

ThermaFRAC

Shear-tolerant high-temperature fracturing fluid

BENEFITS

- Reduces costs through flexibility, simplicity, and improved fracture placement
- Eliminates the need for costly workovers

APPLICATIONS

- Bottomhole static temperature between 200 degF and 375 degF [93.3 degC and 190.6 degC]
- Hard rock formations where enhanced downhole viscosity is critical
- Hydraulic fracturing and stimulation treatments of oil and gas wells pumped through tubing, casing, and coiled tubing

FEATURES

- Provides flexibility to be formulated with potassium chloride or organic clay stabilizer
- Can be formulated with heated water (up to 140 degF [60 degC]) for sensitive completions
- Reduces fluid complexity through using 50% fewer additives
- Is compatible with current additives and breakers
- Enhances long-term thermal stability
- Eliminates traditional shear sensitivity of metal crosslinked fracturing fluids
- Provides improved vertical proppant distribution

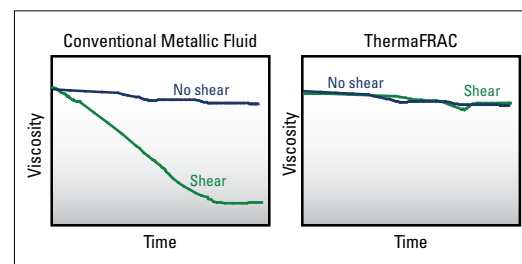
FRACTURING IN DEEPER, HOTTER WELLS

As hydraulic fracture treatments are pushed into deeper and hotter wells, fracturing fluids are subjected to more extreme environments than ever before. Not only do the temperatures in these environments approach 400 degF [204 degC] and beyond, but the tubular configurations and pump rates result in tremendously high shear rates. The combination of these conditions creates a challenging environment for today's fracturing engineer.

SHEAR TOLERANCE

Designing a conventional metallic crosslinked fracturing fluid requires careful balancing. If the fluid crosslinks too late, the resulting fracture width may be too small to place proppant. If the fluid crosslinks too early, it is subject to extremely high shear in the tubulars that dramatically degrades the fluid's viscosity and its ability to generate fracture geometry and carry proppant.

ThermaFRAC* shear-tolerant, high-temperature fracturing fluid developed by Schlumberger is a unique chemical approach that provides long-term thermal stability from the zirconium crosslinker. At the same time, it does not sacrifice early time viscosity that is critical for the creation of fracture width.



ThermaFRAC eliminates traditional metal crosslinked fracturing fluid sensitivity to shear.

FLUID SIMPLICITY

Traditionally, complex fracture fluid systems have been used for treatments in complex fracture environments. These systems require buffers, crosslinkers, stabilizers, breakers, surfactants, and other fluid additives, resulting in complex chemistry that must be kept in a tight range to ensure fluid performance.

The ThermaFRAC* fluid system is a five-additive system that reduces fluid complexity and that is compatible with either KCL or organic clay stabilizer. This system provides greater reliability and repeatability at the wellsite.

ThermaFRAC Specifications

Temperature Range

High temperature application	200 degF–375 degF [93.3 degC–190.6 degC]
------------------------------	--

Additive Compatibility

Clay stabilizer	Up to 4% KCl; organic clay stabilizer
Surfactants	Typical foamers and surface tension lowering surfactants
Breakers	Persulfate and Bromate oxidizers
Proppant transport additive system	Compatible with high-temperature and low-temperature FiberFRAC* technology
Proppant flowback control	PropNET* additive I, II, and Gold
Biocides	Compatible with typical oilfield biocides

Proppant Compatibility

All mesh sizes	Sand, resin-coated proppant, intermediate strength proppant, Bauxite
----------------	--

Energized Compatibility

Nitrogen in all cases	
-----------------------	--