

CHEMRAZ[®] 694

Exceptional Chemical Resistance and Best-in-Class in High Temperature Steam Environments

PERFLUOROELASTOMERS ENABLE SEALING SOLUTIONS IN HIGH-TEMPERATURE STEAM APPLICATIONS

Greene, Tweed developed Chemraz[®] 694, a perfluoroelastomer, for exceptional chemical resistance and best-in-class performance in high temperature steam environments, including Steam Assisted Gravity Drainage (SAG-D) and other enhanced oil recovery (EOR) applications requiring steam injection. In addition, Chemraz 694 can be utilized in typical Oilfield applications where sustained high temperature resistance is a requirement.

With the increased use of steam injection as an EOR technique in maturing, as well as heavy oil fields, Greene, Tweed has responded to the market demand for reliable and extended downhole service life capacity for sealing materials for that environment. Greene, Tweed undertook a stringent process to develop an FFKM which would retain its physical properties in a steam environment, thus meeting customer requirements for a more reliable sealing solution. Chemraz 694 outperformed competitor materials after an extended time at 500°F (260°C) in steam and short term exposure to a peak excursion at 600°F (316°C). Other comprehensive testing regimes carried out under a variety of conditions have shown Chemraz 694 to be the “go-to” solution for critical steam environments.

In addition to best-in-class performance in a steam resistance, Chemraz 694 also delivers exceptional chemical resistance to well fluids and gases commonly found in the Oil & Gas industry including amine-based inhibitors, Toulene, Xylene, and other reservoir fluids including H₂S. Chemraz 694 is rated for a working temperature range of 10°F to 600°F (-12°C to 316°C). In addition to SAG-D applications, the use of Chemraz 694 can be considered for steam injection applications such as Cyclic Steam Stimulation (CSS) and artificial lift methods, including electrical submersible pumps (ESPs).



Prior Best-in-Class solution: before/after one week in 600°F steam



Chemraz 694 seals: before/after one week in 600°F steam

FEATURES & BENEFITS

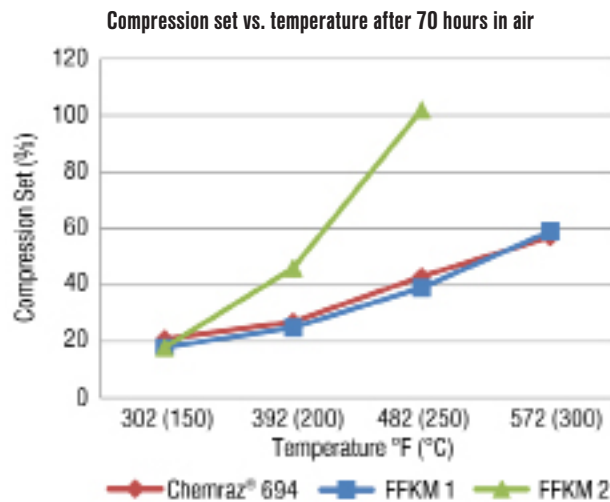
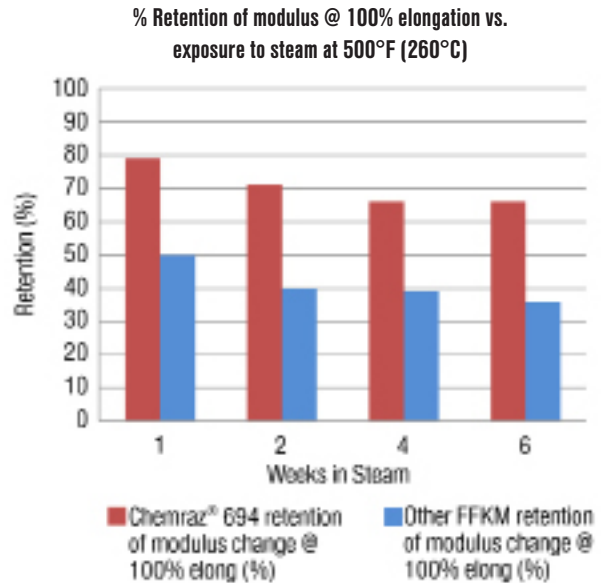
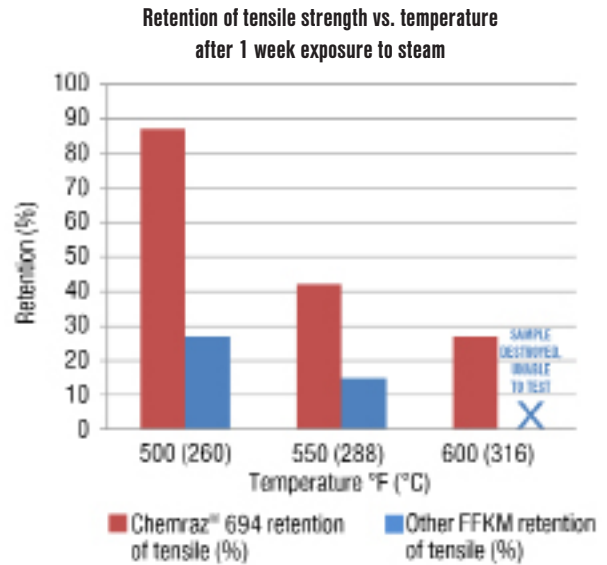
- Retains physical properties in a hot steam environment, thus reducing mean time between failure (MTBF) of elastomeric components in critical steam environments
- Superior resistance to hostile reservoir chemistries, drilling fluid additives and production chemicals for improved elastomeric performance
- Excellent compression set and thermal shock resistance for increased reliability of components used in critical steam and high temperature environments

Chemraz 694 is available in O-ring, Vee ring, G-T[®] ring and custom configurations.



TYPICAL PROPERTIES*		
Physical	ASTM Method	Typical Value
Color		Black
Polymer Type		Perfluoroelastomer
Specific Gravity	D792	1.94
Hardness, Type A**	D2240	87
Mechanical		
Compression Set @ 25% Deflection, %** — 70 hours @ 392°F (200°C)	D1414	26
Tensile Strength, psi (MPa)	D1414	2,650 (18.2)
Elongation, %	D1414	145
Modulus @ 50% Elongation, psi (MPa)	D1414	1,100 (7.5)
Modulus @ 100% Elongation, psi (MPa)	D1414	2,150 (14.8)
Thermal		
Maximum Service Temperature		600°F (316°C)

*Note: Unless otherwise indicated, all tests are performed on AS 568A (-214) O-rings.
 **Note: Test performed on button samples.



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 EN-DS009-US-08-17-2016



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