

PureChem®
Services
Fracturing & Completions

PFR-Z™

AMPHOTERIC, ZWITTERIONIC HVFR EMULSION

PRODUCT DETAILS

PureChem's exclusive PFR-Z™ HVFR product has been developed for enhanced performance in the most exertive completion designs that are currently pushing the operational and productivity limits in shale development. PFR-Z™ is an HVFR that has found the ideal balance between HV and FR: there is sufficient viscosity to aid in proppant transport and optimize frac geometry but not compromise on friction pressure reduction and the resultant injection rate.

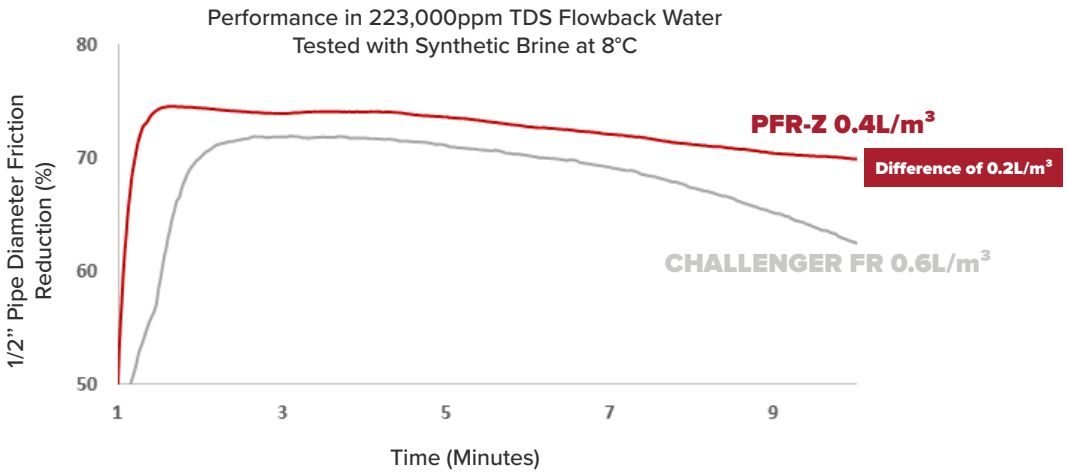
WHAT MAKES PFR-Z BETTER?

PFR-Z™ differentiates through its speed of on-set for friction pressure reduction (inversion time), overall friction pressure reduction, and optimized dynamic proppant suspension capacity. PFR-Z™ allows for placement of higher proppant concentrations at faster pumping rates, utilizing 100% produced or flowed back water, and maintains its performance in cold water, necessitating less heating costs. **Re-use your production water more effectively** due to the unique polymer backbone, making it more resistant to changes in water chemistry. PFR-Z™ is highly resilient to iron and other common contaminants.

- **MINIMIZED PUMP PRESSURE**
- **SALINITY FLEXIBILITY / ESG BENEFITS**
- **LOWER LOADING RATES**
- **INCREASED CLUSTER COUNT, PREFERABLE ZONAL STIMULATION**
- **LOWER COST**

PURECHEM CALGARY FLOW-LOOP DATA

Pre-job testing utilizing PureChem's Chandler 6500 flow-loop has accurately predicted the realized benefit of the PFR-Z™ during fracturing operations.



CASE STUDY

N.E. BC - MONTNEY

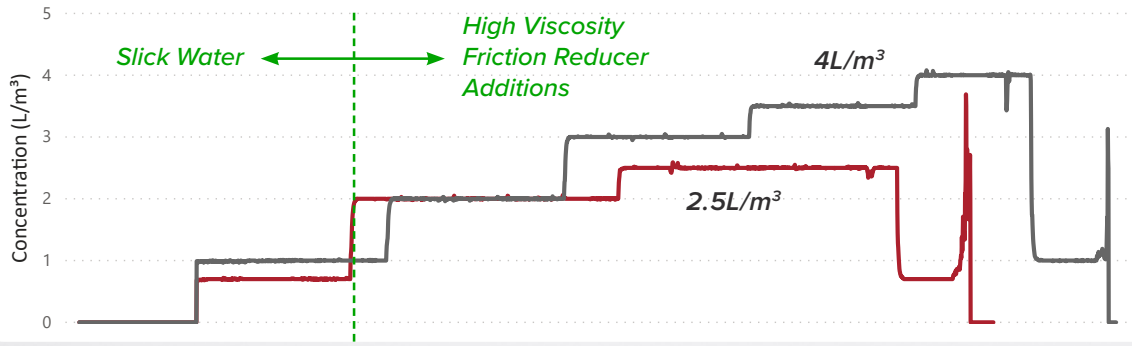
PFR-Z was trialled side by side with the Challenger FR (friction reducer) during a Zipper Frac Montney Pad in North East B.C.

Below is a comparison of back to back stages where PFR-Z was used against the Challenger FR for the initial 3 stages, at which point the switch was made back to the Challenger FR high molecular weight anionic FR. The regular FR showed a noticeable decrease in flow rate, while loading rates had to be increased to maintain pressure savings. PFR-Z enabled the operator to increase the number of clusters per frac stage, leading to a significant time savings of almost 2 days on a single frac pad and preferable zonal stimulation.

