AGC Chemicals

AGC

LINING & COATING POWDER

Fluon® ETFE

ETHYLENE-TETRAFLUOROETHYLENE COPOLYMER

Fluon® LM-ETFE

ETHYLENE-TETRAFLUOROETHYLENE COPOLYMER

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Fluon®ETFE Powder Coating & Lining

Fluon®ETFE is a thermoplastic fluoropolymer, a copolymer of tetrafluoroethylene and ethylene, developed by Asahi Glass Co., Ltd.. Fluon®ETFE is widely used in various industrial applications for its outstanding processability in addition to excellent chemical resistance and electrical properties associated with fluoropolymers generally, such as PTFE, PFA and FEP.
Various anti-corrosion equipments are made by Fluon®ETFE Powder by various moulding methods such as electrostatic powder coating, rotolining, fluid bed, etc. Seamless coating is easily available in each process.

■ Reactor Vessel

Suitable for coat on used vessels

Before　　After

Chemical Resistance of Fluon®ETFE

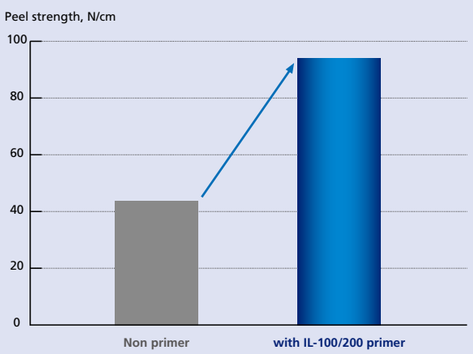
Fluon®ETFE is stable against most chemicals, including acids, alkalis and solvents, across a wide temperature and at various pressures. ETFE has the benefit of outstanding processability enabling various shapes and sizes, and thick coatings of over Imm to be achieved. The IL primer series increase Fluon®ETFE adhesive properties, thus increasing the potential applications of Fluon®ETFE.

■ T-joint, elbow

■ Expansion joint

■ Vessel

■ Peel strength of Fluon®ETFE coating



Grade : TL-081, 1mm thickness
Substrate : SS400
Coating process : sand blasting > pre-heating > electrostatic powder coating > baking
Measurement condition : 90°C peeling at 50 mm/min speed

Fluon®

■ Chemical resistance of Fluon®ETFE Rotomoulding

Category	Chemical	Concentration (%)	Anticorrosive temperature(°C) 25	50	75	100	110	120
inorganic acids	acid	25	●	●	●	●	▲	
		50	●	●	●	●	▲	
		80	●	●	●	●	●	▲
		95	●	●	●	●	●	●
	hydrochloric acid	5	●	●	●			
		35	●	●	●			
	nitric acid	5	●	●				
		60	●	●				
	phosphoric acid	20	●	●	●	●		
		85	●	●	●	●		
	chromic acid	10	●	●	●	▲		
		50	●	●	●	▲		
	hydrofluoric acid	10	●	●				
		50	●	●				
	hydrobromic acid	40	●	●	▲			
organic acids	formic acid	100	●	●	●			
	acetic acid	10	●	●	●	▲		
		50	●	●	●	▲		
		96	●	●	●	▲		
	chloroacelic acid	10	●	●	●			
		50	●	●	●			
	lactic acid	100	●	●	●	●	▲	
	benzoic acid	3	●	●				
	citric acid	40	●	●				
	oxalic acid	20	●	●	●	▲		
	benzensulfinic acid	100	●	●	●	●	▲	
alkalis	potassium hydroxide	25	●	●	●	●	▲	
	sodium hydroxide	10	●	●	●	▲		
		25	●	●	●	●	▲	
		48	●	●	●	●	▲	
	ammonium hydroxide	10	●	●	●	▲		
		25	●	●	●	▲		
bleaching agents	calcium hypochlorite	10	●	●	●	▲		
	sodium hypochlorite	6	●	●	●	▲		
	chlorine dioxide	15	●	●	▲			
	hydrogen peroxide	35	●	▲				
	chlorine water	saturated	●	●	▲			
gases	chlorine(Dry)	—	●	●	●	●		
	chlorine(Wet)	—	●	●	▲			
	bromine	—	●	▲				
	sulphurous anhydride(Dry)	—	●	●	●	●	▲	
	sulphurous anhydride(Wet)	—	●	●	●	●	▲	
	sulfuric anhydride	—	●	●	▲			

