



VICTREX™ PEEK MATERIAL BATTERY SOLUTIONS

ENABLING ENHANCED PERFORMANCE
AND RELIABILITY



CONTENTS



- ▶ Battery market trends
- ▶ Introducing APTIV™ PEEK film
- ▶ Material Benefits
- ▶ Material data and typical applications
- ▶ Key properties
- ▶ A substantiable solution & supplier
- ▶ Security of supply
- ▶ Why Victrex?
- ▶ Victrex Product Portfolio
- ▶ Contact us

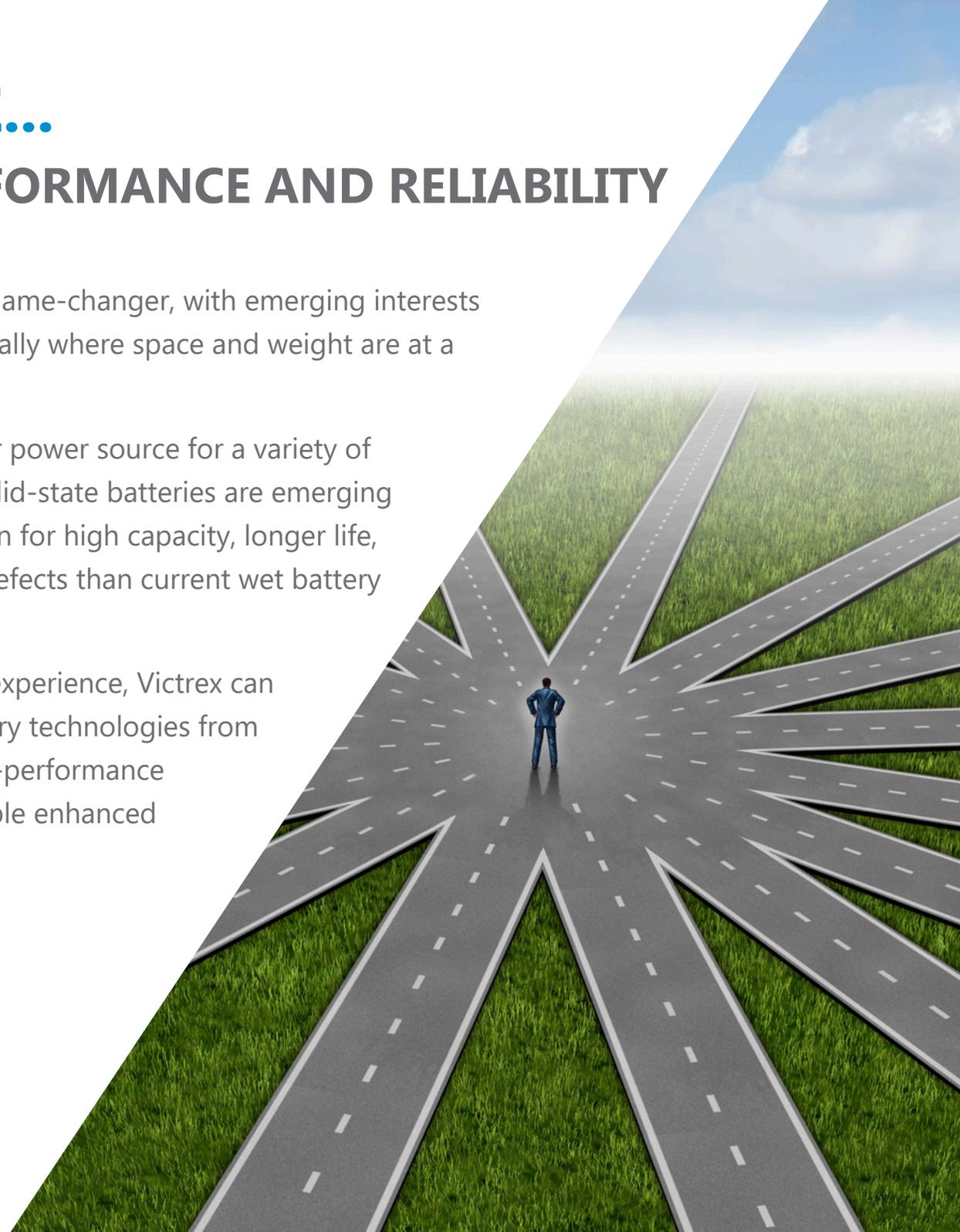
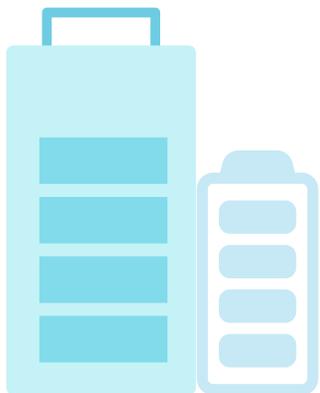
MATERIAL OF CHOICE...

ENHANCING BATTERY PERFORMANCE AND RELIABILITY

Advancements in battery technology have been a game-changer, with emerging interests and demands across markets and industries, especially where space and weight are at a premium.

While battery technology is expected to be a major power source for a variety of devices from mobile phones to electric vehicles, solid-state batteries are emerging as a next-generation technology to drive innovation for high capacity, longer life, faster charging and with fewer risks of failures or defects than current wet battery technology.

