



# Hydro Safe®

## Environmentally Friendly Hydraulic Oil

### Non-Toxic ≈ Biodegradable

### Military Specification MIL-PRF 32073

## Extreme Low Temperature Hydraulic Fluids

### PRODUCT DATA & USAGE

The Hydro Safe® M series are hydraulic products formulated with synthetic and natural esters incorporating additives to meet the demand for biodegradable hydraulic fluids. These products offer excellent antiwear performance in a wide array of hydraulic components, and can be used as a replacement for conventional petroleum oil. The M series exhibits excellent thermal and oxidative properties when compared to conventional vegetable-derived products. The various viscosity grades provide the required product for the appropriate environment.

These fluids have biodegradability that exceeds sixty percent (readily biodegradable), and possess low toxicity. The Hydro Safe® VG-M lubricants are designed for use in many hydraulic applications, such as hydraulic lifts, elevators, canal locks, hydraulic gates, bridges, industrial lift trucks, stackers, cranes, maintenance platforms, forestry hydraulic equipment, hydraulic sprayers, shipboard hydraulic winches, lifts, bow thrusters, variable pitch props, hydraulic steering, pile drivers, dredging equipment, davits, boat lifts, robotics, debris rakes, chainsaw lubrication, log splitters, and many other uses required by the Military or Industry.

#### Hydro Safe® Typical Physical Properties

	<u>VG-15 M1</u>	<u>VG-22 M2</u>	<u>VG-32 M3</u>	<u>VG-46 M4</u>	<u>VG68 M5</u>
Viscosity, cSt, ASTM D445					
@ 40°C	14.65	22.6	40.56	46.4	69.03
@ -15°C, max	252	394.2	845	1218	1605
Viscosity Index, min, ASTM D2270	148	166	85	189	194
Evaporation loss, %, max ASTM E1131	1.5	0.40	0.2	0.2	0.28
100 C, 1 hr					
Flash point, °C, min, ASTM D92	196	248	258	309	300
Pour point, °C, max, ASTM D97	-57	-50	-36	-31	-32
Water content, %, max, ASTM D1744	.05	.03	.02	.035	.03
Acid number, mg KOH, max, ASTM D664	0.90	1.2	1.4	1.3	1.2
Galvanic Corrosion, FTM 5322	PASS	PASS	PASS	PASS	PASS
Oxidation stability (PDSC), min, ASTM D6186	ND	87.4 @ 180°C	38. @180° C	66.11	104.2 @ 155°C
Low temperature stability, FTM 3458	PASS	Clear Flowing	Clear Flowing	Clear Flowing	Clear Flowing
Rust prevention, ASTM D665B	Pass Clean & Bright	Pass Clean & Bright	Pass Clean & Bright	Pass Clean & Bright	Pass Clean & Bright
Swelling of synthetic rubber, %, FTM 3603	25.5	25.0	19.8	12.8	10.24
Solid particle contamination:					
Particle size, micron, max, Automatic counter					
5 to 25	11/11/8	17/15/11	17/16/9	20/18/15	16/14/11
Foaming: ASTM D892					
Sequence 1, ml, max	5/0	5/0	20/0	40/0	5/0
Sequence 2, ml, max	45/0	5/0	10/0	10/0	10/0
Sequence 3, ml, max	10/0	5/0	20/0	20/0	5/0
Lubricity, scar diameter, mm, max, ASTM D4172					
40 kg load	0.3429	0.343	0.457	0.482	0.415
Trace sediment, %, max, ASTM D2273	NIL<0.005	NIL<0.005	NIL<0.005	NIL<0.005	NIL<0.005
Copper strip corrosion, max, ASTM D130	1B	1B	1B	1A	1B
Biodegradability, %, min, ASTM D5864	ND	70	71	72.5	65
Toxicity, LC50, Mg/l, min, OECD 203	3272	2148 mg/l	2160mg/l	4100 mg/l	8505 mg/l
Storage stability, 12 months, FTM 3465 & 4.35.3	ND	ND	ND	ND	ND
Fluid clarity, 3.3.6	Clear Liquid	Homogeneous clear liquid free of suspended matter	Homogeneous clear liquid free of suspended matter	Homogeneous clear liquid free of suspended matter	Homogeneous clear liquid free of suspended matter

Hydro Safe® Oil Division, Inc. **“Committed to Excellence”**  
ISO 9002 CERTIFIED

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