Category		Chemical	Concentration (%)	Anticorrosive temperature(°C) 25	50	75	100	110	120
gases		nitrous oxide	—	●	●				
		carbon dioxide	—	●	●	●	●	▲	
		carbon monoxide	—	●	●	●	●	▲	
aromatic compounds	alcohols	n-amyl alcohol	100	●	●	●	●	▲	
		benzil alcohol	100	●	●	●	●	▲	
		butyl alcohol	100	●	●	●	▲		
		ethyl alcohol	100	●	●	●	▲		
		methyl alcohol	100	●	●	●	▲		
	ethers	ethyl ether	100	●	●	●	▲		
		butyl ether	100	●	●	●	●	▲	
		phenyl ether	100	●	●	●	●	▲	
		dioxane	100	●	●	▲			
		tetrahydrofuran	100	●	●	●	▲		
	ketones	acetone	100	●	●	●	▲		
		methyl ethyl ketone	100	●	●	●	▲		
		diethyl ketone	100	●	●	●	▲		
	esters	ethyl acetate	100	●	●	●	▲		
		methyl palmitate	100	●	●	●	●	▲	
	halogens	methylene chloride	100	●	●	●	▲		
		chloroform	100	●	●	●	▲		
		carbon tetrachloride	100	●	●	●	▲		
		ethylene chloride	100	●	●	●	▲		
		tetrachloroethylene	100	●	●	●	▲		
		ethylene chlorohydrine	100	●	●	●	▲		
		chlorobenzene	100	●	●	●	▲		
	others	acetaldehyde	100	●	●	●	▲		
		benzene	100	●	●	●	▲		
		toluol	100	●	●	●	▲		
		xylene	100	●	●	●	●	▲	
		nitrobenzene	100	●	●	●	▲		
		aniline	100	●	●	●	▲		
		acrylonitrile	100	●	●	●	▲		
		dimethyl phthalate	100	●	●	●	●	▲	
		ethylene glycol	100	●	●	●	●	▲	
		furfural	100	●	●	●	●	▲	
		pyridine	100	●	●	●	●		
		hexane	100	●	●	●	▲		
		triethanolamine	100	●	●	●	▲		
		naphthalene	100	●	●	●	●	▲	
		phenol	10	●	●	●	▲		
		gasoline	100	●	●	●	●	▲	
		kerosene	100	●	●	●	●	▲	
		naphtha	100	●	●	●	●	▲	

*The data in this table to the 0.6 to 0.8mm thick lining of Fluon®ETFE over a carbon steel plate.
*The mark ● represents no alteration. The mark ▲ means slight alteration, but effective lining in use.
*These data were obtained in our laboratory and are given for reference.

Typical Application Methods of Fluon®ETFE Powder

Electrostatic Coating

Powder grades of ETFE are electrostatically charged then sprayed onto the substrate and subsequently baked in an oven.

Rotolining

Powder grades of ETFE are placed inside a double axial rotating container and subjected to a heating and cooling cycle. Stand-alone tanks may also be coated using an appropriate release agent.

Fluidised Bed Coating

The substrate is heated and dipped into a container of fluidised powder.

