



6411-6414 LOW TOX[®] TURBINE OIL

Designed for use where environmental concerns dictate the use of a very low toxicity turbine oil.

Lubrication Engineers' Low Tox Turbine Oils offer superior performance in lubrication, with long oil life and excellent wear protection. There is no worry of premature oxidation or failure of the lubricant as there is with most vegetable oil based products. Low Tox Turbine Oils are based on USP quality white mineral oils and specially selected additives to provide a low toxicity product with good biodegradability that does not sacrifice lubrication performance or necessitate shortening of lubricant change intervals.

USER BENEFITS:

- **Reduced ecotoxicity** – Lowest toxic effect on aquatic organisms. Up to a tenfold reduction in ecotoxicity without any compromise in lubricant or turbine performance.
- **Longer life** – lasts significantly longer than vegetable based oils.
- **Oxidation stability** – Two to three times better oxidation stability than conventional oils.
- **Performance** – Low Tox Turbine oils are superior to conventional oils while offering significantly reduced toxicity.
- Excellent demulsibility and seal compatibility.
- Resists hydrolysis better than vegetable or synthetic ester based oils.
- **Versatility** – Available in a number of viscosity grades. Low Tox Turbine Oils meet the different requirements of various types of equipment.

6411	ISO 32	
6412	ISO 46	
6413	ISO 68	SAE 20
6414	ISO 100	SAE 30

TYPICAL APPLICATIONS:

- Hydro-turbines
- Generators
- Governors
- Downhole Water Pumps
- Forestry/Logging Equipment
- Water/Wastewater Treatment Plants
- Paper Mills
- Other applications where low toxicity and minimal environmental impact is desirable.

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.



LUBRICATION ENGINEERS, Inc.[®]
LEADERS IN LUBRICANTS

LE operates under an ISO 9001
Certified Quality System

300 BAILEY AVENUE • FORT WORTH, TEXAS 76107 • 817-916-3200 • 800-537-7683 • FAX 817-820-1512 • www.LElubricants.com



TECHNICAL DATA BULLETIN

6411-6414
Low Tox[®]
Turbine Oil

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DESCRIPTION:

Low toxicity turbine oil designed with advanced product technology that exceeds the performance of premium turbine oils, yet affords low eco-toxicity to address environmental concerns. Has a low order of toxicity compared to standard commercial turbine oils and biodegradable turbine oil. LE's Low Tox Turbine Oils meet or exceed OEM requirements for many generators, turbines and governors.

PHYSICAL CHARACTERISTICS – TYPICAL:

	<u>6411</u>	<u>6412</u>	<u>6413</u>	<u>6414</u>
ISO Grade	32	46	68	100
Gravity, °API	31.9	32.3	31.3	30.9
Viscosity				
SUS @ 100°F	153.9	203.8	306.8	472.3
SUS @ 210°F	43.7	47.8	54.2	64.6
cSt @ 40°C	32.9	45.9	66.3	102.3
cSt @ 100°C	5.4	6.6	8.64	11.61
Viscosity Index, min	95	95	95	95
Color	Amber	Amber	Amber	Amber
Flash Point, °F (°C)	400 (204)	455 (235)	460 (238)	500 (260)
Pour Point, °F (°C)	-5 (-21)	0 (-18)	5 (-15)	5 (-15)

TEST RESULTS:

Copper Corrosion, ASTM D130	1a	1a	1a	1a
Salt Water Rust Test, 48 hrs., ASTM D665B	Pass	Pass	Pass	Pass
Oxidation Stability, ASTM D943 % Sludge @ 1,000 hrs.	<0.1	<0.1	<0.1	<0.1
Rotary Bomb Oxidation Test, min. ASTM D2272	875	875	560	560
Water Separation, ASTM D1401 ml oil-ml water-ml emulsion (min.)	40-40-0-(20)	40-40-0-(10)	40-40-0-(20)	40-40-0-(20)
Microtox [®] Bioassay, EC 50, mg/L.min.	>100,000	>100,000	>100,000	>100,000

MEETS PERFORMANCE REQUIREMENTS OF:

General Electric Generators GEH527j
General Electric Vertical Waterwheels GE-TPP-77904-1

Voith Allis Hydro Hydraulic Turbines
Woodward Hydraulic Turbine Governors

APPLICATION:

Designed for use where environmental concerns require the use of a very low toxicity turbine oil. Especially suited for use in hydroelectric facilities and flood control structures requiring lubricants. Provides reduced eco-toxicity without reduced performance.

