT/DI is slightly yellow.

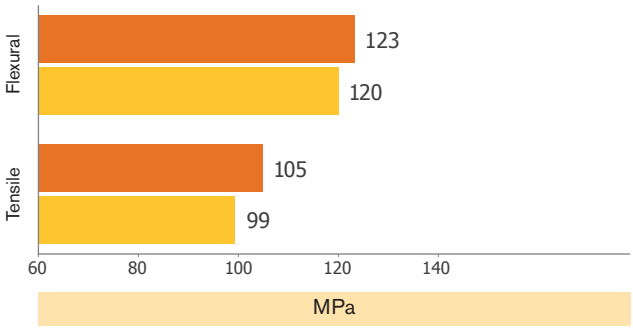
Comparison charts between Novadyn™ DT/DI and nylon 6I/6T



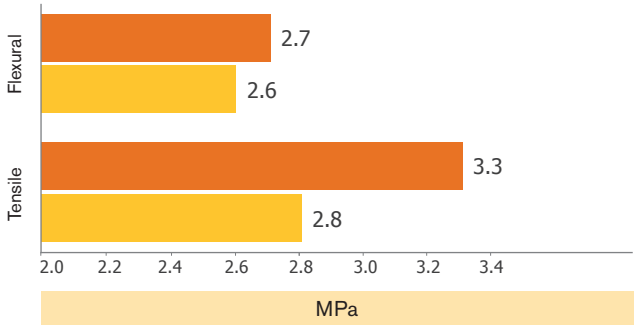
Heat resistance



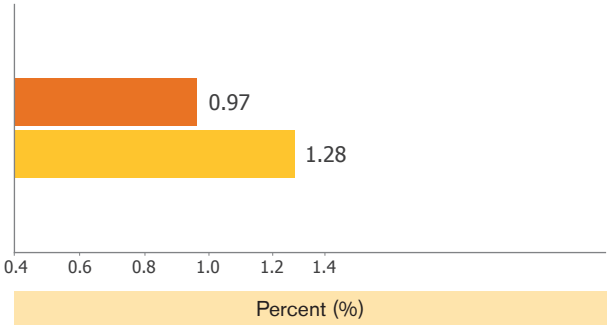
Strength



Modulus



Water absorption



Scratch resistance[6]

Scratch load	2 N	3 N	7 N	10 N	15 N
Novadyn™ DT/DI					150 [*]
Nylon 6I/6T				153 [*]	161 [0.51]
Polycarbonate			188 [0.68]	262 [2.42]	250 [5.57]

No visible scratch.

Visible scratch. Deformation visible at some angles, no more than 30% of the evaluated lines at all angles show deformation.

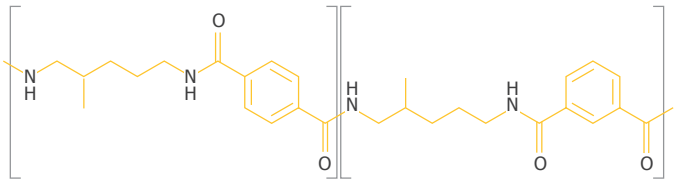
Width [depth] (µm) — Visible scratch. Deformation present at all angles.

* These scratches disrupt the surface, different from a typical ductile scratch. The depth could not be measured.

[6] Test method FLTM BO 162-01.

About Novadyn™ DT/DI

Novadyn™ DT/DI is made from monomers DYTEK® A diamine, purified terephthalic acid (PTA) and purified isophthalic acid (PIA).



Potential applications and processing methods

We are actively seeking partners to investigate potential uses where this new-to-market polymer can provide value. Based on differentiated properties, cost effectiveness and recycled content, developmental Novadyn™ DT/DI could be considered for many existing and new applications, including the following:

- Filter Technology – filter bowls (pneumatic, fuel, water)
- Electrical/Electronics – battery seals, terminal strips, push buttons, casings (relays, switches), LED lighting components, etc.
- Industrial – greasing systems (grease guns, grease hubs), lubricant reservoir, flow meters, metering equipment, sight and inspection glasses, guide rails, etc.
- Plumbing components – brackets, faucets, taps, shower heads, valve housings, pressure reduction valves, etc.
- Furniture/home décor assembly/component – gears, wheels, clips, etc.
- Other – Instrument windows/lenses (including thin lenses), wire & cable, tubing, toys, 3-D printing, etc.

Besides neat molded applications, Novadyn™ DT/DI could be used as a blend additive with nylons for injection molded parts, specialty film, barrier films and monofilament.

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FOR SAMPLES AND FURTHER INFORMATION

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