THIXATROL® RM14
Low Shear Rate Rheology Modifier for OBM

Designed for horizontal and vertical drilling, THIXATROL RM14 is a unique proprietary organic product that builds low end rheology while having minimal impact on high shear rate rheology. It is very efficient at building structure in invert emulsion drilling fluids with a synthetic, mineral oil or diesel oil based continuous phase.

THIXATROL RM14 imparts anti-sag properties to an OBM. For enhanced hole cleaning and faster rates of penetration, drilling fluids using THIXATROL RM14 have lower HSRR:LSRR ratios (ie: lower Plastic Viscosity for a given Yield Point). This highly desirable (flat with respect to shear rate) rheological property is stable through 350°F.

THIXATROL RM14 is available in liquid form for ease of handling. Alone it can gel base oil. Formulation in combination with organophilic clay is recommended. The efficiency of THIXATROL RM14 improves the cost performance of building rheology over conventional rheology builders used in invert emulsion drilling fluids.

THIXATROL RM14 exhibits an excellent balance of dispersibility, for initial viscosity build, efficiency for cost effectiveness and tolerance to adverse conditions for reduced depletion rates. Sag control properties are significantly improved as compared to drilling fluids incorporating only conventional rheological additives.

PERFORMANCE CHARACTERISTICS
- Increased LSRR (6 RPM) with minimal impact on HSRR (600 RPM)
- Improved anti-sag properties for better hole cleaning
- Stable to bottom hole temperatures through 350°F
- “Flatter” rheological profile with respect to both shear and temperature.
- Reduced PV for a given YP
- Improved ECD control at reduced temperatures
- Fragile gels
- Shear thinning rheological profile for improved ROP
- Compatible with conventional invert emulsion drilling fluid additives and contaminants
- Builds viscosity in clay free systems or in combination with organoclays
- More than four times the efficiency at building rheology as compared to conventional OBM viscosifiers
- Easily dispersible for initial viscosity build
APPLICATIONS

The required concentration of THIXATROL RM14 is dependent on:
- oil/water ratio
- base oil type
- density of the system
- type and concentration of surfactants / emulsifiers / wetting agents
- type and concentration of organophilic clay

A fluid with a higher oil/water ratio (i.e. 90:10) will require more THIXATROL RM14 than a fluid with a lower oil/water ratio (i.e. 70:30). A higher density fluid will generally require less THIXATROL RM14 as compared to a lower density fluid.

Generally, concentrations will be in the range of 0.25 to 3.0 pounds per barrel. The ratio of organophilic clay to THIXATROL RM14 will typically range from 1:1 to 10:1. Viscosity can be built in:

- Oil Based Drilling Fluids
- Completion Fluids
- Packer Fluids
- Invert Emulsion Drilling Fluids
- Workover Fluids
- Clay Free Drill-In Fluids

THIXATROL RM14 can be added at the mud plant when building new mud or can be added directly to the mud pits when building volume during the drilling process. THIXATROL RM14 should not be used in combination with any other polymeric rheological additives without first pilot testing. THIXATROL RM14 can be used with or without organophilic clay. The addition of some organophilic clay is recommended to achieve the most efficient and temperature stable rheological system.

Adequate agitation is necessary when incorporating THIXATROL RM14 into the oil based fluid. The amount of shear necessary will depend on the temperature of the mud, the rate of rheological additive addition, the oil/water ratio, and the amount of solids and/or weight material in the system.

CHEMICAL AND PHYSICAL DATA

Composition…………oil soluble organic
Color…………………yellow to amber
Form…………………liquid
Specific Gravity……0.96
Flash Point …………>210°F
Solubility……………Water Insoluble
Pour Point……………20°F

