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Date In: January 17, 2020

Customer:
Damage Prevention Solutions, LLC
660 Hunters PI, Suite 202
Charlottesville, VA 22911

Purchase Order Number: 1007

A. TEST OBJECTIVE:
Determine the tensile properties of the materials provided.

B. TEST ITEM(S):
Three (3) polyethylene film materials

C. SPECIFICATIONS / METHODS / TECHNIQUES:
ASTM D882-18 Tensile Properties of Thin Plastic Sheeting

D. RESULTS:
See results section on page 3.

TESTING PERFORMED BY:

Tina A. Buchanan
Senior Analyst

TECHNICAL/QUALITY APPROVALS:

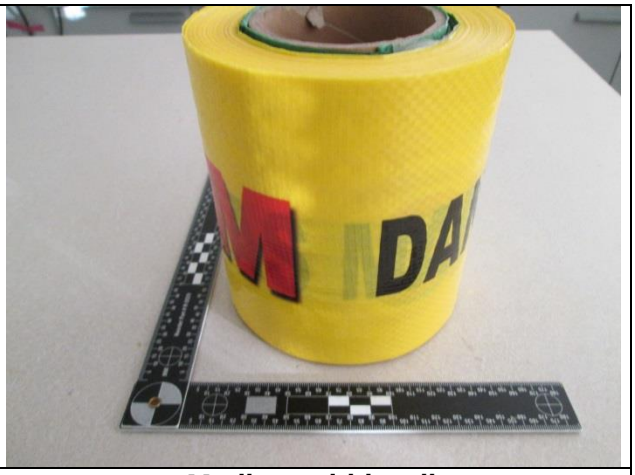
Daniel D. Phillips
Department Manager –
FA/Analytical

TEST ITEM IDENTIFICATION

SAMPLE TYPE	Polyethylene film
NUMBER OF SAMPLES SUBMITTED	Three (3) rolls (only two (2) rolls were to be tested)
SAMPLE IDENTIFICATION	• Small width roll • Medium width roll • Large width roll
SAMPLE DISPOSITION	Samples to be returned to Damage Prevention Solutions, LLC

Sample Overview

Small width roll



Medium width roll

Large width roll

TENSILE STRENGTH

REFERENCE	ASTM D882-18 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting
TEST SPECIMENS	Two (2) rolls
REQUIREMENT	N/A
SUMMARY	**See results in the table below.**
SAMPLE PREPARATION DETAILS	Specimens were supplied in full roll form. The large roll was selected and cut for 1" width x 6" length analysis. The small roll was selected and cut for 0.5" width x 6" length analysis. The samples were conditioned for a minimum of 40 hours at 23 ±2°C and 50 ±5% relative humidity. The thicknesses were measured and recorded to the nearest 0.0005".
SAMPLE PREPARATION PERFORMED BY	TAB
PREPARATION DATE	January 22-28, 2020
TEST MODIFICATIONS	The grip separation was set to 4 inches for all samples.
TEST CONDITIONS	22.4°C / 51.0% RH
TEST PERFORMED BY	TAB
TEST DATE	January 28, 2020
EQUIPMENT USED	WC059392, WC051783, WC051746, WC051747

RESULTS:

An image of the test set up, the tensile strength results and representative tensile graphs are shown below. Tensile load was applied at a constant rate of 0.5 in/min for one set and 2.0 in/min for a second set based upon the requirements listed in Table 1 of ASTM D882 shown below. The % elongation values were close to 20% (above and below) therefore, both speeds were run for comparison.

TABLE 1 Crosshead Speeds and Initial Grip Separation

Percent Elongation at Break	Initial Strain Rate, mm/mm·min (in./in.·min)	Initial Grip Separation		Rate of Grip Separation	
		mm	in.	mm/min	in./min
Modulus of Elasticity Determination					
	0.1	250	10	25	1.0
Determinations other than Elastic Modulus					
Less than 20	0.1	125	5	12.5	0.5
20 to 100	0.5	100	4	50	2.0
Greater than 100	10.0	50	2	500	20.0

