



# Texan Minerals and Chemicals LLC

14090 Southwest Freeway, Suite 310, Sugar Land, TX 77478

Phone: 713-294-4180 Email: Mani@TMCgreen.com



## PRODUCT DATA SHEET

### FRICITION REDUCER *ANIONIC HIGH BRINE* TS-HBS SLURRY

#### PRODUCT DESCRIPTION

TS-HBS is a premium anionic friction reducer (FR) in slurry form. It offers good performance in high salinity brines and can be effective at small dosages. TS-HBS has a very high molecular weight and is manufactured as a Non-Aqueous Slurry. Addition of small amounts, typically 0.25 – 1.00 gpt (gallons per thousand gallons) to water based high brine frac fluids can deliver friction reduction (pressure loss) of over 70% in a short period of time. Due to its rapid hydration properties, it can be pumped continuously into stimulation fluids as supplied or by batch mixing before treatment. TS-HBS is APE (alkyl phenol ethoxylates) and NPE (nonyl phenol ethoxylates) free, thus making it environmentally friendly. It is a field tested and proven product in oil field operations.

#### APPLICATIONS

TEXAN STONE TS-HBS has been specifically optimized for use as a high brine friction reducer, which can be added as supplied due to its excellent hydration properties. Due to its anionic nature, it is compatible with conventional non-ionic and anionic stimulation additives, and its' compatibility range is wide ranging. TS-HBS is also designed to handle divalent cations such as calcium, iron and barium. It can achieve optimal performance at low dosages (0.25 – 1.00 gpt), reducing overall treatment costs.

