Tallicin® 2544
EXTREME PRESSURE/ANTI-WEAR ADDITIVE FOR LUBRICANTS

TYPICAL CHARACTERISTICS

Appearance ............................................... Opaque viscous liquid
Color ........................................................... Amber
Specific Gravity ............................................. 1.04 ± .05
Acid Number pH ca 9.5 ..................................... 140-150
pH (10% in distilled water) ................................. < 2.5
Moisture (% Maximum) ..................................... 2.0

COMPATIBILITY

Tallicin® 2544 is soluble in petroleum oils (naphthenic and paraffinic) and aromatic solvents. Tallicin® 2544 is dispersible in water when neutralized to its alkali metal or alkanolamine salt. Tallicin® 2544 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® 2544 is also compatible with most other commonly used additives such as petroleum sulfonates, polymethacrylate Viscosity Index improvers, and phenolic antioxidants.

APPLICATIONS

Tallicin® 2544 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® 2544 is an effective wetting and dispersing agent for commonly used additives such as graphite, Molybdenum DiSulfide and Teflon.

Tallicin® 2544’s triethanolamine salt is an excellent emulsifier for naphthenic and paraffinic oils used in soluble oil (emulsifiable) cutting fluid formulations with moderate foaming properties. It is completely stable under neutral and alkaline conditions. Tallicin® 2544 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® 2544’s extreme pressure\anti-wear properties are (at low concentrations) in a straight oil formulation when compared to chlorinated paraffin (50% chlorine).

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### PERFORMANCE COMPARISON OF Tallicin® 2544

<table>
<thead>
<tr>
<th>COMPOSITION</th>
<th>CONCENTRATION (parts by weight)</th>
<th>FOUR-BALL TEST Scar Diameter, mm 100 Kg; 1500 rpm; 121°C. Steel = 52100 stainless</th>
<th>FOUR-BALL TEST Scar Diameter, mm 160 Kg; 1500 rpm; 121°C. Steel = 52100 stainless</th>
<th>FALEX WEAR TEST (Number Teeth)</th>
<th>FALEX LOAD TEST (Pounds Passed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASE OIL* Tallicin® 2544</td>
<td>99.0 1.0</td>
<td>0.570 0.700 0.725 0.895</td>
<td>0</td>
<td>2250</td>
<td></td>
</tr>
<tr>
<td>BASE OIL* Tallicin® 2544</td>
<td>99.5 0.5</td>
<td>0.585 0.720 0.725 0.820</td>
<td>0</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>BASE OIL* Cl PARAFFIN**</td>
<td>95.0 5.0</td>
<td>0.700 0.790 0.790 0.995</td>
<td>75</td>
<td>3500</td>
<td></td>
</tr>
<tr>
<td>BASE OIL* Cl PARAFFIN**</td>
<td>99.0 1.0</td>
<td>0.895 0.995 0.930 1.050</td>
<td>Pin Broke</td>
<td>750</td>
<td></td>
</tr>
</tbody>
</table>

* BASE OIL = 100 SUS NAPHTHENIC  
** Cl PARAFFIN = 50% Cl

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The following table illustrates how effective Tallicin® 2544 is as a rust preventive in a soluble-oil formulation even at standard dilutions.

<table>
<thead>
<tr>
<th>FORMULATED PRODUCT</th>
<th>Days To Failure At Specific Dilution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/25</td>
</tr>
<tr>
<td>Tallicin® 2544</td>
<td>&gt;11</td>
</tr>
<tr>
<td>(*Formulated As Below)</td>
<td></td>
</tr>
<tr>
<td>WATER</td>
<td>1</td>
</tr>
</tbody>
</table>

Procedure: The formulated product was diluted with water in the ratios shown and emulsified with a Hamilton Beach mixer. A small quantity of the emulsified product was dropped onto degreased steel samples placed in a watch glass and observed for signs of rust over a period of 11 days. Any rust formation observed is classed as a failure.

*Formulation:  
Tallicin® 2544..............10% By Weight  
Base Oil......................85%  
Triethanolamine............. 5%

KEY FEATURES

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

RECOMMENDED USE LEVELS

For straight oil formulations involving Tallicin® 2544 (as supplied) the recommended range is from .25 - 5.0%. For soluble-oil formulations the alkali salt or the triethanolamine salt of Tallicin® 2544 is an excellent emulsifier for naphthenic and paraffinic cutting oil bases. The optimum use level should be determined experimentally for each particular application.

CONTAINER SIZES

5 Gallon Pail and 55 Gallon Drum.

8/1/08