

Comparative Hydraulic Fluids Load/Shear Test

Summary:

In examining the following data provided by the hydraulic fluid load/shear tests, it is obvious that lubricity and load carrying capability will be significantly enhanced through the utilization of Lubritherm[®] All-Temp. This is made apparent by the variance in point load pressures and wear scar sizes in the following tests:

1. **LUBRITHERM ALL-TEMP** hydraulic fluid (Test Bearing “A”) – **241,000 psi**. Experienced no seizure and no wear scar.
2. **Esso**, synthetic hydraulic pump oil (Test Bearing “A”) – **3,100 psi**. Experienced full seizure of machine with a sizable wear scar.
3. **Unocal**, Unax AW 32 hydraulic Oil (Test Bearing “A”) – **2,600 psi**. Experienced full seizure of machine with a sizable wear scar.
4. **Shell TORCULA** – Pneumatic Rockbit Oil (Test Bearing “A”) – **6,900 psi**. Experienced full seizure of machine with a sizable wear scar.
5. **Water**, straight from the tap, (Test Bearing “B”) – **2,900 psi**. Experienced full seizure of machine with a sizable wear scar.

Lubricant Shear Strength Test:

1. **LUBRITHERM ALL-TEMP** hydraulic fluid, (Bearing “A”)
LubeCorp Lubritherm All-Temp is placed into the bath. At 300 lbs. (136 Kg) point load, the mixture did not “shear.” The resultant mark** on the bearing is noted at 0.000527^{2”}: pressure 284,600 psi. maximum, with a 241,000 psi average over 2 tests.

**This mark on the bearing is not scarring as such in this instance (there was no seizure). It is in fact metal displacement, or laminar flow, on the bearing caused by the pressure/heat. It is not “shear” of the lubricant, which would cause temporary welding of the metals and a consequent breaking loose again (scuffing), thus showing as a scar.
2. **Esso**, synthetic hydraulic pump oil (Test Bearing “A”)
Plain synthetic hydraulic oil is put into the oil bath. The machine seized up at 30 lbs. (14 Kg) point load, with a resultant scar* on the bearing of 0.009729^{2”}: ultimate pressure 3,100 psi.

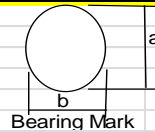
*Hydraulic oil film “shears” initially at approximately 2 lbs. (1 Kg) bearing load, in this type of test, at which point it causes a scar and removal of the parent metal on the bearing.
3. **Unocal**, Unax AW 32 hydraulic oil (Test Bearing “A”)
Plain Unax AW 32 hydraulic oil is put into the oil bath. The machine seized up at 30 lbs. (14 Kg) point load, with a resultant scar* on the bearing of 0.011350^{2”}: ultimate pressure 2,600 psi.
4. **Shell Torcula** –Pneumatic rockdrill oil (Test Bearing “A”)
Plain Torcula hydraulic oil is put into the oil bath. The machine seized up at 90 lbs. (41 Kg) point load, with a resultant scar* on the bearing of 0.013124^{2”}: ultimate pressure 6,900 psi.
5. **Water**, straight from the tap, (Bearing “B” - Water Neat)
Plain water is put into the bath. The machine seized up at 36 lbs. (16 Kg) point load, with a resultant scar* on the bearing of 0.012186^{2”}: pressure 2,900 psi.

LUBRITHERM® All-Temp Water-Based Hydraulics Shear Test

COMPARATIVE HYDRAULIC-FLUID LOAD/SHEAR-TESTS in Pounds per Square Inch

(As Tested on the Timken Bearing Stress Test Machine by Lubecorp Laboratories)

Load/Shear is a direct indicator of Equipment-Wear such as used in Hydraulic Equipment.



*AREA = 3.14159 x 0.5a x 0.5 b
*PSI = 1/Area x Load
[PSI = Pounds per Square Inch]
[Load in Inch Lbs = Lbs x 30"]
[30" = lever arm length]

