Fluon® ETFE

Superior Insulation for Magnet Wires

Fluon® ETFE - Supercharge Your E-Motor Performance

As the market for electric vehicles grows, so does the desire to expand the boundaries of performance, quality and lifetime. Technology never stops, thus AGC's Fluon® and Fluon+™ ranges of fluoropolymers deliver the best combination of insulating properties and robustness, ensuring your motor windings drive the industry far into the future. These products offer excellent insulating properties at high temperatures, delaying dielectric failure and enabling boundless capabilities. Their exceptional resistance to electrical aging provides peace of mind in service. Additionally, a wide operating window for thermoplastic processes highlights their versatile processability, making them easy to work with.

Features

- Ultra low permittivity
- Excellent temperature resistance
- Very low dissipation factor
- Exceptional resistance to partial discharge
- Enhanced flexibility for complex bends in manufacture and assembly

Benefits

- Unbeatable insulating performance
- Localised heating from current won't affect wire or motor lifetime
- Lowest possible loss of energy for exceptional efficiency
- Peace of mind for longer motor life
- Zero voids greatly reduces the possibility of corona discharge

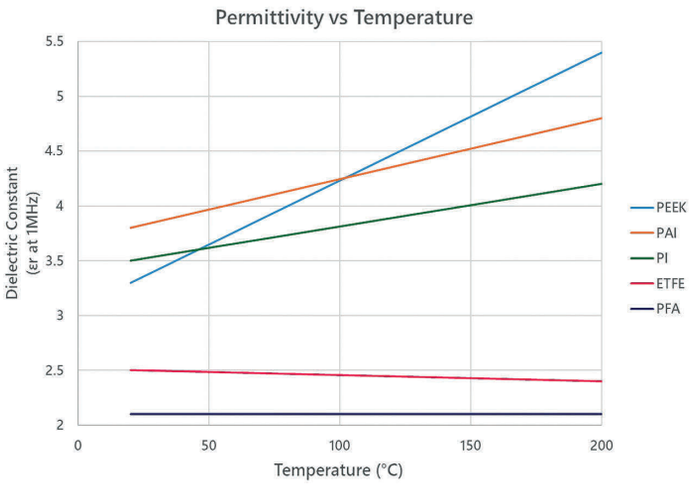
Properties of Key Fluoropolymers

Polymer	ETFE	PFA
Melting Point (°C)	255	305
Specific Gravity	1.73	2.15
Tensile Strength (MPa)	42	30
Elongation to Break (%)	430	370
UL94 Flame Rating	V-0	V-0

Electrical Properties of Commonly Used High-Temperature Polymers

Polymer	Max Continuous Operating Temp (˚C)	Glass Transition Temp (˚C)	Relative Permittivity (ε_r) @ RT	Relative Permittivity (ε_r) @ 200˚C	Volume Resistivity (Ω.cm)	CTI (V)	Flexural Modulus (MPa)
ETFE	175	85	2.5	2.4	$> 10^{18}$	~600	800
PFA	260	90 - 100	2.1	2.1	$> 10^{18}$	> 600	660
PEEK	260	143	3.2	5.4	$> 10^{17}$	175	4100
Polyimide	300	200 - 300	3.5	4.2	$> 10^{14}$	150	3700
PAI	300	280	3.8	4.8	$> 10^{14}$	150	5000

Comparison of Electrical Performance of Fluon® ETFE



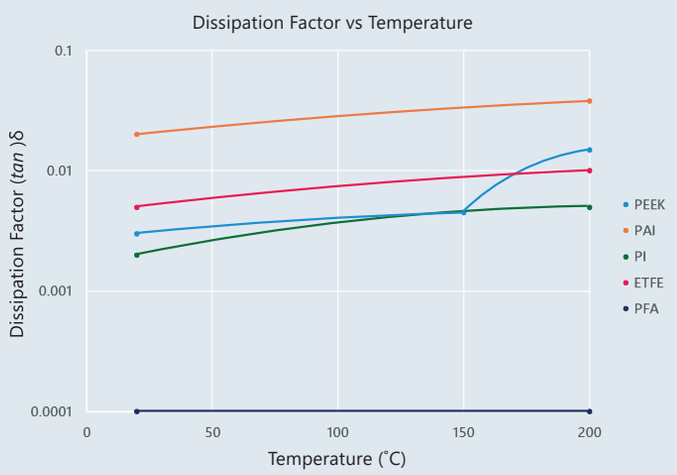
Relative permittivity, or dielectric constant, is a measure of how effective an insulator a material is – the lower the number, the better.

