

SOLUTION DATA SHEET

Aliphatic TPU for automotive, electronics, and sports and recreation



Markets	Transportation, industrial, electronics, compounding, sports and recreation
Polymers	Estane® D91T80 & D91T86, and Pearlthane™ 91T85 aliphatic thermoplastic polyurethane (TPU)
Key Benefits	<ul style="list-style-type: none"> • Less yellowing, even in clear and transparent parts • Improved processing performance • Superior chemical and hydrolysis resistance

For a high-class aesthetic finish, whether molding or extruding light and/or dark colored parts, manufacturers, designers and OEMs can rely on Lubrizol Engineered Polymers' aliphatic TPUs for improved staining resistance and strong color stability upon UV exposure. Latest developments have focused on the improvement of the TPU structure and formulation to offer an aliphatic TPU solution with better thermal stability, chemical and hydrolysis resistance.

Estane D91T86 is the most recent aliphatic TPU grade, with a 90 Shore A hardness. It resulted from the work developed by R&D to improve the mechanical properties, elastic behavior and rebound performance of other TPU grades in the Pearlthane and Estane aliphatic product portfolio. The key objective was to enhance the aesthetic design of molded parts. Like other aliphatic TPU from Lubrizol, this grade has a long-term performance that ensures a superior chemical, hydrolysis and blooming resistance, while being a cost-effective manufacturing solution that includes fast cycling, high flow, and low-density properties.

In the staining test performed as per figure no. 1 below, Estane D91T86 NAT01 showed an improved staining resistance after 3 hours, versus other grades from the same product range and a competitive material, as illustrated below:

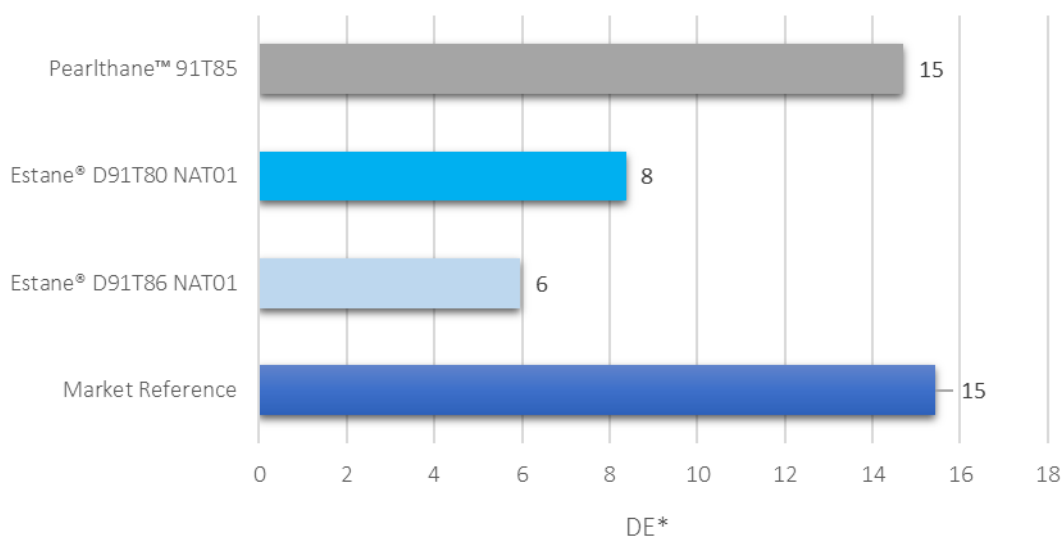


Figure 1: Test of staining resistance after 3 hours (Immersion in vinegar at 65°C)

Weatherability is an important feature for the selection of a material that will be used in outdoor applications. Main weathering forces that may cause degradation are sunlight, high temperature and moisture. The QUV accelerated tester exposes materials to alternating cycles of UV light and moisture at controlled, elevated temperatures. It simulates the effects of natural sunlight and artificial irradiance using fluorescent UV lamps to provide a radiation spectrum centered in the ultraviolet wavelengths.

Both Estane D91T86 NAT01 and Estane D91T80 NAT01 achieved better results than the market reference in the test using the QUV weatherability test that can be seen in the next page.

Yellowness Index of Aliphatic TPU grades

	Pearlthane™ 91T85		Estane® D91T80 NAT01		Estane® D91T86 NAT01		Market Reference	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
YI	-1.1	12	6.1	5.5	6.0	5.3	12	12
DE	7.3		0.5		0.5		0.5	

Table 1: Yellowness Index of Aliphatic TPU grades under QUV weatherability test ASTM G154-06, ISO 105-A02 (72 hours, 6 cycles of 8 h. UV at 60°C, 0,89 W/m²*nm and 4 h. condensation at 50°C)

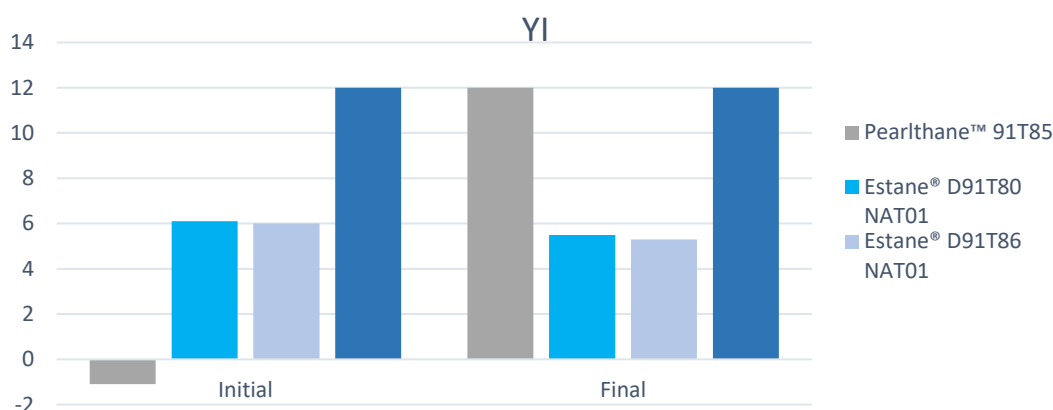


Figure 2: QUV weatherability test

Summary of benefits obtained by using Lubrizol TPU:

Long-term performance:

- Superior abrasion/scratch resistance
- High tear resistance and rebound resilience

High-class finish aesthetics:

- Non-yellowing
- Strong color stability upon UV exposure
- Adequate for both light and dark colors
- Unique staining resistance

Cost-effective manufacturing solution:

- Fast cycling
- High Flow
- Low density
- Lower rejects

For more information on our solutions, you can visit the Lubrizol Engineered Polymers website:

<https://go.lubrizol.com/EP>

