



Texan Stone LLC

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PRODUCT DATA SHEET TEXAN CATIONIC DPAM *Cationic Friction Reducer in Powder Form*

PRODUCT DESCRIPTION

TEXAN CATIONIC DPAM is a cationic water-soluble polyacrylamide based friction reducer (FR) that is highly effective in high brine harsh water conditions. It has a very high molecular weight and is manufactured as dry powder with 100 mesh size for optimal hydration. Addition of small amounts, typically 0.25 – 1.00 gpt (gallons per thousand gallons), to water based frac fluids can deliver friction reduction (pressure loss) of over 70% in a short period of time. Due to its rapid hydration properties, TEXAN CATIONIC DPAM can be pumped continuously into the stimulation fluids as supplied or by batch mixing before treatments. TEXAN CATIONIC DPAM 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 CATIONIC DPAM has been specifically optimized for use as a high TDS level brines friction reducer, which disperses well and hydrates rapidly, so it can be added directly into a water stream and become effective friction reducing agent almost immediately. It is compatible with common non-ionic and anionic stimulation additives such as surfactants, scale inhibitors, biocides, etc., and can be used with low to moderate salt concentrations. TEXAN CATIONIC DPAM can achieve optimal performance at low dosages (0.25 – 1.00 gpt), reducing overall treatment costs. The dissolution in water should be in a temperature range between 10°C and 40°C. For optimum use of TEXAN CATIONIC DPAM and in order to achieve the best possible results, it is necessary to allow a “maturation” time of 60 minutes. When treating turbid water, the flocculant solution must be added to water at a point of average turbulence. In order to achieve a thorough and homogeneous mixing without impairing the flock formation. Recommended operating concentration is 1 to 2 lbs of powder per thousand gallons.

TEST METHOD BY INDEPENDENT LABORATORY

Test Method(s): Friction reduction properties of TEXAN CATIONIC DPAM 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. A dosage of 0.25 gpt (via 2% solution, which is equivalent to 0.625 lbs powder per thousand gallons), was injected on the fly through the suction header of the mono-pump. Total test time was 8 minutes. TEXAN CATIONIC DPAM was tested in API brine (108K TDS) with composition: NaCl (95.5 g/L), CaCl₂ (28.10 g/L) with a FR dosage of 0.25 gpt, and Marcellus brine (150K TDS) with composition NaCl (96.47 g/L), KCl (1.54 g/L), CaCl₂ (59.38 g/L), BaCl₂ (7.47 g/L), FeCl₃ (0.55 g/L), NaHCO₃ (0.07 g/L), MgCl₂ (11.43 g/L) and SrCl₂ (17.52 g/L) with a FR dosage of 0.25 gpt.

PROPERTIES

Form	White Fine Dry Powder
Flash Point	Not applicable
Freeze Point	Not determined
Mesh Size	100 Mesh
Molecular Weight (Million)	10-13
Cationic Charge	28-32
Solid Content (%)	≥ 90
Viscosity (cps)@Temp	315 cPs (0.1% solution)
Odor	Little odor or odorless
Density (g/cm ³)	≥0.60 g/cm ³
Ph	7.3 (1% solution)
Solubility	Water Soluble
Insoluble Content (%)	≤0.5
Shelf Life	24 Months (<i>It should be stored in a dry place and the storage temperature is 0 °C to 35 °C, away from direct sunlight and moisture.</i>)

PACKED IN JUMBO BAGS WEIGHING 1650 LBS.



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PERFORMANCE & RESULTS

The following figures represent test results in the two brines, 0.25 gpt via 2% solution, which is equivalent to 0.625 lbs powder per thousand gallons.

