



# **TECHNICAL DATA**

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## **#311 SYNKOOL SS**

### **DESCRIPTION:**

Synkool SS is a concentrated water-soluble semi-synthetic, biostable, low foaming 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. Synkool SS does not contain any active sulfur, chlorine, nitrites, phenols, Diethanolamine (DEA) or heavy metals.

Synkool SS is especially recommended for use in metalworking fluid operations that employ the use of high-pressure machines.

### **EXCELLENT COOLING AND LUBRICITY:**

Synkool SS possesses excellent cooling, extreme pressure, and lubricity properties that are needed for high speed machining operations. Synkool SS contains surface-active ingredients, which enable 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. Synkool SS also contains synthetic lubricity and anti-weld additives that function as extreme pressure agents that reduce the coefficient of friction between the tool and the workpiece interface. This combination of cooling and extreme pressure/lubricity 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:**

Synkool SS contains an effective low-foaming emulsifier system that allows the Synkool SS to be mixed with water at varying concentrations. This emulsifier system allows the oil portion of the Synkool 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 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 Synkool SS 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.

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

Synkool SS's emulsifier 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:**

Synkool SS contains an effective broad-spectrum anti-microbial agent that allows the Synkool SS to resist bacterial and fungal growth during use. This broad-spectrum anti-microbial agent unlike conventional biocides found in conventional soluble cutting fluids is not readily used up during usage. This means that Synkool SS is less likely to sour and produce odors resulting in longer sump life and less worker complaints.

Synkool 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 Synkool SS's emulsifier system possesses less susceptibility to attack from bacterial growth. This results 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".

**VERY LOW FOAMING CHARACTERISTICS:**

Excessive foaming of a cutting fluid especially when used in high pressure machining operations 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. Synkool SS contains a highly effective non-silicone base antifoam additive system that allows the product to exhibit very low foaming characteristics. The non-silicone base antifoam additive system provides rapid defoaming and a high degree of stability during use. This results in a sufficient amount of the cutting fluid being available to the tool-workpiece interface,

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greater visibility of the workpiece and a vast reduction in maintenance problems due to coolant overflow.

In addition the antifoam additive will not result in any deposition of residues on the workpiece. This results in less cleaning of the metal parts and ease of painting or further processing of the part after machining.

### **WASTETREATABILITY:**

Synkool SS is a water waste treatable product that can be safely discharged into the normal flow of the wastewater from the plant. The only time Synkool SS 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 Synkool 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 20:1 mixture of Synkool 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 Synkool SS is ready to be discharged into the plant waste effluent.

### **BENEFITS:**

Synkool SS 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. Lower tool tip temperatures and prevention of chips from welding to the tool and the workpiece.
6. Extended tool and wheel life.
7. Resistance to the formation of gummy residues.
8. Superior rust and corrosion inhibition on all ferrous and nonferrous metals.
9. Excellent retention of the products alkalinity reserve.
10. Excellent machine and tool cleanliness.

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11. Excellent rejection of tramp oil contamination.
12. Excellent protection from rancidity and Monday Morning Smell.
13. Very low foaming tendencies.
14. Longer coolant sump life
15. Excellent waste treatability in waste water systems.
16. Easily recycled or disposed of using conventional techniques and equipment.
17. Very good settling properties so chips and grit can be removed and filtered from the machine sump.
18. Very low misting properties.
19. Prevents chip "clinkering" and hot chip hoppers.
20. Operator friendly and clean running.
21. Very low carry-off for low, long term operating costs.
22. Mild and pleasant odor.
23. Good workpiece visibility.
24. Reduced overall waste volume and spent-fluid disposal costs.
25. Reduced rejection of parts.
26. Lower maintenance costs.
27. Increased productivity.
28. Lower overall operating costs.

**PRODUCT MAINTENANCE:**

Prior to charging the system with Synkool SS, 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 2 to 4 hours, draining it, and then rinsing with hot water until the rinse water is clear. 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.

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Though Synkool SS 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 Synkool 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.

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.

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**REFRACTOMETER READINGS**

Concentration	°Brix*
5:1 (20% dilution)	6
10:1 (10% dilution)	3.5
15:1 (7% dilution)	2.5
20:1 (5% dilution)	2
30:1 (3% dilution)	1.5
40:1 (2.5% dilution)	1
50:1 (2% dilution)	1

\*Readings taken from America Optical Fluid Testing Model 10441 using St. Louis City Water

**Note: Due to variances between makes and model of refractometer 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:**

<b>APPLICATION:</b>	<b>RATIO OF SYNKOOL SS TO WATER</b>
Automatic turret and engine lathe	1:20 (5% dilution)
Drilling, Milling ,and Turning	1:20 (5% dilution)
Reaming, Boring, and Sawing	1:20 (5% dilution)
Gearhobbing, Hobbing, Shaping, Broaching	1:20 (5% dilution)
Tapping, Threading and Counterbroaching	1:20 (5% dilution)
Grinding	1:30 (3% dilution)

**At concentrations below 40:1 (2.5% dilution) the biostability of this product may be compromised leading to shorter sump life.**

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### **APPLICATION GUIDELINES**

- Synkool 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.
- The recommended concentration for cast iron and cast aluminums is 5% (20:1)

### **TYPICAL PROPERTIES**

Appearance	Clear, green color
pH Value (neat)	10 to 11
Emulsion pH @ 5%	9.5
Falex Pin & Vee Block Test ASTM D-3233 Method B 20:1 dilution	
	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	107%
Cast Iron Chip Test 20:1 dilution	Pass – No rust
50:1 dilution	Pass – No rust
CI Chip Rust Test IP 287	
Breakpoint	2%
Emulsion Stability @ 5% IP 263 40°C, 200 ppm (% oil/ % cream)	0/0 (Clear)
40°C, 200 ppm (% oil/ % cream)	0/0 (Slightly hazy)
Waring Blender Foam Test 200ml of 20:1 dilution agitated for 1 minute	Low Foaming

Packaging: #311 Synkool SS is available in 6x1 gallon cases, 5-gallon pails, 30-gallon drums, 55-gallon drums and 275-gallon totes.