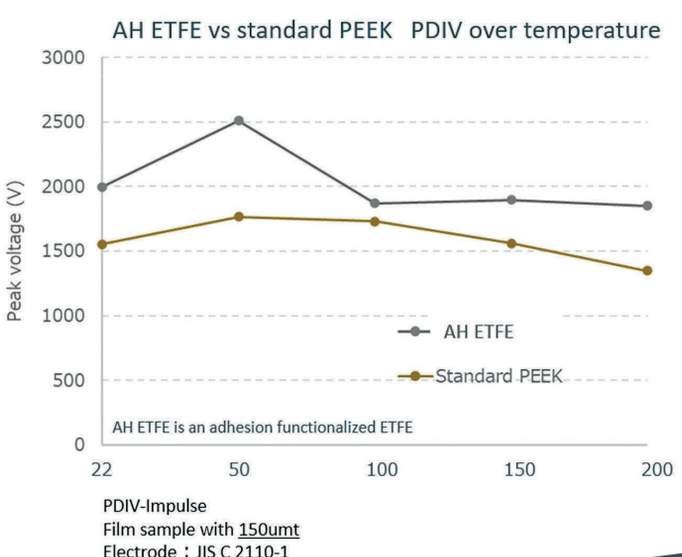
In many cases, the insulating performance of commonly used materials worsens at higher temperatures, potentially limiting their effectiveness during normal operation.

Fluon® ETFE retains its permittivity over its full working temperature range.

Dissipation is a measure of how much energy is lost as heat during conductance – again, a lower number is better. In most cases, the dissipation factor increases with temperature, so systems become less efficient.

Above its Tg, PEEK experiences a sudden increase in *tan* δ. At higher operating temperatures ETFE experiences less loss as heat than PEEK and significantly less than PAI.

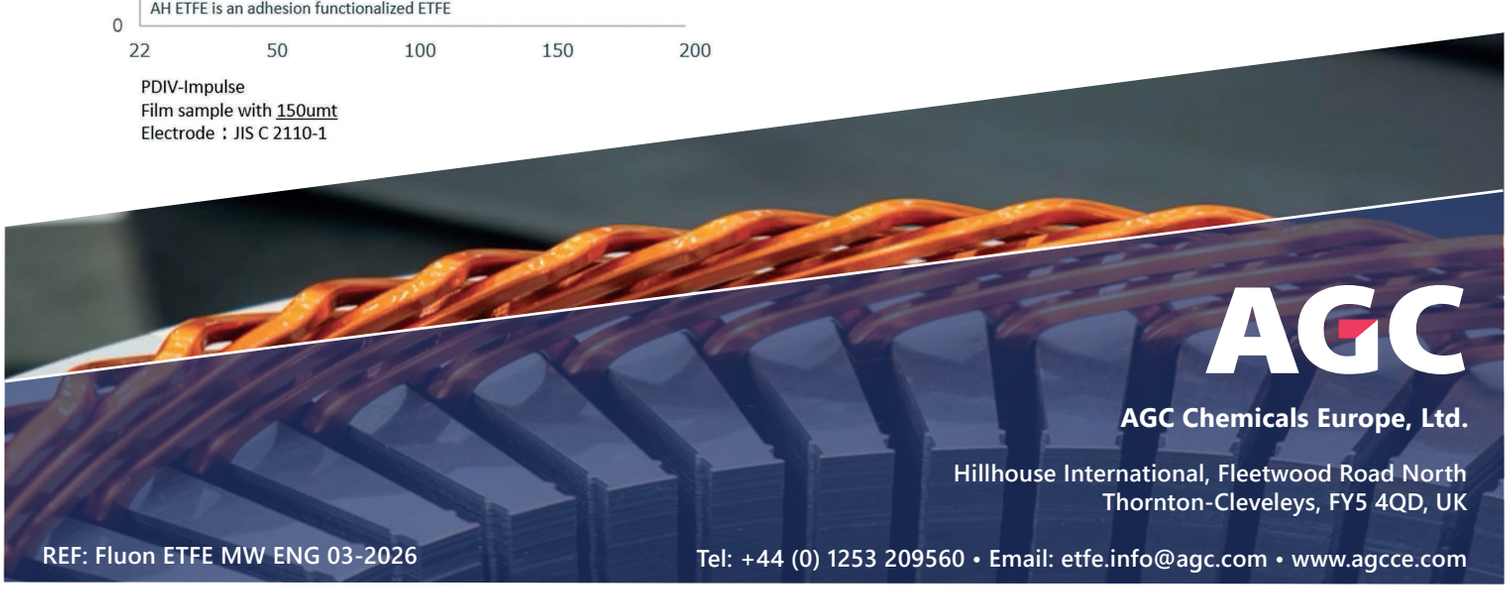




PEEK is the benchmark in magnet wire insulation for its dielectric properties.

At higher temperatures, high voltages can become riskier to the insulation integrity, with the potential for sparking or shorting.

ETFE is shown to maintain its resistance to partial discharge over the full temperature working range, giving peace of mind especially in high voltage systems.



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REF: Fluon ETFE MW ENG 03-2026