PETRO-CANADA LUBRICANTS

AN HF SINCLAIR BRAND

TECH DATA

HYDREX™ MV

WIDE TEMPERATURE RANGE HYDRAULIC FLUIDS

INTRODUCTION

Petro-Canada Lubricants HYDREX™ MV hydraulic fluids are advanced formula, long life, anti-wear fluids designed for use in hydraulic systems exposed to wide temperature ranges. HYDREX MV provides excellent operating and maintenance benefits for increased productivity and energy efficiency. Formulated with ultra-pure, high quality base oils and specially selected additives, HYDREX MV retains its 'fresh oil' properties longer providing resistance to oxidative breakdown and outstanding wear protection in wide temperature ranges.

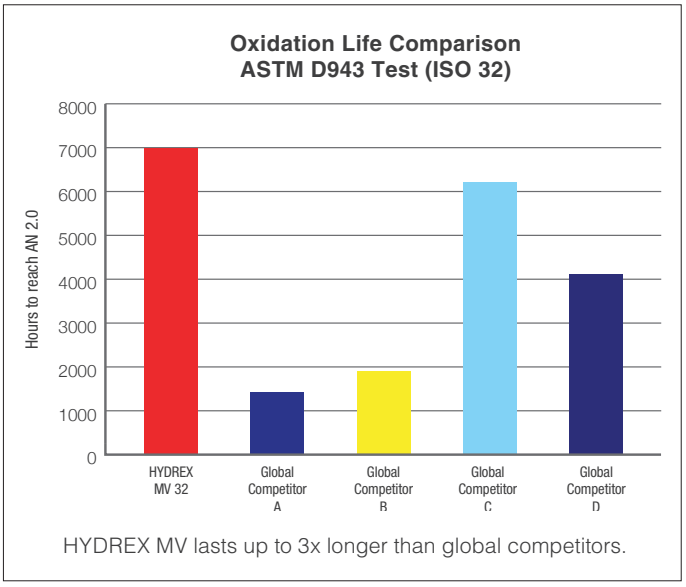
FEATURES AND BENEFITS

Seasonal use under wide temperature ranges

- Increased equipment precision and responsiveness
- Better protection from wear in low and high temperatures
- Reduced inventory for greater operational efficiencies and less chance of misapplication

Outstanding oxidation and thermal stability

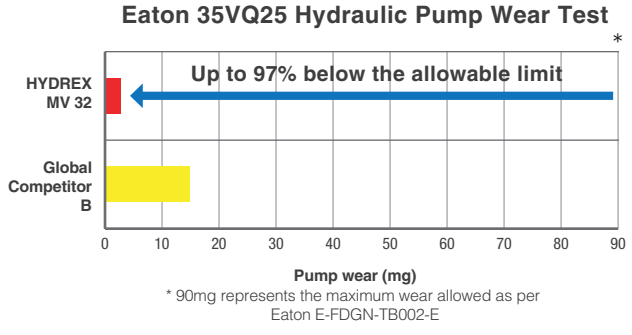
- Longer oil life which helps extend drain intervals for reduced change-out costs and less reservoir exposure to external contaminants
- Prevents varnish build up that can interfere with servo and directional valve operation
- Minimizes harmful sludge build up in the reservoir that can lead to shortened oil life and equipment wear (see inset on the next page)



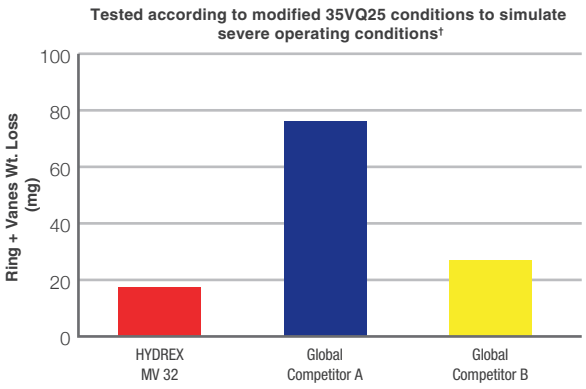
HYDREX MV lasts up to 3x longer than global competitors.

