The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

"MYLAR" POLYESTER FILM (NOT INCLUDING POLYVINYLIDENE CHLORIDE COATED TYPES)

MYL045 Revised 10-OCT-2008

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

Mylar is a registered trademark of DuPont Teijin Films.

Product Use

OSHA Hazard Communication Standard (29 CFR 1910.1200) requirements for Material Safety Data Sheets do not apply to the product described in this information sheet. This product is excluded as an article.

Tradenames and Synonyms (Remarks)

This data sheet covers the following "Mylar" film types:
A, A101, A102, A701, A951, AB, AC, AGN1, AGN4, AHS1, ALS1, AP, AP101, AR, AT, AWH, AXM901, B, C, CL, CMA121, CND, COOK, COOK2, COOK3, COOK4, COOK5, COOKF12, D804, DA, DCLF, DL, DL1, DM, DMS, DP, E, E101, E951, E101MR, EB11, EB11P, EB21, EB31, EC, ECO13, ECO23, ECO33, EL, EL21, ETSF, FG90, FG140, FG200, FG250, FG313, FGM90, FT, GA10, GA848, GF, GFX951, GL-AE, GL-AEH, GL-AS, GL-AU, GX-P, HP, HR, HR631, HS, HS2, IHP, J101, J102, J956, KB, KL, KL1, KM, LB, LB3, LBJ, LBT, LBT2, LJE181, LJP111, LJP112, LJP181, LJP182, M461, M462, M577, MSX, MA, MBP, MLB, MLBT, MO, M021, MSX, MT, MTD1003, MTE, MTL, OL, OL2, OL3, OL12, OL13, OL22, OLAF, OL12AF, OL13AF, OLAFT, OWF, P25, PB, PRP, PST, REL, RELT, RS, RSX, RSX631, RSX951, S, SC, SM462, SMVBT, SP, SR, SRL, ST, ST2, SXM121, SXM141, TLX, TLXMR, TTMHT, VBLC, 122VCMR, WC, WC11, WC11G, WC22, WOL, XD856, XHDS, XM35, XM35W, XM101, XM123, XM125, XM208AF, XM462MR, XM679, XM679T1MR, XM728WMR, XM841, XM852, XM861, XM918, XMB, XMBLSF, XMDULAM, XMLBH, XMLBH2, XMLD, XMOL60, XMPCL, XPRL, XSM, XSROL, XWOLT, 308, 365, 376, 401, 800, 800C, 808, 811, 813, 814, 816, 820, 822, 823, 834, 840, 841, 844, 845, 850, 851, 852, 854, 864, 890, 891, 7100

This data sheet also covers the following DuPont Teijin Films which are not branded as "Mylar" products:
DuPont Teijin Films, types DB, G2, N5, S1, S2, X2, X2I, X2P, X3I

(CHEMICAL PRODUCT/COMPANY IDENTIFICATION - Continued)

Company Identification

MANUFACTURER/DISTRIBUTOR

DuPont Teijin Films
U.S. Limited Partnership
1 Discovery Drive
P.O. Box 411
Hopewell, VA 23860 USA

PHONE NUMBERS
Product Information : (800) 635-4639 Fax: (804) 530-9867
Transport Emergency : CHEMTREC: 1-800-424-9300

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
Oriented polyester film. May contain a coextrusion layer. Various fillers or additives used to modify the physical appearance and/or surface properties may be present.		100
Base Film:		
Polyethylene Terephthalate	25038-59-9	55-100
Coextrusion layer (if present):		
Isophthalate Copolymer	24938-04-3	8-20
The following Fillers and/or Additives may be present in one or more film types:		
Poly(Ethylene/Vinyl Acetate)		<25
Barium Sulfate	7727-43-7	<20
Titanium Dioxide	13463-67-7	<20
Styrene Block Copolymer		<20
Polyterpene Polymer		<18
Acrylic Polymer		<5
Polypropylene	9003-07-0	<5
Polyvinyl Alcohol	9002-89-5	<5
Silica	7631-86-9	<1
Silicone		<1
Carbon Black (only in black films)	1333-86-4	<1
Aluminum	7429-90-5	<1
Aluminum Oxide	1344-28-1	<1

Components (Remarks)

Material is not known to contain Toxic Chemicals under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

Emergency Overview

Appearance: Solid film
Odor: Odorless

No known health hazards at ambient temperature.
Read the entire MSDS for a more thorough evaluation of the hazards.

