

MAXDIRECT

Generic System Name: Low density direct emulsion water based mud.

Introduction:

Category: Non inhibitive Water based mud with a density lower than water. The system can also be transformed into a stable foam direct emulsion system.

Application: This system has two distinct applications:

- Drilling blind (little to no returns) in depleted zones where the density required is 7.2 – 7.4 ppg (860 – 880 kg/m³).
- As a carrier fluid for sized salt pills for workover and completion operations.

Replacement for: Low densities invert emulsions and foam systems.

Components: MAXDIRECT

<i>QMax Product</i>	<i>Function</i>
<i>Water</i>	Continuous phase
<i>*QMUL DIRECT</i>	Emulsifier
<i>Diesel</i>	Discontinuous phase

Key aspects

- Q Designed for drilling depleted zones
- Q Easy to maintain
- Q For mud densities between 7.2 – 7.4 ppg
- Q Can be recycled and re-used

Oil-Based Drilling Fluids

<i>Supplemental Materials</i>	<i>Function</i>
<i>Zinc Oxide</i>	H ₂ S scavenger
<i>*QPAC HV</i>	Viscosifier / Foam stabilizer

* Proprietary or brand name products

Typical System Properties

<i>MAXDIRECT</i>		
<i>Property</i>	<i>Range</i>	<i>Min/Max Recommended</i>
<i>Mud Weight, ppg (kg/m³)</i>	7.2 - 7.4 (860 - 880)	< 7.4 (< 890)
<i>Plastic Viscosity, cP</i>	20 - 40	< 60 cP
<i>Yield Point, lb/100ft² (Pa)</i>	30 - 70 (15 - 35)	< 80 (<40)
<i>Gels, lb/100ft² (Pa)</i>	16/20 - 20/30 (8/10 - 10/15)	As required
<i>API Fluid Loss, cc/30min</i>	8.0 - 10.0	As required
<i>pH</i>	8.0 - 9.0	< 10.0
<i>Calcium, mg/l</i>	40 - 120	< 240

Key aspects

- Q Max OWR is 80:20 for a stable emulsion
- Q QMUL DIRECT is a key product
- Q Do not allow contamination with OBM
- Q Efficient SCE is needed to control MW

Field Operations

Mixing Procedures

For New System: Check make-up water for calcium and magnesium. If the check indicates a total hardness in excess of 150 mg/L, the water should be pre-treated with the exact amount of soda ash. After the make-up water quality is acceptable, a proper fluid may be mixed by using the following procedure:

1. In a clean tank, add the calculated amount of make-up water.
2. While circulating and agitating tanks, slowly add at the same time QMUL DIRECT and diesel through a shear mixing device to entrain air. Allow the system to homogenize by mixing vigorously for a least 50 minutes.

For mix “on the fly”: Not recommended

Maintaining Properties

Small additions of the emulsifiers and shear could be needed to maintain or improve rheology.

Fluid Specific Tests and Equipment

- Complete WBM testing kit

Contaminants: effect and treatment

Contaminant	Mud Effect	Treatment
Aeration	Pump cavitation, foaming	Increase surfactant and shear; add Q'PAC HV
Bacteria	Odour, viscosity or filtration change, carb/bicarb change	Bactericide (Not common)
Calcium	Emulsion break up	Soda Ash
Cement	High pH and Ca ²⁺	Sodium Bicarbonate
CO₃²⁻/HCO₃⁻/CO₂	Emulsion break up	Lime
H₂S	Odour, decreased pH	Zinc Oxide, Caustic Soda
pH (low)	Emulsion break up	Caustic soda
Water influx	Dilutes concentrations; emulsion break-up	Increase density; replenish product concentrations to recommended levels
Oil Based mud	Emulsion break-up	QMUL DIRECT and water

Operational Recommendations and “Best Practices”

- Always run all the solids control equipment to avoid undesirable LGS incorporation into the mud system.
- If the system is to be used for drilling “blind”, excessive mud foaming should be avoided on initial mixing. To limit the amount of air entrapment, slowly add the emulsifier (QMUL DIRECT) and the diesel to the water at the same time.
- Always pay special attention in the chemical properties (Pm, Pf and Mf values). A viscosity increment could be related to $\text{CO}_3^{2-}/\text{HCO}_3^-/\text{CO}_2$ contamination.