



DirectDrill™ Emulsifier

DirectDrill™ is a dry direct emulsifier from Drilling Specialties Company. New to the portfolio, DirectDrill™ is an optimized particle generated through a unique sulfonation reaction. This sulfonation chemistry provides a high range of hydrophilic and lipophilic balance needed to generate a fundamental direct emulsion between water and oil. Direct Emulsions are water-based muds wherein oil microdroplets (discontinuous phase) are dispersed into the brine (continuous phase). Unlike most conventional direct emulsifiers, DirectDrill™ provides the added benefit of a robust chemistry suitable for harsh field brine compatibility at temperatures of up to 300°F. Tables 1-2 show the formulation and rheology after hot roll (AHR) of the DirectDrill™ system.

Advantages

- Imparts improved lubricity to the fluid (COF)
- Compatible with monovalent Saturated brines
- High Calcium tolerance
- Reduced disposal costs
- Used for low fracture gradient drilling
- Alternative to OBM
- Wellbore Strengthening
- Sealing Capacity
- Shale inhibition and stabilization
- HTHP Fluid Loss
- Adaptable rheology formulation
- Cost-effective Direct Emulsifier
- Minimizes impact of formation wettability and cement bonds

Mud Types

Direct Emulsion: Diesel Ratio up to 60%

Mixing Requirements

Mix through a mud hopper followed by good pit circulation.

Handling

For specific instruction on handling, refer to the SDS

Packaging

50-pound, multiwall paper sacks, 40 sacks to the pallet.

Concentration

2-6 ppb dependent on temperature and oil fraction

Table 1-2: DirectDrill™ Extender formulation and rheologies with EXP D523-19 Extender

Brine: Diesel ratio	%	61 : 39	AHR for 16 hours		@ 130F	@150F
Sodium Bicarbonate	ppb	as needed	600 rpm	θ	26	25
NaOH	pH	to pH 10	300 rpm	θ	17	15
EXP D112-19	ppb	6	200 rpm	θ	14	11
DE Extender	ppb	0.3	100 rpm	θ	10	7
			6 rpm	θ	2	2
			3 rpm	θ	2	1
			Plastic Viscosity (PV)	cps	9	10
			Yield Point (YP)	lb/100ft ²	8	5
			10 sec Gel	lb/100ft ²	2	1
			10 min Gel	lb/100ft ²	2	---
			API Fluid loss @ RT/100 psi	mls	20	11.5

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Table 3: COF = (torque or meter reading / 100) of Direct Emulsion compared to WBM and OBM

Dosage (ppb)	Water Polymer Mud (9.0 ppg)	Direct Emulsion	Direct Emulsion + Lubricant	Direct Emulsion + Lubricant + C. Inhibitor	OBM (8.3 ppg)
Torque applied (in-lb.)					
100	17.5	10.8	10.9	10.6	8.7
150	25.0	16.3	16.9	16.4	12.4
200	33.5	21.7	23.3	21.7	15.3
250	43.2	26.7	28.6	26.5	18.7
300	55.9	31.6	34.5	30.7	22.2
350	72.4	36.4	39.6	34.7	25.2
400		40.6	45.2	39.0	29.0
450		46.2	52.5	44.6	32.7
500		51.5	57.4	50.3	37.2
550		55.8	65.0	54.6	41.5
600		64		60.1	45.5

