

Greenbase™ Flowzan® Biopolymer



Greenbase™ Flowzan® Biopolymer is a high-purity xanthan gum biopolymer suspended in an ultra-clean glycol ether. This type of polymer is unique when compared to most other polymers in oilfield drilling and completion applications. Xanthan gums are well known for their ability to provide extremely low-solids fluids with excellent carrying and suspending characteristics. This is due to their “shear thinning” properties. Fluids thickened with Greenbase™ Flowzan® Biopolymer have a tendency to thin at higher velocities and thicken at lower velocities.

Drilling Specialties’ 39% active Greenbase™ Flowzan® Biopolymer will not experience the separation, evident in other suspension products. It is not subject to particle settling or fluid separation under normal storage or transport conditions. Starting with an environmentally friendly fluid and utilizing our unique suspension technology, we eliminate settling of the Flowzan® Biopolymer particles while the product remains fully pourable. The long-term stability of the suspension provides for consistent, reliable product properties at your field locations any place in the world. Greenbase™ Flowzan® Biopolymer has seen successful application in both warm climates, like the Gulf of Mexico and the Middle East, and in cold climates, like the North Sea and Alaska.

Packaging the Flowzan® Biopolymer as a liquid suspension allows for accurate metering, and provides complete dispersion of the particles in your treating fluids before hydration begins. This quality eliminates problems of polymer lumping and incomplete viscosity development, even when facing adverse field mixing conditions.

• Advantages

- Easy to handle and mixes well in low shear environments
- Extremely stable suspension provides reliable properties
- Freeze/thaw cycle does not affect stability or performance of the product
- Optimized bit hydraulics resulting in higher penetration rates
- Reduces circulating pressure losses
- Improves hole cleaning with lower bentonite concentrations
- Minimal drilled solids settling under static conditions
- Performs well in fresh water, sea water, brine and saturated salt environments
- Rapid dispersion without “fisheyes”
- Reduces clean up time
- Excellent viscosifier – requires less material than other types of rheology modifiers
- Excellent friction reduction in coil tubing applications
- Stable thickener for 15% HCl at temperatures below 150 °F

Greenbase™ Flowzan® Biopolymer is a versatile product and can be used in most types of water-based fluids for rheology modification, improved hole cleaning and solids suspension. It provides excellent friction reduction for coil tubing operations. It is useful over a wide pH range. Xanthan gum was the first truly stable thickener for hydrochloric acid used in the oilfield. Our Greenbase™ Flowzan® Biopolymer is uniquely stable, easily handled and useful in both oilfield and non-oilfield applications.

Cost

The performance characteristics of Flowzan® Biopolymers are well established in the oilfield. As a liquid suspension this polymer disperses in water and develops viscosity very quickly.

Mud Types

Most water-based mud formulations

Mixing Requirements

Mix through a mud hopper or may be added directly to a well agitated pit.

Handling

For specific instruction on handling, refer to the MSDS

Packaging

Disposable pails, containing a net weight of 45 lbs of product (18 lbs of Flowzan® Biopolymer) for a 39% active product.

Before using this product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the product is suited and the information is applicable to the user's specific application. Drilling Specialties Company does not make, and expressly disclaims, all warranties, including warranties of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, or allegedly arising from any usage of any trade or from any course of dealing in connection with the use of the information contained herein or the product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or the product itself. Further, information contained herein is given without reference to any intellectual property issues, as well as federal, state or local laws which may be encountered in the use thereof. Such questions should be investigated by the user.

Greenbase™ Flowzan® Biopolymer



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| Application | Normal Use Range |
|--|---------------------|
| Horizontal drilling and completions | 0.07 to 0.6 gal/BBL |
| Drill-in fluids | 0.07 to 0.6 gal/BBL |
| Drilling large-diameter well bores | 0.10 to 0.8 gal/BBL |
| Solids-free drilling, completion and workover fluids | 0.10 to 0.8 gal/BBL |
| Coring fluids | 0.07 to 0.6 gal/BBL |
| Improve hole cleaning | 0.07 to 0.6 gal/BBL |
| Gravel packing operations | 0.30 to 0.6 gal/BBL |
| Acid thickener | 0.50 to 0.9 gal/BBL |

Performance

The performance characteristics of the xanthan gums are well established in the oil field. Typical fluid properties imparted by Greenbase™ Flowzan® Biopolymer are shown in Table 1. In fresh water and most brines, the xanthan gum produces stable viscosities as high as 275 °F. In saturated salt water, that thermal stability has been shown to extend beyond 300 °F. The addition of an oxygen scavenger may be useful in stabilizing the rheology at high temperatures. Greenbase™ Flowzan® Biopolymer has been demonstrated to have a minimal effect on the permeability of Berea sandstone cores. For wellbore cleanup, however, the xanthan gum is acid soluble and is degradable by strong oxidizing agents.

Table 1 – Typical Rheologies Greenbase™ Flowzan® Biopolymer in Seawater

| Concentration | 0.07 | 0.14 | 0.21 | 0.28 | 0.42 | 0.56 | 0.69 | Gal/BBL |
|---------------|--------|--------|--------|--------|--------|--------|--------|---------------------------|
| n' | 0.8903 | 0.5079 | 0.4103 | 0.4266 | 0.3237 | 0.2611 | 0.2611 | |
| K' | 0.0002 | 0.0031 | 0.0091 | 0.0119 | 0.0355 | 0.0754 | 0.1006 | Dynes/cm ² |
| Viscosity | 5 | 12 | 21 | 30 | 53 | 81 | 108 | cP(170sec ⁻¹) |
| PV | 2 | 3 | 4 | 5 | 7 | 9 | 11 | cP |
| VP | 2 | 4 | 7 | 11 | 18 | 27 | 37 | Lb/100ft ² |

Greenbase™ Flowzan® Biopolymer in Saturated NaCl

| Concentration | 0.07 | 0.14 | 0.21 | 0.28 | 0.42 | 0.56 | 0.69 | Gal/BBL |
|---------------|--------|--------|--------|--------|--------|--------|--------|---------------------------|
| n' | 0.7946 | 0.7248 | 0.5665 | 0.4470 | 0.4010 | 0.3237 | 0.3588 | |
| K' | 0.0005 | 0.0012 | 0.0044 | 0.0118 | 0.0245 | 0.0567 | 0.0558 | Dynes/cm ² |
| Viscosity | 8 | 14 | 23 | 33 | 54 | 84 | 99 | cP(170sec ⁻¹) |
| PV | 5 | 5 | 7 | 9 | 11 | 13 | 15 | cP |
| YP | 1 | 5 | 7 | 9 | 17 | 27 | 34 | Lb/100ft ² |

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