

Fluoropolymer as Environment-symbiotic Technology

Nowadays, environmental protection is regarded as the highest priority theme in every industrial field. Fluoropolymer and fluoroelastomer have been applied into environmental friendly products and process techniques. The properties of fluoropolymer and fluoroelastomer such as weatherability, nonflammability and chemical resistance, give longer life to various products and save resources and reduce industrial wastes. For examples, Fluon® ETFE is used for fuel hose of automobile to reduce its fuel permeation, and F-CLEAN® ETFE film is used as film for agricultural house because of its long life. AGC helps your continuous effort for environment protection, through our development, improvement, and enhanced applications of these products. Simultaneously, AGC as a manufacturer of fluorine chemicals establishes recycling process technique and anti-pollution process technique in actual production sites, to continuously effort to reduce the environmental load by the fluorine products themselves. AGC believes that the technology of fluoropolymer with advantageous possibilities contributes to solve environmental problems and plays an important role in realizing a safe and comfortable society of environment-symbiotic type.

Notice

- 1) The statements and data given in this publication are believed to be accurate. They are presented without any guarantee or warranty, express or implied. Statements or suggestions regarding the use of these products are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated.
- 2) Please refer to the MSDS (Material Safety Data Sheet) for safety and details.
- 3) This product is not designed for use in the implantation of the human body or for medical applications that come in contact with body fluid or body tissues, ASAHI GLASS CO., LTD. carries out no test as to the fitness of the product for any medical applications.
- 4) The contents are subject to change without prior notice.

AGC Chemicals, Multi-Functional Films Business Group

ASAHI GLASS CO., LTD.

1-12-1, Yurakucho, Chiyoda-ku, Tokyo 100-8405 Japan Phone: +81-3-3218-5438 Facsimile: +81-3-3218-7857
URL: <http://www.agc.co.jp>
Fluon Website: <http://www.fluon.jp>

AGC Chemicals Americas, Inc.

55 East Uwchian Ave., Suite 201 Exton, PA 19341 Phone: +1-610-423-4306 Facsimile +1-610-423-4301

AGC Chemicals Europe Commercial Centre

World Trade Center, Zuidplein, 80, H-Tower, Level 9, 1077 XV, Amsterdam, The Netherlands
Phone: +31-20-880-4170 Facsimile: +31-20-880-4188

AGC Chemicals Asia Pacific Pte Ltd.

460 Alexandra Road, #30-02, PSA Building Singapore 119963 Phone: +65-6273-5656 Facsimile: +65-6276-8783

AGC Chemicals Trading (Shanghai) Co., Ltd.

2307-2308, Rui An Plaza, 333 Middle Huai Hai Road, Shanghai, 200021, China
Phone: +86-21-63862211 Facsimile: +86-21-63865377

AGC Chemicals(Thailand) Co., Ltd.

24th Floor, Bangkok Insurance Building, 25 South Sathorn Road, Bangkok 10120, Thailand
Phone: +66-2-679-1600 Facsimile +66-2-677-3135

AGC Chemicals

AGC

 **Fluon®** ETFE FILM

ADVANCED FLUOROPOLYMER FILM

High-performance fluoropolymer film with an amazing array of applications

Fluon® ETFE FILM is high-performance film from Asahi Glass using Asahi Glass' own ETFE resin. Films of thickness between 12µm and 250µm are manufactured using a unique film-forming method. Properties of the film are excellent heat resistance, chemical resistance, anti-stick properties, electrical properties and long-term weatherability, all of which are typical of fluoropolymers.

Due to its exceptional durability, transparency and antifouling properties, Fluon® ETFE FILM is used in a wide range of applications including mold releasing films for electronic components, interior design, outdoor architectural applications, solar cells, greenhouses, and various other innovative and ground-breaking areas for films.

Fluon® ETFE FILM offers more choices from the exciting world of fluoropolymers.



Safety and heat resistance

Fluon® ETFE FILM meets UL94VTM-0 and is suitable for use within a wide temperature range -200°C to 200°C .

Chemical resistance

Fluon® ETFE FILM is highly resistant to almost all chemicals and solvents.

Weatherability

Fluon® ETFE FILM is resistant to ultraviolet light and is suitable for long-term outdoor use. A 16000-hour accelerated weathering test (comparable to over 30 years' exposure) produced almost no signs of deterioration in the film.

Light transmittance

Fluon® ETFE FILM boasts excellent light transmittance making it ideal for use as a protective film for solar cells, greenhouses, roofing and architectural facades.

Anti-stick properties

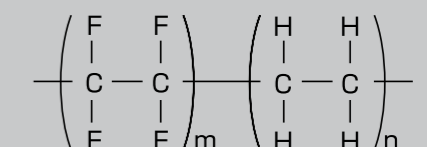
Fluon® ETFE FILM possesses excellent anti-stick and antifouling characteristics as well as excellent release properties.