Tensile Strength Results – 2.0 inches/minute

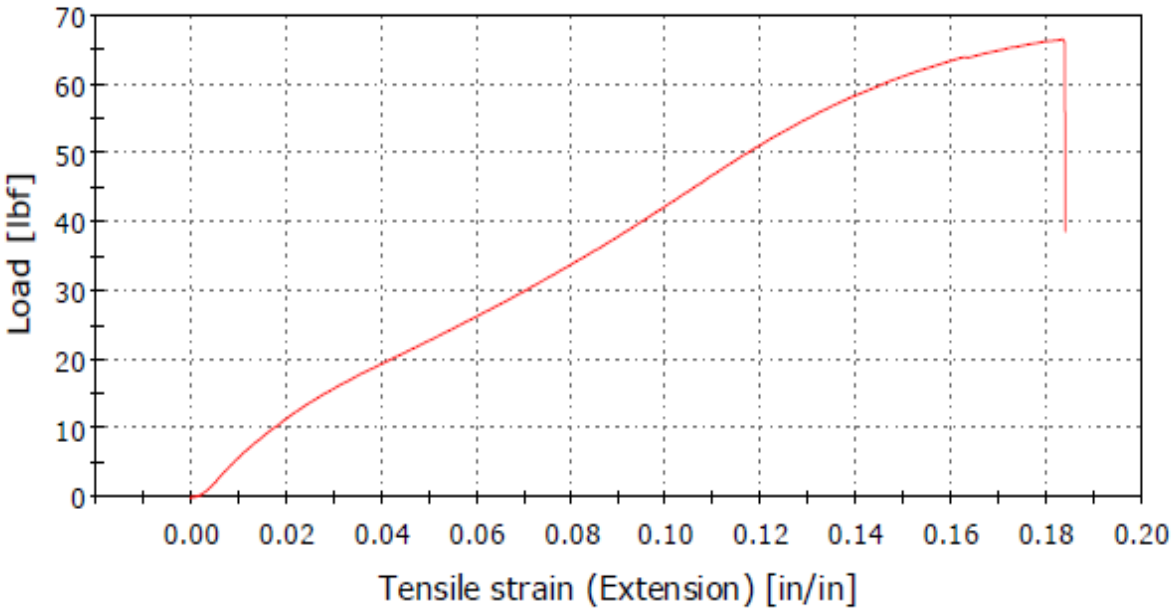
Sample No.	Replicate	Area (in^2)	Max. Load (lbf)	Tensile Strength (psi)	Elongation at Failure (%)	Speed (in/min)	Failure
1in. wide (large roll)	1	0.00500	66.50	13,300	18.33	2.0	Tear at grip
	2	0.00500	68.54	13,708	22.84	2.0	Tear at grip
	3	0.00500	68.49	13,698	18.74	2.0	Tear –gauge area
	4	0.00450	68.18	15,151	19.85	2.0	Tear at grip
	5	0.00450	66.96	14,880	21.34	2.0	Tear at grip
	Average	**0.00480**	**67.73**	**14,147**	**20.22**	**2.0**	
0.5in. wide (small roll)	1	0.00250	34.09	13,638	19.54	2.0	Tear at grip
	2	0.00250	34.98	13,990	18.64	2.0	Tear at grip
	3	0.00275	33.37	12,135	17.47	2.0	Tear at grip
	4	0.00250	33.35	13,339	16.12	2.0	Tear at grip
	5	0.00225	32.53	14,456	16.37	2.0	Tear at grip
	Average	**0.00250**	**33.66**	**13,512**	**17.63**	**2.0**	

