



# TECHNICAL DATA

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## 411 MAXKOOL SS™

### Description:

Maxkool SS™ is a micro-emulsion, semi-synthetic metalworking fluid designed to machine a wide variety of alloys from aluminum to cast iron. It exhibits excellent bio-static control along with non-staining qualities. It is effective for milling, tapping, sawing, reaming, and other types of machining applications requiring moderate nozzle pressures. Proprietary technology offers superior part quality, extended tool life, heat dissipation and fluid longevity.

- **Maxkool SS™ does not contain any sulfur, chlorine, nitrites, phenols, Diethanolamine (DEA) or heavy metals.**
- **Maxkool SS™ also exhibits excellent corrosion protection, bio-resistance and biostability that allows for longer sump life.**
- **Maxkool SS™ is recommended for use in those machines that have coolant nozzle pressures up to 800 psi.**

### Excellent Cooling, Lubricity and Film Boundary Characteristics:

Maxkool SS™ possess excellent cooling, extreme pressure, lubricity and film boundary forming characteristics and properties.

Maxkool SS™ contains a unique group of surface active ingredients, lubricity, anti-weld and extreme pressure additive systems that work in synergism which enables the product to wet and coat the metal surfaces of the tool and work-piece interface in order to provide a protective film that improves the film boundary characteristics, chip carrying capabilities and heat dissipation properties of the fluid. Maxkool SS™ contains a combination of properly balanced wetting agents that allows the penetration of the fluid directly into the cutting zone to form a chemical/metal bond that reduces friction and rapidly cool the part/tool interface through a physical characteristic call inverse solubility.

At the temperatures typically found in the machine sump, Maxkool SS™ is completely soluble in water. As the Maxkool SS™/water solution comes into contact with the tool/work-piece interface, the heat that is generated at the interface causes the wetting agents, and other surface active components to come out of solution and form a very thin film molecular layer of micelles that coats and wets the tool and work-piece interface in order to cool the tool and work-piece. Working in synergism with the wetting agents Maxkool SS™'s lubricity, anti-weld and extreme pressure additives migrate out of solution and collect between the micelles and the water phase to form a thin layer of concentrated lubricity, anti-weld and extreme pressure additives to form a chemical/metal bond that reduces the coefficient of friction between the tool and the work-piece interface. Once the Maxkool SS™/water solution leaves the tool/work-piece interface and goes back into the relatively cool machine sump, these unique groups of surface active ingredients, lubricity, anti-weld and extreme pressure additive systems goes back into solution.

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This combination of cooling and extreme pressure/lubricity properties that is provided by the Maxkool SS™'s inverse solubility properties effectively transfers heat away from the cutting zone, thus reducing friction between the cutting tool and the work-piece. 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:**

Maxkool SS™ contains an extremely stable and tight micro emulsion system that allows the Maxkool SS™ to be mixed with water at varying concentrations. This micro emulsion system allows the oil portion of the Maxkool SS™ 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 work-piece being machined. Further, by being evenly and uniformly dispersed, the smoking and misting characteristics that are often associated with the use of soluble cutting fluids is greatly reduced.

This tight and extremely stable micro emulsion system also provides the proper detergent action that is needed to allow the Maxkool SS™ with 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 the rapid flushing, lift and removal of the chips and fines away from the cutting area.

The micro emulsion system further complements and enhances the performance characteristics of Maxkool SS™'s rust and corrosion inhibiting additive package by enhancing the rust and corrosion inhibitors' alkaline reserve during use, thus resulting in the Maxkool being able to resist rancidity, a drop in pH and prevention of the rusting of parts, tools, and machinery.

Maxkool SS™'s micro emulsion system contains sequestering agents which combat iron, calcium and magnesium ions in hard water up to 400 ppm; thus preventing the formation of hard water soaps, scum, and resins on the machine and the parts.

### **EXCELLENT BIORESISTANCE and BIOSTABILITY:**

Maxkool SS™ possess a high degree of bioresistance and biostability. This means that Maxkool SS™ is less likely to sour and produce odors resulting in longer sump life and less worker complaints.

Maxkool SS™ will reject a very high percentage of 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.

In addition Maxkool SS™'s micro emulsion system possesses less susceptibility to attack from bacterial growth. This result is less degradation of the fluid during use.

All of these factors result in a very biostable coolant that is able to resist extreme biological degradation. This results in long sump life in a properly maintained machine tool and diminishes the possibility of "Monday Morning Odor".