Electrical properties

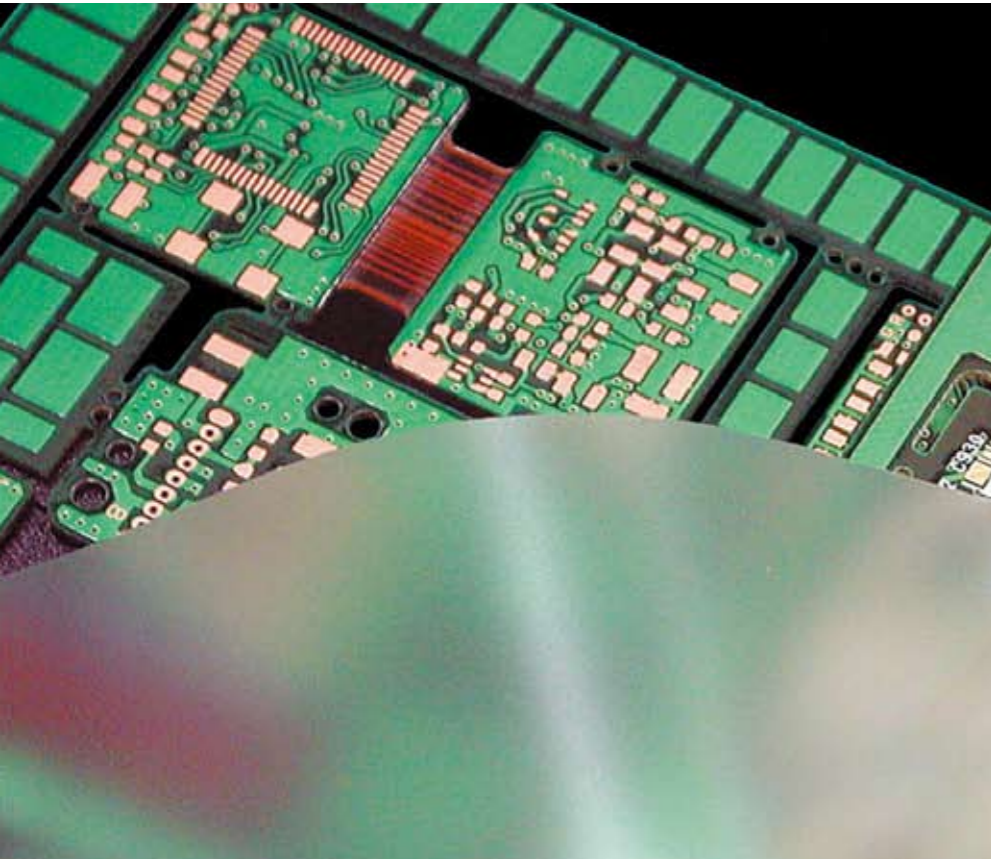
Fluon® ETFE FILM exhibits high dielectric strength even when it is in its thinnest form. It has a low dielectric constant and dielectric loss tangent over a wide frequency range.

Fluon® ETFE is used as a raw material in the production of Fluon® ETFE FILM and is a thermoplastic fluoropolymer developed by Asahi Glass. It is an ethylene-tetrafluoroethylene copolymer.

Fluon® ETFE has good mechanical properties and moldability, and is suitable for processing using a variety of techniques including extrusion, injection molding and blow molding. Fluon® ETFE is easy to use and provides outstanding performance in widely diverse applications.



Fluon® ETFE FILM offers benefits galore in a whole host of applications



Electronics

Its anti-stick properties and resistance to temperatures over 200°C, make Fluon® ETFE FILM suitable for use as a release film for printed circuit boards and electronic components.



Interior finishing

Fluon® ETFE FILM is used indoors in both commercial and residential buildings to give a wide-clean and heat-resistant surface.



Photovoltaics

Fluon® ETFE FILM provides long-term protection for photovoltaics. It has excellent weatherability with good mechanical properties and light transmittance. Its flexibility makes it ideal for use on curved surfaces.



Roofing and architectural facades

Fluon® ETFE FILM is used in many architectural constructions. The famous football stadium in Munich, Germany is a modern-day application of Fluon® ETFE FILM.



Greenhouses F-CLEAN®

Distributed by AGC Green-tech, F-CLEAN® is ETFE film developed especially for greenhouses. It has high light transmittance and weatherability, plus other features required for greenhouses, including UV-control and our unique anti-dripping treatment technology.