■ Fluon®ETFE Powder Grade List

Grade	Application											Characteristics	Thickness μm	Colour	Application			Mean particle size μm
	Coating					Lining									Electrostatic Coating	Roto-lining	Fluidised Bed Coating	
	Agitator	Grating	Parts	Hopper	Duct	Pipe	Tank	Pump	Tanker	Bottle	Vessel							
Z-8820X	●	●	●	●	●							normal use, non-stick	50 ～ 80	clear to white	●			10 ～ 40
Z-882NX	●	●	●	●	●							normal use, non-stick, high heat resistance	50 ～ 80	clear to white	●			10 ～ 40
Z-885C	●	●	●	●	●							thick coating, non-stick, high heat resistance	50 ～ 400	clear to white	●		●	40 ～ 80
TL-081	●	●	●	●	●							anti-cracking, high fluidity, high heat resistance	～ 1000	clear to white	●			80 ～ 120
ZL-522F						●	●	●	●			high erosion resistance	more than 2000	clear to white		●		100 ～ 140
TL-580						●	●	●		●	●	anti-cracking, high fluidity	more than 2000	clear to white		●		230 ～ 310
TL-581						●	●	●				anti-cracking, high fluidity, high heat resistance	more than 2000	clear to white		●		230 ～ 310
TL-584						●	●	●				anti-cracking, high fluidity, high heat resistance	more than 2000	clear to white		●		230 ～ 310
ZL-520N	●	●	●	●	●							CF 20wt%, thickness, low-contraction	～ 1000	black	●		●	40 ～ 80
ZL-521N	●	●	●	●	●							CF 5wt%, intermediate coat for ZL-520N, low-contraction	50 ～ 150	black	●		●	40 ～ 80
LM-2300N						●	●	●				top coat (smooth surface)	more than 2000	clear to white		●		300 ～ 500
CP-801XGN	●	●	●	●	●							base coat	50 ～ 100	green	●			80 ～ 120

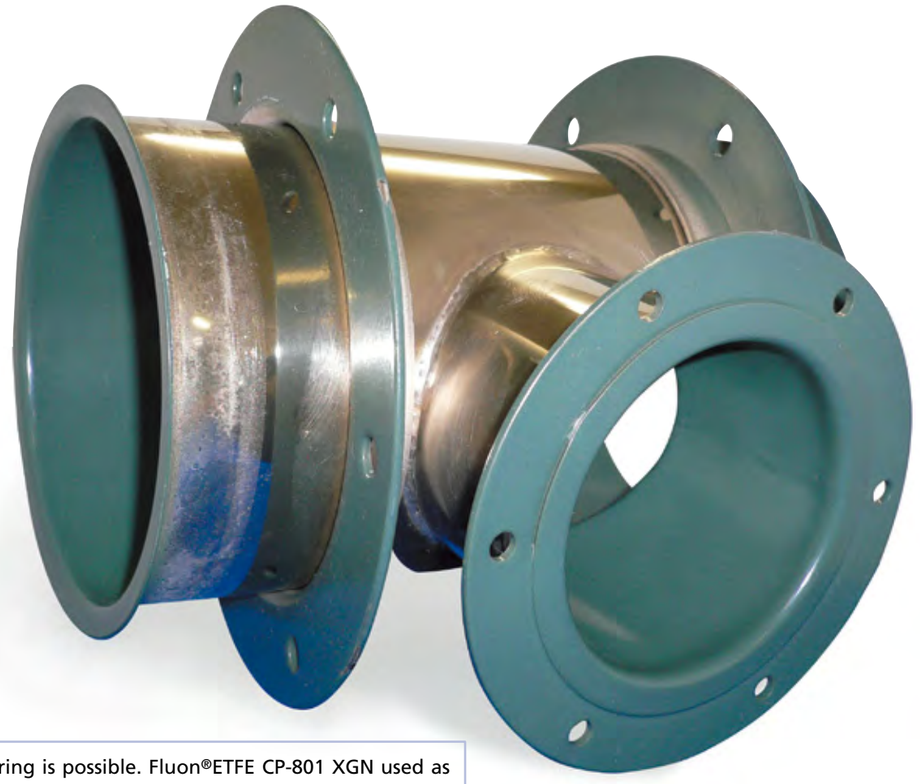
■ Fluon®ETFE Primer List (for High Adhesion Strength)

Grade	Characteristics	Colour	Application
IL-100	Liquid Primer (water based)	clear	spray
IL-200	Liquid Primer (alcohol based)	clear	spray

Fluon®ETFE for FM Standard Duct Works

FM Standard & FM Duct

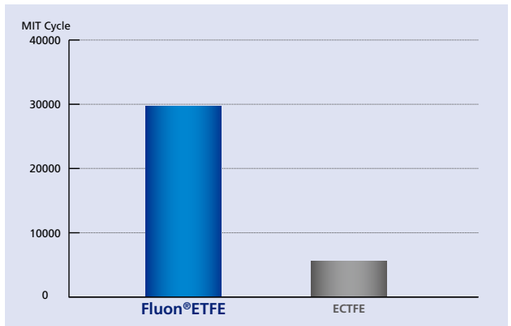
FM Global, a well known mutual insurance organization, provides an approval standard for fume exhaust ducts (Class 4922) regarding controlling the spread of a fire. Fluon®ETFE has excellent inflammability and is widely adopted as the material of choice for FM duct material.