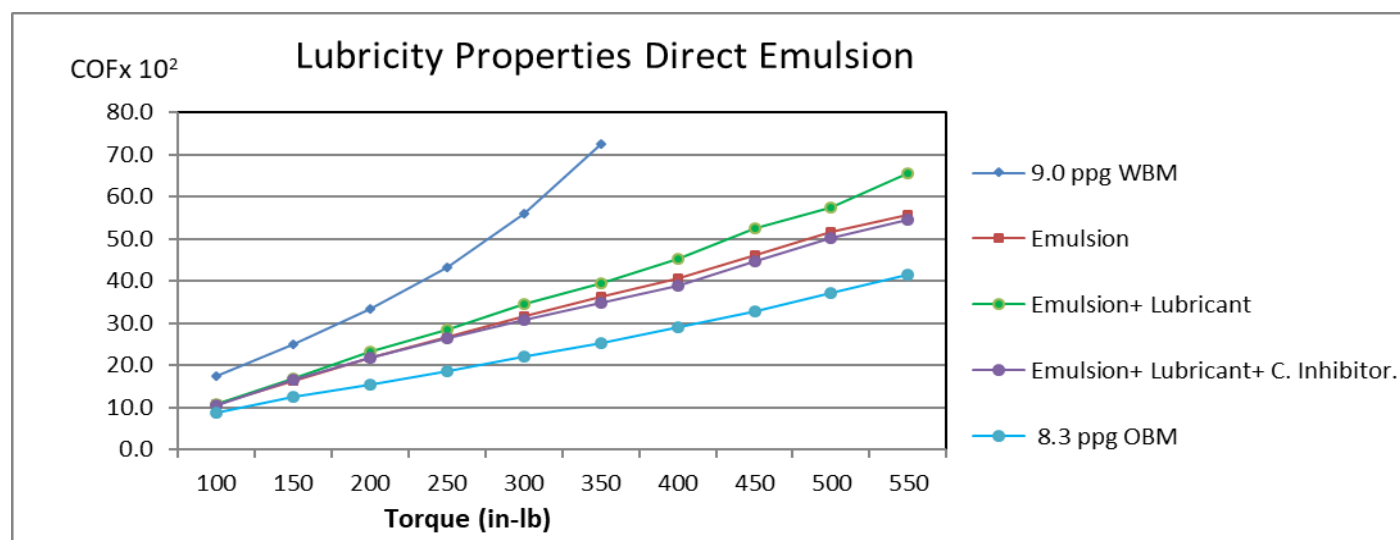


Figure 1. Lubricity properties of Direct Emulsion (DE) as compared to 9.0 ppg WBM, DE + Liquid Lubricant, DE+ Lubricant+ Corrosion Inhibitor, and 8.3 ppg OBM.

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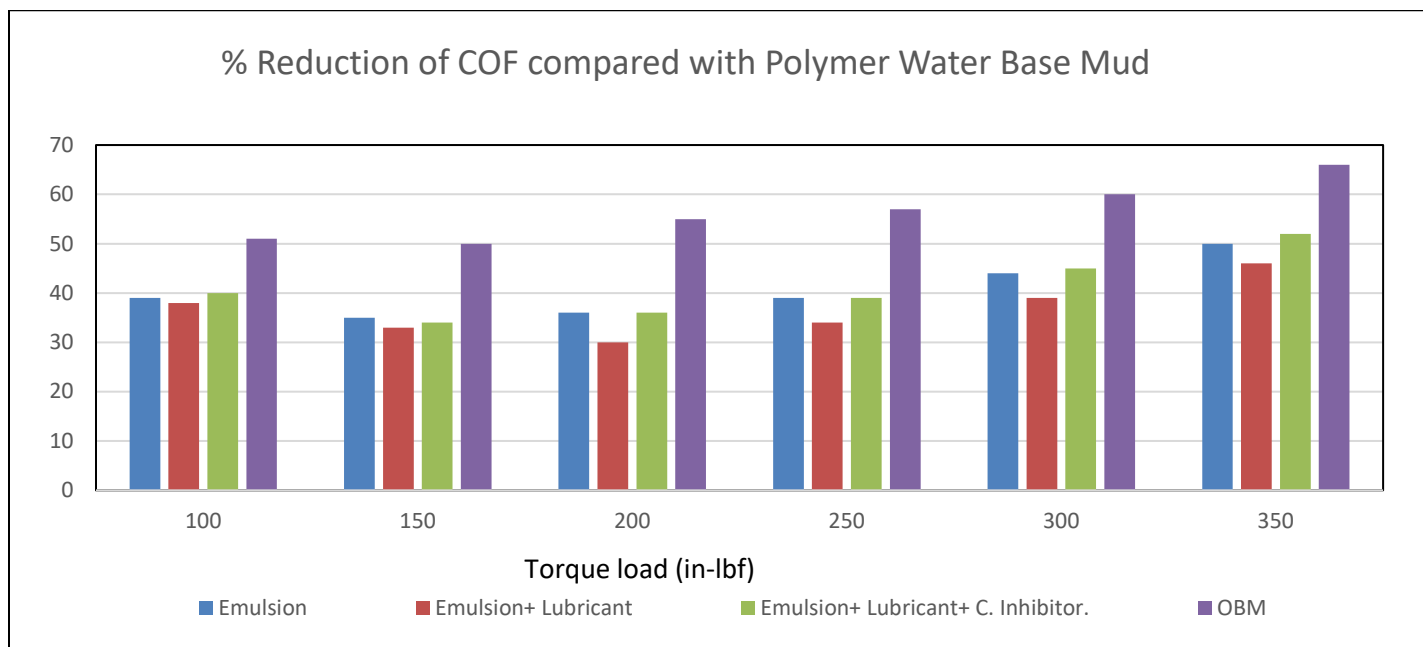


Figure 2. Percentage of reduction of COF. This graph illustrates the % reduction of COF of the Direct Emulsion with and without lubricant, compared to OBM and a Polymer water base mud.

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