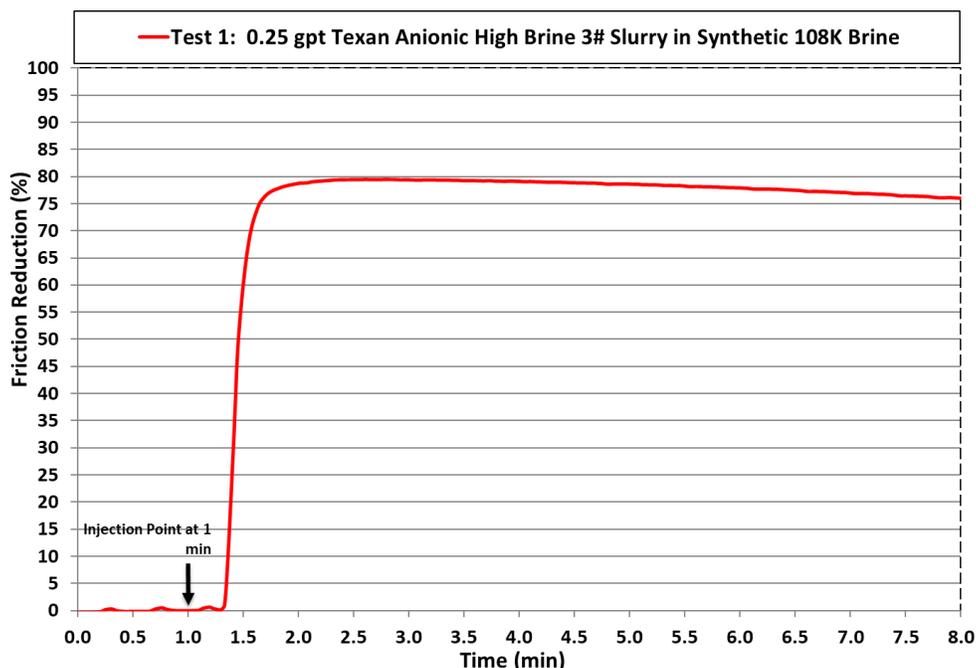
#### TEST METHODS

Test Method(s): Friction reduction properties of TS-HBS were tested on a custom Flow Loop at a flow rate of 6 gpm, generating 80,000 Reynold's number. The test section of the loop consisted of pipe having 3/8" O.D. Typical dosage of 0.25 gpt was used and the polymer was injected on the fly through the suction header of the mono-pump. Total test time was 10 minutes. TEXAN STONE TS-HBS was tested in API brine (108K TDS) with composition: NaCl (95.5 g/L), CaCl<sub>2</sub> (28.10 g/L); and Marcellus (150K TDS) with composition NaCl (96.47 g/L), KCl (1.54 g/L), CaCl<sub>2</sub> (59.38 g/L), BaCl<sub>2</sub> (7.47 g/L), FeCl<sub>3</sub> (0.55 g/L), NaHCO<sub>3</sub> (0.07 g/L), MgCl<sub>2</sub> (11.43 g/L) and SrCl<sub>2</sub> (17.52 g/L) and 231K Ultra high brine with composition: NaCl (189.123 g/L), KCl (2.511 g/L), MgCl<sub>2</sub> (5.702 g/L), CaCl<sub>2</sub> (25.392 g/L), BaCl<sub>2</sub> (0.003 g/L), SrCl<sub>2</sub> (1.420 g/L), Na<sub>2</sub>SO<sub>4</sub> (0.762 g/L), NaHCO<sub>3</sub> (0.945 g/L), LiCl (0.110 g/L), KH<sub>2</sub>PO<sub>4</sub> (0.053 g/L), H<sub>3</sub>BO<sub>3</sub> (0.172 g/L).

#### PERFORMANCE & RESULTS

The following figures represent the test results in Various Brines in 3/8" OD.

**Figure 1. Performance of TS-HBS 3 # in 108K in 3/8" OD**





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Figure 2. Performance of TS-HBS 3 # in 150K in 3/8" OD