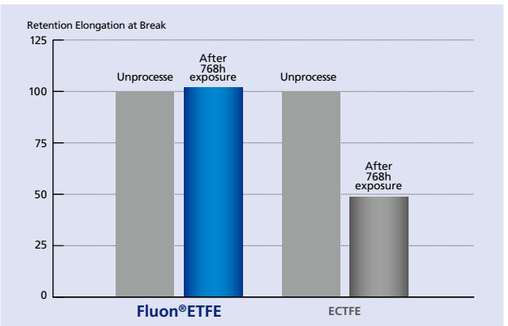
Colouring is possible. Fluon®ETFE CP-801 XGN used as an undercoat gives a green colour.

Fluon®ETFE has excellent stress crack resistance, thermal stability and ozone resistance.

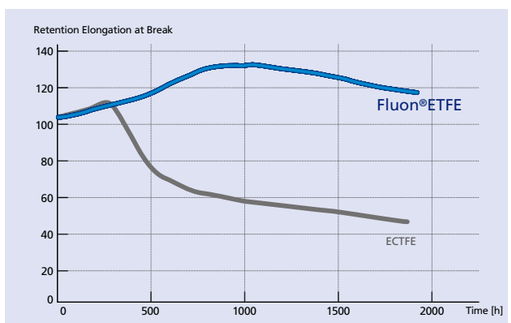
■ Stress Cracking



■ Ozone Resistance (Ozone Gas:10vol%, 0.7L/min)



■ Heat Aging at 200°C



Fluon®ETFE Powder for Food Contact Use

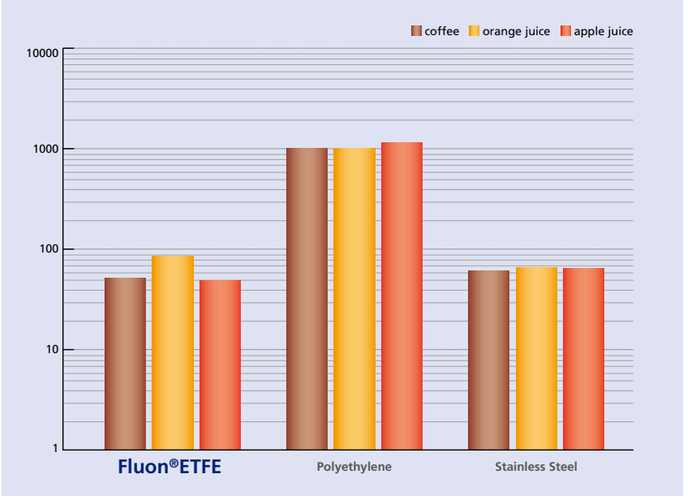
Fluon®ETFE has excellent anti-stick properties and significantly reduced odour transfer index compared to other polymer materials.

Ideal for Food Contact Applications

- Fluon®ETFE meets various food contact standards
- Fluon®ETFE is stable against most chemicals across a wide temperature range and contains no plasticizers
- Fluon®ETFE complies with Japanese food contact standard 1959-370 MHLW
- Fluon®ETFE has FDA compliance and is No. 481 in the Food Contact Notification List

* See MSDS for detailed information.

