Deep Black FR™

Graphite Lubricant & Friction Reducer

Oil & Gas Drilling Fluids / WBM

Deep Black FR™ is part of a family of additives consisting of stabilized dispersion of graphite in an environmentally friendly oily medium (low BTEX).

Deep Black FR™ provides all functions of graphite lubricants.

Deep Black FR™ is particularly effective as a friction reducer in fresh water and brines based completion and coiled tubing fluids.

Deep Black FR™ can be used as a thickener for fresh water or brines in work-over or completions operations.

Deep Black FR™ can be used as a thickener for Slick Water Fracturing. DEEP BLACK FR can be used as thickener or aqueous lubricant for use in pipeline.

BENEFITS AND USE

- **Deep Black FR™** uses the new technology concept which means to treat solid particles with a teflonized derivative.
- **Deep Black FR™** with a slippery surface tension free ability to coat the well bore and drill bit and therefore reduces torque and drag which in turn increases ROP.
- **Deep Black FR™** is non-toxic, non-combustible and contains no heavy metals or environmentally hazardous chemicals.
- **Deep Black FR™** provides for high drilling efficiency and minimization of well costs in vertical, inclined and horizontal wellbores, completion and work-over operations, as well as coiled tubing.
- **Deep Black FR™** does not generate damage formation.

ADDITIONAL ADVANTAGES

- Optimizes lubrication, especially at higher temperatures
- Inhibits hydration of the clay fraction in shale
- Reduces wellbore damage, especially vibration induced formation damage resulting from the stick-slip phenomenon
- Stabilizes rheological properties, leading to greater borehole efficiency
- Stabilizes HTHP filtrate values
- Slicks the entire open-hole, casing and drill-string; reducing frictional forces

ADDITIONAL ADVANTAGES (CONTINUED)

- Reduction of torque and drag values
- Reduction or elimination of bit and BHA balling
- Significant reductions in tubular and drilling equipment wear.
- Improved tripping, logging and casing run times
- Provides additional viscosity to WBM

TREATMENT

- **Deep Black FR™** is easily dispersed and may be added via a hopper directly into the active system or through pre-mixing.
- Concentration should vary dependent on mud types, density, well path design (anticipated torque and drag) and anticipated formation.
- Field experience has shown that a treatment of 3.5- 8 ppb to be effective in reducing torque and drag due to brittle formations and pressurized shale and clay inhibition.
- Treatment on maintenance of daily addition of between 0.25 and 0.50 ppb should be made.
- Control of HPHT filtrate values could be an efficient way to follow the **Deep Black FR™** performance and additions to the system.

PACKAGING

- 55 Gallon Drum
- 275 Gallon Tote
- Bulk

P.O. Box 431, Wharton, Texas 77488 / *phone* (979) 531-1100 / *fax* (979) 531-8030 / www.primeecogroup.com

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PERFORMANCE TESTS

In 4% KCl Base

These test show that additions of **Deep Black FR™** from 5.3 to 9.0 gal/m3 can help to get acceptable rheology parameters.

Sample	1	2	3
Tap Water (ml)	350	350	350
Soda Ash (g)	0.50	0.50	0.50
KCl (g)	14	14	14
Deep Black FR™	**7**	**10**	**12**
Calcium Carbonate Mesh 200 (g)	50	50	50
pH	9.8	9.8	9.9

Sample	1	2	3
Temperature (°F)	120	120	120
PV (cps)	7	9	10
YP (lbf/100ft2)	11	20	26
Gels (lbf/100ft2)	1/1	2/2	3/4
6/3 rpm Readings (lbf/100ft2)	1/1	3/2	6/4

Sample	1	2	3
Liquid XE (ml)	3		
Liquid XP-175 (ml)		3	
Liquid XH Polymer (ml)*			1

** Liquid XH Polymer is a liquid presentation of fluid lost control/rheology enhancer polymer.*

Sample	1	2	3
Temperature (°F)	120	120	120
PV (cps)	9	14	12
YP (lbf/100ft2)	16	25	33
Gels (lbf/100ft2)	2/2	3/3	4/4
6/3 rpm Readings (lbf/100ft2)	3/2	4/3	7/4

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PERFORMANCE TESTS

In 4% Sea Salt Fluids

These test show that additions of **Deep Black FR™** from 15 gal/m3 can help to get acceptable rheology parameters.

Sample	1	2	3
Tap Water (ml)	350	350	350
Soda Ash (g)	0.50	0.50	0.50
Sea Salt Mix (g)	14	14	14
Deep Black FR™	**10**	**20**	**25**
Calcium Carbonate Mesh 200 (g)	50	50	50
pH	9.8	9.8	9.9

Sample	1	2	3
Temperature (°F)	120	120	120
PV (cps)	15	20	23
YP (lbf/100ft2)	8	27	35
Gels (lbf/100ft2)	1/1	1/1	2/3
6/3 rpm Readings (lbf/100ft2)	1/1	2/1	3/2

Sample	1	2
Liquid XE-170 (ml)	2	
Liquid XP-175 (ml)		2

Sample	1	2
Temperature (°F)	120	120
PV (cps)	20	37
YP (lbf/100ft2)	42	43
Gels (lbf/100ft2)	10/12	2/2
6/3 rpm Readings (lbf/100ft2)	9/7	4/2

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