COPY

DATE October 27, 1975

JOB Fire Resistant Air Compressor Lubricants

(W.D. Lubic, MICC, BINB - 4-2630)

Cover

include in booklet (after MC?)

~~MONSANTO~~ PYDRAUL®

Fire Resistant Air Compressors ~~Lubricants~~

Lubricants for

lubricants for — 30-E, 90-E, and 115-E —

Pydraul air compressors ~~lubricants~~ were developed to eliminate the conditions that cause compressor fires and explosions, ~~in air compressors~~. Numerous studies, including work by the U.S. Bureau of Mines, The Walter Kidde Company and various individual researchers shows that carbonaceous deposits from petroleum in high pressure lines are the primal cause of compressor explosions and receiver fires. Mist and accumulated petroleum oil film can, under a variety of conditions, break down and ignite. These sophisticated studies detail the conditions and define the operating hazards:

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Monsanto

TOWOLDMON0024436

WATER_PCB-00008905

OPERATING ADVANTAGES OF PYDRAUL FLUIDS

Pydraul fire resistant fluids ~~assure~~ are formulated to give excellent lubrication, long pump life and efficient equipment operation with minimum maintenance. The use of a fire resistant fluid frequently lowers insurance premiums below the costs for operating with petroleum oils. Pydraul fluids are heat- and shear stable, inhibit metal corrosion, eliminate foaming and permit equipment to operate at optimum response capability.

SERVICE-PROVED APPLICATIONS OF PYDRAUL FLUIDS

Steel Industry	Aluminum Industry	Forging And Extrusion
Continuous casters	Stripper cranes	Forge presses
Rolling mills	Direct chill casters	Extrusion presses
Furnaces	Furnaces	Billet manipulators
Scrap chargers	Rolling mills	
Stripper cranes	Shearers	
Arc welders	Combustion controls	
Combustion controls	mobile equipment	
Mobile equipment		

Diecasting	Fabrication	Foundries
Diecast machines	Forming presses	Furnaces
Trim presses	Welders	Molding lines
	Furnaces	

Mining Industry

Power shovels & draglines
Blasthole drills
Bulldozers & rippers
Tractors
Scrapers & Graders
Crushers
Ore Feeders
Trucks
Jumbos
Ore Drills
Mechanical Loaders & Scrapers

Air Compressors
Reciprocating
Rotary Screw

Offshore Oil + Gas
Drill string Heave Compensators
Guide line tensioners
Riser tensioners

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WATER_PCB-00008906

PYDRAUL® "E" SERIES

All-Synthetic Premium Grade ~~Fluids~~

Straight phosphate-ester ~~lubricants~~ offering long service life and excellent lubricity, ~~freedom from corrosion and foam.~~

~~"E" series fluids can be reclaimed, re-used.~~

~~Application~~
~~APPLICATION~~
~~Hydraulic Equipment~~
~~Air Compressors~~

FLUID	PYDRAUL® 10-E	PYDRAUL 29-E-LT	PYDRAUL 30-E	PYDRAUL 50-E	PYDRAUL 65-E	PYDRAUL 115-E
PHYSICAL PROPERTIES Appearance	Clear Blue Liquid	Clear Blue Liquid	Clear Blue Liquid	Clear Blue Liquid	Clear Blue Liquid	Clear Blue Liquid
Specific Gravity @ 25°C	1.065—1.075	1.030—1.110	1.155—1.175	1.145—1.160	1.142—1.152	1.135—1.155
Neutralization No. (mg KOH/g) max.	0.25	0.25	0.15	0.15	0.15	0.15
Moisture content %	0.10	0.15	0.10	0.10	0.10	0.10
VISCOSITY						
Centistokes @ 100°F.	10.0 cs	30.9 cs	32 cs	49 cs	67.3 cs	127 cs
@ 210°F.	2.4 cs	7.0 cs	4.9 cs	5.9 cs	7.1 cs	9.1 cs
SSU @ 150°F.	60 SSU	163 SSU	150 SSU	231 SSU	312 SSU	555 SSU
@ 210°F.	35 SSU	62 SSU	47 SSU	46 SSU	50 SSU	56 SSU
Absolute SSU @ 100°F.	60.5 SSU	158 SSU	174 SSU	262 SSU	343 SSU	644 SSU
(SSU x Density) @ 210°F.	35 SSU	54 SSU	47 SSU	50 SSU	54 SSU	61 SSU
Pour Point	—50°F.	—45°F.	—15°F.	—5°F.	0°F.	+10°F.
C.O.C. Flash Point (consensus operation)	175°F.	175°F.	225°F.	225°F.	225°F.	225°F.
Boiling Point °F. at 760 mm Hg	700°F.	500°F.	725°F.	750°F.	795°F.	820°F.
Coefficient of Thermal Expansion per °F.	0.00064	0.00040	0.00035	0.00026	0.00024	0.00015
Specific Heat BTU @ 77°F.	0.42	0.39	0.36	0.37	0.35	0.38
Thermal Conductivity BTU @ 77°F.	0.067	0.0757	0.0737	0.0739	0.0705	0.0733
Vapor Pressure @ 400°F.	0.002	0.002	0.027	0.003	0.001	<0.001
Evaporation Loss (6½ hrs. Temp. 400°F/205°C)	325,000	370,000	370,000	390,000	390,000	390,000
Rust Test ASTM D 665	Pass	Pass	Pass	Pass	Pass	Pass
Foam Test ASTM D 892	Pass	Pass	Pass	Pass	Pass	Pass
Solubility in Water	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
FIRE RESISTANCE TESTS						
Factory Mutual Spray Test. Test fluid sprayed at 1000 psi through orifice, ignited and burned on steel target.	Fail	Pass	Pass	Pass	Pass	Pass
Factory Mutual Channel Iron Test. Test fluid sprayed at 1000 psi through orifice, ignited and burned on steel.	Fail	Pass	Pass	Pass	Pass	Pass
Hot Manifold Test (Federal Test Method Std. 791). Test fluid dripped on surface.	Intermittent flashing but does not propagate to pan below.	Intermittent flashing but does not propagate to pan below.	Intermittent flashing but does not propagate to pan below.	Intermittent flashing but does not propagate to pan below.	Intermittent flashing but does not propagate to pan below.	Intermittent flashing but does not propagate to pan below.
Factory Mutual Approval. FM	No	Yes	Yes	Yes	Yes	Yes

