SINCE 1839 Schaeffer MANUFACTURING COMPANY

ISO 9001 CERTIFIED

TECHNICAL DATA

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#288 HTC EXTREME PERFORMANCE MEHF
ISO Grades 68 and 100

HTC Extreme Performance MEHF is a para-synthetic, anti-wear, rust and oxidation inhibited maximum efficiency multi-grade hydraulic fluid that is specially formulated for use in mobile equipment such as, hydraulic excavators, hydraulic cranes, aerial bucket trucks, forestry equipment, and industrial hydraulic systems. These systems, subjected to wide variations in ambient and operating temperatures, require protection against the formation of varnish deposits on close clearance servo-valves and other system components. Typical applications in which the HTC Extreme MEHF would be used include:

- Snow plow hydraulic systems
- Hydraulic excavators and cranes.
- Surface mining and construction equipment operations at very low to high ambient temperatures.
- Off-road forestry equipment.
- Hydrostatic driven equipment.
- Industrial hydraulic systems

HTC Extreme Performance MEHF is blended from the finest quality solvent refined, severely hydro-finished 100% paraffin base oils and polyalphaolefin (PAO), synthetic base fluids available. This unique combination provides HTC Extreme Performance MEHF with the following advantages:

1. **Very Good Low Temperature Properties**
2. **Superior Oxidation Stability and Excellent Resistance to Thermal Degradation**
3. **High Viscosity Index with Excellent Film Strength**
4. **Superior Operating Temperature Reduction**
5. **Compatibility With All Types of Seals and Coatings**

Blended into this unique combination of (PAO) and 100% pure paraffin petroleum base oil is a carefully balanced, premium antiwear additive package, VarniShield. VarniShield™ is patented hydraulic fluid additive technology designed to prevent the formation and build-up of varnish deposits, while providing exceptional anti-wear performance, outstanding thermal and oxidation stability, rust and corrosion protection and rapid water separation. The VarniShield™ additive system provides HTC Extreme Performance MEHF with a high degree of thermal and oxidative stability thus minimizing the formation of sludge and varnish. If any varnish particles do form, the dispersancy of the VarniShield™ additive will keep these particles suspended to prevent them from depositing on critical internal components. This helps eliminate the replacement of components such as filters and valves and the costs associated with these activities.

In addition to protecting against the formation of varnish deposits and keeping the system clean and operating longer the **VarniShield™** additive also offers the following performance benefits:

1. Exceptional and long lasting anti-wear protection to protect system components
2. Extended pump and bearing life.
3. Enhanced thermal and oxidative stability.
4. Superior hydrolytic stability.
5. Excellent demulsibility characteristics so water separates quickly.
6. Excellent rust and corrosion protection that extends component life and protects multi-metallurgy components.
7. Excellent anti-foaming and air release properties.
8. Reduced sludge, varnish and deposit formation.
9. Improved durability of non-ferrous parts.

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10. Reduced filter blockage and excellent filterability.
11. Enhanced compatibility with existing fluids.
12. Excellent fluid quality reserve to maintain its performance features even under severe service conditions and extended drain intervals.
13. Enhanced fluid and seal life.
14. Reduced system maintenance.

An extremely shear stable polymer viscosity index improver provides multi-grade functionality and wide temperature performance. In additions, this viscosity improver will increase the performance of the hydraulic system by increasing hydraulic efficiency and reducing energy and fuel consumption. The productivity of the equipment is also enhanced. This extremely shear stable polymer viscosity index improver provides the HTC Extreme Performance MEHF with a viscosity index of **>140** and allows the HTC Extreme Performance MEHF to provide the proper viscometric properties that are needed for maximum efficiency over a wide range of operating temperatures and pressures. By maintaining its viscometric properties in the optimum viscosity range for the hydraulic pump HTC Extreme Performance MEHF will provide the following performance benefits:

1. **Improved viscometric properties over a wide range of temperatures.**
2. **Less warm-up time during low temperature operation.**
3. **Faster and smoother response of the hydraulic system at low temperatures.**
4. **Less power required and consumed at cold start-up than conventional fluids.**
5. **Reduced risk of pump cavitation and lubricant starvation at low operating temperatures.**
6. **Improved volumetric and hydro-mechanical efficiency.**
7. **Less internal pump leakage at high operating temperatures.**
8. **Excellent resistance to recirculation resulting in a reduction in heat build-up and an increase in hydraulic system responsiveness.**
9. **Less hydraulic system fade.**
10. **Stable pump performance, especially during high operating temperatures**
11. **Excellent protection from wear during periods of high operating temperatures and high pressures.**
12. **Higher flow rate at peak operating temperature.**
13. **Stress on the overall system is kept in check.**
14. **Significantly less wear and tear on hydraulic system components such as pumps hoses and seals.**
15. **An increased Temperature Operating Window (TOW) that allows the fluid to perform consistently and reliably with in a wide range of temperatures from cold to hot.**
16. **Ability to exhibit lower viscosity at cold temperatures and delivery of stay-in-grade viscosity at high operating temperatures.**
17. **Minimization of friction and wear and reduced fuel consumption over a wide temperature range.**
18. **Elimination of seasonal changes.**
19. **Increased hydraulic power.**
20. **Enhanced energy efficiency with lower energy consumption for the same amount of work.**
21. **Improved productivity (more work can be done in the same amount of time).**
22. **Reduced Greenhouse gas emissions**
23. **Lower operating temperatures which reduces the risk of overheating and equipment shutdown.**
24. **Potential fuel savings and reduced emissions.**
25. **Reduced operating and maintenance costs.**

The trend by hydraulic pump manufacturers to employ higher speeds, higher pressures, reduced cycling times and smaller systems along with the fact that in many applications the equipment may be operating beyond its design capacity can result in thin film lubrication conditions. These thin film lubrication conditions can result in increased wear conditions and rates, which can lead to a loss in system efficiency, reduced equipment life and potentially catastrophic system failure.

