Mylar®
polyester film

Chemical Properties

Mylar® polyester film exhibits good resistance to the action of many chemical reagents, solvents, impregnants, and varnishes as shown by **Tables 1–3**. Such oils and greases as penetrating oil, lard, cottonseed oil, and motor oil do not penetrate through 1 mil film after two months' exposure at room temperature.

Table 1
Chemical Resistance of Mylar®*
Mylar® 92A—31 days at 23°C (73°F)

		Tensile Strength (% Retained)	Elongation (% Retained)	Tensile Modulus (% Retained)	Stress at 5% Elongation (% Retained)	Tear Strength (% Retained)	Pneumatic Impact Strength (% Retained)
	Control	100	100	100	100	100	100
Acids	Acetic, Glacial	100	100	100	100	100	75
	Hydrochloric, 10%	100	100	100	100	100	100
	Hydrochloric, conc.	50	2	100	–	13	37
	Hydrofluoric, 48%	80	55	100	100	52	56
	Nitric, 10%	100	100	100	100	100	100
	Nitric, 40%	75	50	100	100	15	60
	Nitric, fuming	0	0	0	0	0	0
	Sulfuric, 3%	100	100	100	100	100	100
	Sulfuric, 30%	100	100	100	100	100	100
Bases	Ammonium Hydroxide, 2%	100	100	100	100	80	100
	Ammonium Hydroxide, 10%	0	0	0	0	0	0
	Ammonium Hydroxide, conc.	0	0	0	0	0	0
	Sodium Hydroxide, 2%	100	100	100	100	70	80
	Sodium Hydroxide, 10%	0	0	0	0	0	0
	Sodium Hydroxide, conc. (54%)	0	0	0	0	0	0
Solvents	Benzyl Alcohol	100	100	100	100	100	80
	Dioxane (1,4)	100	100	100	100	100	80
	Ethyl Acetate	100	100	82	100	100	100
	Ethyl Alcohol	100	100	100	100	100	100
	Methyl Ethyl Ketone	100	100	100	100	100	80
	Toluene	100	100	100	100	100	100
	Trichloroethylene	100	100	100	100	100	100
	Tetrahydrofuran	100	100	100	100	100	100
	Cyclohexanone	100	100	100	100	100	100
	Sulfurhexafluoride	100	100	100	100	100	100
Miscellaneous	Detergent, 0.25%	100	80	100	100	100	100
	Dimethyl Formamide	100	100	100	100	100	85
	Hydrogen Peroxide, 28%	100	100	100	100	100	80
	Phenol, 5%	100	100	80	65	100	100
	Sodium Sulfide, 4%	100	75	100	100	75	100
	Ticresyl Phosphate	100	100	100	100	100	80
	Water	100	100	100	100	100	100

*Data relevant for other types of Mylar®.

Table 2
Chemical Resistance of Mylar®*
Mylar® 92A—24 hr at 75°C (167°F)

		Tensile Strength (% Retained)	Elongation (% Retained)	Tensile Modulus (% Retained)	Stress at 5% Elongation (% Retained)	Tear Strength (% Retained)	Pneumatic Impact Strength (% Retained)
	Control	100	100	100	100	100	100
Acids	Acetic, Glacial	100	100	100	100	100	80
	Hydrochloric, 10%	100	100	100	100	75	100
	Hydrochloric, conc.	0	0	0	0	0	0
	Hydrofluoric, 48%	80	50	100	100	50	55
	Nitric, 10%	100	100	100	100	100	100
	Nitric, 40%	0	0	0	0	0	0
	Nitric, fuming	0	0	0	0	0	0
	Sulfuric, 3%	100	100	100	100	100	100
	Sulfuric, 30%	100	100	100	100	100	100
Bases	Ammonium Hydroxide, 2%	85	65	100	100	40	55
	Ammonium Hydroxide, 10%	0	0	0	0	0	0
	Sodium Hydroxide, 2%	90	65	100	100	40	75
	Sodium Hydroxide, 10%	0	0	0	0	0	0
Solvents	Benzyl Alcohol	100	100	100	100	100	100
	Dioxane (1,4)	100	100	100	100	100	100
	Ethyl Acetate	100	100	100	100	100	80
	Ethyl Alcohol	100	100	100	100	100	100
	Methyl Ethyl Ketone	100	100	100	100	100	100
	Toluene	100	100	100	100	100	80
	Trichloroethylene	100	100	100	100	100	100
Miscellaneous	Detergent, 0.25%	100	100	100	100	100	75
	Dimethyl Formamide	100	100	100	100	–	100
	Phenol, 5%	100	100	100	80	100	100
	Sodium Sulfide, 4%	72	45	100	100	40	67
	Tricresyl Phosphate	100	100	100	100	–	100
	Water	100	100	100	100	100	100