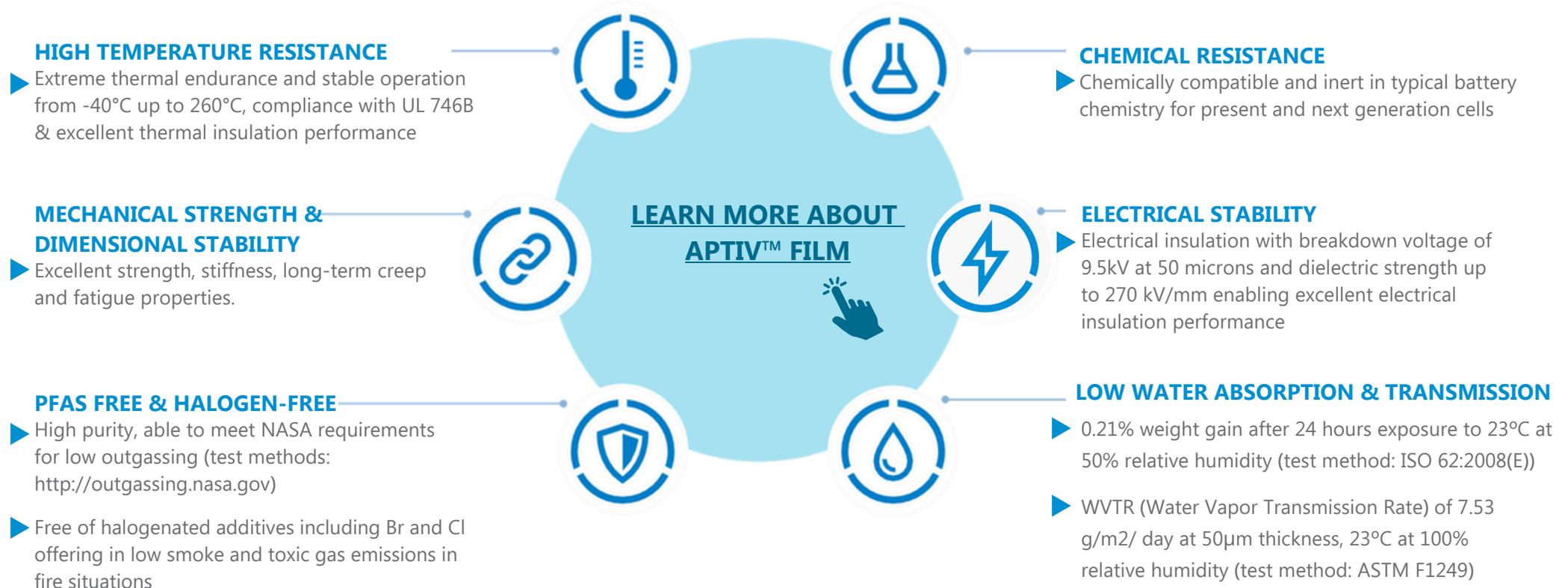
As the #1 PEEK expert with more than 40 years of experience, Victrex can help you address challenges in adapting new battery technologies from concept to commercialisation with innovative high-performance VICTREX™ PEEK polymer-based solutions that enable enhanced performance for batteries.



WE'VE GOT YOUR BATTERY'S BACK!

SUPPORTING RELIABLE BATTERY OPERATION WITH VICTREX™ PEEK

Victrex APTIV™ PEEK film offers reliability in the most demanding application environments. They incorporate all of the outstanding properties of VICTREX™ PEEK (PolyEther Ether Ketone) polymer in a thin film format. Their balance of properties make them amongst the highest-performing, most versatile thermoplastic films on the market.



MATERIAL BENEFITS

DESIGN MATERIALLY BETTER PRODUCTS

The design freedom and ease of processing offered by using Victrex APTIV film helps OEMs, designers and processors achieve enhanced product performance, reduced systems cost, increased functionality, and product differentiation.

USED IN

4 BILLION+

MOBILE DEVICES

APTIV films have been used in billions of mobile devices for acoustic performance and reliability.

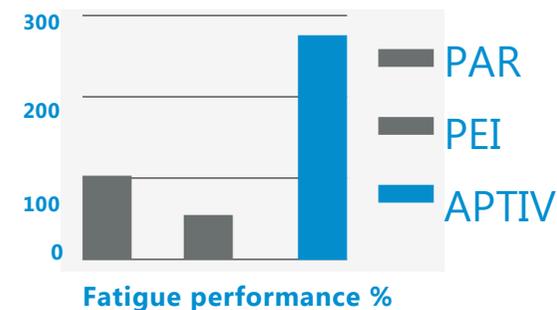
RANGE OF

3 – 500 μm

THICKNESS

APTIV Films can meet specific needs of different electronics applications for wear and insulation.

UP TO 3X



APTIV Films have around three times the fatigue lifetime of other polymers films such as PAR or PEI films.

VS. METAL

UP TO 70%

LIGHTER

Replacing metal with VICTREX PEEK can help you pack more performance into a lighter package.



VICTREX™ PEEK — KEY MATERIAL PROPERTIES

Material Type	Thickness	Dielectric Strength	Breakdown Voltage	RTI, Electrical	Tensile Strength	Tensile Modulus
		kv/mm ASTM D149	kV	°C, UL746B	MPa, ISO 527	GPa, ISO 527
APTIV film	25 µm	270	6.75	240	120	2.6
	50 µm	190	9.50	240	120	2.5
	125 µm	120	15.00	240	120	2.3
	250 µm	70	17.50	240	110	2.3

SOURCE: APTIV™ FILM TDS 1000/1300

Typical customer applications include:

- ▶ Thermally Insulative Liners and Layers
- ▶ Gaskets and Seals Terminals
- ▶ Electrical Insulation Caps
- ▶ Connectors
- ▶ Circuit Substrates
- ▶ Flexible Film Sensors