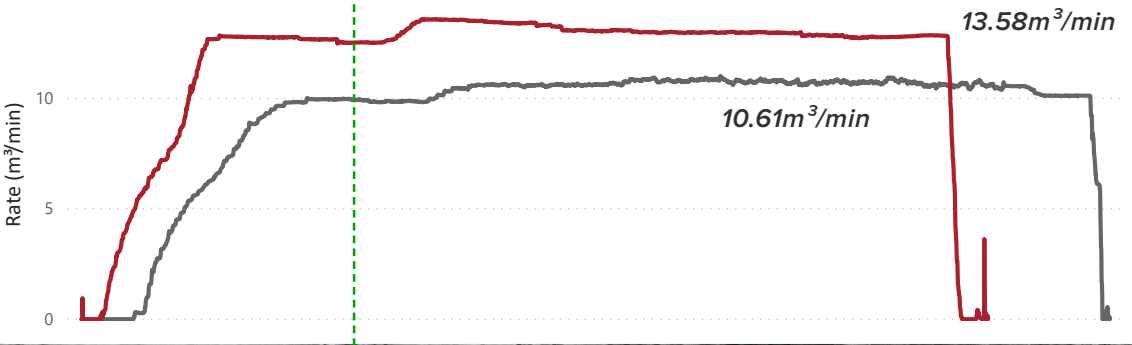
2 DAYS SAVED

19 CLUSTERS ADDED

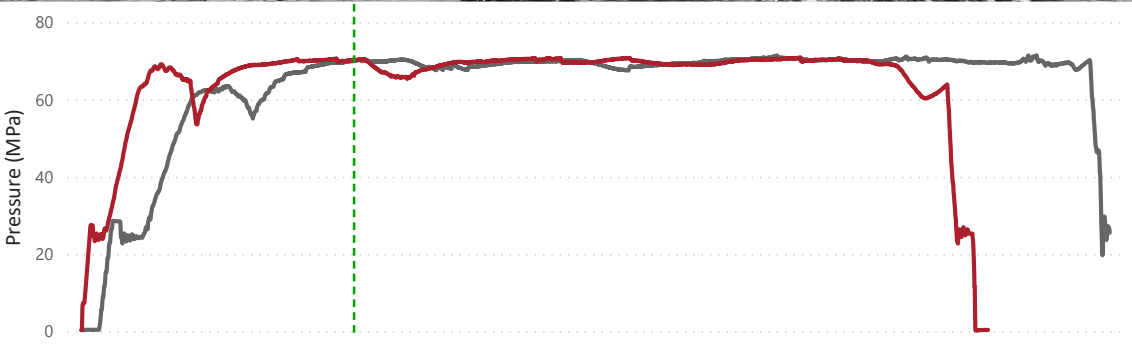
PFR-Z vs CHALLENGER FR



LOWER FRICTION REDUCER LOADING (L/M³)



IMPROVED PUMP RATES (M³/MIN)



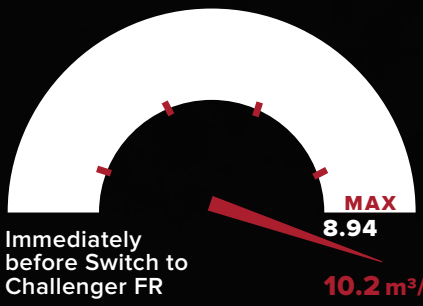
MAINTAINED PRESSURE (mPa)

BIG DATA ANALYTICS

FRAC FLOW RATES IN AREA (M^3/MIN)

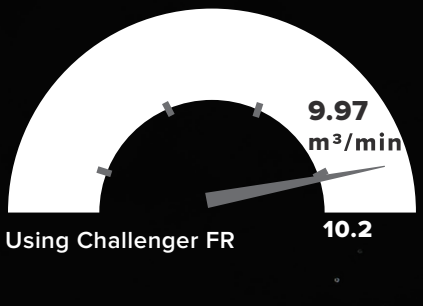
Using our Frac Analytics we compared the maximum flow rates experienced on 35 wells by the same operator in the same area at subsequent depths. PFR-Z™ saw greater than 100% of previous highest flow rates according to publicly available frac data, while the stages that used the Challenger FR were right in line with other maximums.

INITIAL STAGES
Depth: 4,500m - 5,000m



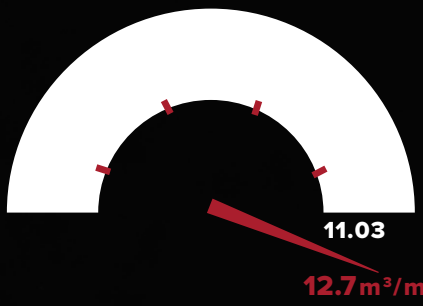
Immediately before Switch to Challenger FR

SWITCH OVER TO CHALLENGER FR
Depth: 4,000m - 4,500m



Using Challenger FR

SWITCH BACK TO PFR-Z
Depth: 3,500m - 4,000m







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