HTC Extreme Performance MEHF also contains Micron Moly®, a liquid soluble type of moly that plates itself to the sliding, rolling and rubbing metal surfaces of the hydraulic and compressor systems. This plating action forms a long lasting solid lubricant film on these rubbing, rolling and sliding surfaces. This moly film will withstand pressures up to 500,000 pounds per square inch. Once plated to the sliding, rolling and rubbing metal surfaces the Micron Moly® not only produces a smooth finish surface, but also reduces friction between the moving parts. This results in less heat being generated, which in turn not only reduces operating temperatures, but also downtime.

HTC Extreme Performance MEHF meets and exceeds the following specifications and manufacturers requirements: Denison HF-O: Eaton-Vickers M2950-S; JCMAS HK specification; Eaton Char-Lynn; Haldex Barnes; Husky; FMC; Rexnord; Commercial Shearing HD 2/900; Commercial Hydraulics; Cincinnati Machine P-69 (ISO 68); DIN 51524 Part 3;ISO 6743/4 Type HV; ISO 11158 HV; GB 1111-81-1-94 (HV Fluid); Bosch Rexroth; Saur Sundstrand; Saur Danfoss; US Steel 126; 127 and 136; AF Nor E 48-603

TYPICAL PROPERTIES

ISO Grade (AGMA Grade)	**68** (2)	**100** (3)
Specific Gravity 60°F/15°C	0.88	0.89
Viscosity cSt 40°C (ASTM D-445)	65 – 74	100-106
Viscosity cSt 100°C (ASTM D-445)	11.4-12.95	14.1-14.95
Viscosity Index (ASTM D-2270)	159	142
Brookfield Viscosity (ASTM D-2983)		
cP @ 0°C/32°F	625	1,130
cP @ -18°C/0°F	3,000	8,850
cP @ -20°C/-4°F	4,050	12,300
Sonic Shear Test after 40 minutes (ASTM D-5621)		
% Viscosity Loss @ 40°C	7.75	8.63
Flash Point °F/°C (ASTM D-92)	440°/227°	450°/232°
Pour Point °F/°C (ASTM D-97)	-38°/-39°	-17°/-27°
Aniline Point °F/°C (ASTM D-611)	220°/104°	220°/104°
Total Acid Number (ASTM D-664)	0.91	0.91
Copper Strip Corrosion Test 3 hrs. (ASTM D-130)	1A	1A
Rust Test (ASTM D-665)		
Procedure A (Distilled Water)	Pass	Pass
Procedure B (Salt Water	Pass	Pass
Four Ball EP Test (ASTM D-2783) Weld Point, kg-f	200	200
Four Ball Wear Test (ASTM D-4172)		
(1hr/40kg/130°F) Mean Scar diameter, mm	0.35	0.35
Four Ball Wear Test (ASTM D-4172)		
(1hr/20kg/130°F) Mean Scar diameter, mm	0.27	0.27
Falex Continuous Load lbs. (ASTM D-3233) Failure Load, lbs-f	1250	1250
% Residue	0.01	0.01
Foam Tendency (ASTM D-892)		
Sequence I	0/0	0/0
Sequence II	0/0	0/0
Sequence III	0/0	0/0
FZG Test (ASTM D-5182) Load Stage Pass	12	12
Hydrolytic Stability (ASTM D-2619)		
Copper Wt. Loss, mg/cm^2	0.0566	0.0566
Acidity of Water mg/KOH	0	0
Demulsibility Test (ASTM D-1401) Oil-Water-Emulsion	40-40-0	40-40-0
Time, minutes	15	15
Denison Filterability Test TP-02100		
Filtration Time, without water (seconds)	146	146
Filtration Time with 2% water (seconds)	163	163
Oxidation Stability Test (ASTM D-943) Hours to TAN of 2	5000+	5000+
Sludge Tendencies (ASTM D-4310)		
Neutralization Number after 1000 hours	0.34	0.34
Insoluble Sludge, mg.	39.4	39.4
Total Copper, mg.	0.1	0.1
Thermal Stability Test (ASTM D-2070)		
168 hr./135°C, copper/Steel Catalyst)		
Sludge (mg/100ml)	1.8	1.8
Copper weight loss, mg/100ml	0.2	0.2
Condition of Copper Rod	1	1
Air Release (ASTM D-3427) Time (minutes @ 122°F)	6.2	6.2
Denison T6H20C Hybrid Pump Test		
Phase 1 1700 rpm/110°C, weight loss	5.1	5.1
Phase 2 1700 rpm/80°C + 1% water, weight loss	5.8	5.8
Vickers 35VQ25 Pump Test		
Total Weight Loss Vane, mg	5	5
Total Weight Loss Ring, mg	11	11
Total Weight Loss, mg	16	16