

# NA-SUL<sup>®</sup> MG

## Performance In Hydraulic Fluids

**NA-SUL MG** is a magnesium sulfonate that imparts outstanding rust inhibition and demulsibility to formulated functional fluids. It is recommended for use at 0.05%-1.0% by weight to formulate hydraulic fluids.

FORMULATIONS		
TESTS	HF-0 Type Package* Without NA-SUL MG	HF-0 Type Package With 9.0% NA-SUL MG
<b>Treat Level of Additive Package, %</b>	0.8	0.8
<b>Base Oil</b>	ISO VG 46 (Group II)	ISO VG 46 (Group II)
<b>Additive Package Color</b>	Light Amber	Light Amber
<b>Demulsibility</b> (ASTM D 1401, DIN 51 599) Oil-Water-Emulsion Time (minutes)	41-34-5 30	40-38-2 10
<b>Steel Corrosion</b> (ASTM D 665, DIN 51 585) A & B	Fail	Pass
<b>Rotary Bomb</b> (ASTM D 2272) Lifetime (minutes)	295	312
<b>Four Ball Wear</b> (ASTM D 4172) 1 hour, 75°C, 40 kg, 1200 rpm Scar Diameter (mm)	0.42	0.47
<b>Copper Corrosion</b> (ASTM D 130, DIN 51 759) 3 hours, 100°C 3 hours, 135°C 3 hours, 160°C	1b 1b 1b	1b 1b 1b
<b>CM Thermal Stability</b> (ASTM D 2070) CM Color Class: Copper Steel Viscosity Change, % Acid Number Change (mg KOH/g) Rod Weight of Deposit (mg/200ml) Rod Metal Loss (mg/200ml) Total Sludge (mg/100 ml) Whatman Precipitate (mg/100 ml) Millipore Precipitate (mg/100 ml)	1.5 1.5 1.8 0.23 Steel: 0.1 Copper: 0.1 Steel: 0.2 Copper: 0.6 5.5 2.7 2.8	1.5 2.0 0.5 0.2 Steel: 0.0 Copper: 0.0 Steel: 0.4 Copper: 0.4 2.1 0.5 1.6
<b>Hydrolytic Stability</b> (Beverage Bottle) (ASTM D 2619) Copper Loss (mg/cm <sup>2</sup> ) Total Acidity of Water Layer (mg KOH) Copper Appearance (ASTM D 130)	0.29 0.91 2a	0.06 0.47 2a
<b>FZG A/8.3/90</b> (ASTM D 5182, DIN 51 354 Part 2) Damage Load Stage	12	12

\* See Page 2

The results shown reflect data generated by King Industries' Technical Service Laboratory. Actual results may vary depending on the additive package, base oil, and test equipment design.

(see reverse side)

## NA-SUL<sup>®</sup> MG Performance In Hydraulic Fluids

This table compares the performance of a Denison HF-0 type package for hydraulic fluids with and without **NA-SUL MG**. **NA-SUL MG** was incorporated into the package at 9.0% replacing the oil. The concentrations of all other additives were held constant. Testing was conducted at a package treat level of 0.8% in an ISO VG 46 Group II oil. **The package without NA-SUL MG failed the steel corrosion and demulsibility test and resulted in significant copper loss in the hydrolytic stability test.**

Inclusion of **NA-SUL MG** in the formulation imparted excellent steel corrosion protection and demulsibility performance and greatly reduced the amount of copper loss in the hydrolytic stability test. In addition, **NA-SUL MG** exhibited no adverse effects on other performance tests including rotary bomb oxidation, four ball wear, copper corrosion, Cincinnati Milacron thermal stability and FZG.

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Revision date: 5 MAY 1999

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