

ELMENDORPH TEAR PROPERTIES OF FLAT GLASS FILM

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CP FILMS
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SCOPE OF WORK: ETC Laboratories was contracted by CP Films to perform Elmendorf Tear testing on eight types of self-adhesive film. The testing was performed according to ASTM D 1922-94a *Standard Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method*.

SPECIMENS: The test samples were shipped from CP Films and received at ETC Laboratories for testing. One sample of each type of film was received. The samples were designated SCL SR PS4, SCL SR PS11, SCL SR PS7, SCL SR PS6, SCL SR PS15, N1050 SR PS8, N1050 SR PS4 and SCL SR PS4. Each sample consisted of 4 sheets of film measuring approximately 8 1/2 by 11 inches. For each type of film, ten specimens conforming to the requirements of section 6 of the test method were cut from these sheets. The specimens were of the constant radius type and had a 43 mm tear radius and a 76 mm base. Five of the ten specimens were cut to be torn in a direction parallel to the machine direction (MD) and five were cut to be torn in a direction perpendicular to the machine direction (TD). The specimens were conditioned at 73 degrees F and 50% RH for a minimum of 24 hours prior to testing.



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NOTE: For security purposes, the original of this report has been printed on special paper with a red bar running down the entire right margin. (C)

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PROCEDURES: The Elmendorf Tear test was conducted in accordance to ASTM D1922-94a. One specimen at a time was placed in the Elmendorf Tear Tester with the radius side up and clamped in place. A 20mm slit was cut in the center of the specimen using the knife found on the tester. The indicator needle was placed against its stop and the pendulum was released. As the pendulum swings forward, the specimen is torn and the indicator needle remains stationary against the stop. As the pendulum swings back, the indicator needle is carried with it due to a friction mount and it shows the height of the pendulums swing. At this point, the operator arrested the pendulums swing and the indicator needles position on the scale was recorded. If the specimen did not tear a heavier pendulum was used. The specimens were tested in both the machine direction (MD) and the transverse direction (TD). The thickness of each specimen was determined prior to testing.

EQUIPMENT: The equipment consisted of the Elmendorf Tear tester itself. The tester was manufactured by Thwing-Albert Instrument Co. of Philadelphia and conformed to the test method described.

RESULTS: The results of testing can be viewed in Table I.

TABLE I

ELMENDORF TEAR TEST RESULTS									
I.D.	Test Dir.	Specimen Thickness, in			Tester Cap., gf	Tearing Force, gf			
		Avg.	Min.	Max.		Avg.	Min.	Max.	Std. Dev.
SCL SR PS11	MD	.0119	.0119	.0119	800	286.4	264	304	15.4
	TD	.0119	.0119	.0119	800	292.8	280	304	9.1
SCL SR PS7	MD	.0077	.0076	.0077	800	121.6	104	160	22.2
	TD	.0075	.0074	.0075	800	80	72	88	5.7
SCL SR PS6	MD	.0066	.0065	.0067	800	436.8	376	512	59.2
	TD	.0065	.0065	.0065	800	150.4	144	160	6.7
SCL SR PS15	MD	.0168	.0167	.0171	1600	752.0	448	880	174.9
	TD	.0167	.0167	.0168	1600	656	592	720	50.6
N1050 SR PS8	MD	.0087	.0086	.0087	800	480.0	440	552	45.6
	TD	.0085	.0085	.0086	800	136	128	144	5.7
N1050 SR PS4	MD	.0043	.0043	.0043	400	159.2	136	184	18.0
	TD	.0043	.0043	.0043	400	85.6	80	92	4.6
SCL SR PS4	MD	.0042	.0042	.0042	400	173.6	152	208	24.9
	TD	.0043	.0042	.0043	400	81.6	72	120	21.5

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The following calculation was used to determine the Average Tearing Force. To determine the tearing force of each specimen, the scale reading of that specimen was substituted for the average scale reading in the equation.

Calculations:

Average tearing force,

$$gf = (16 \times \text{average scale reading} \times \text{gf-capacity of arm}) / (n \times 1600)$$

$$mN = (16 \times 9.81 \times \text{average scale reading} \times \text{gf-capacity of arm}) / (n \times 1600)$$

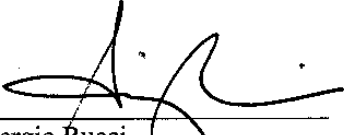
Where: gf = grams force
 mN = millinewtons
 n = number of plies

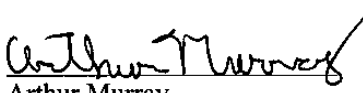
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