KEY PROPERTY

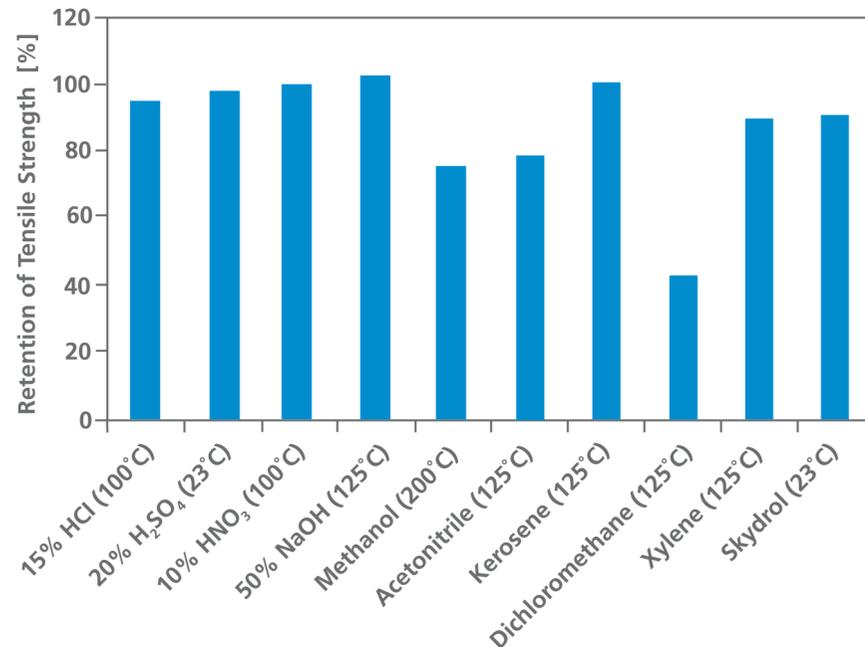
CHEMICAL RESISTANCE

Excellent resistance to a very wide range of chemicals over high temperatures

The importance of chemical resistance in batteries, from mobile phone to electric vehicles, cannot be overlooked. It is essential for preventing electrolyte leakage, resisting chemical corrosion, maintaining electrode stability, and enhancing overall battery safety, lifetime and performance consistency.

Victrex PEEK-based APTIV™ film, with its exceptional chemical resistance support these requirements, ensuring that mobile phone batteries perform reliably and safely under various conditions.

Retention of tensile strength of PEEK 450G after 4 weeks immersion in a range of chemical species



VIEW [CHEMICAL RESISTANCE BROCHURE](#) FOR MORE INFORMATION

[LEARN MORE](#)

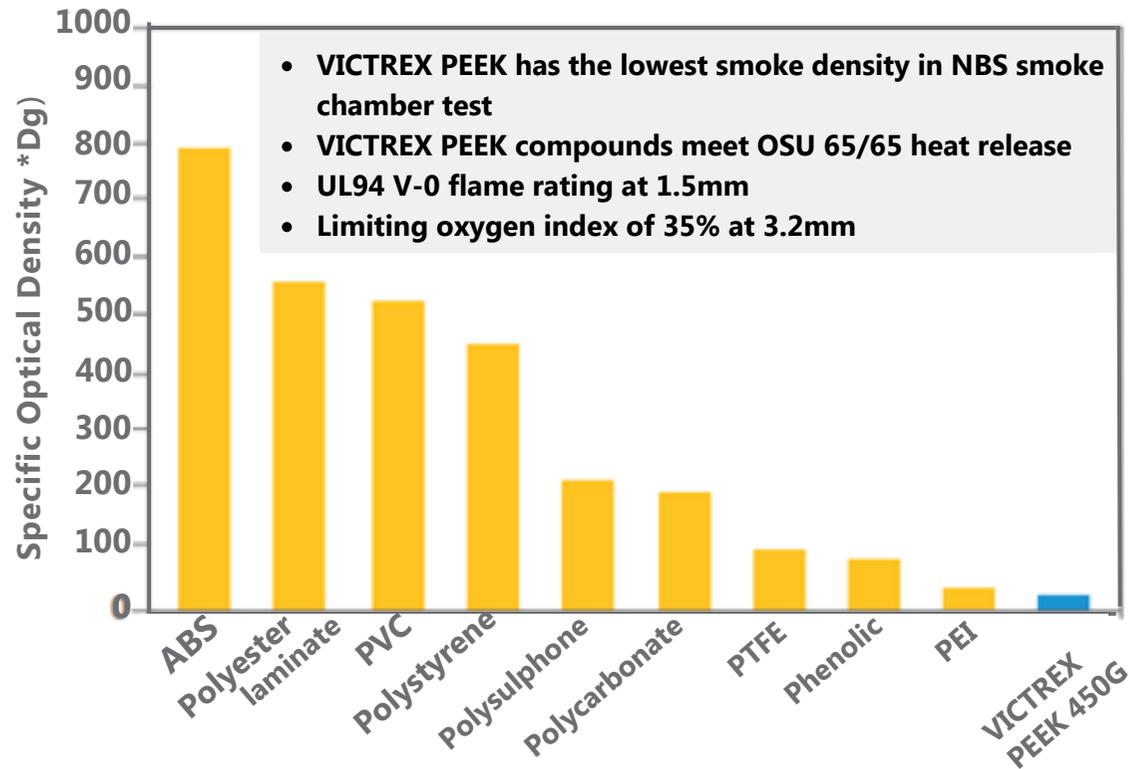


KEY PROPERTY

FLAMMABILITY

Materials used in battery applications must have exceptional flame retardancy properties. VICTREX™ PEEK material performs exceptionally well in respect to flammability. These flammability characteristics are inherent in the material and are achieved without the inclusion of any flame retardant materials such as halogen-based additives. In tests to measure smoke produced by the combustion of plastic materials, the data shows that unfilled VICTREX PEEK polymer has the lowest value of specific optical density of smoke in all the materials tested.