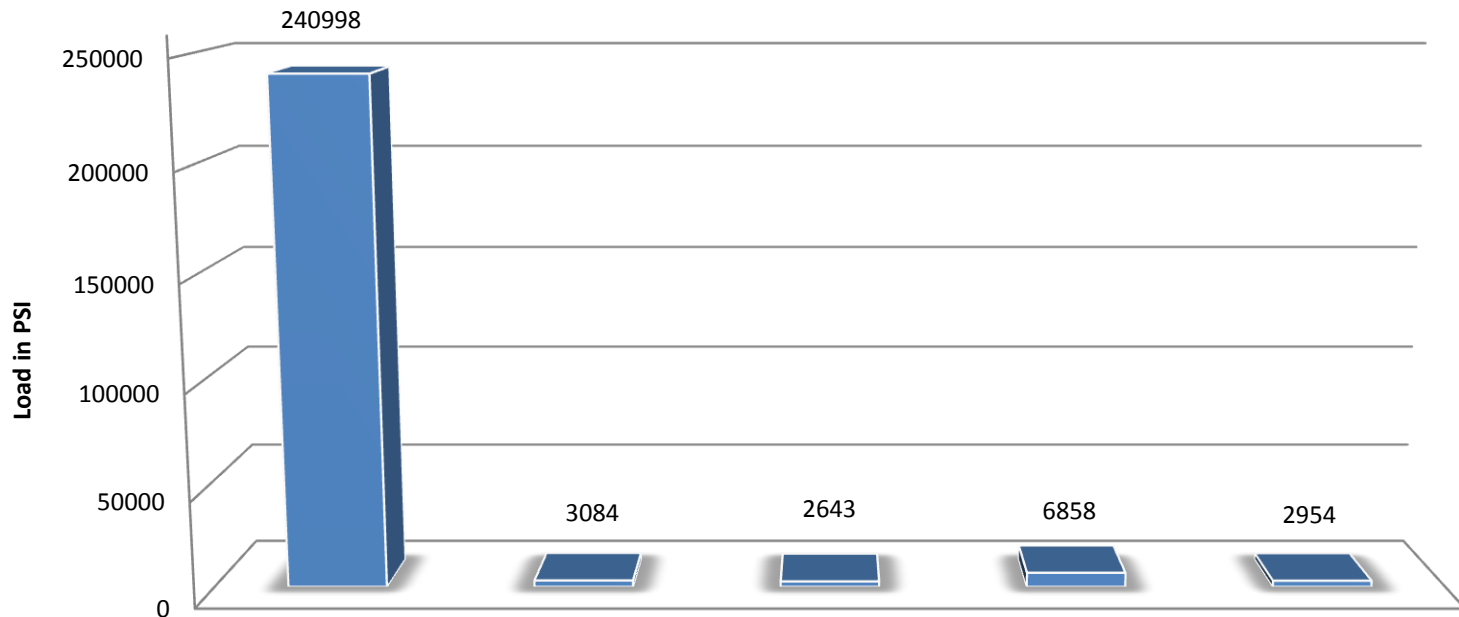
NOTES:

All products were tested on the Timken Bearing Stress-Tester with the noted point load applied slowly. The load was held in each case for 5 seconds and released. Resultant bearing mark and load in PSI as noted hereunder. It was noted that all products, except Lubritherm All-Temp, commenced to "shear" as soon as any load at all was applied. Lubritherm All-Temp loads were applied twice as noted to see if the product would "shear" at a higher comparative load. These tests should be used as comparative load testing only; they are not definitive.

LUBRITHERM ALL-TEMP HYDRAULIC FLUID LOAD/SHEAR TEST						Tested at full strength, no dilution		
Load in Lbs.	a in mm	a in inches	b in mm	b in inches	Area in Sq. In.	PSI	NOTES	
2	1	0.025400	0.6	0.015240	0.000304	197,353	No Shear	
5	1.3	0.033020	0.8	0.020320	0.000527	284,643	No Shear	
TOTALS						481,996	240,998	
XP240 Ave. Load per Sq. Inch = 241,000 PSI								
ESSO SYNTHETIC HYDRAULIC PUMP OIL LOAD/SHEAR TEST						Tested at full strength, no dilution		
Load in Lbs.	a in mm	a in inches	b in mm	b in inches	Area in Sq. In.	PSI	NOTES	
1	6	0.152400	3.2	0.081280	0.009729	3,084	Sheared	
ESSO Load per Square Inch = 3,100 PSI								
UNICAL HYDRAULIC FLUID UNAX AW 32 LOAD/SHEAR TEST						Tested at full strength, no dilution		
Load in Lbs.	a in mm	a in inches	b in mm	b in inches	Area in Sq. In.	PSI	NOTES	
1	6.4	0.162560	3.5	0.088900	0.011350	2,643	Sheared	
UNICAL Load per Square Inch = 2,600 PSI								
SHELL TORCULA -Pneumatic Rockdrill Oil LOAD/SHEAR TEST						Tested at full strength, no dilution		
Load in Lbs.	a in mm	a in inches	b in mm	b in inches	Area in Sq. In.	PSI	NOTES	
3	7	0.177800	3.7	0.093980	0.013124	6,858	Sheared	
SHELL Load per Square Inch = 6,900 PSI.								
HARD TAP WATER, Ph 7.0 LOAD/SHEAR TEST						TAP WATER Shear test:		
Load in Lbs.	a in mm	a in inches	b in mm	b in inches	Area in Sq. In.	PSI	NOTES	
1.2	6.5	0.165100	3.7	0.093980	0.012186	2,954	Sheared	
PLAIN TAP WATER Load per Square Inch = 2,900 PSI								

Product Name	Load in PSI	Notes
Lubritherm All-Temp hydraulic fluid	240,998	NO Shear
Esso synthetic hydraulic pump oil	3,084	Sheared
Unocal, Unax AW 32 hydraulic oil	2,643	Sheared
Shell Torcula -Pneumatic rockdrill oil	6,858	Sheared
Water, straight from the tap	2,954	Sheared

COMPARATIVE HYDRAULING FLUID LOAD/SHEAR TEST in Pounds per Square Inch



	Lubritherm All-Temp Hydraulic Fluid	Esso Synthetic Hydraulic Pump Oil	Unical UNAX AW 32 Hydraulic Oil	Shell Torcula-Pneumatic Rockdrill Oil	Water, hard
■ Load in PSI	240998	3084	2643	6858	2954

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