



# TECHNICAL DATA

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## #254 HTC SUPREME ISO 32 THROUGH 220

HTC Supreme is a premium quality para-synthetic, non-detergent, anti-wear, rust and oxidation inhibited, non-detergent oil that is specially formulated for use in those critical high precision industrial and mobile type low pressure and high pressure hydraulic systems, rotary vane, rotary screw, reciprocating, axial and centrifugal type air compressor systems and vacuum pumps and blower applications. HTC Supreme is particularly suited for those hydraulic applications such as plastic injection molding machines, glass transfer systems, heavy presses, numerically controlled machine tools and mobile equipment where excessive operating temperatures are seen and protection against the formation of varnish deposits on close clearance servo-valves and other system components is critical.

HTC Supreme is blended from the finest quality severely hydrotreated polyalphaolefin (PAO) synthetic base fluids and severely solvent refined, severely hydrofinished 100% pure paraffin base oil available. This unique combination provides HTC Supreme with the following advantages.

1. **Excellent Low Temperature Properties.** This results in the bearing and other machine parts being instantly lubricated at sub-zero temperatures the moment they start turning.
2. **Superior Oxidation Stability.** Any oil as it is increasingly exposed to high temperature operation undergoes the process of oxidation. This results in the oil's thickening and buildup of acidic components. Because of the PAO's and 100% paraffin base oil's uniform molecular structure, the process of oxidation is greatly reduced.
3. **Excellent Resistance to Thermal Degradation.**
4. **Excellent Hydrolytic and Demulsibility Characteristics.** This results in the separation of water much faster and more completely, allowing the water to be easily removed from the system. These properties result in increased bearing, pump and gear life, antiwear protection and improved rust and corrosion protection.
5. **High Viscosity Index.** This results in a minimum change in viscosity. The adequate viscosity for proper lubrication is provided regardless of temperature change.
6. **Excellent Film Strength.** This results in increased wear protection.
7. **Superior Operating Temperature Reduction.** This unique combination of PAO and 100% paraffin base oils have better specific heat values (less heat is absorbed) and better thermal conductivity than conventional oils. These combined properties help to reduce operating temperature.
8. **Compatibility With All Types of Seals and Coatings.**

The trend among hydraulic equipment system OEMs is to design hydraulic systems with increased power output and pressures, while minimizing the oil reservoir size in order to make the systems more compact. This trend coupled with higher oil flow rates relative to the amount of hydraulic fluid present in the system has resulted in higher operating temperatures, which increases the rate of oxidation and thermal degradation of the lubricant- all resulting in the potential for the formation of varnish and sludge deposits in the system.

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Once varnish deposits are formed they can create a host of problems. Once deposited on the metal surfaces of the system, the sticky nature of these deposits can attract wear particles and contaminants to adhere to the metal surface. This sticky abrasive residue can increase overall friction, especially to servo valves resulting in reduced efficiency and responsiveness. Varnish deposits can also result in sticking servo valves which must be cleaned or replaced, restricted oil flow due to clogged or blocked filters and strainers, and poor heat transfer. All of these factors result in increased maintenance costs, system downtime and lost production.

To combat the formation of varnish deposits a carefully balanced premium antiwear additive package **VarniShield™** is blended into the blend of 100% paraffin base oils and PAO synthetic base fluids. **VarniShield™** is a patented hydraulic fluid additive technology that is designed to prevent the formation and the 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 Supreme 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 and 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 technology provides the following performance benefits:

1. Exceptional and long lasting anti-wear protection to protect system components
2. Extended pump life.
3. Extended bearing life.
4. Enhanced thermal and oxidative stability.
5. Superior hydrolytic stability.
6. Excellent demulsibility characteristics so water separates quickly.
7. Excellent rust and corrosion protection that extends component life and protects multi-metallurgy components.
8. Excellent anti-foaming and air release properties.
9. Reduced sludge, varnish and deposit formation.
10. Improved durability of non-ferrous parts.
11. Reduced filter blockage.
12. Excellent filterability.
13. Enhanced compatibility with existing fluids.
14. Excellent fluid quality reserve to maintain its performance features even under severe service conditions and extended drain intervals.
15. Enhanced fluid life.
16. Enhanced seal life.
17. Reduced system maintenance.

With the trend by hydraulic pump manufacturers to employ higher speeds, higher pressures reduced cycling times and small systems along with the fact that in many applications that the equipment may be operating beyond its design capacity this has resulted in thin film lubrication conditions taking place. These thin film lubrication conditions can result in increased wear conditions and rates taking place. These increased wear conditions and rates can not only result in a loss in system efficiency, reduced equipment life and lead to potentially catastrophic system failure.

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Though HTC Supreme contains an exceptional anti-wear performance additive system that last longer than most conventional anti-wear hydraulic fluids the products anti-wear capabilities is further enhanced by the addition of Micron Moly®.

Micron Moly® is 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 Supreme can also be used as a slide and way lube, a airline oil for pneumatic systems, as a circulating oil and in those bearing and gearbox applications, where the use of a non extreme pressure oil is specified.