Forced Combustion Chamber Smoke Results for a range of Polymers



Source: VICTREX Aerospace brochure



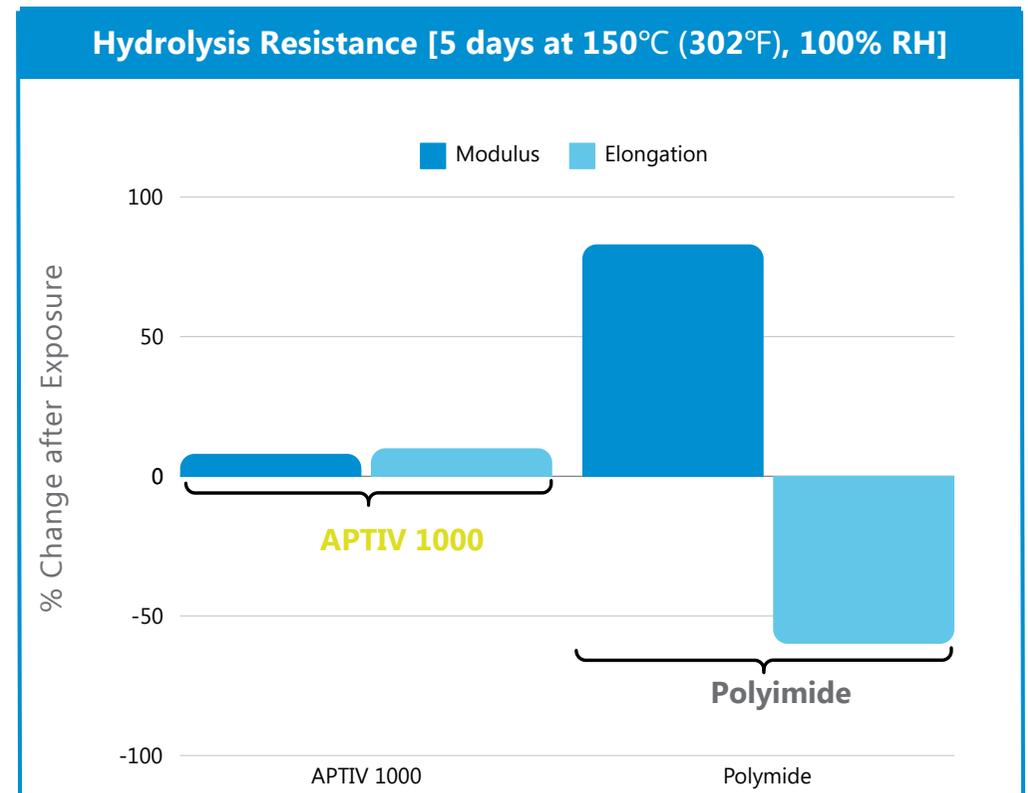
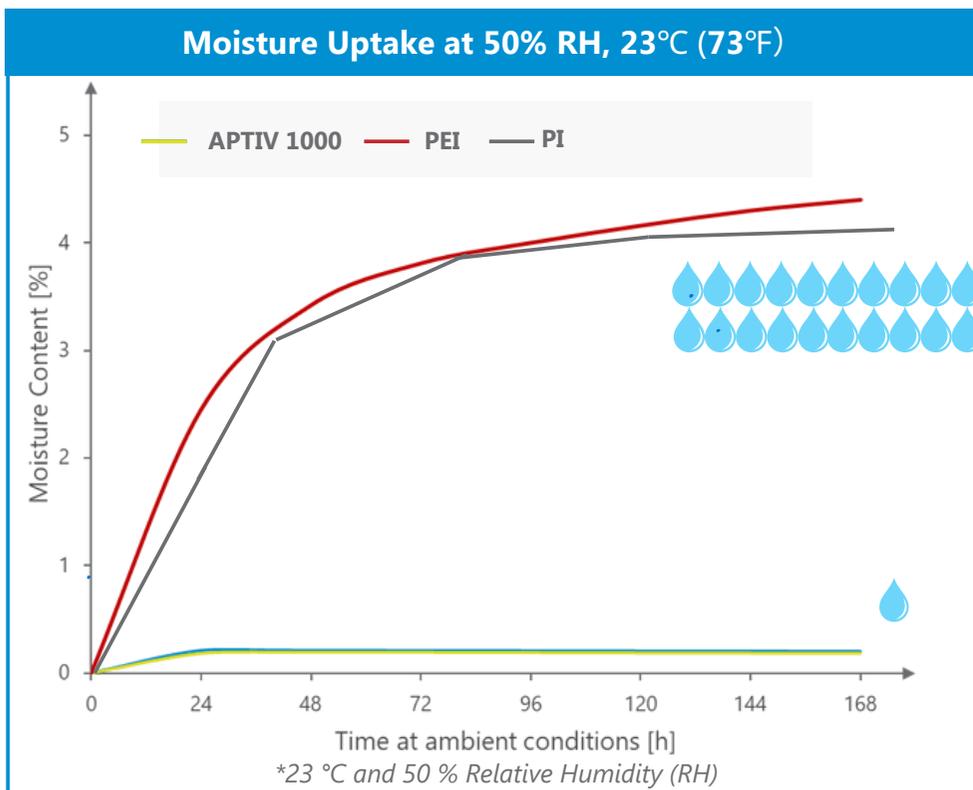
KEY PROPERTY

MOISTURE UPTAKE

In the rapidly evolving field of mobile technology, the performance and safety of batteries has become increasingly critical. These batteries are not only required to provide long-lasting power but also to ensure the safety of users and devices. Among the various factors influencing battery performance and safety, moisture uptake especially when used in humid conditions is particularly important.