Tensile Strength Results – 0.5 inches/minute

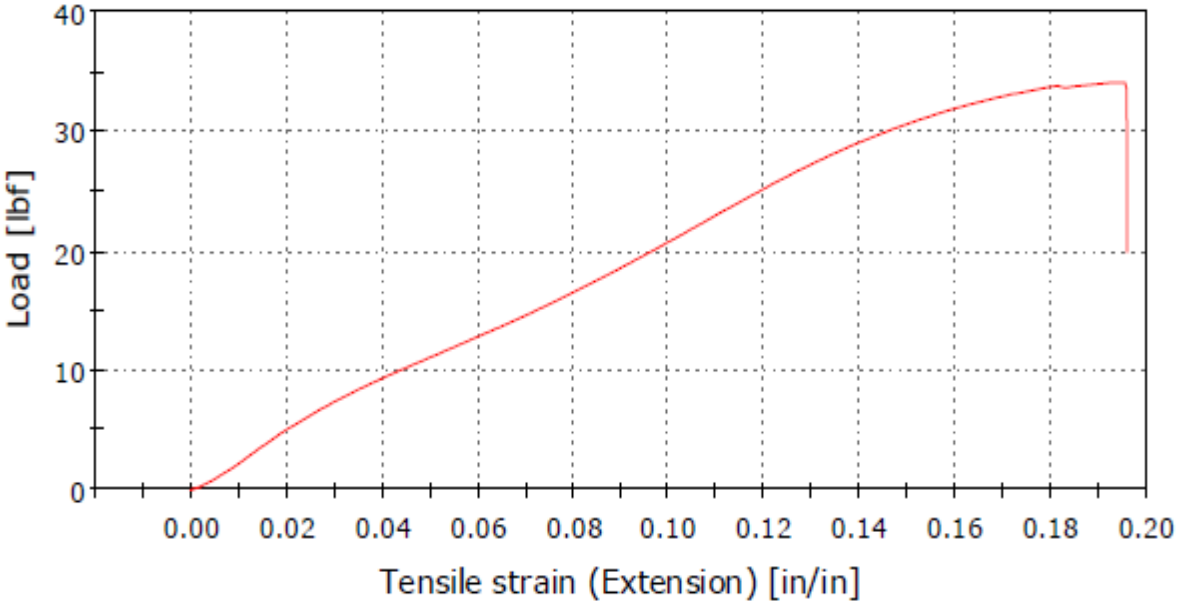
Sample No.	Replicate	Area (in^2)	Max. Load (lbf)	Tensile Strength (psi)	Elongation at Failure (%)	Speed (in/min)	Failure
1in. wide (large roll)	1	0.00450	59.42	11,884	20.50	0.5	Tear at grip
	2	0.00500	58.60	11,720	20.77	0.5	Partial tear at grip
	3	0.00450	58.36	12,969	22.87	0.5	Tear at grip
	4	0.00500	61.12	12,224	21.13	0.5	Tear at grip
	5	0.00500	59.10	11,820	23.63	0.5	Tear at grip
	Average	**0.00480**	**59.32**	**12,387**	**21.78**	**0.5**	
0.5in. wide (small roll)	1	0.00225	31.50	13,998	23.51	0.5	Tear at grip
	2	0.00250	28.00	11,200	16.23	0.5	Tear at grip
	3	0.00275	31.52	11,462	20.78	0.5	Tear at grip
	4	0.00250	30.87	12,346	21.07	0.5	Tear-gauge area
	5	0.00250	30.45	12,179	18.44	0.5	Tear at grip
	Average	**0.00250**	**30.47**	**12,237**	**20.01**	**0.5**	

