

Alternatives to THV for Wire and Cable





We Will Discuss:

- AGC Fluon+[™] AR Flexible Compounds
- AGC Fluon® LM ETFE



THV is in Short Supply

- Demand is high
- Price is high (due to high demand)
- Lead times are long (due to high demand)

... but there are alternatives.

Some even out-perform THV



What are Fluon+ AR Products?

- Blends of ETFE with fluoroelastomer
- Easy to process (same as ETFE)
- Per cent of elongation at break is much greater than for ETFE
- Flexural modulus is much lower than for ETFE
- Can be cross-linked by electron beam or other high-energy radiation sources





Advantages of Fluon+ AR Products

- Resistant to attack from most chemicals
- Rugged vs. std. fluoroelastomers
- Wide service temperature range (up to 200 deg. C)
- Raw materials are much more available than for THV
- Can be custom-tailored to meet individual applications in wire and cable





What is an LM ETFE ?

- ETFE with lower melting point and lower processing temperatures than standard ETFE
- Three different MFI versions are available





Advantages of Fluon LM ETFE vs. Standard ETFE

- Higher transparency
- Slightly more flexible
- Lower melting temperatures
- Lower processing temperatures
- Higher throughput rates on extruder (at same melt temperature)
- Better resistance to stress cracking
- Higher limiting oxygen index (less flammable)





Fluon+ AR ETFE

Flexural modulus of various fluorinated materials



Fluon+ AR ETFE



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Use Fluon+ AR Grades For

- Ultra-flexible wire and cable (or tubing)
- Resistance to chemicals
- Applications requiring good opacity
- High/extended service temperature applications
- Applications requiring a customtailored solution to enhance physical properties, service temperatures, etc.

Use Fluon LM ETFE Grades For

- Flexible wire and cable (or tubing)
- Resistance to fuels and chemicals
- Applications requiring good
 transparency

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- High/extended service temperature applications
- Applications that require good abrasion resistance and toughness



Fluon+ AR and Fluon LM ETFE vs. THV and ETFE

Material	THV	ETFE	FLUON LM ETFE	FLUON+ AR
Specific Gravity	1.93-2.06	1.73	1.78	1.62-1.64
Tensile Strength	moderate to high	very high	high	moderate to high
Elongation	high	low to moderate	moderate	high
Flexibility	moderate to high	low	moderate	high
Flammability UL94	V-0	V-0	V-0	V-2 to V-0
Appearance	transparent	transparent	transparent	opaque

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Overview of Fluon+ Products

GRADE:	AR-3300N	AR-3300P	AR-3300XL	AR-3300LH
Recommended use	General purpose	V-0 UL rated for flame retardancy	Radiation curable (for extended life)	Enhanced adhesion to metals and other plastics
MFI	9.0	8.0	9.0	9.0
Service Temperature	150º C	150º C	200º C (after cure)	150º C

AGC Chemicals Americas can also custom tailor the Fluon+ AR products to your individual applications

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Benefits to Custom Compounding

Modifier level vs tensile, elongation and flex mod Fluon+ AR series; high temperature ETFE





Fluon+ AR Grades Can Be Radiation Cured

Fluon+ AR-3300N Typical Properties

Property	Test Method	Units	Fluon+ AR-3300N	With EB irradiation 120 kGy
Melt Flow Rate (MFR)	ASTM D-2116	g/10min	8.7	NA
Melting Point	AGC Internal	°C	225	NA
Tensile Strength	ASTM D638	MPa	10.4	29.3
Tensile Elongation	ASTM D638	%	441	366
Flex Modulus	ASTM D790	MPa	141	148
Durometer Hardness	ASTM D1706	Shore D	42	44
Flammability	UL 94		V-2	V-2

- Elongation decreases a small amount
- Tensile strength increases significantly

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Fluon LM ETFE Products Overview

GRADE:	LM-720A	LM-730A	LM-740A
Recommended use	General purpose extrusion / injection molding; Better stress crack resistance over LM-730A	General purpose extrusion / injection molding	General purpose extrusion / injection molding; higher flow than LM-730A
MFI	10 – 20	20 - 30	30 - 40
Service Temperature	150º C	150º C	150º C



Available Colors

- Specifically designed for use in colorizing Fluon+ AR and Fluon LM ETFE
- Custom color matching capabilities



AGC Chemicals Flexible Resins

- AGC offers two products to replace THV, depending on specific application requirements.
- All solutions provide improved flexibility over traditional ETFE.
- The AR series offers similar or superior flexibility to THV.

Fluon+ AR and LM ETFE also offer:

- High resistance to heat
- Excellent chemical resistance
- Physical toughness
- Outstanding resistance to weather and aging
- Good dielectric properties



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