► Moisture Uptake

Under general atmospheric conditions of 50% relative humidity(RH) , APTIV™ film exhibits stable mechanical, dielectric and dimensional properties.



KEY PROPERTY

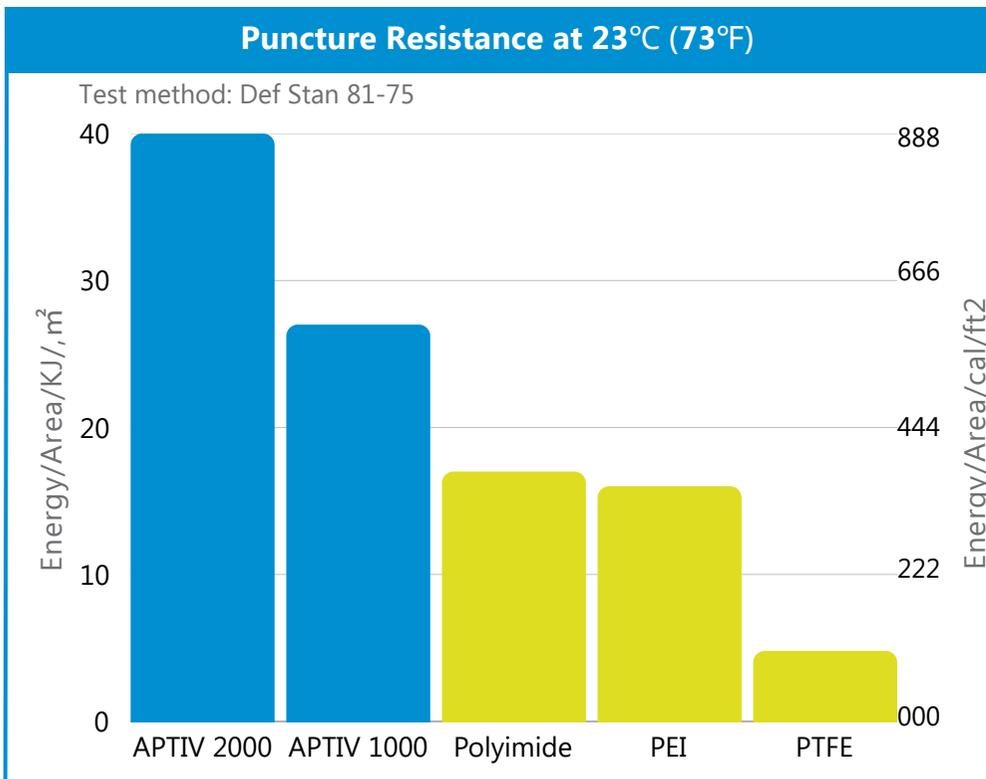
PUNCTURE & TEAR RESISTANCE

Batteries can be damaged if punctured, leading to potential hazards such as short circuits, fire, or explosion. Puncture resistance ensures battery safety, durability, and performance.

APTIV™ Film's lightweight, flexible, and puncture-resistant properties make it an excellent candidate for the battery industry, allowing users to rely on their mobile devices for extended periods without worrying about potential hazards or performance issues.

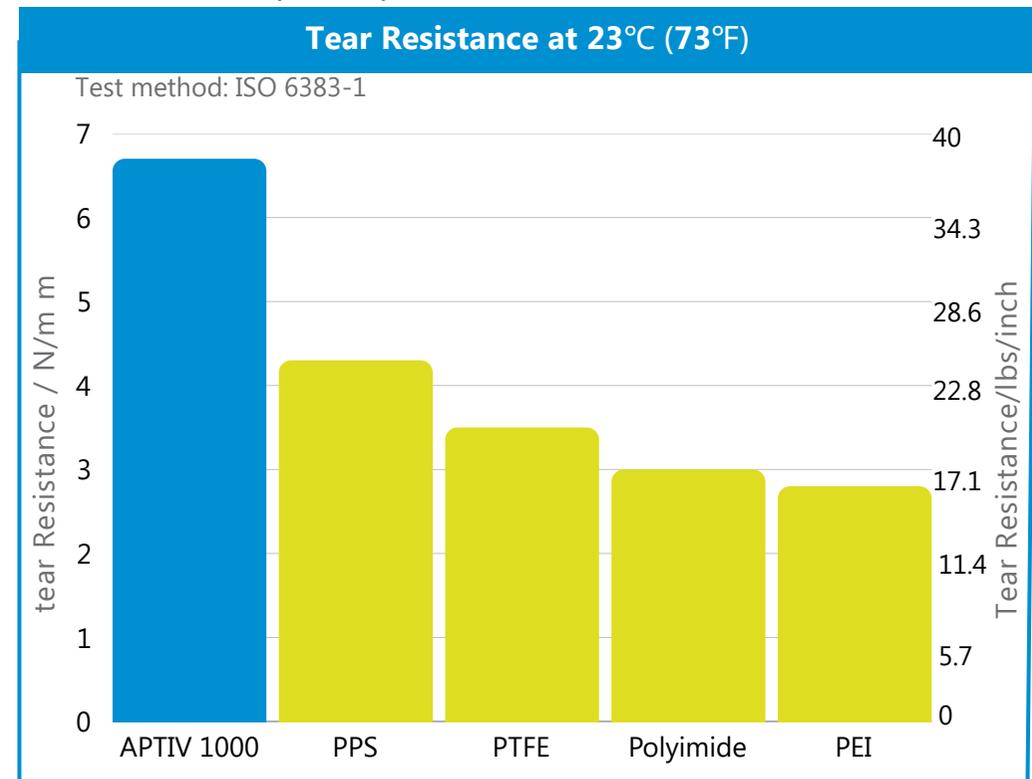
► Puncture Resistance

APTIV film demonstrate excellent puncture resistance compared with other high temperature polymers films.



