



product information

Fluon® ETFE Resins

DESCRIPTION

Fluon® ETFE is a melt-processable copolymer of tetrafluoroethylene and ethylene. Fluon ETFE possesses a unique combination of desirable properties such as higher resistance to heat and chemical attack and outstanding physical toughness. It is processable by conventional extrusion, injection molding, rotomolding, rotolining, and electrostatic coating. It is available in a variety of forms including 1/8" pellets, designated as 'P', and powder, designated as 'B'.

BENEFITS

- High resistance to heat: Fluon ETFE has a continuous use temperature of 150°C.
- Excellent chemical resistance
- Outstanding physical toughness: Fluon ETFE has better physical properties than most other fluoropolymers.
- Low smoke and flame characteristics: Fluon ETFE is rated 94 V-0 by Underwriters Laboratories Inc.
- Outstanding resistance to weather and aging
- Good dielectric properties
- Non-stick characteristics

APPLICATIONS

- Wire & cable (automotive, industrial, aerospace, transit, and appliance markets)
- Film and sheets
- Tubing and pipe
- Electronic components
- Electrostatic and rotomolded vessel linings
- Valves, fittings, and pump housings

FDA COMPLIANCE

AGC Chemicals Americas, Inc., a wholly owned subsidiary of the Asahi Glass Company, confirms FDA compliance for Food Contact Notification (FCN) number 481 for its Fluon ETFE manufactured by Asahi Glass Company. The U.S. Food and Drug Administration concurs compliance on the FDA website.

Fluon ETFE is the *only* ETFE resin in the world that is FDA compliant, permitting use as base resins or coatings in repeat use applications in contact with all food types at temperatures up to 150°C in listed applications.

Fluon® is a registered trademark of Asahi Glass Company, LTD.

The information provided herein is related only to the specific product designated and may not be applicable where such product is used in combination with any other materials or in any process. NO REPRESENTATION OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE, ARE MADE HEREUNDER. The user of this product has the sole responsibility to determine the suitability of the product for any use and manner of use intended. This document may be revised after its issuance, and the user is advised to use the latest revision.



AGC Chemicals Americas, Inc.
Business & Technical Center
55 E. Uwchlan Ave, Suite 201
Exton, PA 19341
Phone: 610.423.4300
Fax: 610.423.4301
<http://www.agcchem.com>

Fluon® ETFE Resins

FLUON® ETFE GRADES AVAILABLE

Grade	Melt Flow Rate	Application
C-55AP	3.9 – 6.5	General purpose extrusion / injection molding
C-55AXP	3.9 – 6.5	Extrusion / injection molding; Better stress crack resistance over C-55A
C-88AP	9.0 – 12.0	High flow extrusion / injection molding
C-88AXP	9.0 – 12.0	High flow extrusion / injection molding; Better stress crack resistance over C-88A
C-88AXMP	27 – 43*	Very high flow extrusion / injection molding
Z-8820X		Electrostatic coating – thin wall (30 – 50 microns) Fluidized bed dip coating
Z-885C		Electrostatic coating – thin wall (50 – 150 microns) Fluidized bed dip coating
TL-081		Electrostatic coating – thick walls, severe conditions
ZL-520N		Electrostatic coating – reinforced with 20% carbon fiber (undercoat)
ZL-521N		Electrostatic coating – reinforced with 5% carbon fiber (top coat for ZL-520N)
ZL-522F		Rotomolding & rotolining
TL-581		Rotomolding & rotolining
TL-584		Rotomolding & rotolining – high antioxidant content

Melt flow rate tested according to ASTM D-3159

*C-88AXM conditions: 2.095 mm (0.0825”) orifice

PROCESSING

Fluon ETFE fluoropolymer resins can be processed by conventional melt-processable resin techniques including extrusion, injection molding, blow molding, compression molding, transfer molding, and rotolining/rotomolding. It is strongly recommended that process equipment exposed to molten resin be made of corrosion-resistant metals such as Monel®, Inconel®, or Hastelloy®.

Extruder barrels should be long relative to diameter (24/1 up to 30/1 and beyond) and heaters should have the capacity to heat material to approximately 340°C. Temperature controllers should be of the proportional-integral-derivative (PID) type to insure precise temperature control. Extruder screws with 3/1 compression ratio, a relatively long feed zone, and ½ to 3 turn transition zone are recommended. Reciprocating screw injection molding machines are preferred.

Your AGC Chemicals Americas, Inc. technical service representative can provide specific recommendations for process equipment and process conditions.

