Low Tox® Turbine Oil (6412-6414)

Provides reduced toxicity without reduced performance

LE’s Low Tox® Turbine Oil (6412-6414) provides long-lasting performance, equivalent to conventional turbine oils while providing lower toxicity than biodegradable turbine oils. Its advanced technology formulation – with highly refined mineral oil and specially selected additives – offers low toxicity, but it does not sacrifice lubrication performance or necessitate shortening of lubricant change intervals; there is no worry of premature oxidation or failure of the lubricant as there is with most vegetable oil-based products. Low Tox Turbine Oil meets or exceeds OEM requirements for many generators, turbines and governors; it is especially suited for use in hydroelectric facilities and flood control structures requiring lubricants.

Beneficial Qualities

Environmentally Friendly

- Provides up to tenfold reduction in ecotoxicity
- Ensures low toxic effect on aquatic organisms

Premium Long-Lasting Performance

- Provides long-lasting performance, equivalent to conventional turbine oils.
- Resists hydrolysis better than vegetable or synthetic ester-based oils
- Lasts significantly longer than vegetable-based oils
- Exhibits excellent demulsibility
- Is compatible with seals

Available Grades

- ISO 46 (6412)
- ISO 68 (6413)
- ISO 100 (6414)

Microtox Luminescent Bacteria Bioassay Test

Higher EC50 Values Indicate Lower Toxicity

EC50: Effective concentration measured in milligrams of product per liter of water. Tells you the effective concentration of the product being measured and what quantity it takes to reduce bacterial luminescence metabolic activity by 50%. EC values are applicable to compounds that are not soluble in water, including oils.

LE’s Low Tox Hydraulic and Turbine Oils (6603 and 6413) are less toxic to the environment than other conventional and biodegradable products (A-H). A further concern is the toxic effect on the environment of a lubricant during the time that biodegradation is taking place. LE’s Low Tox oils are 55 percent biodegradable in 28 days and have the lowest toxicity of all competitive hydraulic and turbine products, as shown by the test results above.

Why Low Toxicity?

One question confronting scientists in environmental risk assessment is whether it is better for a material to be quickly biodegraded and possess relatively high toxicity or be low in toxicity and biodegrade at a slightly slower rate. Lubrication Engineers believes that the latter option provides the best protection of the environment because it minimizes overall impact on the ecosystem.
## Technical Data

### Low Tox® Turbine Oil

<table>
<thead>
<tr>
<th>Property</th>
<th>6412</th>
<th>6413</th>
<th>6414</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color</strong></td>
<td>Straw</td>
<td>Amber</td>
<td>Amber</td>
</tr>
<tr>
<td><strong>ISO VG</strong></td>
<td>46</td>
<td>68</td>
<td>100</td>
</tr>
<tr>
<td><strong>Relative Density @ 60°F/60°F, ASTM D1298</strong></td>
<td>0.867</td>
<td>0.868</td>
<td>0.873</td>
</tr>
<tr>
<td><strong>Viscosity @ 100°C, cSt, ASTM D445</strong></td>
<td>6.910</td>
<td>8.980</td>
<td>11.40</td>
</tr>
<tr>
<td><strong>Viscosity @ 40°C, cSt, ASTM D445</strong></td>
<td>45.63</td>
<td>68.58</td>
<td>98.70</td>
</tr>
<tr>
<td><strong>Viscosity Index ASTM D2270</strong></td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td><strong>Flash Point °C (°F), (COC), ASTM D92</strong></td>
<td>235 (455)</td>
<td>238 (460)</td>
<td>238 (460)</td>
</tr>
<tr>
<td><strong>Pour Point °C (°F), ASTM D97</strong></td>
<td>-18 (0)</td>
<td>-15 (+5)</td>
<td>-15 (+5)</td>
</tr>
<tr>
<td><strong>Rust Test</strong> 4 hrs @ 60°C, Sea H₂O, ASTM D665B</td>
<td>Pass</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td><strong>Copper Corrosion 3 hrs @ 100°C, ASTM D130</strong></td>
<td>1a</td>
<td>1a</td>
<td>1a</td>
</tr>
<tr>
<td><strong>Oxidation by RPVOT @ 150°C, minutes, ASTM D2272</strong></td>
<td>875</td>
<td>560</td>
<td>560</td>
</tr>
<tr>
<td><strong>Acid Number</strong> mg KOH/g, ASTM D664</td>
<td>0.06</td>
<td>0.06</td>
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</tr>
<tr>
<td><strong>Emulsion Characteristics @ 54°C, oil-water-emulsion/minutes, ASTM D1401</strong></td>
<td>40-40-0/10</td>
<td>40-40-0/20</td>
<td>40-40-0/20</td>
</tr>
<tr>
<td><strong>Microtox Bioassay</strong> mg/l, EC50</td>
<td>≥100,000</td>
<td>≥100,000</td>
<td>≥100,000</td>
</tr>
<tr>
<td><strong>Precipitation Number</strong> ASTM D91</td>
<td>0.02</td>
<td>0.02</td>
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</tr>
</tbody>
</table>

### Performance Requirements Met or Exceeded
- GE Generators GEH527j
- GE Vertical Waterwheels GE-TPP-77904-1
- Voith Allis Hydro-Hydraulic Turbines
- Woodward Hydraulic Turbine Governors

### Typical Applications
- Hydro-turbines
- Generators
- Governors
- Downhole water pumps
- Forestry and logging equipment
- Water and wastewater treatment plants
- Paper mills
- Other applications where low toxicity and minimal environmental impact is desirable.

Low Tox® is a registered trademark of Lubrication Engineers, Inc.