



DuPont Films

High Performance Films

Tefzel®

fluoropolymer film

Types LZ, CLZ, and CLZ-20

Introduction

These specifications cover Tefzel® fluoropolymer film sold by DuPont Films.

Film types included in this specification are:

Type LZ—General-purpose film,

Type CLZ—Treated one-side for improved cementability, and

Type CLZ-20—Treated both sides for improved cementability.

Where maximum and/or minimum tolerances are given, these represent limiting conditions approached by only a small portion of the film. A majority of the film will have properties falling within a range narrower than that specified.

Current product availability is shown in **Table 1**.

Table 1
Availability of Tefzel® Fluoropolymer Film

Type	Gauge						
	50	100	200	500	750	1000	2000
LZ	—	*	*	*	*	*	*
CLZ	—	—	*	*	—	—	—
CLZ-20	—	—	—	—	—	—	—

*Available

Note: Specifications apply to gauges and type available as indicated.

Manufacturing

Material

Copolymer of tetrafluoroethylene and ethylene in the form of a film.

Color

The color of the film is uniform and ranges from clear to translucent depending on the thickness.

Defects

The material shall be uniform in appearance and shall be sufficiently free of contamination, wrinkles, holes, scratches, and other imperfections so as to be functionally acceptable.

Coresh

Shall be of sufficient strength to prevent collapsing on handling. Sizes 3 in (76.2 mm) or 6 in (152.4 mm) I.D. should be specified on orders.

Order Tolerance

The tolerance for under or overrun on pounds ordered is $\pm 10\%$.

Splices

Description

Splices for all gauges are butt type and are made with yellow pressure-sensitive tape. One strip is applied to each side of the splice and shall be 2 in (50.8 mm) wide for 200 gauge and above and 1 in (25.4 mm) wide for below 200 gauge.

Frequency

See **Table 2**.

Thickness and Coverage

The average thickness is determined by measurement of the average weight of the film. The average unit weight will meet the specifications as shown in **Table 3**, Section A. In addition, no single point will fall outside the minimum and maximum thickness as shown in **Table 3**, Section B. Point thickness is determined through at least ten measurements across the width of the film in accordance with ASTM D-374 Method A or C.

Width

The maximum variation in film width from that required on the order varies with the gauge and width of film and is shown in **Table 4**.

General

Packaging

Tefzel® film is wound on 3-in (76.2-mm) or 6-in (152.4-mm) cores and is overwrapped in polyethylene. The film is then boxed to prevent loss of contents or damage during shipment. Each container is labeled with DuPont and customer's name, purchase order number, film thickness, type, mill roll number, and shipping date.

A label containing similar information is also affixed to the core for roll widths $2\frac{1}{8}$ in (54 mm) and above; for rolls less than $2\frac{1}{8}$ in (54 mm) wide, the core label is in the package.

Assurance

Statistical sampling techniques are used to ensure specified properties in the following tables are met.

Table 2
Maximum Allowable Splices/Roll
Types: LZ, CLZ, and CLZ-20

Put-Up							
Gauge	O.D., in						
	3-in Cores				6-in Cores		
	6	<7½	7½	9½	<9½	9½	11
50	—	—	—	—	3	4	7
100	2	2	3	4	2	3	4
200	1	1	2	3	1	2	3
500	1	1	2	3	1	2	3
750	1	1	2	3	1	2	3
1000	—	—	—	—	1	1	3
2000	—	—	—	—	1	1	2

Note: Minimum distance between splices or between a splice and the end or start of a slit roll shall not be less than 100 ft for film under 2000 gauge and 50 ft for 2000 gauge.

Table 4
Roll Width Tolerance, in

Gauge	Web Width, in		
	$\frac{1}{2}$ – $\frac{15}{16}$	1–6	Over 6
50 and 100	$\pm\frac{1}{16}$	$\pm\frac{1}{16}$	$\pm\frac{1}{16}$
200	$\pm\frac{1}{16}$	$\pm\frac{1}{16}$	$\pm\frac{1}{16}$
500 through 1000	$\pm\frac{1}{16}$	$\pm\frac{1}{32}$	$\pm\frac{1}{16}$
2000	$\pm\frac{1}{16}$	$\pm\frac{1}{16}$	$\pm\frac{1}{16}$

Note: Variation in film width shall not exceed these limits.

Table 3
Tefzel® Fluoropolymer Film Thickness Tolerance
Types: LZ, CLZ, and CLZ-20

Nominal Gauge	Nominal Thickness, in	A				B		C		
		Average Thickness Unit Weight, g/m ²				Single Point Thickness*		Area Factor, ft ² /lb		
		Nom.	Min.	Max.	% Var.	Min.	Max.	Nom.	Min.	Max.
50	0.0005	22.19	19.97	24.41	±10	0.00035	0.00065	220.02	200.01	244.49
100	0.0010	44.38	39.94	48.82	±10	0.00070	0.00130	110.01	100.00	122.25
200	0.0020	88.77	79.89	97.65	±10	0.00150	0.00250	55.00	49.99	61.12
500	0.0050	221.92	199.72	244.12	±10	0.00400	0.00600	22.00	19.99	24.45
750	0.0075	339.50	312.00	367.00	±10	0.00650	0.00850	16.50	14.99	18.34
1000	0.0100	443.85	399.46	488.24	±10	0.00850	0.01150	11.00	9.99	12.23
2000	0.0200	887.70	798.93	976.47	±10	0.01700	0.02300	5.50	5.00	6.12

Note: Determined by using lowest and highest thickness readings of ten measurements across the film per ASTM D-374 Method A or C.

