King Industries, Inc. - Lubricant Additives Division
Technical Report
Science Road, Norwalk, CT 06852 - (203) 866-5551
Fax: (203) 866-0425 - Email: lad@kingindustries.com

K-CORR® 1031
Industrial Lubricant Performance Data

K-CORR 1031 is a rust inhibitor that imparts outstanding steel corrosion protection and demulsibility to formulated fluids.

Tests	0.35% K-CORR NF-410*	0.35% K-CORR NF-410 0.06% K-CORR 1031	0.35% K-CORR NF-410 0.25% K-CORR 1031	0.60% ZnDTP	0.60% ZnDTP 0.06% K-CORR 1031	0.60% ZnDTP 0.25% K-CORR 1031
Base Oil	**ISO VG 32 Group I**					
Steel Corrosion (ASTM D 665, DIN 51 585) A & B	**Fail**	**Pass**	**Pass**	**Fail**	**Pass**	**Pass**
Demulsibility (ASTM D 1401, DIN 51 599) Oil-Water-Emulsion (ml) Separation Time (minutes)	**42-38-0** **10**	**43-37-0** **15**	**41-39-0** **15**	**36-23-21** **60**	**38-39-3** **30**	**39-39-2** **20**
Copper Corrosion (ASTM D 130, DIN 51 759) 3 hours, 100ºC 24 hours, 100ºC 3 hours, 135ºC	**1a** **1a** **1a**	**1b** **1b** **1b**	**1a** **1a** **1a**	**1a** **1a** **1a**	**1a** **1a** **1a**	**1a** **1a** **1a**
FZG A/8.3/90 (DIN 51 354 Part 2) Damage Load Stage	**9**	**9**	**9**	**11**	**11**	**11**
Four Ball Wear (ASTM D 4172) 1 hour, 75ºC, 40 kgf, 1200 rpm Scar Diameter (mm)	**0.75**	**0.76**	**0.61**	**0.45**	**0.46**	**0.43**

* Dimercaptothiadiazole derivative

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.

This table compares the performance of a ISO VG 32 Group I oil containing a dimercaptothiadiazole derivative or zinc dithiophosphate with and without **K-CORR 1031**. **K-CORR 1031** was incorporated into the formulations at different treat levels. The concentration of the dimercaptothiadiazole derivative or zinc dithiophosphate was held constant. Formulations without **K-CORR 1031** failed the steel corrosion test. The ZnDTP formulation without **K-CORR 1031** also failed the demulsibility test.

Formulations containing **K-CORR 1031** imparted excellent steel corrosion protection and demulsibility performance. In addition, **K-CORR 1031** exhibited no adverse effects on other performance tests including copper corrosion and FZG. At the increased treat level of 0.25%, the **K-CORR 1031** improved the four ball wear performance, as noted with the dimercaptothiadiazole derivative. Similar synergistic antiwear performance has been observed when **K-CORR 1031** is used in combination with a variety of EP/AW agents, including phosphate esters, **NA-LUBE EP** sulfurized olefins, triphenyl phosphorothionate **NA-LUBE® AW-6509** and ashless dithiocarbamates **NA-LUBE ADTC**.

The ashless **K-CORR 1031** was tested in combination zinc dithiophosphate because concern exist about the compatibility of ashless and metal-containing (primarily zinc) lubricants and functional fluids.

(see reverse side)

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Our studies have shown that formulations containing **K-CORR 1031** are tolerant of contamination with zinc and calcium based HF-0 hydraulic fluids, as shown in the table below.

Tests	**--**	**K-CORR 1031**	**K-CORR 1031**
Treat Level of Rust Inhibitor, %	**--**	**0.05**	**0.10**
Test Oil	Ashless HF-0 without Rust Inhibitor		
Contamination	50% Ash-containing commercial HF-0		
Steel Corrosion (ASTM D 665, DIN51 585) B	Fail	Pass	Pass
Demulsibility (ASTM D 1401, DIN 51 599)			
Oil-Water-Emulsion (ml)	41-37-2	42-37-1	39-39-2
Separation Time (minutes)	30	5	10
Copper Corrosion (ASTM D 130, DIN 51 759)			
3 hours, 100°C	1a	1a	1a
3 hours, 135°C	1b	1b	1b
Four Ball Wear (ASTM D 4172)			
1 hour, 75°C, 40 kgf, 1200 rpm	0.48	0.45	0.40
Hydrolytic Stability (ASTM D 2619)			
Copper Loss (mg/cm^2)	0.15	0.27	0.30
Total Acidity of Water Layer (mg KOH)	0.7	0.41	0.41
Copper Appearance (acc. to ASTM D 130)	1b	1b	1b
CM Thermal Stability (ASTM D 2070)			
Viscosity Change (%)	2.2	2.15	2.48
Acid Number Change (mg KOH/g)	0.15	0.24	0.07
Total Sludge (mg/100 ml)	6.0	5.85	4.1
Filtration, Wet			
AFNOR E 68691, IF (index)	1.52	1.26	1.30

For Samples or Technical Service, contact King Industries or your King representative.

King Industries, Inc.
Science Road
Norwalk, CT 06852-0588
Tel: 203-866-5551
Fax: 203-866-0425
E-mail: LAD@kingindustries.com

King Industries International, Inc.
Science Park 402,
1098 XH Amsterdam
The Netherlands
Tel: +31-20-723-1970
E-mail: info@kingintl.nl

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