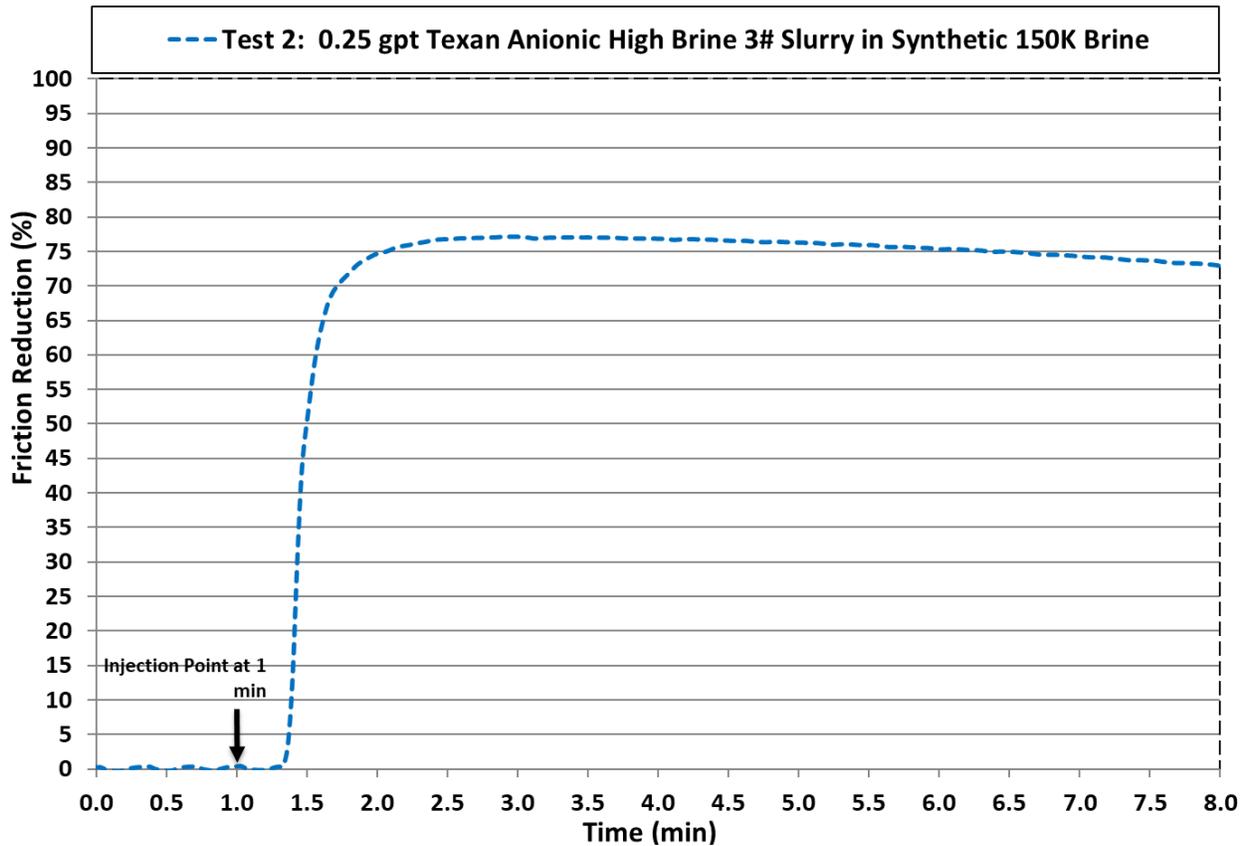
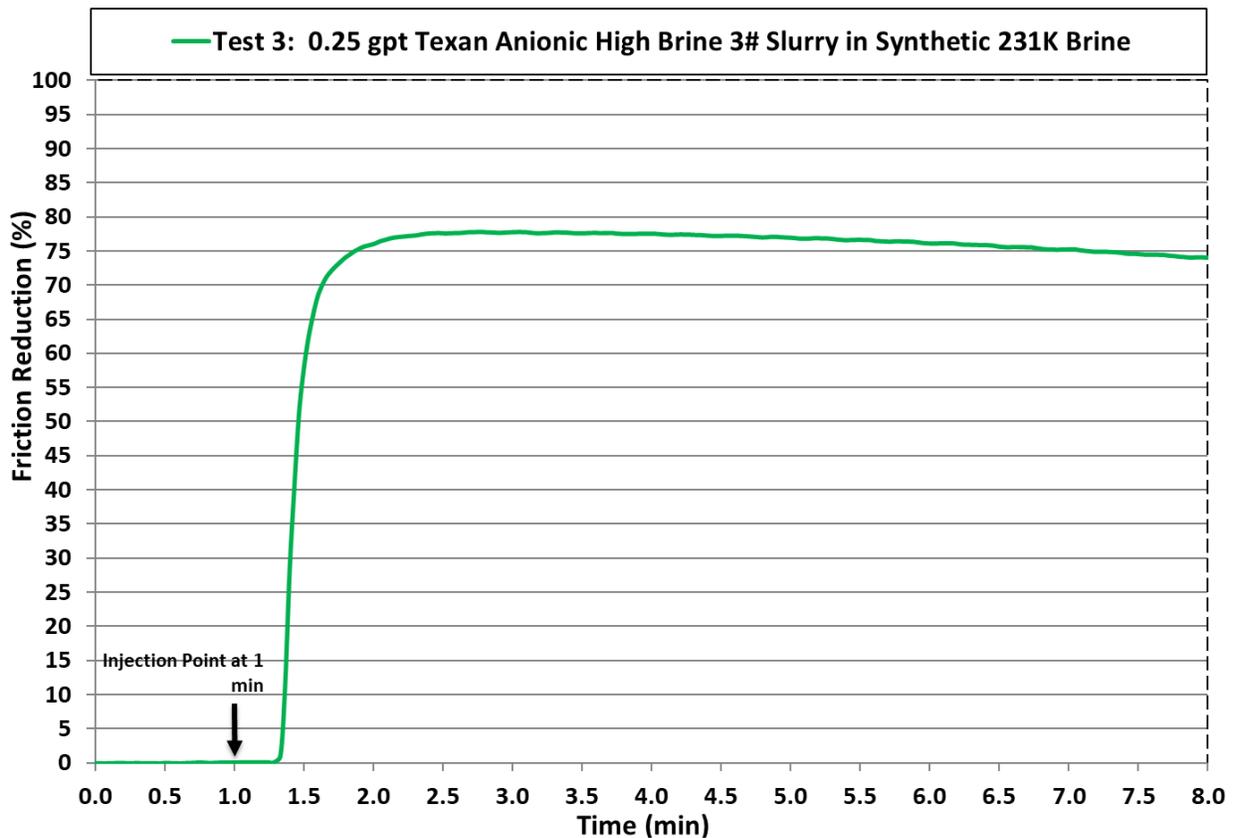


Figure 3. Performance of TS-HBS 3 # in 231K in 3/8" OD





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The test results show that TS-HBS achieves a FR value of 79.44% in Synthetic 108K Brine, 77.12% in Synthetic 150k Brine and 77.80% in Synthetic 231k Brine.

## PROPERTIES

Form	Opaque Liquid
Flash Point	> 200 F (93.0 C). Method Used: Pensky-Marten Closed Cup
Freeze Point	- 30 C (-22 F)
Viscosity (cps)@Temp	No data available
Color	White / Off-White
Odor	Slight petroleum oil
Density	8.6-8.8 lbs/gal
pH	5-8 (1% solution)
Shelf Life	6 Months ( <i>recommended to store indoors between 5 – 30 C.</i> )

## PACKAGING (customized packaging available upon request.)

Size	Packaging	Weight
55 gal.	Drum	475 lbs
275 gal.	Tote	2,300 lbs
330 gal.	Tote	2,800 lbs
5000 gal.	Bulk/ISO	45,500 lbs

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