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TOWOLDMON0024438
WATER_PCB-00008907

TYPICAL PROPERTIES

	Pydraul 30E	Pydraul 90E	Pydraul 115E
Appearance	Clear Blue Liquid	Clear Blue Liquid	Clear Blue Liquid
Spec. Gravity 25°/25°C.	1.150-1.170	1.145-1.165	1.145-1.165
Neutralization Number (Acidity) (mg KOH/gm) max.	0.15	0.15	0.15
Moisture (max.)	0.10%	0.10%	0.10%
Viscosity			
Centistokes @ 100°F.	30-34	85-95	115-125
@ 210°F.	4.6-5.0	7.7-8.1	8.9-9.3
Saybolts @ 100°F.	150 SSU	415 SSU	565 SSU
@ 210°F.	42 SSU	52 SSU	56 SSU
"Absolute Saybolts" @ 100°F.	173 SSU	473 SSU	695 SSU
(SSU x Density) @ 210°F.	47 SSU	57 SSU	61 SSU
Pour Point	-15°F.	+10°F.	+10°F.
Compressibility x 10^{-6} sq. in./lb.	2.56	2.53	2.52
Maximum Exit Air Temperature	350°F.	350°F.	350°F.
Boiling Point, °F. @ 760 mm Hg.	725°F	805°F.	820°F.
Coefficient of Thermal Expansion per °F.	0.00035	0.00035	0.00035
Specific Heat (BTU/lb. °F.) @ 77°F.)	0.36	0.38	0.38
Thermal Conductivity BTU/hr./ft./°F.	0.0737	0.0723	0.0721
Bulk Modulus (Room temp. 1000-6000 psi)	390,000	396,000	397,000
Solubility in water	Negligible	Negligible	Negligible
Vapor Pressure, mm Hg @ 200°C.	2.2	2.0	1.8

LUBRICITY CHARACTERISTICS

	Pydraul 30E	Pydraul 90E	Pydraul 115E
Shell Four-Ball Wear (167°F., 1 hr., 630 rpm, mm scar dia.)			
Steel on Steel			
4 kg	0.47	0.28	0.29
10 kg	0.50	0.32	0.39
40 kg	0.64	0.54	0.56
Steel on Bronze			
10 kg	0.46	0.35	0.45
40 kg	0.97	0.65	0.66
Falex Wear Test			
Weight Loss, Pin (mg.)	0.1	0.7	1.0
Weight Loss Blocks (mg.)	0.2	1.0	0.3

TOWOLDMON0024439
WATER_PCB-00008908

PYDRAUL "C" SERIES

Phosphate-ester Base Economy Grade Fluids

A unique phosphate ester base formulated with ~~[illegible]~~ petroleum fractions to produce a fire resistant fluid lubricant in a range of viscosities, i.e. grades

