



CFHF Bio Based Hydraulic Fluid Information

Bio-Hydraulic Fluids, CFHF, are ultimately biodegradable¹ vegetable based formulas that replace mineral oil based hydraulic fluids. CFHF Hydraulic Fluids are formulated to perform in hydraulic systems that require anti-wear, anti-rust, anti-oxidation, anti-foam, and demulsibility properties. They are highly inhibited against moisture and rusting in both fresh and sea water and pass both A and B Sequences of the ASTM D-665 Turbine Oil Rust Test. Incorporating the super high viscosity index of the Stabilised* High Oleic Base Stocks (HOBS) into the formula, increases the viscosity index past synthetic levels (Energy Conserving Formulas). CFHF Hydraulic Fluids are Zinc-free.

CFHF Hydraulic Fluids are designed for use in mobile and stationary hydraulic vane, piston, and gear-type pumps and have shown to have exceptional anti-wear performance. Very little wear was encountered, 0 to 25mg (Pass), in accelerated bio based tests using Denison T-5D, Vickers 20VQ, 35VQ-25 (M-2950-S), and V-104C (ASTM D-2882) pump stand tests at pressures and temperatures ranging from 2000 to 3000 psi and from 65 C to 100 C. The anti-wear performance exceeds the requirements for US Steel 126 and 127, load stage 10 in the FZG (DIN 51354), DIN 51524, and GM (LS-2). They also meet the requirements for ash less GL-3 gear oils in reduction units and gear sets where they meet the viscosity ranges. CFHF meets and exceeds Federal Specifications A-A-59354 Superseding MIL-H-46001D.

The super high viscosity index of the HOBS naturally improves the thermal shear stability of the formula and increases load capacity. The HOBS's extremely low volatility increases the flash and fire safety features in the formula. They are formulated to provide seal conditioning for longer seal life and to reduce oil leakage from the system. CFHF Hydraulic Fluids should be used in hydraulic systems where low toxicity, and BIODEGRADABILITY properties are required. Base oils and additives in these products pass and exceed the acute toxicity (LC-50) criteria adopted by the US Fish and Wildlife Service and the US EPA. CFHF Hydraulic Fluids are ENVIRONMENTALLY RESPONSIBLE lubricants that are formulated from renewable agricultural plant resources. We believe Earth's environmental future rests in the use of renewable materials.

High Oleic Base Stocks (HOBS) are agricultural vegetable oils. This Stabilised technology allows the HOBS to perform as a high performance formula in high and low temperature applications, reducing oil thickening and deposits.

1 Ultimate Biodegradation (Pw1) within 28 days in ASTM D-5864 Aerobic Aquatic Biodegradation of Lubricants

CFHF Hydraulic Fluids ISO 32, and 68 test data shows that the CFHF Hydraulic Fluids provide high performance in a wide variety of stationary and transportation equipment that operate in broad ranges of environmental conditions. In equipment operating outside, wear from poor cold temperature pump-ability, surge loads, moisture, and dusty environments are more prominent. CFHF Hydraulic Fluids are formulated to improve performance in equipment that requires excellent anti-wear, hydrolytic stability, and cold temperature pump-ability as low as -35 C. In addition, the products may be used in machine tool hydraulic systems with the above Denison and Vickers pump requirements and exceeds the requirements of US Steel 126, 127 and DIN 51524 Part 2.



CFHF³²
BIO BASED HYDRAULIC FLUID

CFHF⁶⁸
BIO BASED HYDRAULIC FLUID

Biodegradability Report

The manufacturers of Traxx CFHF 32 and CFHF 68 hydraulic fluids specify that these products come within the 'Ultimately Biodegradable Pw1' classification when tested using the method of ASTM D-5864 "Standard Test Method for Determining Aerobic Aquatic Biodegradation of Lubricants".

The levels of biodegradability are quoted using the US Environmental Persistence Classification. Ultimate Pw1 is the fastest and highest level of biodegradability. It means that more than 60% of the material is degraded to carbon dioxide by the test microorganisms in 28 days.

Ultimate Pw1 is equivalent to the 'Readily Biodegradable' classification in OECD countries including Australia.

Typical Specifications	Methods	ISO 32	ISO68	Special Requirements
Specific Gravity @ 15.6C	ASTM D-287	0.88	0.88	Report
Viscosity @ 40C	ASTM D-445	30.87	64.1	Note 1
Viscosity @ 100C	ASTM D-445	6.9	12.5	Note 1
Viscosity @ -15C Brookfield	ASTM D-2983	550 cP	3200 cP	Note 1
Viscosity @ -25C Brookfield	ASTM D-2983	1200 cP	4500 cP	Note 1
Viscosity @ -30C MRV TPI	ASTM D-4864	4500 cP	15000 cP	10W= <60000
Viscosity @ -35C MRV TPI	ASTM D-4864	7500 cP	24000 cP	5W= <60000
Viscosity Index	ASTM D2270	184	189	90 (min)
Pour Point	ASTM D-97	Minus 40C	Minus 39C	Note 1
Flash Point (COC)	ASTM D-92	236C	251C	198C (min)
Fire Point (COC)	ASTM D-92	260C	274C	218C (min)
Hydrolytic Stability	ASTM D-2619			
*Copper Weight Loss		0.0139	0.0208	0.2
*Copper Appearance		1B	1B	Report
*Change in Acid Number		0.16	0.21	Report
*Water Layer		3	3	4
* % Insolubles		0.001	0.001	Report
Foam Sequence I,II,III (10 Min)	ASTM D-892	0 Foam	0 Foam	0 Foam
Rust Prevention	ASTM D-665			
* Distilled Water		Pass	Pass	Pass
*Syn Sea water		Pass	Pass	Pass
Copper Corrosion strip 3 hr @100C	ASTM D-130	1B	1B	1B
Rotary Bomb Oxidation (minutes)	ASTM D-2272	360	360	USS 120 (min)
Oxidation Stability (Pressure Differential Scanning Calorimeter) m	ASTM D-5483 (Modified)	70.0 (165C)	70.0 (165C)	Note 2
Neutralization Number mg KOH/g	ASTM D-974	<0.4	<0.4	1.5 (max)
Swell of Synthetics NBR-L Rubber, % (avg)	DIN 53538, Part 1			
* Volume Change %		6	6	0 to 12
* Shore a Hardness change		-4	-4	0 to -7
Filterability	Denison TP 02100			
*A- No Water (avg)	HF-0 Requirement	113	335	600(Max)
*B-2% Water (avg)		187	449	2 x A (Max)
Demulsibility, MI Oil/Water/Emulsion	ASTM D-1401	40/40/0 (10 minutes)	40/40/0 (10 minutes)	40/37/3 (max) 30 Minutes
4 Ball wear, 1h 167deg.C 1200 rpm 40kg	ASTM D-4172	0.3-0.4	0.3-0.4	USS 127 0.5(max)
FZG Test	DIN 51354	12	12	US Steel 10 (min)
Biodegradation Classification	ASTM D-5864	Ultimate PW1	Ultimate PW1	Ultimate PW1
Environmentally Friendly	ISO 15380	Yes	Yes	
USDA Biobased test	New Carbon	Yes	Yes	Meets / exceeds
Environmental Management system	ISO 14001 : 1996	Yes	Yes	over 50%

Note 1 - Viscosity sufficient form application
Note 2 - Not required