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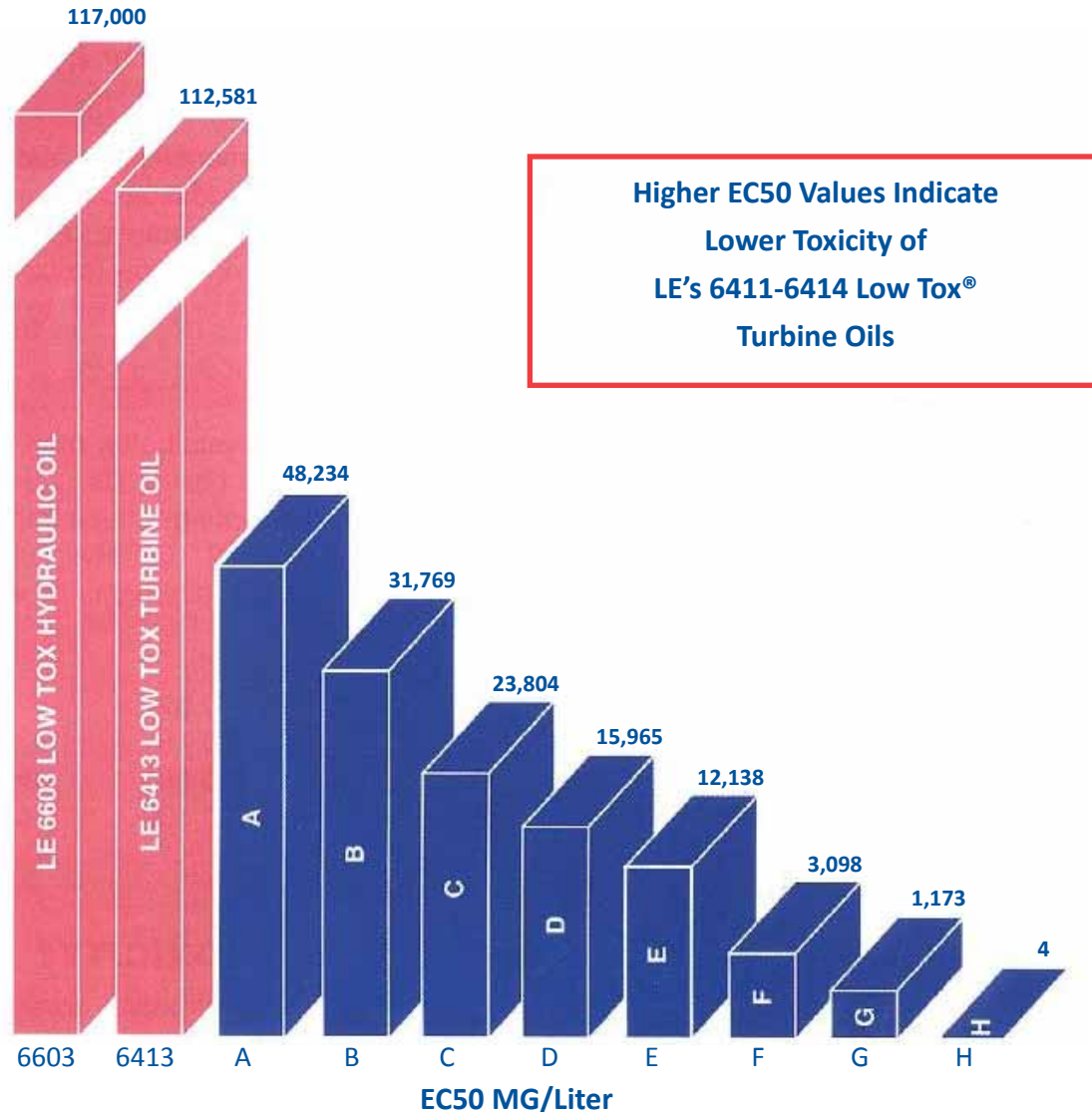
LUBRICATION ENGINEERS[®] Inc.

300 Bailey Ave Fort Worth, Texas 76107
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**LE OPERATES UNDER AN ISO 9001
CERTIFIED QUALITY SYSTEM.**

LE's Low Tox® Oils
Show High EC50 Value in
Microtox® Luminescent Bacteria Bioassay Test.

EC 50 Value: Effective concentration measured in milligram 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 which are not soluble in water, therefore, they are applicable to oils.



Lubrication Engineers' Low Tox Hydraulic and Turbine Oils are less toxic to the environment than conventional and biodegradable products available today. The issue of biodegradability is not the only concern. A further concern is the toxic effect on the environment of a lubricant during the time that biodegradation is taking place. Lubrication Engineers' Low Tox product line is 55% biodegradable in 28 days and has the lowest toxicity of any hydraulic or turbine products on the market today, as shown by the Microtox Luminescent Bacteria Bioassay Test.



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