

IMPROVING **RELIABILITY IN**
CRYOGENIC SEALING COMPONENTS

VICTREX CT™ 100 POLYMER FOR THE
NATURAL GAS PROCESSING INDUSTRY

SHAPING THE FUTURE OF CRYOGENIC SEALING COMPONENTS

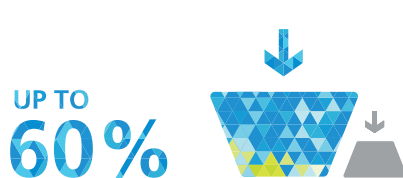
The natural gas processing industry faces a critical safety and environmental challenge in escalating fugitive emissions and operating costs. With 51% of fugitive emissions coming from failed sealing components¹, \$93 million in violations² have already been administered due to non-metallic seal integrity issues resulting from the extreme cold temperatures found in compressing and liquefying natural gas. In order to maintain high operational and environmental safety standards, rigid regulations have been put into place. Given our decades of experience in delivering innovative PEEK solutions for the Energy industry, Victrex understands the need for reliability and efficiency in harsh conditions. With the introduction of VICTREX CT™ 100 polymer, end-users are now able to take advantage of a PEEK-based solution that has been tailor-made for low temperature environments. **Sealing material solutions designed and tested for proven performance in cryogenic environments that help reduce fugitive emissions and costs while providing improved reliability and durability compared to fluoropolymers – that's future performance.**

PERFORMANCE BENEFITS



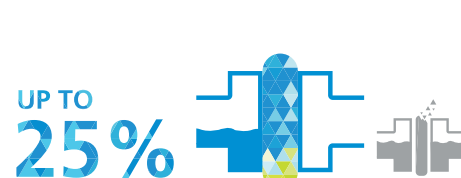
MORE RELIABLE SEAL *VS. FLUOROPOLYMERS

*PTFE and PCTFE have lower thermal conductivity than VICTREX CT™ 100 polymer meaning that the fluoropolymer seal takes longer to equilibrate with its metal counterpart



GREATER SEALING LOAD CAPACITY* VS. FLUOROPOLYMERS

*VICTREX CT™ 100 polymer has higher compressive strength than PTFE at -196 °C (-321 °F).



LESS LOAD* REQUIRED TO SEAL VS. FLUOROPOLYMERS

*PTFE has a higher compressive modulus compared to VICTREX CT™ 100 polymer at -196 °C (-321 °F)



LESS EXPANSION AND CONTRACTION* VS. FLUOROPOLYMERS

*Fluoropolymer components fitted within and against steel parts are more susceptible to thermal mis-match failures when compared to VICTREX CT™ 100 polymer at -196 °C (-321 °F)



TOUGHER* THAN FLUOROPOLYMERS

*PTFE and PCTFE are less ductile than VICTREX CT™ 100 polymer at -196 °C (-321 °F)

POTENTIAL BENEFITS

-  **Prevents** over-tightening failures
-  **Faster recovery** than PTFE on unloading
-  **Reduces risk** of circumferential stress fractures
-  **Use lower force actuation elements** for system cost reductions

¹<http://www.flowcontrolnetwork.com/the-valves-role-in-fugitive-emissions-compliance/>

²<http://www.environmental-expert.com/news/big-west-oil-to-spend-18m-on-emission-controls-to-resolve-clean-air-act-violations-at-north-salt-lake-389832>

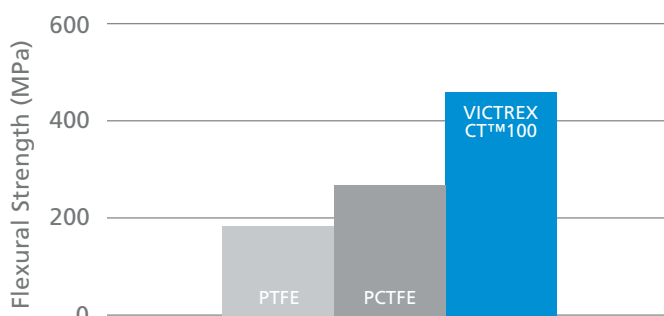


PROCESSING BENEFITS AND MATERIAL DATA



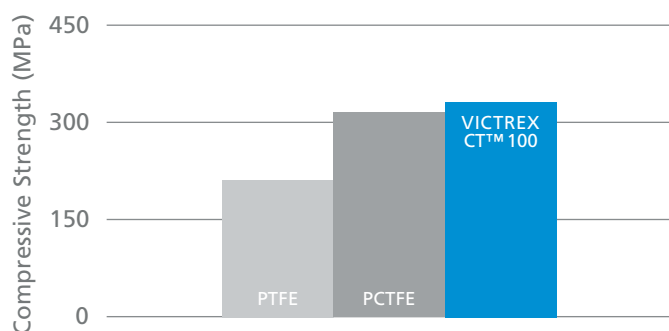
-  **Smoother machining,**
no "gumming"
-  **Equivalent mechanical properties**
for molded and machined components
-  **Processed**
on conventional tooling and equipment

Flexural Strength at -196 °C (-321 °F)



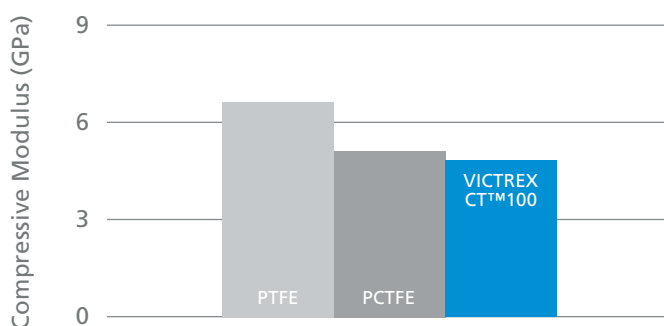
VICTREX CT™100 polymer exhibited improved flexural strength at cryogenic temperatures when compared to PTFE and PCTFE. It is important to note that, out of the five test bars used, three of the bars did not break within the extremes of the test jig itself.