Representative Tensile Graphs

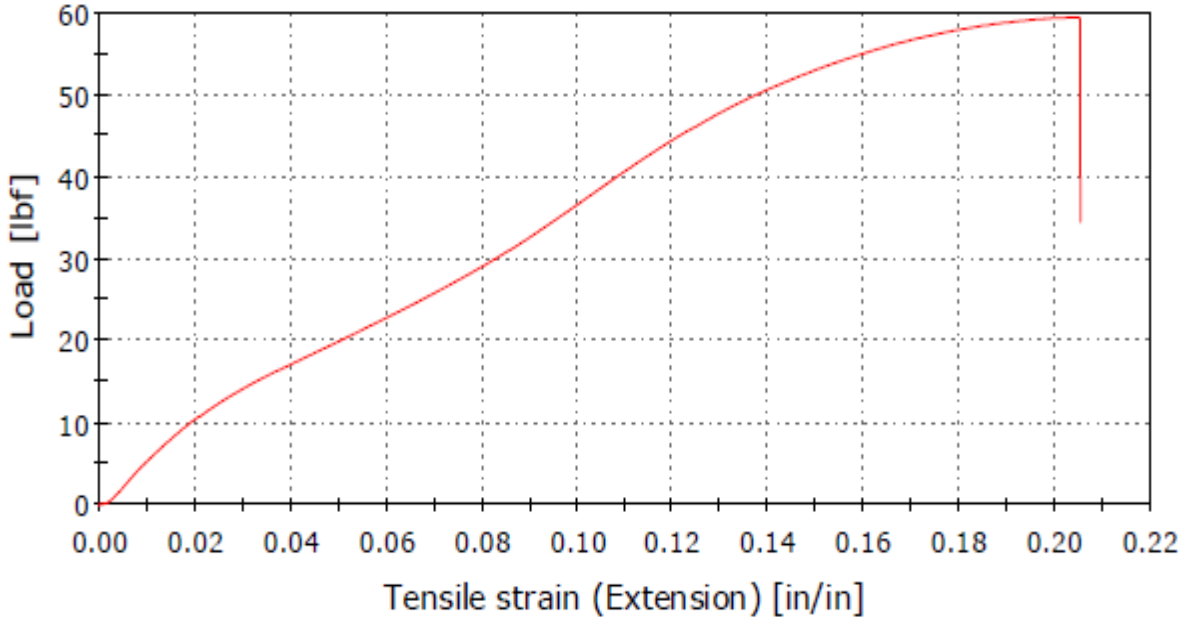
1” Wide / 2.0”/minute



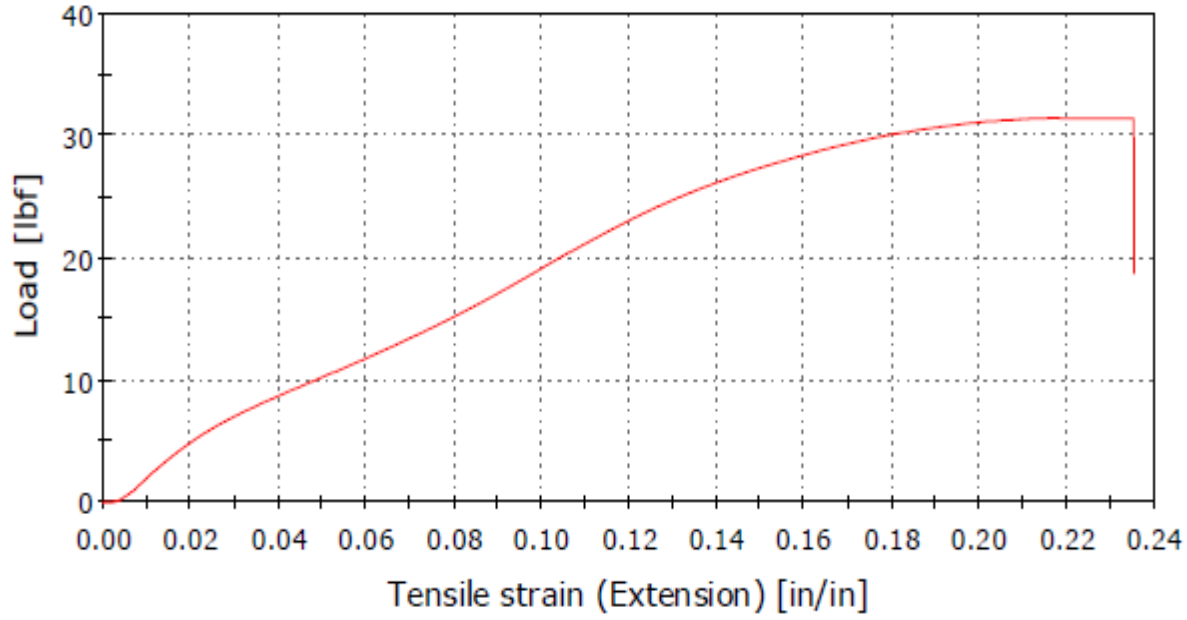
0.5” Wide / 2.0”/minute



1” Wide / 0.5”/minute



0.5” Wide / 0.5”/minute



EQUIPMENT LIST

ID	Manufacturer	Equipment Name	Model Number	Serial Number	Calibration Date	Calibration Due Date
WC051773	Lufft	Temperature/Humidity Meter with built in probe	5700.00 XC200	008.0316.1107.008	8-Mar-2019	31-Mar-2020
WC059392	Lufft	Temperature/Humidity Meter with built in probe	5120.00 C200	002.0911.0202.4.2.1.25	26-Oct-2019	31-Oct-2020
WC051783	Control Company	Digital Caliper	62379-531	160527136	10-Jul-2019	31-Jul-2020
WC051746	Instron	Tensile Tester	5982	B10355	18-Sep-2019	18-Sep-2020
WC051747	Instron	Load Cell 500N	2580-105	302239	18-Sep-2019	18-Sep-2020

TEST METHODS

TENSILE AND ELONGATION

The grip separation of the tensile tester was set to 4 inches. Each specimen was placed in the grips of the tensile tester. The load was applied at a rate determined from the table below. After complete rupture of the specimen, the maximum load and the travel distance was recorded.

Table 1 of ASTM D882

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The following formulas were used to calculate the tensile strength and elongation:

$$Tensile\ Strength\ (TS) = \frac{maximum\ load}{cross - sectional\ area}$$

$$Elongation\ (\%), = \frac{Distance\ crosshead\ moved}{Original\ gage\ length} \times 100$$

END OF REPORT