

# METATRON™ 559

## DESCRIPTION :

**Metatron™ 559** is a concentrated water-soluble polyalkene glycol base synthetic, non-staining metalworking fluid that is recommended for use in grinding and other high speed light to heavy duty machining operations on both ferrous and non-ferrous metals. **Metatron™ 559** does not contain any sulfur, chlorine, nitrites, phenols, or heavy metals. **Metatron™ 559** is formulated to provide maximum lubricity to ferrous and non-ferrous materials without the use of additives that can cause staining to copper, brass, bronze, aluminum, and other non-ferrous metals.

## EXCELLENT COOLING AND LUBRICITY BY INVERSE SOLUBILITY:

**Metatron™ 559** possesses excellent cooling, extreme pressure, and lubricity properties that are needed for high speed machining operations. **Metatron™ 559** contains surface-active ingredients in the form of polyalkene glycol synthetic base fluids, which enables the fluid to wet the metal surfaces of the tool and the workpiece in order to provide a protective film for lubricating the tool and the workpiece interface through a unique physical characteristic called Inverse Solubility. The Inverse Solubility characteristic works as follows.

1. At ambient temperatures, typically of those found in a machine sump, the **Metatron™ 559** is completely soluble in water forming a clear transparent solution.
2. As the **Metatron™ 559** /water solution is brought into contact with the tool-workpiece interface, the heat being generated at the interface by the tool causes the polyalkene glycol portion of the **Metatron™ 559** to come out of solution and form small, oil-like drops.
3. **Metatron™ 559** lubricity and anti-weld additives that function as extreme pressure agents that reduce the coefficient of friction between the tool and the workpiece interface migrate and collect at the interface between the small oil-like droplets and the water phase.
4. The polyalkene glycol droplets wet the surfaces of the workpiece and the tool. This results in the formation of a thin layer of concentrated polyalkene glycol and lubricity/ anti-weld additives.
5. The spent chips and excess **Metatron™ 559** /water solution falls back into the relatively cool machine sump, where the polyalkene glycol and the lubricity/anti-weld additives go back into solution. Unlike soluble cutting fluids, the chips generated during use are not coated with a significant amount of oil that does not re-emulsify. As a result, less of the **Metatron™ 559** is lost due to dragout.

This combination of cooling and Inverse Solubility properties effectively transfers heat away from the cutting zone, thus reducing friction between the cutting tool and the workpiece. This in turn results in greater dimensional accuracy, higher turning speeds and feeds, prevention of the chips from welding to the cutting tools, improved surface finish and extended tool life.

### **ADDITIONAL PERFORMANCE FEATURES:**

**Metatron™ 559** contains an effective emulsifier system that allows the **Metatron™ 559** to be mixed with water at varying concentrations. This emulsifier system allows the oil portion of the **Metatron™ 559** to be evenly and uniformly dispersed throughout the coolant mixture. This even and uniform dispersion results in a transparent emulsion that allows the operator the ability to see the workpiece being machined. Further, by being evenly and uniformly dispersed, the smoking and misting characteristics that are associated with the use of soluble cutting fluids is virtually eliminated.

This emulsifier system also provides a detergent action that allows the **Metatron™ 559** the ability to break up and dislodge dirt and grit in order to keep the machine and tools clean. This detergent action also assists in flushing of the chips and fines away from the cutting area.

The emulsifier system further complements and enhances the performance characteristics of **Metatron™ 559** rust and corrosion inhibiting additive package. The emulsifier system enhances the rust and corrosion inhibitors' alkaline reserve during use resulting in the **Metatron™ 559** being able to resist rancidity, a drop in pH and prevention of the rusting of parts, tools, and machinery.

**Metatron™ 559** emulsifier system contains sequestering agents which combat iron, calcium and magnesium ions in hard water; thus preventing the formation of hard water soaps, scum, and resins on the machine and the parts.

### **EXCELLENT BIORESISTANCE:**

**Metatron™ 559** contains an effective broad-spectrum antimicrobial agent that allows the **Metatron™ 559** to resist bacterial and fungal growth during use. This broad-spectrum antimicrobial agent unlike conventional biocides found in conventional soluble cutting fluids is not readily used up during usage. In addition, **Metatron™ 559** does not contain any oils, chlorine, or other components that are considered good food sources for bacterial growth. This means that **Metatron™ 559** is less likely to sour and produce odors resulting in longer sump life and less worker complaints.

**Metatron™ 559** will effectively reject any tramp oil contamination allowing for easy skimming and removal of the tramp oils from the sumps and reservoirs. This results the elimination of a potential food source for the growth of bacterial and fungus in the sump and greater bioresistance to the growth of bacteria and fungus in the coolant sump.

#### **LOW FOAMING CHARACTERISTICS:**

Excessive foaming of a cutting fluid during use can result in an insufficient amount of the cutting fluid being available at the tool-workpiece interface and in maintenance problems due to metalworking fluid overflow in sumps. **Metatron™ 559** contains a highly effective antifoam additive system that allows the product to exhibit low foaming characteristics. This results in a sufficient amount of the cutting fluid being available to the tool-workpiece interface, greater visibility of the workpiece and a vast reduction in maintenance problems due to coolant overflow.