	PYDRAUL® 230-C	PYDRAUL 312-C	PYDRAUL 540-C
PHYSICAL PROPERTIES Appearance	Clear Green Liquid	Clear Green Liquid	Clear Green Liquid
Spec. Gravity 25/25°C	1.043–1.050	1.035–1.050	1.035–1.050
Neutralization No. (mg KOH/g) max.	0.30	0.30	0.30
Moisture (max.) %	0.15	0.15	0.15
VISCOSITY			
Centistokes @ 100°F.	46.2 cs	66 cs	106 cs
@ 210°F.	6.9 cs	8.4 cs	10.5 cs
SSU @ 100°F.	215 SSU	309 SSU	491 SSU
@ 210°F.	49 SSU	54 SSU	61 SSU
Absolute SSU @ 100°F.	224 SSU	311 SSU	498 SSU
(SSU x Density) @ 210°F.	49 SSU	52 SSU	59 SSU
Pour Point	–70°F.	–10°F.	0°F.
Bulk Temp. Max. (continuous operation)	200°F.	200°F.	200°F.
Boiling Point °F. at 760 mm Hg	500°F.	540°F.	545°F.
Coefficient of Thermal Expansion per °F.	0.00036	0.00036	0.00035
Specific Heat BTU/lb./°F. at 77°F.	0.41	0.41	0.43
Thermal Conductivity BTU/hr./ft./°F.	0.0055	0.0060	0.0069
Vapor Pressure mm Hg at 210°F.	0.24	0.20	0.22
Bulk Modulus (Room Temp. 3000-6000 psi)	332,000	329,000	316,000
Rust Test ASTM D 665	Pass	Pass	Pass
Foam Test ASTM D 892	Pass	Pass	Pass
Solubility in Water	Negligible	Negligible	Negligible
FIRE RESISTANCE TESTS			
Factory Mutual Spray Test. Test fluid sprayed at 1600 psi through orifice, passing through flame of propane torch	Pass	Pass	Pass
Factory Mutual Channel Iron Test. Test fluid sprayed at 1800 psi through orifice onto hot channel iron at 1317°F.	Pass	Pass	Pass
Hot Manifold Test (Federal Test Method Std. 791). Test fluid dripped on at 1157°F.	Intermittent flashing but does not propagate to pan below.	Intermittent flashing but does not propagate to pan below.	Intermittent flashing but does not propagate to pan below.
Factory Mutual Approval. FM FIA	Yes	Yes	Yes

U.S. Bureau of Mines Schedule 30 approval

TOWOLDMON0024440
WATER_PCB-00008909

PYDRAUL MC

Waterless Phosphate-ester Fluid Formulated For Mining Equipment

A constant composition fluid that meets the fire resistance requirement of the U.S. Bureau of Mines Schedule #30.

Appearance	Clear Green Liquid
Specific Gravity 25/25°C.	1.098
Density at	
140°F.	1.075 grams/ml.
77°F.	1.100 grams/ml.
Neutralization No. (mg KOH/g) max.	0.30
Moisture (max.) %	0.15
Viscosity	
Centistokes @ 40°F.	1250 cs
@ 100°F.	69 cs
@ 210°F.	6.9 cs
SSU @ 40°F.	5800 SSU
@ 100°F.	320 SSU
@ 210°F.	48 SSU
Pour Point	-10°F.
Coefficient of Thermal Expansion per °F.	0.00034
Specific Heat BTU/lb./°F. @ 77°F.	0.39
Thermal Conductivity BTU/hr./ft./°F.	0.0728
Solubility in Water	Negligible

Bulk 200

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TOWOLDMON0024441
WATER_PCB-00008910

CONVERSION TO PYDRAUL FLUIDS

Changing over to a fire resistant Pydraul fluid is quite simple, a matter of selecting the proper material composition of seals and packings. Operating experience shows the preferred materials are Vitron*, Teflon* or silicone rubber. Monsanto provides detailed information on change-over and most equipment manufacturers familiar with Pydraul fluids will do the same.

For more detailed information, check the types of fluid(s) that interest you.

Please send me further data on:

/___/ Pydraul "Series E" Premium Fluids

/___/ Pydraul "Series C" Economy Fluids

/___/ Pydraul "Series W/G Water Glycol Fluids

/___/ Pydraul MC Mining Equipment Fluid

/___/ Pydratek-100 Preservative Fluid

The type of hydraulic equipment we operate is:_____

_____with fluid capacity of approx. _____ gallons _____ operating in a temperature range of _____°F.

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

[Postage Paid Reply Indicia]

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TOWOLDMON0024442
WATER_PCB-00008911

FORE MORE INFORMATION

... that will assist you to evaluate Pydraul air compressor lubricants, simply fill in the following postcard. Monsanto can recommend the suitable choice of Pydraul lubricant for your equipment and furnish guidance for the simple steps required to convert from oil to a fire resistant lubricant.

Please supply further data on Pydraul lubricants for:

Type of Compressor _____

Volume Capacity of Lubricating System _____

Approx. Cylinder-Exit Air Temperature _____ psi ____

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

[Postage Paid Reply Indicia]

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WATER_PCB-00008912