

TUFLIN™ HSE-1003 NT 7

The Dow Chemical Company - Linear Low Density Polyethylene Resin

Tuesday, November 5, 2019

General Information

Product Description

- · Industrial pallet wrap stretch film applications
- · Premium film packaging applications
- Complies with U.S. FDA 21 CFR 177.1520 (c) 3.1a
- · Consult the regulations for complete details.

TUFLIN™ HSE-1003 NT 7 Linear Low Density Polyethylene Resin is an ethylene-hexene-1 copolymer designed for cast stretch film applications such as industrial pallet wrap. Films containing HSE-1003 offer outstanding puncture, toughness and load holding properties.

General		
Material Status	Commercial: Active	
Availability	North America	
Additive	Antiblock: No Processing Aid: No Slip: No	
Agency Ratings	• FDA 21 CFR 177.1520(c) 3.1a	
Forms	• Pellets	
Processing Method	Cast Film	

Physical Nominal Value Unit Test Method Density / Specific Gravity 0,920 ASTM D792 Mett Mass-Flow Rate (190°C/2.16 kg) 2.5 g/10 min ASTM D1238 Films Nominal Value Unit Test Method Film Puncture Energy 34.0 in-lb Internal Method 0.80 mil 34.0 in-lb Internal Method 2.0 mil 9.00 lbf Internal Method 8.80 mil 9.00 lbf Internal Method 2.0 mil 19.0 lbf Internal Method 8.80 mil 319 ft-lb/in³ Internal Method 9.80 mil 319 ft-lb/in³ ASTM D882 9.80 mil 2520 ft-lb/in³ ASTM D882 9.80 mil 3250 ft-lb/in³ ASTM D882 9.80 mil 3250 ft-lb/in³ ASTM D882 9.80 mil 3250 ft-lb/in³ ASTM D882 9.80 mil 21400 psi ASTM D882 9.80 mil 21400 psi ASTM D882 9.80 mil 22600 psi ASTM D882	ASTM & ISO Properties ¹				
Melt Mass-Flow Rate (190°C/2.16 kg) 2.5 g/10 min ASTM D1238 Films Nominal Value Unit Test Method Film Puncture Energy Internal Method 0.80 mil 34.0 in·lb Internal Method 2.0 mil 73.0 in·lb Internal Method Film Puncture Force Internal Method Internal Method 0.80 mil 9.00 lbf Internal Method 2.0 mil 19.0 lbf Internal Method 0.80 mil 319 ft·lb/in³ ASTM D882 2.0 mil 252 ft·lb/in³ ASTM D882 9.80 mil 3250 ft·lb/in³ ASTM D882 18 mil 3250 ft·lb/in³ ASTM D882 9.80 mil 3250 ft·lb/in³ ASTM D882 9.80 mil 4040 ft·lb/in³ ASTM D882 9.80 mil 21400 psi ASTM D882 9.80 mil 22600 psi ASTM D882	Physical	Nominal Value	Unit	Test Method	
Films Nominal Value Unit Test Method Film Puncture Energy Internal Method 0.80 mil 34.0 in-lb Internal Method 2.0 mil 73.0 in-lb Internal Method 8.80 mil 9.00 lbf Internal Method 2.0 mil 19.0 lbf Internal Method 9.80 mil 319 ft-lb/in³ Internal Method 9.80 mil 319 ft-lb/in³ ASTM D882 9.80 mil 252 ft-lb/in³ ASTM D882 9.80 mil 3080 ft-lb/in³ ASTM D882 9.80 mil 3250 ft-lb/in³ ASTM D882 9.80 mil 3250 ft-lb/in³ ASTM D882 9.80 mil 4040 ft-lb/in³ ASTM D882 9.80 mil 21400 psi ASTM D882 9.80 mil 21400 psi ASTM D882 9.80 mil 21400 psi ASTM D882 9.80 mil 22600 psi ASTM D882	Density / Specific Gravity	0.920		ASTM D792	
Film Puncture Energy Internal Method 0.80 mil 34.0 in·lb 2.0 mil 73.0 in·lb Film Puncture Force Internal Method 0.80 mil 9.00 lbf 2.0 mil 19.0 lbf Film Puncture Resistance Internal Method 0.80 mil 319 ft·lb/in³ 2.0 mil 319 ft·lb/in³ 2.0 mil ASTM D882 0.80 mil 2520 ft·lb/in³ 2.0 mil 3080 ft·lb/in³ 2.0 mil 3250 ft·lb/in³ 2.0 mil 3250 ft·lb/in³ 2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD ASTM D882 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 0.80 mil 22600 psi	Melt Mass-Flow Rate (190°C/2.16 kg)	2.5	g/10 min	ASTM D1238	
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2.0 mil 73.0 in-lb	Film Puncture Energy			Internal Method	
Film Puncture Force Internal Method 0.80 mil 9.00 lbf 2.0 mil 19.0 lbf Film Puncture Resistance Internal Method 0.80 mil 319 ft-lb/in³ 2.0 mil 252 ft-lb/in³ Film Toughness - MD ASTM D882 0.80 mil 2520 ft-lb/in³ 2.0 mil 3080 ft-lb/in³ Film Toughness - TD ASTM D882 0.80 mil 3250 ft-lb/in³ 2.0 mil 4040 ft-lb/in³ Secant Modulus - 2% Secant, MD 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 O.80 mil	0.80 mil	34.0	in·lb		
0.80 mil 9.00 lbf 2.0 mil 19.0 lbf Film Puncture Resistance Internal Method 0.80 mil 319 ft·lb/in³ 2.0 mil 252 ft·lb/in³ Film Toughness - MD ASTM D882 0.80 mil 2520 ft·lb/in³ 2.0 mil 3080 ft·lb/in³ Film Toughness - TD ASTM D882 0.80 mil 3250 ft·lb/in³ 2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD ASTM D882 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 0.80 mil 22600 psi	2.0 mil	73.0	in·lb		
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2.0 mil 252 ft·lb/in³ Film Toughness - MD ASTM D882 0.80 mil 2520 ft·lb/in³ 2.0 mil 3080 ft·lb/in³ Film Toughness - TD ASTM D882 0.80 mil 3250 ft·lb/in³ 2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD ASTM D882 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 0.80 mil 22600 psi	Film Puncture Resistance			Internal Method	
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0.80 mil 2520 ft·lb/in³ 2.0 mil 3080 ft·lb/in³ Film Toughness - TD ASTM D882 0.80 mil 3250 ft·lb/in³ 2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD ASTM D882 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 0.80 mil 22600 psi	2.0 mil	252	ft·lb/in³		
2.0 mil 3080 ft·lb/in³ Film Toughness - TD ASTM D882 0.80 mil 3250 ft·lb/in³ 2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD 0.80 mil 22600 psi	Film Toughness - MD			ASTM D882	
Film Toughness - TD 0.80 mil 2.0 mil 3250 ft·lb/in³ 2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD 0.80 mil 2.0 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD 0.80 mil 22600 psi	0.80 mil	2520	ft·lb/in³		
0.80 mil 3250 ft·lb/in³ 2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD ASTM D882 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 0.80 mil 22600 psi	2.0 mil	3080	ft·lb/in³		
2.0 mil 4040 ft·lb/in³ Secant Modulus - 2% Secant, MD ASTM D882 0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 0.80 mil 22600 psi	Film Toughness - TD			ASTM D882	
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0.80 mil 21400 psi 2.0 mil 20600 psi Secant Modulus - 2% Secant, TD 0.80 mil 22600 psi	2.0 mil	4040	ft·lb/in³		
2.0 mil 20600 psi Secant Modulus - 2% Secant, TD ASTM D882 0.80 mil 22600 psi	Secant Modulus - 2% Secant, MD			ASTM D882	
Secant Modulus - 2% Secant, TD 0.80 mil ASTM D882 22600 psi	0.80 mil	21400	psi		
0.80 mil 22600 psi	2.0 mil	20600	psi		
	Secant Modulus - 2% Secant, TD			ASTM D882	
2.0 mil 20500 psi	0.80 mil	22600	psi		
	2.0 mil	20500	psi		