#### **WASTETREATABILITY:**

**Metatron™ 559** is a water waste treatable product that can be safely discharged into the normal flow of the wastewater from the plant. The only time **Metatron™ 559** cannot be discharged into a wastewater system is if the wastewater treatment facility is not a primary wastewater treatment facility.

Before being discharged into the wastewater system, all tramp oils and metal fines should be removed from the **Metatron™ 559** . In some areas, it is necessary to remove all traces of alkalinity before dumping watery wastes. For these areas it is suggested the following procedure be followed:

Skim all tramp oils and remove all metal fines. To the remaining clarified water, neutralize to a pH of 7.0 by the use of muriatic acid. Approximately 1.9Liters (2 quarts) of muriatic acid should be enough to neutralize 378.5 Liters (100 gallons) of a used 20:1 mixture of **Metatron™ 559** . Add a small amount of acid at a time and check the progress using a pH indicator paper or a pH meter. When a pH of 7 is reached, the spent **Metatron™ 559** is ready to be discharged into the plant waste effluent.

**BENEFITS:**

**Metatron™ 559** provides the following benefits during use:

1. Excellent cooling and lubricity.
2. Excellent extreme pressure protection.
3. Ability to machine at high speeds and feed rates.
4. Improved surface finishes.
5. Extended tool/wheel life.
6. Resistance to the formation of gummy residues.
7. Superior rust and corrosion protection.
8. Excellent retention of the products alkalinity reserve.
9. Excellent machine and tool cleanliness.
10. Excellent rejection of tramp oil contamination.
11. Excellent protection from rancidity and Monday Morning Smell.
12. Low foaming tendencies.
13. Longer coolant sump life
14. Excellent waste treatability in waste water systems.

**PRODUCT MAINTENANCE:**

Prior to charging the system with **Metatron™ 559** , it is recommended that the system be thoroughly cleaned to remove residues, machining debris and fines, bioaccumulations, etc. from previously used products. A typical recommended cleaning procedure would involve filling the system with a solution of a commercially available cleaner, circulating the cleaner for one hour, draining it, and then rinsing with water. Depending upon the system size and the condition, additional steps involving physical cleaning and/or circulation of bactericides or fungicides such as a bleach solution may be required to clean and disinfect extremely dirty systems.

Though **Metatron™ 559** is formulated to provide long sump life, the product requires monitoring and maintenance to prevent bacterial/fungal growth, rancidity, and rusting problems. It is recommended that the coolant strength be determined on a daily basis or at least several times per week using a hand held refractometer. Appropriate amounts of coolant should be added to maintain the coolant strength at the recommended level for the machining operation being performed using premixed coolant as makeup. The pH should also be periodically determined and maintained within a range of 8.5 to 9.5. Coolant makeup to the system is generally sufficient to control the pH. Using premixed coolant as makeup will substantially improve and maintain coolant performance. The specific makeup concentration selected should balance the water evaporation rate with the coolant carryout rate. For example if a 20:1 dilution is being used adding a premixed makeup dilution of 40:1 to the sump will generally maintain the proper concentration in the sump.

During use and for makeup purposes **Metatron™ 559** should always be added to water. The use of deionized, distilled, or mineral free water to mix this product will improve sump life will improve sump life, reduce carry-off, and help improve overall product performance.

The coolant system should also be monitored for bacterial/fungal growth using bacterial/fungus dip slides or other suitable test kits. Proper control of the coolant strength and the pH are the best methods to control the level of bacteria and fungus in the coolant mixture.

In order to extend the life of metalworking fluids, foreign materials such as machining debris and fines should be periodically removed by filtration or other suitable means. Since the presence of tramp oils provide a food source for bacterial growth, any tramp oil entering the system should be periodically skimmed from the reservoir or sump.

### REFRACTOMETER READINGS

Concentration	°Brix*
5:1	4
10:1	5
15:1	2
20:1	2
30:1	1.5
40:1	1
50:1	1

\*Readings taken from America Optical Fluid Testing Model 10441

Note: Due to variances between makes and model of refractometers and in water quality, the above readings should only be used as a guideline. It is recommended that various concentrations be made and the refractometer readings obtained be recorded and used as a baseline for makeup.

### RECOMMENDED APPLICATION DILUTION RATES:

APPLICATION TO WATER	RATIO OF METATRON 559
Automatic turret and engine lathe	1:20
Drilling, Milling, and Turning	1:20
Reaming, Boring, and Sawing	1:20
Gearhobbing, Hobbing, Shaping, Broaching	1:20
Tapping, Threading and Counterbroaching	1:20
Grinding	1:30

## Typical Characteristics

### Appearance

pH Value (neat)	Clear, 9 to 9.5
Falex Pin & Vee Block Test ASTM D-3233 Method B 20:1 dilution	2041kg-f (4,500 lbf)
Four Ball E.P. Test ASTM D-2783	
Weld Point, kg 20:1 dilution	250
Tapping Torque Test (1215 Steel) ASTM 5619 20:1 dilution - % Efficiency	100%
Cast Iron Chip Test 20:1 dilution	Pass – No rust
50:1 dilution	Pass – No rust
Waring Blender Foam Test 200ml of 20:1 dilution agitated for 1 minute	Low Foaming