Compressive Strength at -196 °C (-321 °F)



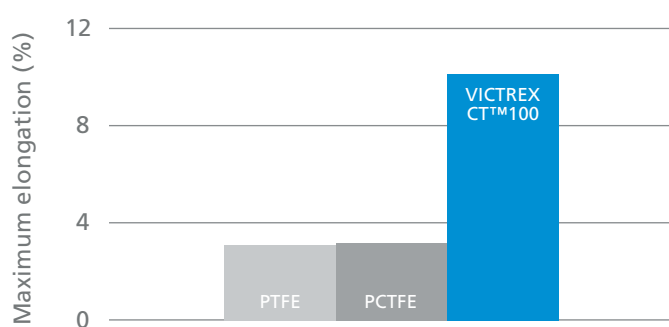
VICTREX CT™100 polymer delivers significantly higher compressive strength than PTFE at -196 °C and similar to PCTFE, but will offer improved modulus when compressed as seen in the next graph.

Compressive Modulus at -196 °C (-321 °F)



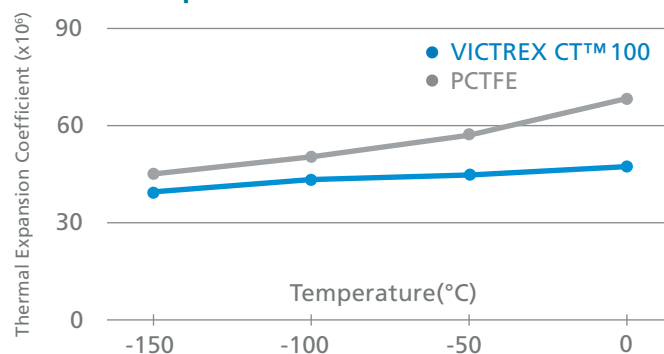
VICTREX CT™100 polymer offers the lowest stiffness at cryogenic temperatures which means it will require the lowest sealing force necessary in this environment. This results in the material being suitable for natural gas processing conditions.

Maximum elongation at -196 °C (-321 °F)

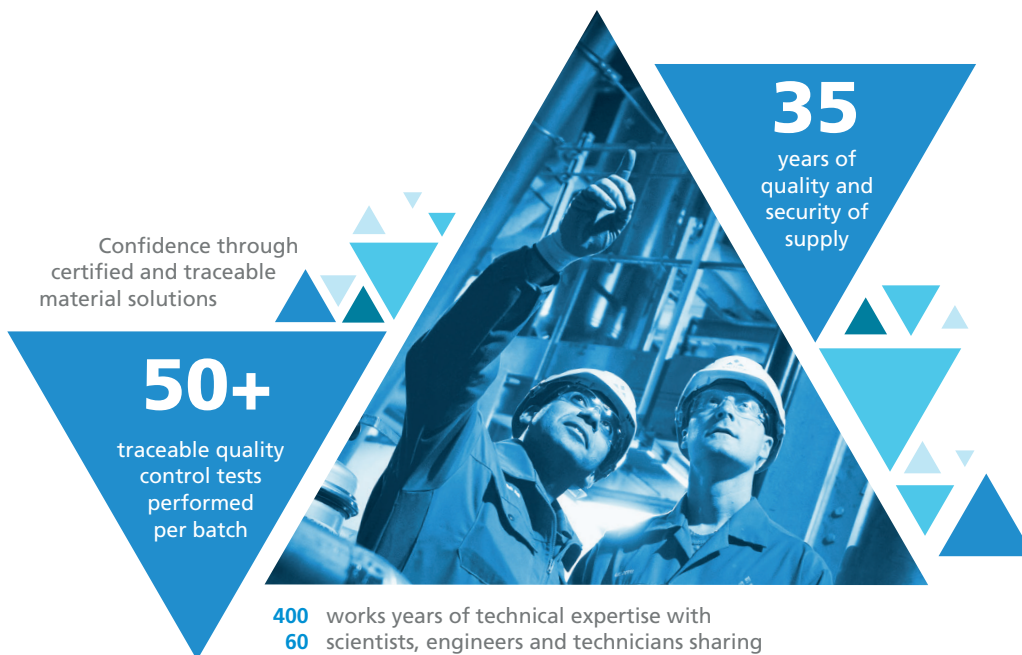


VICTREX CT™100 polymer exhibits significantly greater ductility at the cryogenic temperature found in natural gas processing environments.

Thermal Expansion Coefficient versus Temperature



VICTREX CT™100 polymer offers a stable coefficient of thermal expansion in temperatures ranging from room temperature to cryogenic conditions. This illustrates that the seal will provide more reliable performance across a broad temperature spectrum than PCTFE.



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