

HE[®] 150 Polymer



Drilling Specialties' HE[®] 150 Polymer is a high viscosity synthetic polymer that is useful in thickening hydrochloric acid, brines or fresh water. It shares the excellent high temperature stability found previously in the DSGA Polymer, yet provides greater efficiency by producing more viscosity with each pound of polymer. HE[®] 150 Polymer may be purchased as a dry polymer or as a liquid packaged as a concentrated particle suspension in order to reduce dusting, speed hydration and enhance field handling. Liquid HE[®] 150 Polymer is particularly effective as a friction reducer in fresh water, various brines and in hydrochloric acid and has been widely used for that purpose.

Product Descriptions

There are currently two suspension formulations available, both having unique properties and advantages. The Liquid HE[®] 150 Polymer is a suspension of polymer in iso-alkane oil. This formulation provides a number of advantages, including;

- **Ease of handling** – This suspension flows readily, even in severe winter conditions. The actual pour point of the suspension is below -30°F. This allows the product to be easily poured out of a bung, or metered through a positive displacement pump.
- **Rapid polymer hydration** – Test results show complete viscosity in 2% KCl within one minute at 75°F. This performance suggests the potential use of this product in continuous mix applications, such as Slick Water Fracturing treatments. Under adverse field mixing conditions, the Liquid HE[®] 150 Polymer has been successfully applied directly to 11.6 ppg calcium chloride brine, with very rapid viscosity development.
- **Superior, long term suspension stability** – This formulation utilizes a base fluid system that has been successfully used for other polymer suspensions for well over a decade. Liquid HE[®] Polymer 150 has proven to be stable, with no indication of particle settling or phase separation for more than a year under normal storage conditions.

Applications

- As an acid viscosifier, for reducing fluid loss, extending acid spending time and improving stimulation results by increasing live acid penetration
- As a thickener for Slick Water Fracturing
- As a friction reducer for acids and brines
- As a thickener for fresh water or brines in workover and completion operations
- As a thickener or aqueous lubricant for use in pipeline, fiber optics and related drilling and placement

Cost

The performance characteristics of HE[®]-150 Polymer 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

50 lb multi walled paper sacks 40 sacks to the pallet

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.

HE[®] 150 Polymer



Property	Liquid HE [®] 150 Polymer
Colored liquid	Cream
Density	8.2 lb/gal
Activity	3.6 lb/gal

Packaging

Property	Liquid HE [®] 150 Polymer
Pail	40 lb Net (5 gal)
Drum	440 lb Net (54 gal)
Disposable Tote	2,250 lb Net (274 gal)

Slick Water Friction Reduction

Many slick water fracturing treatments utilize a polyacrylamide emulsion polymer (PHPA) which is added on the fly. Although the PHPA tends to be relatively inexpensive, it poses certain limitations. As an invert emulsion additive, complete inversion of the emulsion must be achieved before the polymer can perform to reduce drag. In some field brines, that inversion can be problematic. Incomplete inversion leads to lower achievable pump rates due to higher friction pressure. This problem can be rectified by using a co-surfactant, but that adds another component to the system. PHPA can also be sensitive to brine components and contaminants, particularly multivalent cations (Ca⁺², Mg⁺², Fe⁺³ etc.) These cations can attach to the hydrolyzed (the carboxylic acid) portion of the polyacrylamide, resulting in cross linking and loss of solubility.

Liquid HE[®] 150 Polymer suspension is an excellent friction reducer (ref: paper # AADE-08 DF-HO-03, dated April, 2008). When added to water, it dispersed readily, so lumping is avoided, and also dissolves extremely fast. One distinct advantage of the HE[®] 150 Polymer suspension is that it does not require an inversion emulsion to be effective in the frac fluid, like the emulsion polymers do. Because of that, common water contaminants do not tend to interfere with the rate of viscosity development.

HE[®] 150 Polymer is a significantly more efficient friction reducer than polyacrylamide, so lower concentrations of polymer will produce the same results normally expected from PHPA. HE[®] 150 Polymer suspension delivers more active polymer (3.6 lb/gal) than a typical emulsion polymer (2.6-3.0 lb/gal), so it should require less volume to produce the same results. AA slick water fracturing treatment can be started with 25% less volume (GTG) than when using traditional emulsion polymers. The concentration of HE[®] 150 Polymer is increased or decreased to maximize the injection rate. Liquid HE[®] 150 Polymer is an oil-based suspension with sufficiently low bulk viscosity making it relatively easy to meter into a fluid stream, even in winter weather.

Polymer Cleanup

Particularly in completions applications, there are often concerns about how to remove residual polymer for the near wellbore area after the operations are finished. HE[®] 150 Polymer is a very robust polymer, which remains soluble and does not degrade under normal conditions, making it generally useful in the oilfield. It can, however, be degraded under downhole conditions and removed with solution of commonly used oilfield oxidizing agents, such as ammonium persulfate.

Literature

1. Fox, Kelly B., Stouffer, Carl E., and Utley, Beau, "Evaluation of a New Friction Reducer for Brines", AADE-09-DF-HO-03 presented at the 2008 AADE Fluids Conference.
2. Fox, Kelly B., Stouffer, Carl E., and Utley, Beau, "Evaluation of a New Friction Reducer for Brines", presented at the 2008 Southwest Petroleum Short Course.

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