Tallicin® 2540
EXTREME PRESSURE/ANTI-WEAR ADDITIVE FOR LUBRICANTS

TYPICAL CHARACTERISTICS

Appearance ......................................... Clear viscous liquid
Color ......................................................... Yellow
Specific Gravity .............................................. 1.05 ± .05
Acid Number .................................................. 90-110
pH (10% in distilled water) .......................................... < 2.5
Moisture (% Maximum) ............................................. 1.0

COMPATIBILITY

Tallicin® 2540 is soluble in petroleum oils (naphthenic and paraffinic) and aromatic solvents. Tallicin® 2540 is dispersible in water when neutralized to its alkali metal or alkanolamine salt. Tallicin® 2540 when used as supplied or in its neutralized form has been found to be noncorrosive and nonstaining to ferrous and non ferrous metals such as steel, aluminum and copper. Tallicin® 2540 is also compatible with most other commonly used additives such as petroleum sulfonates, polymethacrylate Viscosity Index improvers, and phenolic antioxidants.

APPLICATIONS

Tallicin® 2540 is a "phosphate ester" that possesses excellent extreme pressure/anti wear properties. It's lubricity, corrosion-inhibiting and surface-active properties can be useful in the following applications: chain lubricants, circulating oils, cutting fluids, drawing compounds, diesel oils, greases, hydraulic fluids, rolling oils, rust preventives, turbine oils and gear oils.

Tallicin® 2540 is an effective wetting and dispersing agent for commonly used additives such as graphite, Molybdenum DiSulfide and Teflon.

Tallicin® 2540's triethanolamine salt is an excellent emulsifier for naphthenic and paraffinic oils used in soluble oil cutting fluid formulations with low foaming properties. It is completely stable under neutral and alkaline conditions. Tallicin® 2540 will hydrolyze in the presence of strong mineral acids. In laboratory testing Tallicin® 2544 possessed a high degree of thermal stability. (6 hours at 288 degrees C.)
The following table illustrates how effective Tallicin® 2540's extreme pressure/anti-wear properties are in a straight oil formulation when compared to chlorinated paraffin and tricresyl phosphate.

<table>
<thead>
<tr>
<th>COMPOSITION</th>
<th>% BY WEIGHT</th>
<th>FOUR BALL TEST Scar diameter, mm 40 Kg; 100 rpm 121 degrees C. Time = 60 minutes.</th>
<th>FOUR BALL TEST Scar diameter, mm 100 Kg; 100 rpm 121 degrees C. Time = 60 minutes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASE OIL* Tallicin® 2540</td>
<td>99.0</td>
<td>0.45</td>
<td>0.50</td>
</tr>
<tr>
<td>BASE OIL* TRICRESYL PHOSPHATE</td>
<td>98.0</td>
<td>0.55</td>
<td>weld</td>
</tr>
<tr>
<td>BASE OIL* CHLORINATED PARAFFIN**</td>
<td>98.0</td>
<td>0.50</td>
<td>0.64</td>
</tr>
</tbody>
</table>
| ** BASE OIL = 100 SSU; NEUTRAL ** CHLORINATED PARAFFIN = 40% CI

In soluble oil (emulsifiable) cutting fluid formulations Tallicin® 2540's triethanolamine salt imparts superior film strength when compared with a conventional soluble cutting fluid formulation. Tallicin® 2540's triethanolamine salt will also provide outstanding rust inhibition to the soluble cutting fluid formulation. A soluble oil cutting fluid using Tallicin® 2540 can be prepared by simply mixing the required amounts of oil, triethanolamine and Tallicin® 2540.
The following table illustrates how effective Tallicin® 2540's triethanolamine salt is when compared with a conventional soluble cutting fluid formulation.

<table>
<thead>
<tr>
<th>COMPOSITION</th>
<th>% BY WEIGHT</th>
<th>FALEX LOAD TEST POUNDS PASSED AT SPECIFIC DILUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1/20</td>
</tr>
<tr>
<td>BASE OIL*</td>
<td>87.0</td>
<td></td>
</tr>
<tr>
<td>Tallicin® 2540</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>TRIETHANOL-AMINE</td>
<td>3.0</td>
<td>4500+</td>
</tr>
<tr>
<td>BASE OIL*</td>
<td>84.0</td>
<td></td>
</tr>
<tr>
<td>PETROLEUM SULFONATE-SOAP BLEND (82% ACTIVE)</td>
<td>16.0</td>
<td>1500</td>
</tr>
</tbody>
</table>

*BASE OIL = 100 SSU, NAPHTHENIC

The soluble cutting fluid formulations were also tested for rust inhibition on steel samples and cast iron samples. Both formulations provided complete rust protection on the steel samples at all dilutions tested. The Petroleum Sulfonate Soap Blend formulation failed at all dilutions tested on the cast iron samples while the formulation using Tallicin® 2540 provided complete rust protection at all dilutions.

**KEY FEATURES**

- Extreme pressure/anti-wear properties
- Corrosion inhibition
- Wetting and dispersing ability
- Emulsification properties
RECOMMENDED USE LEVELS

For straight oil formulations involving Tallicin® 2540 (as supplied) the recommended range is from .25 - 5.0%. For soluble-oil formulations the alkali salt or the triethanolamine salt of Tallicin® 2540 is an excellent emulsifier for naphthenic and paraffinic cutting oil bases. The optimum level of use should be experimentally determined for each application.

CONTAINER SIZES

5 Gallon Pail and 55 Gallon Drum.

8/1/08