Fluon® ETFE Resins

FLUON® ETFE TYPICAL PROPERTIES

Property	Units	Test Method	C-55AP	C-55AXP	C-88AP	C-88AXP	C-88AXMP
Melt Flow Rate	grams/10 minutes	D-3159	6	6	11	11	30
Melting Point	°C	D-3159	265	258	267	260	260
Specific Gravity		D-792	1.74	1.73	1.74	1.73	1.73
Hardness	Shore D	D-2240	67	67	67	67	67
Tensile Strength (23°C)	psi	D-638	7,540	7,540	6,960	6,960	6,090
Tensile Elongation (23°C)	%	D-638	382	414	415	415	433
Tensile Strength (200°C)	psi	D-638	1,015	725	725	660	725
Tensile Elongation (200°C)	%	D-638	620	530	610	470	410
Flexural Modulus (23°C)	psi	D-790	139,200	134,850	131,950	129,050	126,150
Heat Deflection Temp. (66 psi)	°C	D-648	115	105	95	85	82
Heat Deflection Temp. (264psi)	°C	D-648	85	65	67	64	62
Notched Izod Impact (23°C)	ft-lb/in	C-256	No Break	No Break	No Break	No Break	No Break
Embrittlement Temperature	°C	D-764	-125	-125	-125	-125	-125
CLTE (0 – 100°C)	in/in/°F	D-696	7.3×10^{-5}	7.3×10^{-5}	7.3×10^{-5}	7.3×10^{-5}	7.3×10^{-5}
Water Absorption (24 hours)	%	D-570	less than 0.03	less than 0.03	less than 0.03	less than 0.03	less than 0.03
Dielectric Constant (1 mHz at 23°C)		D-150	2.6	2.6	2.6	2.6	2.6
Volume Resistivity	Ω-cm	D-257	$>10^{17}$	$>10^{17}$	$>10^{17}$	$>10^{17}$	$>10^{17}$
Dielectric Strength (10 mil film)	volts/mil	D-149	1,800	1,800	1,800	1,800	1,800
Heat of Combustion	BTU/lb	D-240	5,900	5,900	5,900	5,900	5,900
Specific Heat	cal/g-°C		0.3	0.3	0.3	0.3	0.3
Oxygen Index	%	D-2863	32	32	32	32	32
Flame Rating		UL-94	V-0	V-0	V-0	V-0	V-0
Upper Service Temperature	°C	UL-746	150	150	150	150	150
MIT Flex Life	cycles	D-2176	50,000	70,000	20,000	40,000	15,000

NOTE: The data listed here represents typical values for the stated grades of Fluon® ETFE. This information should be used as a guide only and not to establish specification limits or design criteria. AGC Chemicals Americas assumes no obligation or liability for any advice furnished by us or for results obtained with respect to this product. All such advice is provided free of charge and the buyer assumes sole responsibility for results obtained in reliance thereon.

Fluon[®] ETFE Resins

HANDLING PRECAUTIONS

Heating Fluon products in excess of 750°F (399°C) can produce toxic fumes. It is, therefore, necessary to provide local exhaust ventilation in areas where Fluon products are exposed to high temperatures. Avoid breathing fumes or contaminating smoking tobacco with fumes, powder, or dust.

Thermal decomposition of this product will generate hydrogen fluoride, which is corrosive. Corrosion resistance materials are required for prolonged contact with molten resin.

For additional information and handling instructions read AGC Chemicals Americas, Inc. Material Safety Data Sheet. It is also recommended that the user consult the latest edition of the "Guide to the Safe Handling of Fluoropolymer Resins" published by the Fluoropolymers Division of the Society of the Plastics Industry (SPI) for important handling and ventilation recommendations. Both publications are available from your AGC Chemicals Americas representative.

SAFE HANDLING INFORMATION

The properties of Fluon ETFE are not impacted by storage time. Storage and handling facilities should be designed to minimize contact with airborne contamination and the formulation of condensation on the resin. Fluoropolymers are not hygroscopic and will not typically need to be dried prior to use. However, masterbatches used to pigment fluoropolymers may contain materials that do absorb water and should be dried prior to use.

FREIGHT CLASSIFICATION

Fluon ETFE when shipped by rail or express is classified "Plastics, Synthetic, O.T.L., NOIBN." Resin shipped by truck is classified "Plastics, Materials O.T.F.C.E. or S. Granules."

ASTM CLASSIFICATIONS

Fluon ETFE grades C-55A, C-55AX, C-88A, C-88AX are ASTM D-3159 type I, grade 1. ETFE grade C-88AXM is ASTM D 3159 type I, grade 3. Your AGC Chemicals Americas Inc. representative can advise you of the ASTM classifications of the other ETFE materials.

UL YELLOW CARDS

Fluon ETFE resins are listed under the *QMFZ2.Guide/Info Plastics - Component* section in the Underwriters Laboratories, Inc. certification directory. See File E54077 under Asahi Glass Co LTD for specific information on ETFE resins. Copies of UL Yellow Cards for Fluon ETFE resins are available online from the UL Online Certifications Directory at <http://database.ul.com/>.

For more information and samples contact

AGC Chemicals Americas, Inc.
55 E. Uwchlan Avenue, Suite 201
Exton, PA 19341

Phone: (800) 424-PTFE (7833)
Fax: (610) 423-4301