Table 3
Chemical Resistance of Mylar®*
Mylar® 92A

Liquids	**Control**	**Exposure**	**Percent Tensile Strength Retained**	**Percent Elongation Retained**	**Percent Tear Strength Retained**
			100	100	100
Impregnants	Hydrocarbon Oil, High Viscosity Index	500 hr Immersion at 100°C (212°F)	92	88	87
	Hydrocarbon Oil, Low Viscosity Index		98	67	100
	Pyranol, GE 1467		100	83	200
	Silicone Fluid, DC200		79	100	97
Varnishes	Asphalt Base, GE 9466	168 hr Baked at 150°C (302°F)	92	18	100
	Glyptal Resin, GE 2480		99	80	60
	Phenolic Resin, GE 1678		92	3	73
	Silicone Resin, GE SR80		58	200	100
	Silicone Resin, GE SR28		100	54	97

*Data relevant for other types of Mylar®.

Permeability

Mylar® polyester film is virtually impermeable to the liquid phase of most chemicals and reagents. The permeability of Mylar® to the vapor phase of some typical chemicals is shown in **Table 4**. The effect of film thickness on the rate of water vapor transmission through Mylar® is shown in **Figure 1**. Gas permeability rates are shown in **Table 4** and **Figure 2**. Marked reductions in gas permeability (up to a factor of 100) can be obtained through polymeric coatings, metal foil laminations, or vacuum metallization.

Table 4
Permeability of Mylar® to Gases and Vapors

Vapors		g/100 in²/24 hr/mil*	
Acetone		2.22	
Benzene		0.36	
Carbon Tetrachloride		0.08	
Ethyl Acetate		0.08	
Hexane		0.12	
Gas	**Temp., °C (°F)**	**cc/100 in²/ 24 hr/atm/mil**	**Test Method**
Carbon Dioxide	25 (77)	16	ASTM D1434-58
Freon® 12	55 (131)	0.01	
Methane	25 (77)	1	

* Permeabilities of vapors are determined at the vapor pressure of the liquid at the temperature of the test, 40°C (104°F), using 1 mil film.

Figure 1. Water Vapor Transmission Rate of Mylar® at 38°C (100°F) (ASTM E-96, Procedure E)

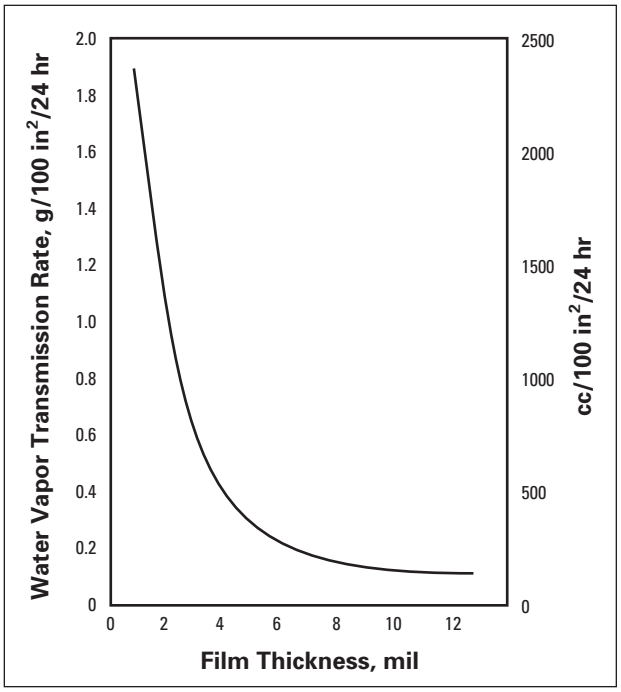
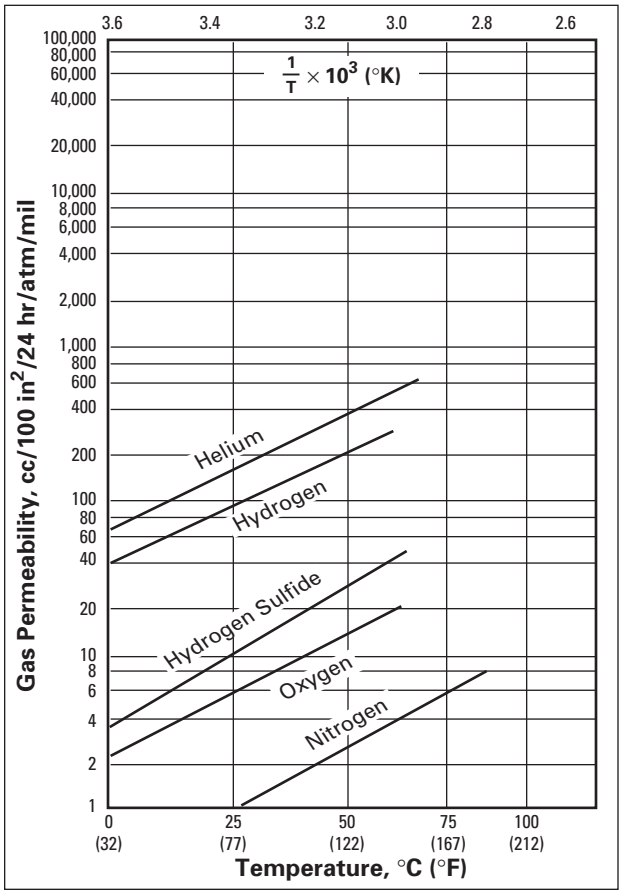