Potential Health Effects

High temperature operations using "Mylar" Films can produce fumes or vapors of decomposition products of polyethylene terphthalate and isophthalate polymer. The type and quantity of the fumes or vapors will vary based on temperature, time and other variables. These fumes or vapors may cause eye, nose, throat or respiratory irritation, or other effects such as headache.

Molten polymer can cause thermal burns.

Exposure to components used as fillers is not likely as these are encapsulated in the polymer and fully incorporated into the film.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material	IARC	NTP	OSHA	ACGIH
Titanium Dioxide	2B			
Carbon Black (only in black films)	2B			

FIRST AID MEASURES

First Aid

INHALATION

No specific intervention is indicated as the compound is not likely to be hazardous by inhalation.

However, if exposed to fumes from overheating or combustion, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician if necessary.

SKIN CONTACT

The compound is not likely to be hazardous by skin contact but cleansing the skin after use is advisable.

(FIRST AID MEASURES - Continued)

If molten material gets on skin, cool rapidly with cold water. Do not attempt to remove material from skin. Obtain medical treatment for thermal burn.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not an expected route of exposure during normal use of the product. If ingested, consult a physician immediately.

Notes to Physicians

Prolonged eye irritation may occur from pieces of debris sticking to the eyeball or eyelids.

FIRE FIGHTING MEASURES

Flammable Properties

Non-metalized films can be combusted only by remaining in contact with flame. If flame source is stationary, non-metalized films will shrink away and self-extinguish. Non-metalized film remaining in contact with flame can continue to burn slowly, dropping flaming liquid which can spread the fire. Metalized films may support combustion if ignited.

Hazardous gases/vapors produced in fire are carbon dioxide, carbon monoxide, organic acids, aldehydes, alcohols.

During processing, film may pick up a strong static charge. Avoid discharge into dust or solvent laden air as a flash fire or explosion may result.

Extinguishing Media

Water, Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Keep personnel removed and upwind of fire. Wear self-contained breathing apparatus. Wear full protective equipment.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Spill Clean Up

Sweep up to avoid slipping hazard.

HANDLING AND STORAGE

Handling (Personnel)

Do not breathe vapors or fumes that may be evolved during processing.

Avoid skin contact with sharp film edges.

Handling (Physical Aspects)

Rolls of film may telescope. Use caution when handling.

Rolled film should be stored at intended processing temperature for approximately 24 hours prior to use.

Plastic packaging materials can pick up static charge. Polyester film rolls packaged with shrinkwrap (or other plastic overwrap) should be opened or unwrapped only in non-process areas where ignition sources such as solvents are not in use or in storage.

Storage

Store away from heat and sources of ignition. Do not store in direct sunlight. Avoid prolonged storage in high or low temperatures. Recommended storage temperatures are 20 F (-7 C) to 100F (38 C).

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

General exhaust is acceptable except where overheating can occur during processing. High temperature operations may require use of local exhaust ventilation to keep employee exposure below recommended limits.

Movement of film over metal or rollers will produce a surface static charge on the film. Consider processing design and procedures that will reduce or dissipate this

(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

charge, and eliminate the possibility of unwanted electrical discharge to people, equipment and materials.

Personal Protective Equipment

EYE/FACE PROTECTION

Wear safety glasses.

RESPIRATORY PROTECTION

Respirators are not needed for normal use.

Where airborne concentrations are expected to exceed exposure limits, a NIOSH approved respirator should be selected based on the form and concentration of the contaminant in air and in accordance with OSHA Respiratory Protection Standard CFR 1910.134.

PROTECTIVE CLOTHING

If there is potential for contact with hot/molten material, wear heat resistant impervious clothing and footwear.

Special protective clothing is not needed for normal use. Gloves are recommended as good industrial practice.

Exposure Guidelines

Applicable Exposure Limits

Polyethylene Terephthalate

PEL (OSHA)	:	None Established
TLV (ACGIH)	:	None Established
AEL * (DuPont)	:	10 mg/m3, 8 Hr. TWA, total dust 5 mg/m3, 8 Hr. TWA, respirable dust

Aluminum Oxide

PEL (OSHA)	:	15 mg/m3, total dust, 8 Hr. TWA 5 mg/m3, respirable dust, 8 Hr. TWA
AEL * (DuPont)	:	None Established

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Form	:	Transparent film
Color	:	Colorless to black (depending on film type)
Odor	:	Negligible
Melting Point	:	~260 C (~500 F) (PET base film -

(PHYSICAL AND CHEMICAL PROPERTIES - Continued)

coextrusion layer or coatings may melt at lower temperatures)

Solubility in Water	:	Insoluble
Specific Gravity	:	1.2-1.4
Vapor Pressure	:	Negligible @ 20 C (68 F)

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

Strong acids and bases may hydrolyze the film.