Exceptional anti-wear protection

- Extends equipment life
- Reduces maintenance and mechanical failure
- Protects equipment being driven longer, harder and faster in tougher conditions
- Improves operating reliability over a wide range of pressures



* 90mg represents the maximum wear allowed as per Eaton E-FDGN-TB002-E



†Test duration: 100 h/cartridge; Outlet pressure: 3200 psig; Inlet temperature: 104 °C (220 °F); Four ASTM D943 copper & iron coils added to reservoir for 200 h

HYDREX provides up to 2x better wear protection than a global competitor.

Improved rust and corrosion prevention

- Iron and other metal components are protected against water damage

Excellent water separability and hydrolytic stability allows oil to be reused

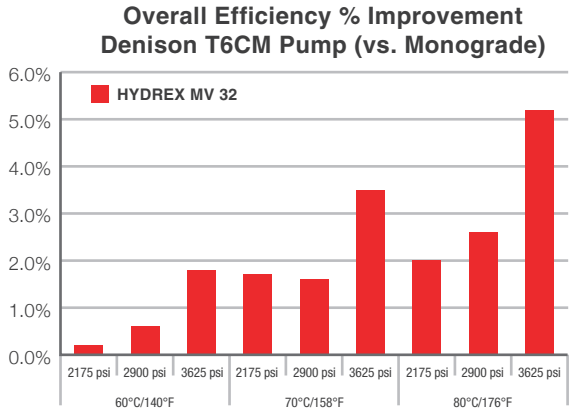
- Oil separates readily from water without loss of performance additives

Improved foam and air entrainment performance

- Prevents overflowing of reservoirs
- Eliminates “sponginess” from hydraulic systems and prevents pump cavitation

High after-shear Viscosity Index to maintain optimal viscosity at operating temperatures

- Up to 40% improvement in shear stability over previous formulation
- Increased pump efficiency
- Lower diesel fuel consumption or increased equipment productivity
- Reduced carbon dioxide ($C0_2$) emissions



HYDREX MV 32 provides 1-3% better overall energy efficiency due to pump efficiencies (see conditions below).

Parker Denison T6CM B06 pump with 22kW motor operating at 1500rpm. Overall efficiency is the product of Volumetric efficiency and mechanical efficiency

$\eta_{Overall} = \eta_V * \eta_{HM}$.

APPLICATIONS

Petro-Canada Lubricants HYDREX MV hydraulic fluids are recommended for wide temperature use in piston, gear and vane hydraulic pumps found on industrial machinery and mobile equipment. HYDREX MV offers minimal fluid friction at low start-up temperatures and provides the correct viscosity at high operating temperatures. HYDREX MV may be used in systems equipped with fine filters down to 3 microns without loss of additives or filter plugging.

HYDREX MV fluids are approved against the following hydraulic equipment manufacturers' specifications:

- Bosch Rexroth Fluid Rating List RDE 90245 (MV 32 and 46)
- Denison HF-0, HF-1 and HF-2 (MV 32, 46 and 68)
- Danfoss (Formerly Eaton) E-FDGN-TB002-E (MV 32, 46 and 68)

HYDREX MV meets the following specifications:

- ISO 11158 HV
- DIN 51524 Part 3 HVLP
- ASTM D6158 HV
- JCMAS HK and the requirements of Komatsu HPV35+35 pump test (MV 46)
- Fives Cincinnati P-68 (MV 32), P-70 (MV 46) and P-69 (MV 68)

HYDREX MV fluids are recommended for use in equipment manufactured by Bosch Rexroth, Danfoss (Formerly Eaton), Dennison, Komatsu, Oilgear, Hydreco, Dynex and others.

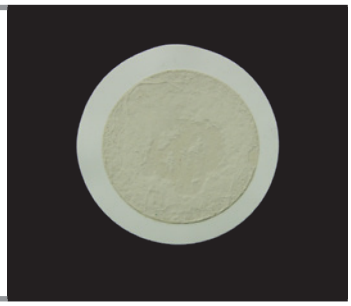
HYDREX MV 32, 46 and 68 are suitable for use where AIST 126 and 127 are required.