Figure 2. Gas Permeability of Mylar® vs. Temperature



Moisture Absorption

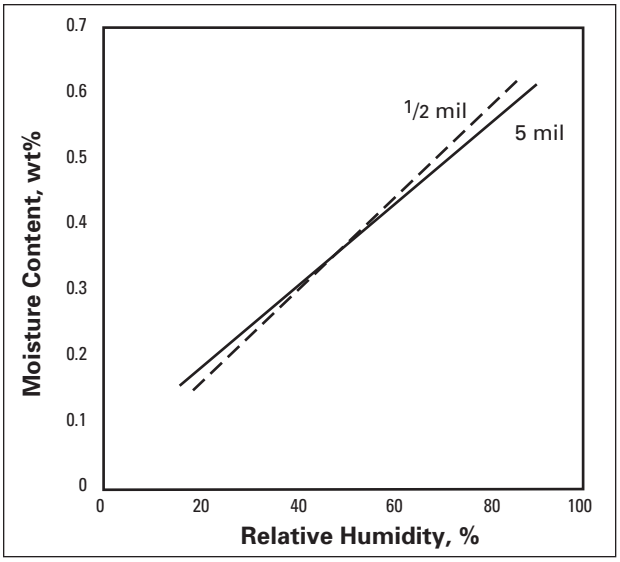
Mylar® polyester film is relatively insensitive to moisture absorption. It absorbs less than 0.8% moisture when totally immersed in water for 24 hr (ASTM D-570-63). For sheet samples hanging in air, with a relative humidity of 80%, the time required to absorb moisture increases as the film thickness increases (see **Table 5**). The effect of relative humidity on the moisture content of single sheet samples is shown in **Figure 3**. (Moisture content was determined by drying at 100°C (212°F) —drying at 150°C (302°F) drives off another 0.2 to 0.3% water.)

For slit rolls of film, the rate of change in moisture content of Mylar® is very slow because of the low moisture permeability of the film. Hence, except for very unusual situations, the moisture content of the film at the time of manufacture will be maintained until processed by the customer.

Table 5
Rate of Moisture Gain of Single Sheets of Mylar®

Gauge, mil	Time Required to Gain 90% Equilibrium Moisture Content, min
1/2	15
1	60
5	135

Figure 3. Moisture Content of Single Sheet Samples Hanging in Air



Stain Resistance

Mylar® polyester film has good overall resistance to staining by various chemicals and food products. The results of studies of stain resistance of Mylar® 92 A to 50 common stains is shown in **Table 6**.* The film was subjected to each material for 16 hr at room temperature. A damp sponge was used to remove the staining agent from the Mylar® after exposure. Samples were graded for stains under northern outside, fluorescent, and tungsten light.

*Data relevant for other types of Mylar®.

Table 6
Stain Resistance

Staining Agent	Stain Grading	Staining Agent	Stain Grading	Staining Agent	Stain Grading
Alcohol	0	Grape Juice	0	Orange Juice	0
Beets*	0	Hand Lotion	0	Pencil	0
Bleach (powder and liquid)	0	Iodine, 10%	0	Pickle Relish	0
Carrots*	0	Lemon Juice	0	Potassium Permanganate, 1%	0
Catsup*	0	Lighter Fluid	0	Rubber Cement	0
Cherries	0	Maple Syrup	0	Spinach*	0
China Marker	0	Mayonnaise	0	Stamp Pad Ink	0
Cocoa*	0	Meat Juice*	0	Tea*	1
Coffee*	0	Mercurochrome	2	Tomato Juice	0
Cola	0	Merthiolate	2	Triclene	1
Copper Sulfate, 2%	0	Milk	0	Vegetable Colors	
Cranberry Sauce	0	Mustard*	0	(Red, Blue, Yellow, Green)*	0
Crayon	0	Nail Polish	0	Vegetable Oil*	0
Detergent (powder and liquid)	0	Nail Polish Remover	0	Vinegar	0
Ethyl Acetate	1	Oleomargarine	0	Worcestershire Sauce*	0
Ferric Chloride, 2%	0	Oil, Machine	0	Writing Ink	0

0 = No stain 1 = Slight mark, no color 2 = Noticeable color 3 = Strong color *Tested at room temperature and at boil

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(06 /2003) 222406B Printed in U.S.A.
[Replaces: H-37250]
Reorder No.: H-37250-1

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