Table 5
Property Value, Types LZ, CLZ, and CLZ-20

Property	Film Gauge							Method
	50	100	200	500	750	1000	2000	
Dielectric Strength, V/mil, AC, Min.	4000	4000	3500	2500	2100	1800	1400	Average of ten samples tested per ASTM D-149 Method A. Flat sheets in air placed between 1/4 in diameter brass electrodes with 1/32 in edge radius and subjected to 60 Hz AC voltage rise at 500 V/sec to the breakdown voltage.
Dielectric Constant (at 25°C, 1000 Hz), Max.	2.7							ASTM D-150. Result is average of five tests using measured sample thickness.
Dissipation Factor (at 25°C, 1000 Hz), Max.	0.0008							ASTM D-150, same as above.
Volume Resistivity, ohm-cm at 170°C, Min.	1 × 10 ¹⁷							ASTM D-257.
Surface Resistivity, ohm (per sq) at 23°C, 38% RH, Min.	1 × 10 ¹⁵							ASTM D-257.

Table 6
Property Value, Types LZ, CLZ, and CLZ-20

Property	Film Gauge							Method
	50	100	200	500	750	1000	2000	
Tensile Strength, psi, 25°C, Min.	5000	6000	6000	6000	6000	6000	6000	ASTM D-882 for ≤10 mil thickness. ASTM D-638 for >10 mil thickness, 2 in/min testing speed.
Elongation at Break, %, Min.	175	200	250	250	250	250	250	Same as above method.
Shrinkage, %, Max. at 200°C								Average of five measurements on room temperature samples before and after each test. Each specimen, 4 in × 4 in freely suspended in an oven controlled to 200°C ±1°C. Exposure time 0.5 hr.
MD	+0	+0	+0	+0	+0	+0	+0	
TD	-7	-7	-5	-4	-4	-4	-4	
Tear Strength, g/mil, Min.	300	300	400	400	400	400	400	Elmendorf ASTM D-1922.
Cementability (Type C film only), Min. peel strength in g/in of width	170	300	750	2000	—	—	—	Use DuPont adhesive #68040 on Aldine #1200 aluminum sheet (0.019 in thickness). Peel Test at 180° angle at peel rate 12 in/min.
Melt Temperature, Melting Endotherm Peak, °C	250–270							ASTM D-3418 (DTA).
Density, g/cm ³ , 23°C	1.73–1.77							ASTM D-1505.

United States

DuPont High Performance Films
P.O. Box 89
Route 23 South and DuPont Road
Circleville, OH 43113
Ordering Information:
(800) 967-5607
Product Information:
(800) 237-4357
Fax: (800) 879-4481

Canada

DuPont Canada, Inc.
P.O. Box 2200, Streetsville
Mississauga, Ontario, Canada
L5M 2H3
Inquiries: (905) 821-5603
Customer Service: (800) 263-2742
Fax: (905) 821-5230

Latin America

Argentina

DuPont Argentina
Av Mitre Calle 5
CP 1884, Berazategui, Argentina
Pcia de Buenos Aires
54-1-256-2435
Fax: 54-1-319-4451

Brazil

DuPont do Brasil
Al. Itapecuru, 506
06454-080, Alphaville
Barueri, Sao Paulo
55-11-421-8689
Fax: 55-11-421-8686

Mexico

DuPont S.A. de C.V.
Homero 206
Col. Chapultepec Morales
Mexico, D.F. 11570
525-722-1184
Fax: 525-722-1370

Venezuela

DuPont Venezuela
Edificio "Los Frailes"
Calle la Guarita
Urbanization Chuao
CP 1060, Caracas, Venezuela
58-2-92-8547
Fax: 58-2-91-5638

Europe

DuPont de Nemours
(Luxembourg) S.A.
Contern
L-2984 Luxembourg
Grand Duchy of Luxembourg
(352) 36-66-403
Fax: (352) 36-00-12

Asia Pacific

Japan

DuPont Kabushiki Katsha
Arco Tower
8-1, Shimomeguro 1-chome
Meguro-ku, Tokyo 153
Japan
81-3-5434-6139
Fax: 81-3-5434-6193

ASEAN

DuPont Singapore PTE Ltd.
1 Maritime Square
#07-01 World Trade Centre
Singapore 099253
65-279-3434
Fax: 65-279-3456

Hong Kong/China

DuPont China Limited
1122 New World Office Bldg.
East Wing
Salisbury Road, Kowloon
Hong Kong
852-2734-5401
Fax: 852-2721-4117

India

DuPont South Asia Ltd.
503-505, Madhava
Bandra Kurla Commercial Complex
Bandra (E)
Bombay 400 051
India
91-22-6438255/6438256
Fax: 91-22-6438297

Korea

DuPont Korea Ltd.
4/5th Floor, Asia Tower
#726, Yeoksam-dong,
Kangnam-ku
Seoul 135-082, Korea
82-2-222-5398
Fax: 82-2-222-5476

Taiwan

DuPont Taiwan Limited
7, Tsu-Chiang 1st Road
Chungli, Taoyuan
Taiwan, ROC
866-3-4549204
Fax: 866-3-4620676

The information set forth herein is based on data believed to be reliable, but the DuPont Company makes no warranties express or implied as to its accuracy and assumes no liability arising out of its use by others. This publication is not to be taken as a license to operate under, or recommendation to infringe, any patent.

Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