► Tear Resistance

APTIV 1000 film has excellent tear resistance properties combining strength from the crystalline phase and ductility from the amorphous phase



MATERIAL DATA

PERFORMANCE WHERE IT'S NEEDED

EXPLORING KEY MATERIAL DATA

	CONDITIONS	TEST METHOD	UNITS	TYPICAL VALUE	
MECHANICAL DATA				APTIV™ 1000 SERIES	APTIV™ 1102 SERIES
Tensile Strength	Yield, 23°C	ISO 527	MPa	130	100
Tensile Elongation	Break, 23°C	ISO 527	%	>150	>100
Tear Strength	At 23°C	ISO 6383-1	N/mm	6.7	4,4

ELECTRICAL PROPERTIES				APTIV™ 1000 SERIES	APTIV™ 1102 SERIES
Dielectric Strength	23°C	ASTM D149	kV / mm	189	200
Dielectric Constant	23°C	ASTM D150	N/A	3,5	3,6
Loss Tangent	23°C	ASTM D150	N/A	0,002	0,001
Volume Resistivity	23°C	ASTM D257	Ohm cm	4.00E +16	1.00E +16
Partial Discharge Inception Voltage (PDIV)	23°C	IEC 60270	V _{peak}	1700*	1450**
Partial Discharge Inception Voltage (PDIV)	180°C	IEC 60270	V _{peak}	1050*	1000**

* tests performed on 150 µm thick film samples

** tests performed on 125 µm thick film samples

SOURCE: APTIV™ FILM TDS 1000/1102

[COMPARE NOW!](#)

A SUSTAINABLE SOLUTION

A POTENTIAL PFAS REPLACEMENT

Innovative companies are seeking and selecting PFAS alternative materials in light of safety concerns, which is driving innovation including in development in battery material science, supporting application of new materials.

VICTREX PEEK POLYMER PROPERTIES VS. PTFE

	VICTREX™ PEEK	PTFE
PHYSICAL PROPERTIES		
Halogen free	Yes	No
Colour	Beige	White
Chemical resistance	Excellent	Excellent
Specific Gravity	1.3	2.16
Biocompatibility	Yes	Yes
Smoke Toxicity	Low	High
Flammability	Excellent	Excellent
MECHANICAL & THERMAL PERFORMANCE		
Tensile strength	High	Low
Tensile modulus	High	Low
Melting temperature	343°C	335°C
PROCESSABILITY	Excellent	Poor to Fair

Like PTFE, PVDF, PFA and PCTFE, VICTREX PEEK is also in the category of high performance polymers.

Victrex PEEK is being used as an alternative in cases where properties offered by PTFE are required such as biocompatibility, chemical, temperature and electrical resistance, and self-lubricating wear resistance.

Victrex PEEK is additionally stronger and stiffer which means it can perform additional structural roles. Although Victrex PEEK can replace PTFE in many scenarios, sometimes the increased strength and stiffness may not be required.

Victrex PEEK is not classified as a PFAS containing material, nor are PFOAs or PFAS used in the production process.

FOR COMPARISONS TO OTHER PFAS MATERIALS OR SPECIFIC PROPERTY MEASURES OR REQUIREMENTS

[CONTACT US](#)

SUSTAINABILITY

SUPPORTING NET ZERO EMISSION GOALS THROUGHOUT THE SUPPLY CHAIN WITH APTIV FILM

- ▶ VICTREX™ PEEK is fully recyclable, enhancing the potential for lifetime circularity
- ▶ VICTREX PEEK has lower Global Warming Potential (GWP) than industry average PEEK*
*Based on KPMG Life cycle analysis report with Victrex UK produced BDF vs GaBi database of PEEK average 15.3kg CO2/kg of PEEK
- ▶ Victrex has a growing number of accreditations from leading sustainability programs including



Ranked in Top 15% of companies



Commitment to the science-based emission reduction targets

SCIENCE
BASED
TARGETS

NQC | SUPPLIER
ASSURANCE

The most widely adopted Automotive Supplier Assurance standard

MSCI
ESG RATINGS



A key ESG rating agency for investors & listed companies
A Rating



Committed to Apple's Supplier Clean Energy program



Inclusion in FTSE Russell Green Revenues Index

Sedex | Member

Committed to an ethical and sustainable supply chain



Climate change assessment, B
Water Security, C



VICTREX IS COMMITTED TO SUSTAINABILITY

52%

Revenues from sustainable products
(products offering a quantifiable environmental or societal benefit)

91%

R&D project investment
focused on sustainable products

100%

Renewable sources
in UK electricity (90% globally)

55%

Waste reduction per unit of revenue
since 2013

17%

Reduction in carbon intensity since 2013
(Scope 1 & 2 CO₂ emissions per tonne of PEEK produced)

Aligned to UN Sustainable Development Goals 2030



[LEARN MORE ABOUT OUR SUSTAINABILITY STRATEGY](#)