Avoid contact with strong oxidizing agents.

Decomposition

Combustion can produces carbon oxides and hydrocarbon oxidation products, including organic acids, aldehydes, alcohols, ketones and acrolein.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

Polyethylene Terephthalate
Oral ALD: > 10,000 mg/kg in rats

Polyethylene Terephthalate is not a skin irritant, but is a mild eye irritant.

Toxic effects from short exposures by inhalation resulted in no adverse effects.

Toxic effects from short exposures by ingestion resulted in no adverse effects.

Animal testing indicates that Polyethylene Terephthalate does not have carcinogenic, mutagenic, developmental or reproductive effects.

ECOLOGICAL INFORMATION

Ecotoxicological Information

AQUATIC TOXICITY:

No information is available. Toxicity is expected to be low based on insolubility in water.

DISPOSAL CONSIDERATIONS

Waste Disposal

Preferred options for disposal are (1) recycling, (2) incineration with energy recovery, and (3) landfill. The high fuel value of this product makes option 2 very desirable for material that cannot be recycled. Treatment, storage, transportation, and disposal must be in accordance with applicable federal, state/provincial, and local regulations.

TRANSPORTATION INFORMATION

Shipping Information

DOT
Proper Shipping Name : Not regulated

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : In compliance with TSCA Inventory requirements for commercial purposes.

CLEAN AIR ACT STATUS: This product does not contain, and is not manufactured with ozone depleting chemicals as defined in 58 FR 8136, February 11, 1993 (final rule).

State Regulations (U.S.)

CONEG STATUS: All "Mylar" products are compliant with CONEG regulations; the sum of the concentrations of cadmium, chromium, lead and mercury does not exceed 100 ppm. None of these metals is used as an ingredient or processing aid.

SUBSTANCES ON THE PENNSYLVANIA HAZARDOUS SUBSTANCE LIST THAT MAY BE PRESENT AT A CONCENTRATION OF 1% OR MORE (0.01% FOR SPECIAL HAZARDOUS SUBSTANCES): Barium Sulfate; Titanium Oxide (TiO_2); Carbon Black (black films only).

SUBSTANCES ON THE NEW JERSEY WORKPLACE HAZARDOUS SUBSTANCE LIST THAT MAY BE PRESENT AT A CONCENTRATION OF 1% OR MORE

(REGULATORY INFORMATION - Continued)

(0.1% FOR SUBSTANCES IDENTIFIED AS CARCINOGENS, MUTAGENS OR TERATOGENS): Barium Compounds; Titanium Dioxide; Carbon Black (black films only).

CALIFORNIA PROPOSITION 65 STATUS: The products described herein do not contain substances that require a warning pursuant to Propositions 65.

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating

Health	: 1
Flammability	: 1
Reactivity	: 0

NPCA-HMIS Rating

Health	: 0
Flammability	: 1
Reactivity	: 0

Additional Information

MEDICAL USE: CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications see DuPont CAUTION Bulletin No. H-50102.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Polyester Films MSDS Coordinator
1007 Market St. Room D-6054A
Wilmington, DE 19898
302-773-0904

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

DuPont Teijin Films™

MYLAR® EL21

Product Description
Mylar® EL21 polyester films are flexible strong and durable films with an unusual balance of properties, making them suitable for a variety of industrial applications. The excellent dielectric strength, moisture resistance, and physical toughnes make Mylar® EL21 a very versatile and functional insulating material.

General Product Info
Mylar® EL21 films offer high dielectric strength, good chemical resistance, and exceptional durability in high-temperature enviroments.

Special Features
Slit rolls are available in the following ID and OD configuration:

- 3" ID 13" OD
- 3" ID 16" OD
- 3" ID 18" OD

Master rolls are available as shown in the Standard Put-Ups table. They are splice free and are available in selected widths in minimum order quantities of 35,000 lb per order with a minimum of 10,000 lb per item.

Typical Applications
Mylar® type EL21 films, similar to Mylar® type MO films, are heavy gauge insulating films designed for general purpose electrical/electronic applications, such as transformers, laminates, bus bars, and punched parts.