HTC Supreme meets and exceeds the following specifications and manufacturer's requirements:

Denison HF-O, Eaton-Vickers I-286-S and M-2950-S; JCMAS HK specification, Eaton-Char-Lynn, Haldex Barnes, Husky, Linde, Rexnord, Bosch Rexroth, Parker Hannifin, Commercial Shearing HD 2/900, Commercial Intertech, Cincinnati Machine P-54, P-68, P-69, P-70, DIN 51 524 Part 2, DIN 51 517 Part 2 (CL) ; ISO 6743/4 Type HM, AGMA 9005-E02 R&O specification, Sauer-Sundstrand, Sauer Danfoss U.S. Steel 126,127 and 136, AFNOR E 48-603, Ingersoll Rand, Joy, Kaeser, Gardner Denver, Sullair, Worthington, LeRoi, Quincy and Atlas Copco compressor specifications.

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### TYPICAL PROPERTIES

ISO Grade	32	46	68	100	150	220
AGMA Grade	----	1	2	3	4	5
Specific Gravity 60°F/15°C	0.8559	0.8559	0.8725	0.8753	0.8769	0.8794
Viscosity SUS 100°F (ASTM D-445)	139-180	232-264	336-383	486-547	728-736	1053-1163
Viscosity cSt 40°C (ASTM D-445)	27-33.5	45.-51.2	65-74	92.5-105	138.-141	200-220.5
Viscosity cSt 100°C (ASTM D-445)	4.9-5.6	6.7-7.3	8.66-9.5	10.9-11.9	14.17-14.45	18.34-19.59
Viscosity Index (ASTM D-2270)	104	102	105	102	102	102
Flash Point °F/°C (ASTM D-92)	408°/209°	421°/216°	462°/239°	466°/241°	471°/244°	480°/249°
Pour Point °F/°C (ASTM D-97)	-25°/-32°	-25°/-32°	-10°/-23°	-5°/-21°	0°/-18°	5°/-15°
Aniline Point °F/°C (ASTM D-611)	220°/104°	228°/109°	228°/109°	233°/112°	240°/116°	252°/122°
Total Acid Number (ASTM D-664)	0.91	0.91	0.91	0.91	0.91	0.91
Copper Strip Corrosion Test 3 hrs. (ASTM D-130)	1A	1A	1A	1A	1A	1A
Rust Test (ASTM D-665)						
Procedure A (Distilled Water)	Pass	Pass	Pass	Pass	Pass	Pass
Procedure B (St Water)	Pass	Pass	Pass	Pass	Pass	Pass
Four Ball EP Test (ASTM D-2783)						
Weld Point, kg	160	160	160	160	200	200
Four Ball Wear Test (ASTM D-4172)						
(1hr/40kg/130°)						
Mean Scar Diameter, mm	0.4	0.4	0.4	0.4	0.35	0.35
Four Ball Wear Test (ASTM D-4172)						
(1hr/20kg/130°)						
Mean Scar Diameter, mm	.27	.27	.27	.27	.33	.33
Falex Continuous Load lbs. (ASTM D-3233)						
Failure Load, lbs.	1250	1250	1250	1500	1500	1500
Conradson Carbon Residue (ASTM D-189)						
% Residue	0.01	0.01	0.01	0.01	0.01	0.01
Foam Tendency (ASTM D-892)						
Sequence I	0/0	0/0	0/0	0/0	0/0	0/0
Sequence II	0/0	0/0	0/0	0/0	0/0	0/0
Sequence III	0/0	0/0	0/0	0/0	0/0	0/0
FZG Test (ASTM D-5182)						
Load Stage Pass	12	12	12	12	12	12
Hydrolytic Stability (ASTM D-2619)						
Copper Wt. Loss mg/cm <sup>2</sup>	0.0566	0.0566	0.0566	0.0566	0.0566	0.0566
Acidity of Water mg/KOH	0	0	0	0	0	0
Demulsibility Test (ASTM D-1401)						
O-W-E	40-40-0	40-40-0	40-40-0	40-40-0	40-40-0	40-40-0
Time, min	15	15	15	15	15	15

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TYPICAL PROPERTIES (Continued)

ISO Grade	32	46	68	100	150	220	
Denison Filterability Test TP-02100							
Filtration Time, without water (seconds)	146	146	146	146	146	146	146
Filtration Time with 2% water (seconds)	163	163	163	163	163	163	163
Oxidation Stability Test (ASTM D-943)							
Hours to TAN of 2	5000+	5000+	5000+	5000+	5000+	5000+	5000+
Sludge Tendencies (ASTM D-4310)							
Neutralization Number after 1000 hours	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Insoluble Sludge, mg.	39.4	39.4	39.4	39.4	39.4	39.4	39.4
Total Copper, mg	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Thermal Stability Test (ASTM D-2070)							
168 hr/135°C, copper/Steel Catalyst							
Sludge (mg/100ml)	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Copper weight loss,mg/100ml	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Condition of Copper rod	3	3	3	3	3	3	3
% Evaporative Loss @700°F/370°C (ASTM D-2887)	4.9%	4.9%	5.0%	5.0%	5.0%	5.0%	5.0%
Air Release (ASTM D-3427)							
Time, (Min. @ 122°F)	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Denison T6H20C Hybrid Pump Test							
Phase 1 1700 rpm 230°F/110°C weight loss	5.1	5.1	5.1	5.1	----	----	----
Phase 2 1700 rpm 176°F/80°C + 1% water	5.1	5.8	5.8	5.8	----	---	----
Vickers 35VQ25 Pump Test							
Total Wt. Loss Vane, mg	5	5	5	5	5	5	----
Total Wt. Loss Ring, mg	11	11	11	11	11	11	----
Total Wt. Loss, mg	16	16	16	16	16	16	----