14 PPG; 85:15 – MO
Increased LSRR for Improved Anti-Sag Properties

THIXATROL RM14 or [PPB BENTONE 38] on top of 10 PPB B38

NOTE: The information herein is currently believed to be accurate. We do not guarantee its accuracy. Purchasers shall not rely on statements herein when purchasing any products. Purchasers should make their own investigations to determine if such products are suitable for a particular use. The products discussed are sold without warranty, express or implied, including a warranty of merchantability and fitness for use. Purchases will be subject to a separate agreement which will not incorporate this document.
<table>
<thead>
<tr>
<th></th>
<th>B155/RM14</th>
<th>B155/RM14</th>
<th>B155/RM14</th>
<th>B155/RM14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mud Weight</strong></td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td><strong>Base Oil</strong></td>
<td>IAO</td>
<td>IAO</td>
<td>IAO</td>
<td>IAO</td>
</tr>
<tr>
<td><strong>Oil:Water</strong></td>
<td>85:15</td>
<td>85:15</td>
<td>85:15</td>
<td>85:15</td>
</tr>
<tr>
<td><strong>Hot Roll 16 hr @ 150°F</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 RPM reading</td>
<td>52</td>
<td>52</td>
<td>68</td>
<td>62</td>
</tr>
<tr>
<td>300 RPM reading</td>
<td>32</td>
<td>32</td>
<td>44</td>
<td>38</td>
</tr>
<tr>
<td>6 RPM reading</td>
<td>7</td>
<td>6</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>3 RPM reading</td>
<td>7</td>
<td>6</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td><strong>5A 16 hr @ 40°F</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 RPM reading</td>
<td>160</td>
<td>130</td>
<td>228</td>
<td>167</td>
</tr>
<tr>
<td>300 RPM reading</td>
<td>107</td>
<td>72</td>
<td>161</td>
<td>97</td>
</tr>
<tr>
<td>6 RPM reading</td>
<td>31</td>
<td>9</td>
<td>55</td>
<td>9</td>
</tr>
<tr>
<td>3 RPM reading</td>
<td>29</td>
<td>8</td>
<td>53</td>
<td>7</td>
</tr>
<tr>
<td><strong>ECD, ppg</strong></td>
<td>13.0</td>
<td>12.4</td>
<td>13.6</td>
<td>12.6</td>
</tr>
</tbody>
</table>

### Thixatrol RM14 Fann iX77 Temperature Profile

<table>
<thead>
<tr>
<th></th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
</tr>
</thead>
<tbody>
<tr>
<td>[B.38 / RM14][8 / 1] PPB</td>
<td>13</td>
<td>14</td>
<td>16</td>
<td>15</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>[Base Mud] - [Neat B.38 / 8 PPB]</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>[Neat B.38 / 12 PPB]</td>
<td>15</td>
<td>13</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

**Fann 35A (HR at 150°F)**

<table>
<thead>
<tr>
<th></th>
<th>Temp</th>
<th>RPM Reading @</th>
</tr>
</thead>
<tbody>
<tr>
<td>[B.38 / RM14][8 / 1] PPB</td>
<td>120°F</td>
<td>71  45  36  28  12  11</td>
</tr>
<tr>
<td>[Base Mud] - [Neat B.38 / 8 PPB]</td>
<td>120°F</td>
<td>49  29  22  16  9   4</td>
</tr>
<tr>
<td>[Neat B.38 / 12 PPB]</td>
<td>120°F</td>
<td>77  49  41  36  11  16</td>
</tr>
</tbody>
</table>
Fragile Gels & Antisag Properties

**Thixatrol RM14 PARCOM / Mysid / Lepto Data**

- MW > 600 (bioaccumulation not likely)
- Class C

- Aerobic Biodegradation in seawater
  - OECD 306
  - 33.4% at 2.0 mg/l

- Marine invertebrate (Acartia Tonsa)
  - ISO 14669
  - LC50 (48h)>1,000 mg/l

- Marine Algal (Skeletonema Costatum)
  - OECD 201
  - EC50 (72h): >37.1 mg/l

- Marine Sediment (Corophium volutator)
  - PC 1995
  - 10day LC50>12,496 mg/kg

- Juvenile fish (Cypinodon variegatus)
  - PC 1995
  - LC50 (96h)>37.1 mg/l

- Mysidopsis bahia
  - USEPA
  - LC50 (96hr)>1,000,000 ppm

- Leptocheirus plumulosus
  - USEPA
  - LC50 (96hr) ratio-42/168 -0.2

**Health and Safety Data**

Before using this product please consult our Material Safety Data Sheet for information on safe handling.

---

NOTE: The information herein is currently believed to be accurate. We do not guarantee its accuracy. Purchasers shall not rely on statements herein when purchasing any products. Purchasers should make their own investigations to determine if such products are suitable for a particular use. The products discussed are sold without warranty, express or implied, including a warranty of merchantability and fitness for use. Purchases will be subject to a separate agreement which will not incorporate this document.

© Elementis Specialties, Inc. 3-1-2013