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Films	Nominal Value	Unit	Test Method
Tensile Strength - MD			ASTM D882
Yield, 0.80 mil	1630	psi	
Yield, 2.0 mil	1480	psi	
Tensile Strength - TD			ASTM D882
Yield, 0.80 mil	1530	psi	
Yield, 2.0 mil	1450	psi	
Tensile Strength - MD			ASTM D882
Break, 0.80 mil	7220	psi	
Break, 2.0 mil	5560	psi	
Tensile Strength - TD			ASTM D882
Break, 0.80 mil	5240	psi	
Break, 2.0 mil	6410	psi	
Tensile Elongation - MD			ASTM D882
Break, 0.80 mil	520	%	
Break, 2.0 mil	720	%	
Tensile Elongation - TD			ASTM D882
Break, 0.80 mil	830	%	
Break, 2.0 mil	900		
Dart Drop Impact			
0.80 mil	130	a	ASTM D1709A
0.80 mil	< 100	-	ASTM D1709B
2.0 mil	270	•	ASTM D1709A
2.0 mil	170	-	ASTM D1709B
Elmendorf Tear Strength - MD ²		3	ASTM D1922
0.80 mil	180	a	NOTW B 1022
2.0 mil	780		
	700	9	ASTM D1922
Elmendorf Tear Strength - TD ²	200		A31W D1922
0.80 mil	620	-	
2.0 mil	1100	g	
Ultimate Stretch ³			Internal Method
0.8 mil	330		
2.0 mil	520	%	
Unstretched Cling			ASTM D5458
0.8 mil	210		
2.0 mil	280		
Thermal	Nominal Value		Test Method
Vicat Softening Temperature	210		ASTM D1525
Melting Temperature (DSC)	255	°F	Internal Method
Optical	Nominal Value	Unit	Test Method
Gloss			ASTM D2457
20°, 0.800 mil	156		
20°, 2.00 mil	146		
45°, 0.800 mil	95		
45°, 2.00 mil	91		
Haze			ASTM D1003
0.800 mil	1.00	%	
2.00 mil	4.00		

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Processing Information Nominal Value Unit 525 °F

Extrusion Notes

Melt Temperature

Extrusion

Fabrication Conditions For Cast Film:

- EGAN/Davis-Standard 5 layer cast line
- Melt Temperature: 525 °F (274 °C)
- Chill Roll (primary/secondary) Temperature: 70 °F (21 °C)
- Line Speed: 0.8 mil = 600 fpm (183 m/min); 2.0 mil = 200 fpm (61 m/min)
- Output: 0.8 mil = 416 lb/hr; 2.0 mil = 341 lb/hr
- Die width: 36in. (914 mm)Die gap: 25 mil (0.65 mm)Air gap: 3 in. (76 mm)

Notes

¹ Typical properties: these are not to be construed as specifications.

² Method B

³ On-Pallet Testing; Highlight Industries Inc. test method.