All HYDREX MV fluids are NSF H2 listed (no allowable food contact).

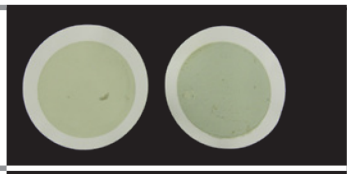
Industry-Leading Sludge Protection

ASTM D4310 (Extended): Standard Test Method for Determination of Sludging and Corrosion Tendencies of Inhibited Mineral Oils. Tested for 2000 hours.

HYDREX MV



Global Competitor A



Global Competitor B

Filters were changed when filter plugging inhibited fluid flow. HYDREX MV's filter only required one filter over the test duration.

TYPICAL PERFORMANCE DATA

Property	Test Method	HYDREX MV			
		MV 22	MV 32	MV 46	MV 68
Start-up Temperature[1], °C/°F	-	-44/-47	-37/-35	-31/-24	-24/-11
Operating Temperature Range[2], °C/°F Mobile Equipment Industrial Machinery	-	 -22 to 64 / -8 to 147 -22 to 55 / -8 to 131	 -17 to 76 / 1 to 169 -17 to 66 / 1 to 151	 -13 to 86 / 9 to 187 -13 to 76 / 9 to 169	 -5 to 96 / 23 to 205 -5 to 86 / 23 to 187
Kinematic Viscosity, cSt @ 40°C cSt @ 100°C SUS @ 100°F SUS @ 210°F	D445	22.2 5.0 115 43	31.9 6.2 163 47	45.4 8.1 231 53	68.2 10.5 349 62
Brookfield Viscosity, cP @ -35°C (-31°F) cP @ -40°C (-40°F)	D2983	- 6260	- 15150	- 41000	60900 -
Viscosity Index	D2270	160	147	153	142
Flash Point, COC, °C/°F	D92	222/432	236/457	256/493	230/446
Pour Point, °C/°F	D5950	-54/-65	-51/-60	-48/-54	-42/-44
Oxidation Stability, hours to 2.0 AN	D943	7000+	7000+	7000+	7000+
Oxidation Stability[3], mg sludge	D4310	Pass	Pass	Pass	Pass
Rust, Procedures A & B, 24 hr	D665	Pass	Pass	Pass	Pass
Hydrolytic Stability[3], copper loss, mg/cm^2	D2619	Pass	Pass	Pass	Pass
FZG Failure Load Stage	D5182	11	11	12	12
Dielectric Breakdown, kV	D877	58	51	48	48
Four-Ball Wear Test, Scar Diam. (mm) 40 kg, 1200 rpm, 75°C, 1hr	D4172B	0.6	0.6	0.6	0.6
Water Separability, 54°C / 129°F oil-water-emulsion (minutes)	D1401	40-40-0(15)	40-40-0(10)	40-40-0(20)	40-40-0(10)

[1]Start-up is defined by the temperatures at which the oil viscosity is 10,000 cP.

[2]Operating temperature limits are determined by the equipment manufacturer. Petro-Canada has chosen to define the upper operating temperature to be the after-shear oil viscosity of 10 cSt for mobile equipment and 13 cSt for industrial machinery, and the lower operating temperature to be the fresh oil viscosity of 750 cP for both mobile and industrial machinery. These ranges are only an approximation and the operator should always check the viscosity requirements as specified by their equipment manufacturer. Please refer to TB-1290 for more information on lubricant & hydraulic fluid shear stability.Mobile equipment typically refers to machinery that encompasses a transmission and braking system to allow and prohibit movement. Industrial machinery is typically stationary, with hard piping and auxilliary components in place.

[3]Pass is defined as meeting the requirement of the Denison HF-0 specification. Oxidation Stability (D4310) 100 mg max sludge; Hydrolytic Stability (D2619) Copper Loss 0.2mg/cm^2 max.

Learn more about us: **petrocanadalubricants.com**
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Committed to the disciplined operation of our business.

CERTIFIED
ISO 9001: 2015
ISO 14001: 2015
IATF 16949: 2016

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