Figure 1. FR performance of TEXAN CATIONIC DPAM in 3/8"OD in 108 K TDS API brine at room temperature

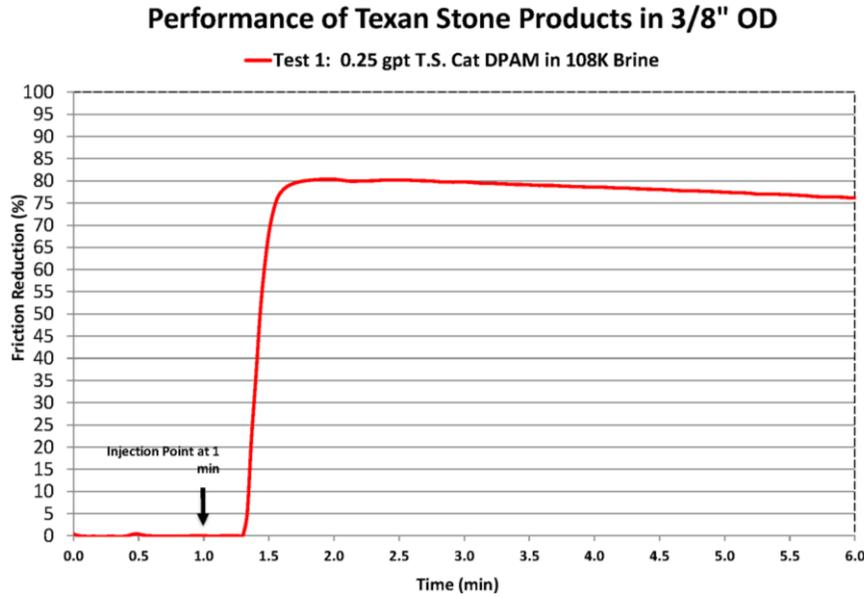
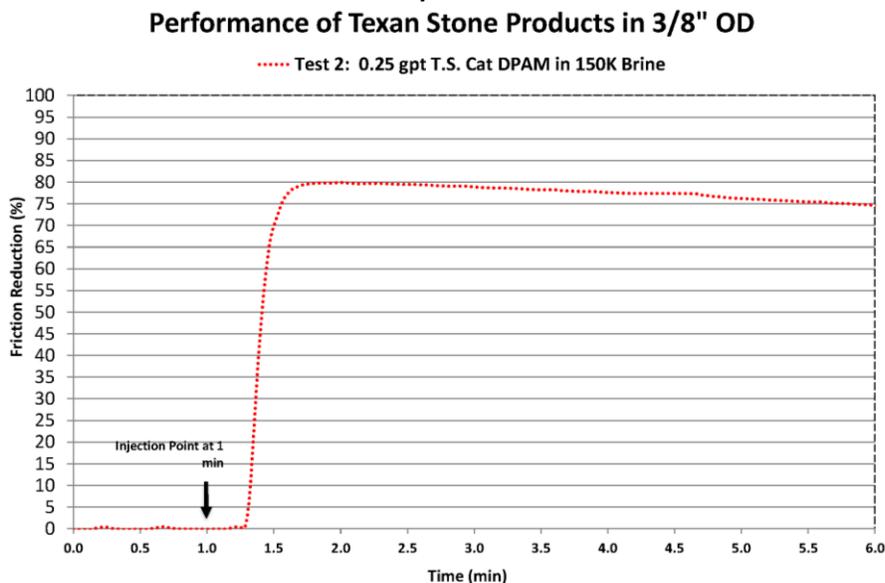


Figure 2. FR performance of TEXAN CATIONIC DPAM in 3/8"OD and 150K TDS Marcellus brine at room temperature



1. From the above results, it is clearly demonstrated that TEXAN CATIONIC DPAM powder is a superior and versatile product, which achieves FR value of 80.35% in 108 K API brine and 79.89 % in 150K Marcellus Brine.
2. Therefore, the TEXAN CATIONIC DPAM offers a tremendous advantage compared to competitors. It can be applied easily under varying brine and harsh water conditions.

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Certificate of Analysis

Product : TEXAN CATIONIC FRICTION REDUCER DRY POWDER
Code : TCFR
Quantity : 30MT
Lot No. : 1803022C

Item	Specifications	Results
Appearance	White Powder	White Powder
Solid Content (%)	≥ 90	91.3
Insoluble Content (%)	≤ 0.5	0.17
Molecular Weight (million)	10-13	11
Cationic Charge (wt%)	28-32	29.8
Monomer Residue (ppm)	<1000	435
Density (g/cm ³)	≥ 0.60	0.63