


# Trouble Check Plus™ Fluid Analysis

## Description

<b>UNIT ID</b> 12345678 <b>SECOND ID</b> 87654321 <b>UNIT TYPE</b> HYDRAULIC <b>APPLICATION</b> PLANT/INDUSTRIAL				<b>COMPANY INFORMATION</b> XYZ COMPANY JOHN DOE 123-456-7890 123 MAIN STREET ANYTOWN, USA 12345																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<b>FLUID ANALYSIS REPORT - 877-223-1572</b> Comments are advisory only and are based on the assumption that this sample and data submitted are valid. Missing data or unit time limits the evaluation. No warranty is expressed or implied.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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# Trouble Check Plus™ Fluid Analysis

## Viscosity

Maintaining the correct viscosity is important for achieving long component service life. Viscosity is reported in centistokes (cSt) @ 40° and 100°C as per ASTM D 445-04. Typically the limits are based on new oil data. Caution limits are calculated at ±10% new oil viscosity and critical limits at ±15% new oil viscosity. (Water glycol fluids can have limits set similarly but the water content should also be monitored as changes in it also affect the viscosity. The manufacturer should be consulted). Trending graphs are available on-line for all reported results. When large changes in viscosity are detected a partial drain of the affected oil and adding fresh fluid may correct the problem. However in some instances a complete oil change may be required.

## Total Acid Number (TAN) \*not applicable to P/N TWG

Oxidation is the primary mechanism of oil degradation. The TAN measures the corrosive acidic by-products of oxidation. TAN results are reported in mg/g KOH (Potassium Hydroxide). Since all hydraulic fluids have some inherent acidic properties any increases in TAN must be compared to the new oil value as a baseline. Typically caution limits are set at +0.6 new oil value and critical limits are set at +1.0 new oil value. Certain application specific fluids may require limits set to manufacturer specifications. The results are graphed along with the limits to clearly show when oil oxidation has increased above acceptable levels. When the TAN has increased above the critical level, the oil should be changed immediately to prevent damage from occurring to your equipment.

## Spectrographic Analysis \*not applicable to P/N TWG

Additive, wear metal and contaminant levels are displayed in parts-per-million (PPM). The oil sample is analyzed for eighteen different elements. The results are also graphically displayed for easy detection of increasing or decreasing levels. The manufacturer blends additives into the oil in different forms and quantities. The additive package varies with the oil type. Wear metals indicate wear on particular components of an individual unit. These metals will indicate a wear problem on the microscopic level (< 8 microns) before the problem can be detected by conventional means. The existence of a wear problem is determined by absolute values of metals, and more importantly, by a relative increase or trend in one or more metals. Contaminants can be an indicator of internal or external contamination. The source and amount can be determined by a comparison with new oil data. Below is a list of additive types, wear metal and contaminant sources.

Additives	Function
Magnesium (Mg)	Dispersent / Detergent
Calcium (Ca)	Dispersent / Detergent
Barium (Ba)	Dispersent / Detergent
Zinc (Zn)	Anti-Wear
Molybdenum (Mo)	Anti-Wear
Phosphorous (P)	Anti-Wear
<b>Wear Metals</b>	<b>Typical Source</b>
Titanium (Ti)	Turbine Components, Bearings, Platings
Chromium (Cr)	Rings, Roller/Taper, Bearings, Rods, Platings
Iron (Fe)	Cylinders, Gears, Rings, Crankshafts, Liners, Bearings, Housings, Rust
Nickel (Ni)	Valves, Shafts, Gears, Rings, Turbine Components
Copper (Cu)	Bearings, Bushings, Bronze, Thrust-Washers, Friction Plates, Oil Cooler
Silver (Ag)	Bearings, Bushings, Platings
Aluminum (Al)	Pistons, Bearings, Pumps, Blowers, Rotors, Thrust-Washers, Dirt
Lead (Pb)	Bearing Overlays, Grease, Paint, Possible Additive in Gear Oils
Tin (Sn)	Bearings, Bushings, Piston Platings, Solder, Coolers
Vanadium	
Cadmium	
<b>Contaminants</b>	<b>Typical Source</b>
Sodium (Na)	Coolant, Sea Water, Dirt, Possible Additive
Boron (B)	Coolant, Sea Water, Possible Additive
Silicon (Si)	Dirt, Possible Additive (Anti-Foam)
Potassium (R)	

## Status and Recommendations

Corrective actions are recommended when applicable. The status of the sample is rated in three categories:

- Normal - System is operating within the parameters established by baseline data & prior samples.
  - System requires no immediate action.
- Abnormal - System is operating outside of caution limits in one or more areas.
  - System requires scheduled maintenance.
- Critical - System is operating outside of critical limits in one or more areas.
  - System requires immediate attention.

## Explanation of Results

TCM
TCM-FC
TSU
TMU
TPM
TIM
TMS
CTU
TWS-C
ET-100-6
HMG 3000
EPK
HTB
GS
<b>Trouble Check Plus</b>
Test Points
Adapters
Hose Joiners
Microflex Hose
Pressure Limiters
Pressure Gauges
Test Kits
Probalizer
Filtration Station
MFS, MFD
AMS, AMD
KLS, KLD
AKS, AKD
KLC
X Series
MTS
HFS
SVD
TDS-A
TDS-E
IXU
Appendix