

HE[®] 100 Polymer



HE[®] (or "Hostile Environment") Polymers 100, 300 are members of a family of synthetic vinyl polymers of varying composition and molecular weight developed for high-temperature oilfield applications. These polymers are available as powders.

HE[®] 100 Polymer dry powder is an efficient thickener for a wide variety of fluid types, including fresh water, sea water, brines and acids.

Advantages of HE[®] 100 Polymer

- Hydrates rapidly in most aqueous systems
- Resists thermally induced hydrolysis
- Maintains solubility at high temperatures
- Provides excellent friction reduction
- Thickens brines of various compositions
- Improves carrying capacity of fluids
- High tolerance to changes in pH

Applications

HE[®] 100 Polymer has historically been used in a wide variety of oilfield applications. Because of its excellent friction reduction capabilities, it has been widely used in coiled tubing workover operations and in fracture acidizing.

In conformance control applications, the HE[®] 100 Polymer provides flexibility in treatment design and superior high temperature stability. At low to intermediate temperatures, it can be readily crosslinked with chromium, aluminum and zirconium ions to produce gels for profile modification or water shutoff. At high temperatures, it can be readily crosslinked with various organic systems, including phenol-formaldehyde, resorcinol-formaldehyde, phenyl acetate- HMTA or hydroquinone-HMTA.

Packaging

Powder: White, free-flowing polymer, packaged in 50-pound, multi-walled bags with 40 bags to the pallet.

Useful as a thickener or friction reducer in the following brines, or mixtures:

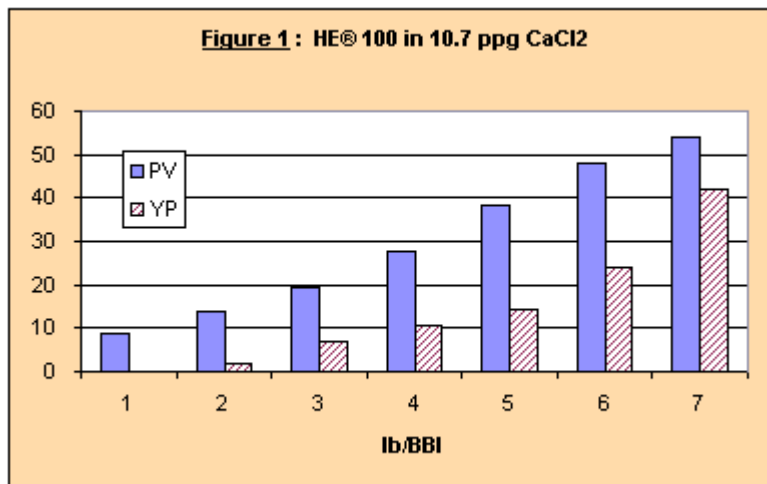
- Fresh Water
- Seawater
- Potassium Chloride
- Sodium Chloride
- Sodium Chloride – Sodium Carbonate
- Alkali Metal Formates
- Calcium Chloride

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.

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The HE[®] 100 Polymer has been utilized as a thickener for brines in drilling and completions applications. The HE[®] 100 Polymer powder is readily dissolved in most brines, yielding rheological properties similar to that shown in (Figure 1), which describes the polymer's performance in a 10.7 ppg calcium chloride brine at 70°F.



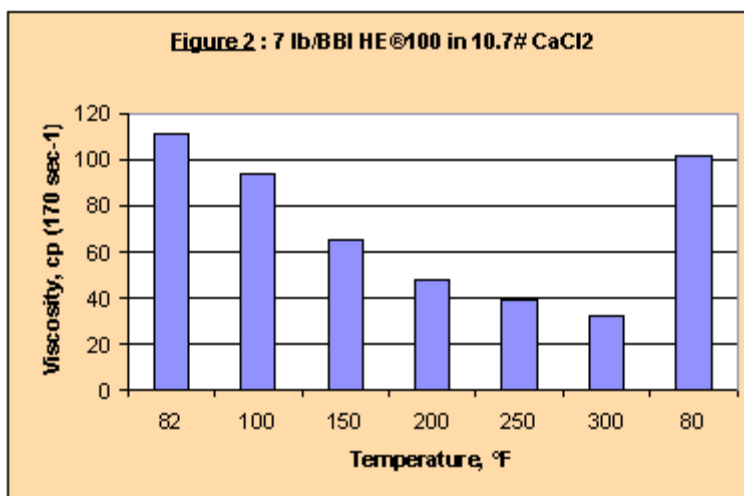
In the very heavy brines, such as calcium bromide and zinc bromides, there may be insufficient free water to allow hydration of the dry polymer. In those brines, the invert emulsion form of the polymer may be easier to use because the polymer is already partially hydrated.

Stability

The Composition of the HE[®] Polymer 100 provides protection against thermal hydrolysis, which allows the polymer to maintain its solubility in high temperature use and to resist precipitation in the presence of multivalent cations. In this Fann 50 test (Figure 2), the thickened calcium chloride brine was heated incrementally to 300°F. The fluid was kept at each temperature for one hour before proceeding to the next stage. There was very little change in viscosity during that one-hour period, which demonstrates the polymer stability at high temperatures. Almost all of the original viscosity was regained upon cool-down, again indicating no polymer degradation, hydrolysis or loss due to precipitation. In most high temperature applications, the polymer may benefit from the use of oxygen scavengers (e.g., sodium thiosulfate) and pH buffers (e.g., sodium bicarbonate).

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Polymer Cleanup

The HE[®] 100 Polymer is an inherently clean thickener, posing very little risk of formation damage under normal usage conditions. The HE[®] 100 Polymer is readily soluble in normal wellbore cleanup type acids. The polymer is degradable using oxidizing agents, such as sodium hypochlorite (bleach) or ammonium persulfate. The activity of the oxidizer is generally enhanced by using fluid with a basic pH. Degradation by oxidizers is also enhanced at temperatures above 125° F.

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