■ Contact us
AGC Green-tech Co.,Ltd
3-5-8, Iwamotocho, Chiyoda-ku
Tokyo 101-0032 Japan
Phone: +81-3-5833-5451
Facsimile +81-3-5833-5457



General properties

	Item	Unit	Test	Method
Physical properties	Specific gravity	-	ASTM D792	1.75
	Tensile strength at break	MPa	JIS K7127	>39
	Tensile elongation at break	%	JIS K7127	200-510
Thermal properties	Melting point	°C	-	260
	Linear thermal expansion coefficient	10 ⁻⁵ /°C	ASTM D696	9.4
	Flammability	-	UL	94VTM-0*
Chemical properties	Water absorption (23°C, 24 hr)	%	ASTM D570	0.03
	Chemical resistance	-	ASTM D543	Excellent
Electrical properties	Volume resistivity	Ω · cm	ASTM D257	10 ¹⁷
	Dielectric constant (23°C, 1MHz)	-	ASTM D150	2.6
	Dielectric tangent	-	ASTM D150	
	60Hz			0.0006
	1KHz			0.0008
	1MHz			0.005
	1GHz			0.01
	Breakdown voltage	kV/0.1mm	ASTM D149	12
Arc resistance	sec	ASTM D495	120	

* 25μm ~ 150μm

Chemical resistance

	Elongation retention	Strength retention
NaOH10%	Excellent	Excellent
HCl 35%	Excellent	Excellent
Xylene	Excellent	Excellent
Toluene	Excellent	Excellent

*50N: 1week immersion test

Grades

Thickness (μm)	Grade	Width (mm)	Surface treatment	Roll length (m)
12	N	1200	S	1000
25	N	1250	NT	1000
40	N	1250	NT	500
50	N	1250	NT	500
100	N	1250	NT	250
200	NJ	1600	NT	250
250	NJ	1600	NT	200
21	GS	1220	NT	1000
25	MW	1250	NT	1000
50	HK (KN)	1250	NT	530
50	MW	1250	NT	530
50	LM	1300	NT	510

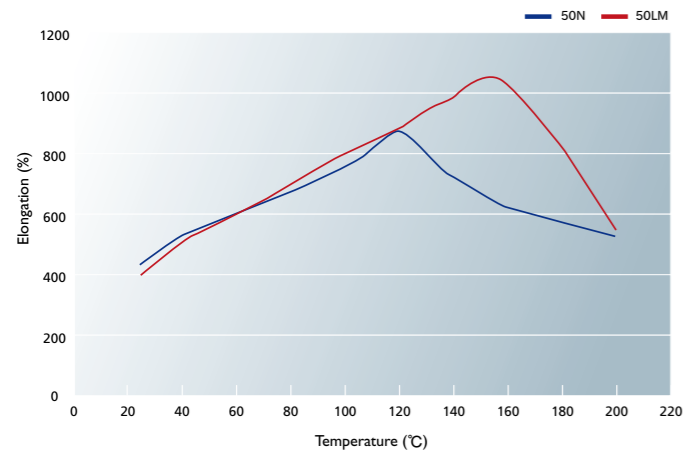
Grades

N	Natural (clear)
NJ	Natural (clear, thick)
GS	Gray
MW	Double side matte (clear)
HK	Matte on outside of the roll (clear)
KN	Matte on inside of the roll (clear)
LM	Natural (clear, low melting point)

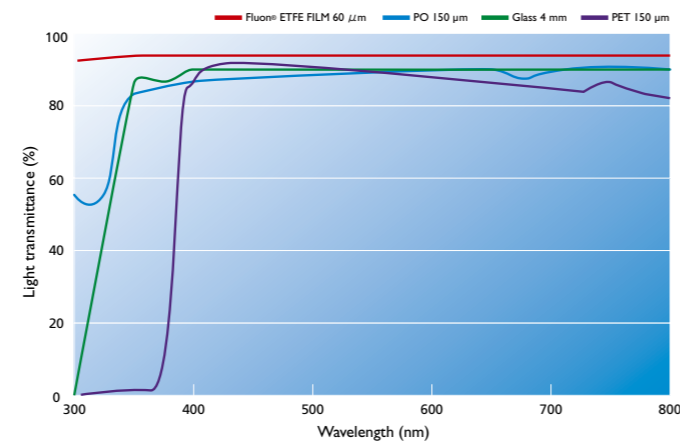
Surface treatment

NT	No treatment
S	Single side corona treatment
CS	Special surface treatment

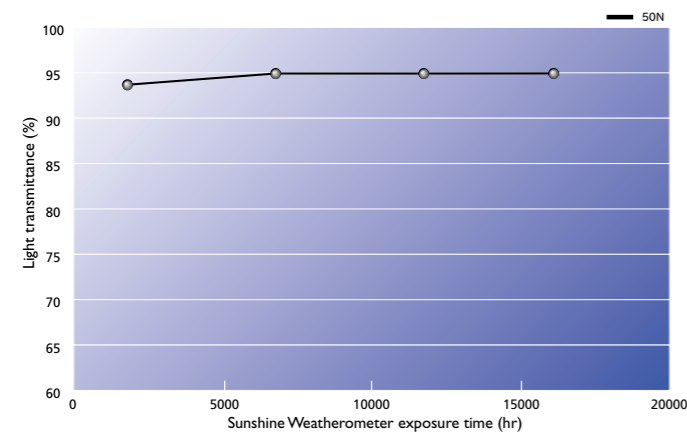
Temperature dependence of tensile elongation at break



Light transmittance



Change in light transmittance with accelerated weathering test



Change in tensile strength and elongation with accelerated weathering test