THE VICTREX DIFFERENCE

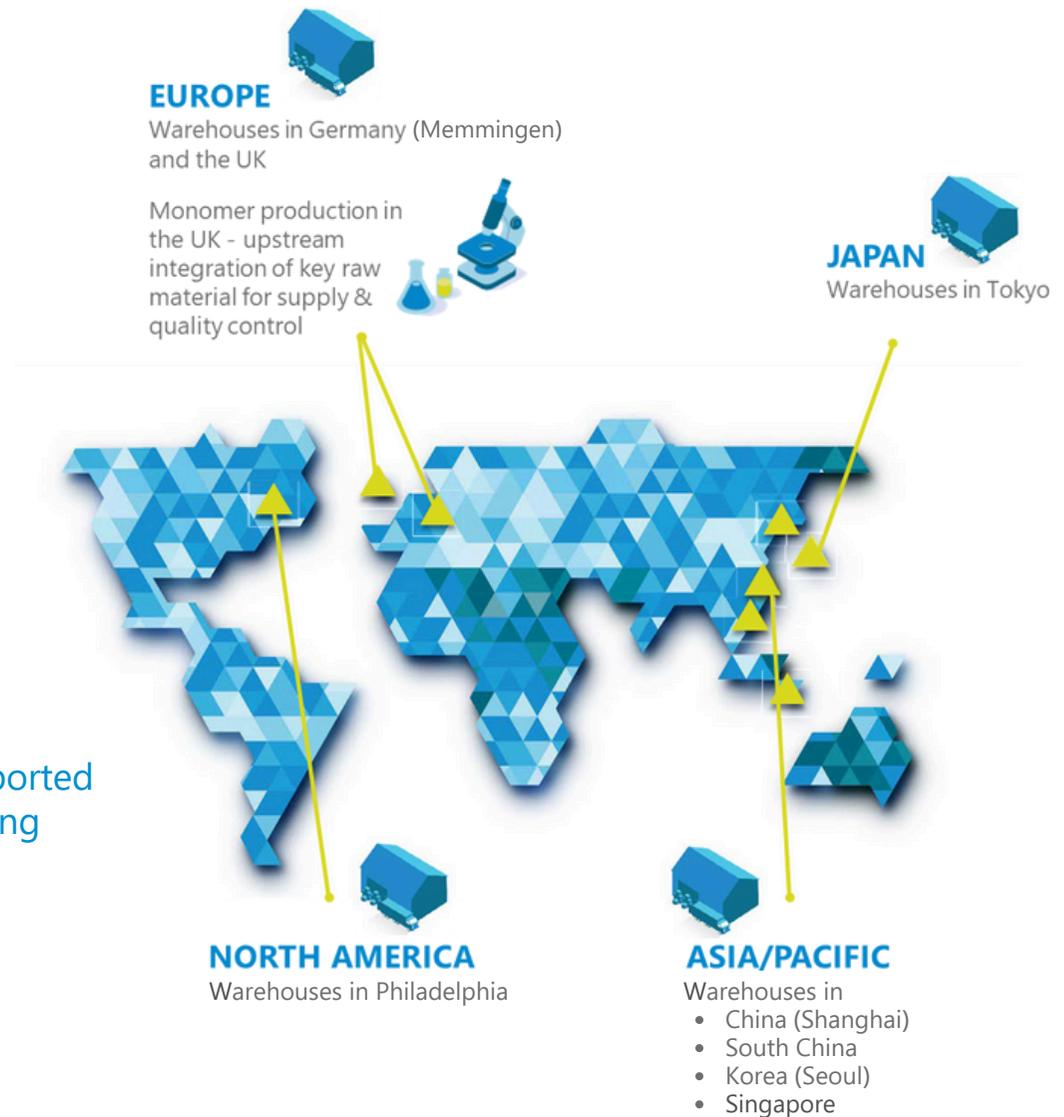
ENSURING SECURITY OF SUPPLY

- ▶ Upstream integration enabling greater control of formulating flexibility & supply
- ▶ Global facilities providing short lead times and strengthening overall logistics
- ▶ Strategic commitment to supply chain security supported through Class A certified Integrated Business Planning
- ▶ #1 global PEEK production capacity – Invested and ready for growth now



ENSURING SECURITY OF SUPPLY
Watch the 90 second video here

Kelly Leveridge
Global Supply Chain Leader
Victrex



WHAT IS YOUR NEXT CHALLENGE?

Contact us to discuss your current project development.

Our team is just a click away and would be more than happy to discuss your requirements and support you.

[CONTACT US NOW](#)