### **LOW FOAMING CHARACTERISTICS:**

Excessive foaming of a cutting fluid especially in machining operations during use can result in an insufficient amount of the cutting fluid being available at the tool-work-piece interface and in maintenance problems due to metalworking fluid overflow from the sump. Maxkool SS™ contains a highly effective antifoam additive system and stable micro emulsion system that allows the product to exhibit low foaming characteristics. These additive systems provide fast foam collapse and a high degree of stability during use. This results in a sufficient amount of the cutting fluid being available to the tool-work-piece interface, greater visibility of the work-piece and a vast reduction in maintenance problems due to coolant overflow.

### **WASTETREATABILITY:**

Maxkool SS™ is a water waste treatable product that can be safely discharged into the normal flow of the wastewater from the plant per the permitting requirements of the plant. The only time Maxkool SS™ cannot be discharged into a wastewater system is if the municipal wastewater treatment facility is not a primary wastewater treatment facility or if the shop's disposal permit does not allow the discharge of spent metalworking fluid into the system.

Before being discharged into the wastewater system, all tramp oils and metal fines should be removed from the Maxkool SS™. 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 2 quarts of muriatic acid should be enough to neutralize 100 gallons of a used mixture of Maxkool SS™. 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 Maxkool SS™ is ready to be discharged into the plant waste effluent.

### **BENEFITS:**

Maxkool SS™ provides the following benefits during use:

1. Excellent cooling and lubricity for extended tool and wheel life.
2. Excellent extreme pressure protection.
3. Ability to machine at high speeds and feed rates.
4. Improved surface finishes.
5. Lower tool tip temperatures and prevention of chips from welding to the tool and the work-piece.
6. Resistance to the formation of gummy residues.
7. Excellent corrosion inhibition, including vapor phase inhibition.
8. Excellent retention of the product's 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. Very low foaming tendencies.
13. Long term emulsion stability.
14. Exceptional parts finish and reduced rejection of parts.
15. Chlorine, nitrate and phenol free
16. Longer coolant sump life.
17. Excellent waste treatability in waste water systems.
18. Easily recycled or disposed of using conventional techniques and equipment.
19. Very good settling properties to remove and filter chips and grit from the machine sump.

20. Very low misting properties.
21. Prevents chip “clinkering” and hot chip hoppers.
22. Operator friendly and clean running.
23. Very low carry-off for low, long term operating costs.
24. Mild and pleasant odor.
25. Good work-piece visibility.
26. Reduced overall waste volume and spent-fluid disposal costs.
27. Lower maintenance costs.
28. Increased productivity and lower overall operating costs.

### **PRODUCT MAINTENANCE:**

Though the Maxkool SS™ can be added to the existing coolant charge in the system at the dilution rate that is being used for the existing fluid, it is recommended that prior to changeover that the system be thoroughly cleaned to remove any existing 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 metalworking fluid machine sump cleaner such as Schaeffer's 611 SumpFlush™ Machine Cleaner and following the directions that are listed on the products technical data or product data sheet. Depending upon the system size and the condition, additional steps involving physical cleaning and/or circulation of bactericides or fungicides such may be required to clean and disinfect extremely dirty systems.

Though Maxkool SS™ is formulated to provide long sump life, the product with proper monitoring and maintenance to prevent bacterial/fungal growth, rancidity, and rusting problems will result in a more stable quality of finished parts over a sustained period of time.

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.

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

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.

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.

**Monitoring Concentration:**

Concentration can easily be monitored by using a refractive index reading. Take the refractive index reading (brix reading) and multiply it by 2.2

Concentration (%) = Refractive index reading (brix reading) X 2.2

**APPLICATION GUIDELINES**

- Maxkool SS™ is not recommended for use on very water reactive metals such as magnesium and zirconium.
- In mixed metal situations, concentration control is critical to fight corrosion.

**TYPICAL PROPERTIES**

Appearance	Blue-green color
Specific Gravity	1.05 +/- 0.02
Emulsion pH @ 5% (20:1 dilution)	9.14
Falex Pin & Vee Block Test ASTM D-3233 Method B 10:1 dilution (10% dilution)	4,500 Lb-f
Microtap Torque Test (1215 Steel, 550 rpm, 15mm depth, Torque 650 Ncm) 10:1 dilution (10% dilution)-	
% Efficiency	100.7%
Average Ncm	206.7
Cast Iron Chip Test	
20:1 dilution (5%)	Pass – No rust
50:1 dilution (2%)	Pass – No rust
CI Chip Rust Test IP 287	
Breakpoint	3%