Approvals
UL 94 VTM-2 - for 92-1400 gauge(0.023-0.35 mm)
UL Recognition - for 92-500 gauge (0.023-0.13mm) HWI=5, HAI=4, CTI=1;
for 700-1400 gauge (0.18-0.35mm) HWI=4, HAI=0, CTI=1

Typical Properties

Available Thickness [Gauge]
750; 900; 1000; 1400

Property	Thickness	Value	Units	Test
ELECTRICAL				
Dielectric Strength	750	17.5	kV	ASTM D149 1/4" electrode 500 V/sec 25°C in air
Dielectric Strength	900	18.4	kV	ASTM D149 1/4" electrode 500 V/sec 25°C in air
Dielectric Strength	1000	19.0	kV	ASTM D149 1/4" electrode 500 V/sec 25°C in air
Dielectric Strength	1400	20.0	kV	ASTM D149 1/4" electrode 500 V/sec 25°C in air
OPTICAL				
Opacity	750	38	%	optical density

Opacity	900	41	%	optical density
Opacity	1000	42	%	optical density
Opacity	1400	46	%	optical density
PHYSICAL				
Density	750	1.3928	g/cc	
Density	900	1.3920	g/cc	
Density	1000	1.3925	g/cm3	
Density	1400	1.3925	g/cc	
Elongation at Break MD	750	140	%	ASTM D882A
Elongation at Break MD	900	150	%	ASTM D882A
Elongation at Break MD	1000	150	%	ASTM D882A
Elongation at Break MD	1400	170	%	ASTM D882A
Elongation at Break TD	750	115	%	ASTM D882A
Elongation at Break TD	900	130	%	ASTM D882A
Elongation at Break TD	1000	140	%	ASTM D882A
Elongation at Break TD	1400	170	%	ASTM D882A
Tensile Strength MD	750	27	kpsi	ASTM D882A
Tensile Strength MD	900	27	kpsi	ASTM D882A
Tensile Strength MD	1000	27	kpsi	ASTM D882A
Tensile Strength MD	1400	26	kpsi	ASTM D882A
Tensile Strength TD	750	30	kpsi	ASTM D882A
Tensile Strength TD	900	29	kpsi	ASTM D882A
Tensile Strength TD	1000	29	kpsi	ASTM D882A
Tensile Strength TD	1400	25	kpsi	ASTM D882A
Yield (nominal)	750	2,600	in^2/lb	
Yield (nominal)	900	2,200	in^2/lb	
Yield (nominal)	1000	2,000	in^2/lb	
Yield (nominal)	1400	1,400	in^2/lb	
THERMAL				
Shrinkage MD (150°C)	750	1.6	%	Unrestrained @ 150°C/30 min
Shrinkage MD (150°C)	900	1.6	%	Unrestrained @ 150°C/30 min
Shrinkage MD (150°C)	1000	1.5	%	Unrestrained @ 150°C/30 min
Shrinkage MD (150°C)	1400	1.3	%	Unrestrained @ 150°C/30 min
Shrinkage TD (150°C)	750	0.9	%	Unrestrained @ 150°C/30 min
Shrinkage TD (150°C)	900	1.1	%	Unrestrained @ 150°C/30 min
Shrinkage TD (150°C)	1000	1.1	%	Unrestrained @ 150°C/30 min
Shrinkage TD (150°C)	1400	0.8	%	Unrestrained @ 150°C/30 min

Standard Put-ups

Core I.D. (Inches)	Roll O.D. (Inches)	Thickness (Gauge)	Length (Feet)
3	13	750	1,360
3	13	900	1,140
3	13	1000	1,020
3	13	1400	730
10 (Master roll)		750	5,400
10 (Master roll)		900	4,520
10 (Master roll)		1000	4,070
10 (Master roll)		1400	2,850

Contact Info

DuPont Teijin Films U.S. Limited Partnership
3600 Discovery Drive
P.O. Box 411
Hopewell, VA 23860 USA
Tel: (800) 635-4639
Fax: (804) 530-9867

Disclaimer

Note: These values are typical performance data for DuPont Teijin Films' polyester film; they are not intended to be used as design data. We believe this information is the best currently available on the subject. It is offered as a possible helpful suggestion in experimentation you may care to undertake along these lines. It is subject to revision as additional knowledge and experience is gained. DuPont Teijin Films makes no guarantee of results and assumes no obligation or liability whatsoever in connection with this information. This publication is not a license to operate under, or intended to suggest infringement of, any existing patents.

CAUTION: Do not use in medical applications involving permanent implantation in the human body (DuPont Teijin Films Medical Policy). For other medical applications, see the Medical Caution Statement. DuPont Teijin Films accepts no liability for use of it's products in medical applications not reviewed and approved by DuPont Teijin Films or for product misuse. DuPont Teijin Films supplies products to an agreed specification and does not manufacture products designed specifically for medical end use.