■ Odour Transfer Index

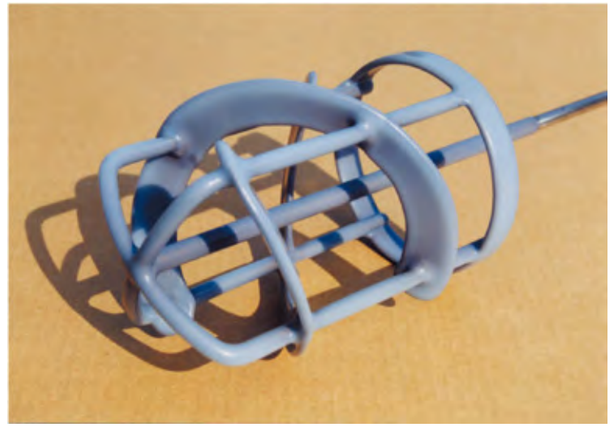


Measurement Method : Shimazu FF-2A after 80°C x 24h immersion and 30min flushing

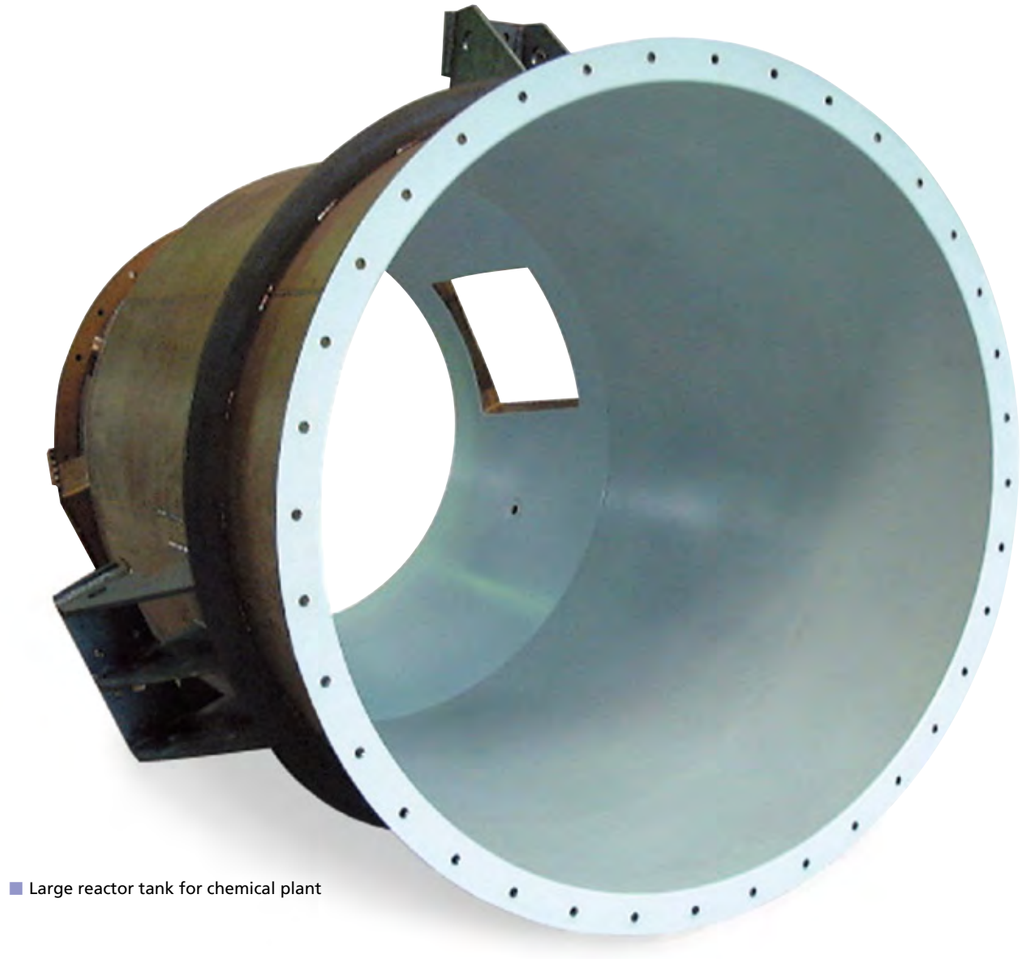
■ Water Repellency of Fluon®ETFE

■ Water Contact Angle

Fluon®ETFE	96°
Polyethylene	89°
Polyethylene chloride	87°
Polymethyl methacrylate	80°
Nylon 66	70°



■ stirrer blades



■ Large reactor tank for chemical plant