POLY-FORCE RD

Certified to NSF/ANSI/CAN 60

POLY-FORCE RD acrylic copolymer (PHPA) is a readily dispersible product designed to provide cuttings encapsulation and shale stabilization. It is formulated for easy mixing with improved dispersion to eliminate "fish eyes." This is beneficial when rapidly mixing either large quantities or high concentrations of polymer where good mixing equipment is unavailable. POLY-FORCE RD acrylic copolymer acts as a viscosifier, friction reducer, and flocculant. It also provides some fluid-loss control.

POLY-FORCE RD acrylic copolymer is a specially treated, high-molecular-weight additive. It can be used in mud systems ranging from low solids to weighted muds, using makeup waters from freshwater to saltwater.

Typical Physical Properties

Physical appearance ..... White, granular powder
Odor..... Slightly hydrocarbon
Specific gravity 1.25–1.40
pH (1% solution) 7.7
Bulk density..... 40–46 lb/ft³ (641–737 kg/m³)
Nature of charge ..... Anionic
Activity ..... >90%

Applications

POLY-FORCE RD acrylic copolymer mud systems: POLY-FORCE RD additive provides excellent cuttings encapsulation and improved wellbore stability. Typical concentrations of POLY-FORCE RD acrylic copolymer are 0.25 to 1 lb/bbl (0.71 to 2.85 kg/m³). It is also effective in salt muds, such as KCl- or NaCl-enhanced fluids, although slightly higher concentrations of POLY-FORCE RD acrylic copolymer can be required.

Clear-water fluids: POLY-FORCE RD acrylic copolymer can be used in clear-water, solids-free drilling fluids. This product enhances solids removal by flocculating the undesired solids and increasing viscosity. The polymer also provides cuttings encapsulation and improved wellbore stability. POLY-FORCE RD acrylic copolymer is frequently used in slimhole, continuous-coring applications.

Typical Properties of POLY- FORCE Polymer in Freshwater			
Concentration (lb/bbl [kg/m³])	**PV (cP)**	**YP (lb/100 ft²)**	**Marsh Funnel (sec/qt)**
0.125 (0.4)	2	1	28
0.25 (0.7)	3	2	31
0.50 (1.4)	4	4	34
0.75 (2.1)	6	8	46
1.00 (2.9)	9	11	60
1.50 (4.3)	15	17	110

Low-Solids, Non-Dispersed (LSND) muds: POLY-FORCE RD acrylic copolymer is well suited to LSND systems. In reduced-bentonite muds, POLY-FORCE RD additive extends bentonite to increase viscosity, flocculates drill solids for more efficient removal, encapsulates cuttings, and improves
wellbore stability.

POLY-FORCE RD sweeps: Viscous POLY-FORCE RD acrylic copolymer sweeps are effective for periodic hole cleaning. Circulating a POLY-FORCE RD sweep through the well helps clear accumulated cuttings and maintain a clean hole.

Addition Method

POLY-FORCE RD acrylic copolymer can be mixed directly into the active mud system. It can also be premixed at higher concentrations in a separate pit or chemical barrel, then blended into the active system. Sweeps can be prepared by mixing POLY-FORCE RD acrylic copolymer directly in the active system at the suction pit or by premixing a high concentration in a separate pit and allowing the polymer to fully yield before being pumped.

Advantages

- Readily dispersible and does not form “fish eyes”
- Excellent cuttings encapsulator limits cuttings dispersion
- Provides improved shale stabilization
- Powdered material has significantly lower toxicity than invert-emulsion, liquid polymers
- Highly concentrated product (>90% activity) reduces transportation costs and storage space requirements
- Aids in preventing balling on the bit, stabilizers and bottomhole assembly by coating and lubricating solids
- Enhances removal of drill solids
- Can be used to viscosify clear-water and low-solids drilling fluids

Limitations

- Severe flocculation can occur during the initial treatment of POLY-FORCE RD acrylic copolymer in a non-dispersed mud system. Flocculation causes high viscosity until all of the solids are coated. POLY-FORCE RD acrylic copolymer mud systems uses low concentrations (<15 lb/bbl [<43 kg/m^3]) of MAX GEL* viscosifier to reduce this interaction. Continued additions of POLY-FORCE RD polymer result in a stable system with the desired rheology.
- Calcium-sensitive—begins to precipitate when the calcium concentration exceeds 300 mg/L.
- pH-sensitive with an optimum pH range of 8.5-10.5. At levels above this range, hydrolysis can convert acrylamide into acrylate and release ammonia (NH_3).
- Temperature-stable to approximately 350°F (177°C), although the copolymer can begin to hydrolyze into polyacrylate when exposed to prolonged temperatures above 275°F (135°C) and release ammonia (NH_3).
- Subject to shear degradation of its viscosity and can lose its ability to viscosify. Cuttings encapsulation and shale stabilization are not affected.

Contamination

POLY-FORCE RD acrylic copolymer reacts with multivalent cations such as calcium. In concentrations greater than 300 mg/L, calcium causes the polymer to precipitate. Use soda ash to remove calcium concentrations above 300 mg/L.

Treat cement contamination to keep the calcium and pH as low as possible. Use sodium bicarbonate along with a pH-reducing product like lignite or citric acid to treat cement contamination.

Toxicity and Handling

Bioassay information available upon request.

No special requirements are necessary for handling and storage. Avoid inhalation of dust. A dust respirator and goggles are recommended if mixing in an enclosed area.

Packaging and Storage

POLY-FORCE RD acrylic copolymer is packaged in 50-lb (22.7-kg), multi-wall, paper sacks or 5-gal (18.9-L) buckets.

Store in a dry location away from sources of heat or ignition, and minimize dust.

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