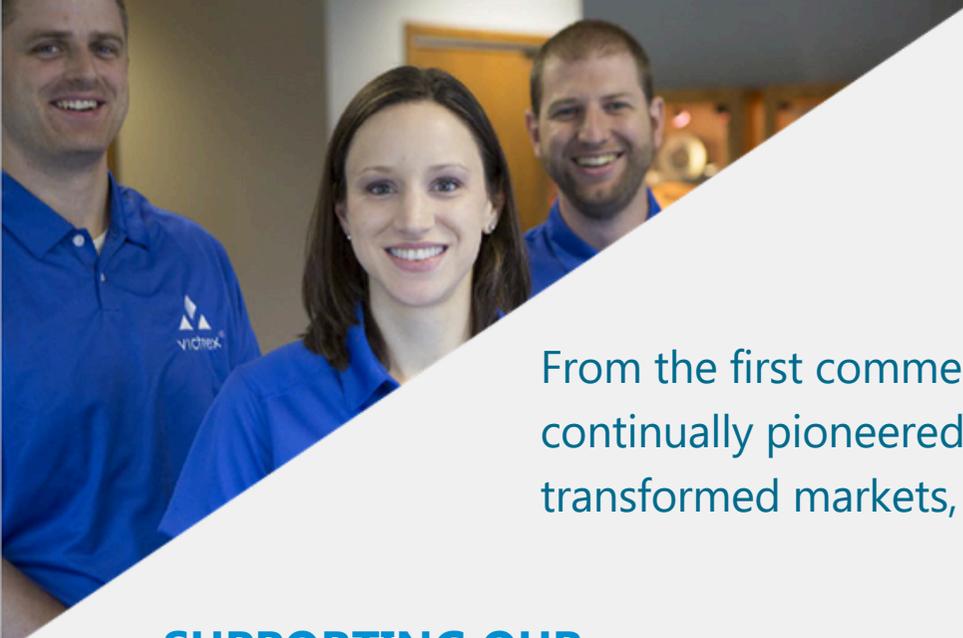


[DESIGN WITHOUT LIMITS](#)
[Watch the 3 min video here](#)



VICTREX PEEK POLYMER SOLUTIONS
FOR ELECTRONICS INDUSTRY





THE VICTREX DIFFERENCE

WHY VICTREX?

From the first commercialisation of PEEK over 40 years ago, Victrex has continually pioneered new PAEK-based polymer solutions that have transformed markets, offering solutions in the toughest environments.

SUPPORTING OUR CUSTOMERS' PRODUCTIVITY

- ▶ Custom formulations optimised for your specific requirements
- ▶ Expert 'on-site or remote' processing support

Not familiar with PEEK?
Learn more in this video!



ACCELERATING INNOVATION

- ▶ Rapid response through deep Electronics sector market insight
- ▶ Faster innovation and product scale up through PEEK-dedicated R&D and manufacturing facilities.

#1

PEEK EXPERTS

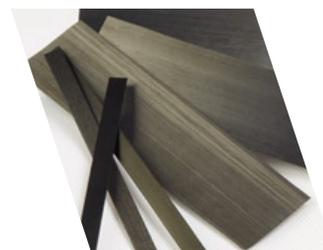
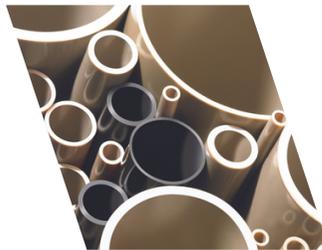
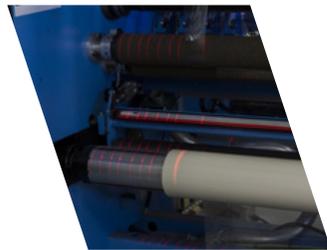
40+

YEARS OF EXPERIENCE

VICTREX PEEK PRODUCT PORTFOLIO

Performance by design

Victrex was the first company to commercialise PEEK and has focused on developing high-performance polymeric solutions for over 40 years. This dedication provides us with unmatched expertise and experience. By working together, we can help turn the toughest challenges into opportunities.



VICTREX PEEK

VICTREX PEEK is THE metal replacement material that can enable optimum performance. Optimise the designs if your next-generation components to achieve significant weight savings with our vast portfolio of polymers.

- 70% lighter vs. steel
- 55% lighter vs. titanium
- 40% lighter vs. aluminum

Injection molding unfilled, carbon-fiber reinforced, and glass-filled grades.

Proprietary grades available to achieve thinner wall sections, higher modulus, and minimal wear.

APTIV FILM

Takes advantage of the properties of VICTREX PEEK in a thin film format for demanding aerospace system. By offering unmatched processing opportunities, APTIV film allows for the design of durable, light-weight solutions.

- Up to 60% lighter vs polyvinyl fluoride (PVF) film.

Laminate, seal, weld, metalize, and many more.

Available in thicknesses from 5 to 500 microns.

VICTREX PIPES

Lightweight tubing manufactured from VICTREX PEEK polymer can be used for protective sheathing, cable conduits and low pressure fluid transport systems. Benefit from the ability to customer design tubing systems to fit your spacing requirements.

- 70% lighter vs. stainless steel
- 45% lighter vs. titanium
- 33% lighter vs. aluminum

Bend, form, fit, flare and clamp

Excellent corrosion resistance and fire, smoke and toxicity properties.

POLYMERS FOR COMPOSITES

Combine strength and light weight by specifying VICTREX PEEK as a composite matrix material. This innovative technology allows engineers to design for the most demanding environments.

- Up to 70% lighter than metal alloys

5x higher specific strength
4x higher fatigue strength
4x higher specific stiffness vs. aluminum

Available in braid, fabric, flake, long fiber pellets, tow and unidirectional tape and sheet

VICOTE COATINGS

Durable VICTREX PEEK coatings enhance the lifetime of metal substrates while being friendly to the environment. Enhance the performance of your components with Victrex liquid and powder dispersions.

- Use a one-coat system for a smooth, uniform surface

Excellent resistance to wear, abrasion, high heat, creep and chemicals.

Halogen-free with no additives

NEED HELP SELECTING PRODUCTS?

[CONTACT US](#)



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About Victrex

Victrex is an innovative world leader in high performance polymer solutions, focused on the strategic markets of automotive, aerospace, energy (including manufacturing & engineering), electronics and medical. Every day, millions of people use products and applications, which contain our materials – from smart phones, aeroplanes and cars to oil and gas operations and medical devices. With over 40 years' experience, we develop world leading solutions in PEEK and PAEK-based polymers, semi-finished and finished parts which shape future performance for our customers and our markets, and drive value for our shareholders. Find out more at www.victrex.com

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