



Renewable Lubricants, Inc.

476 Griggy Rd., P.O. Box 474

Hartville, Ohio 44632-0474

Voice: 330.877.9982 Fax 330.877.2266

Web: www.renewablelube.com

Bio-Fleet™ Trans-Hydraulic
(Universal Tractor Fluid)



"Biobased Lubricants that Perform Like Synthetics"

Bio-Fleet™ Trans-Hydraulic is a universal tractor fluid (UTF) that incorporates Stabilized* additive technology with biodegradable¹ biobased oils. It provides improved performance, provides efficiency in synchronised and glide shift transmissions, and is interchangeable with standard UTF. This formulation contains special frictional modifiers for the Wet Brake's equipment design, and is compounded with detergent, dispersant, anti-wear, anti-rust, and anti-foam inhibitors. Bio-Fleet™ Trans-Hydraulic fluid is a multi-grade lubricant that can be used in agricultural, industrial, and construction equipment and has proven field performance.

Meets or exceeds the requirements of most manufactures; Allison C-3, Cat TO-2 and API GL-4, FZG/Low-Speed/High Torque. Passes: J20-C/M1139 High Torque Axle, Wet Brake Chatter/Squawk, PTO Clutch, and the North America Performance Requirements for Universal Tractor Transmission Oils (UTTOs).

Meets and exceeds UTF and/or UTTO specifications for OEMs.

John Deere
J20C, J14A/B/C
**J20D

Ford, New Holland
M2C134-D, FNHA-2-201
M2C86-C, M2C86-C/B
**M2C41-B/A, M2C48-C/B, M2C92-A
M2C53-B/A, M2C134-C,B,A
CNH MAT 3525

Massey-Ferguson
M1135, M1141, M1139, M1143
**M1110, M1127B/A, M1129A

Kubota, UDT
Steiger, SEMS 1700A
Versatile, 28M, 24M

Case International
**JIC-145/MS-1210
JIC-185/MS-1204, MS-1205, MS-1206
MS-1207, MS-1209, MS1127, M1129-A

Agco, White Farm
Q-1826 Q-1705, Q-1766, Q-1802, Type 55

Agco, Deutz-Allis 821XL
Landini
Fiat-Hesston, AF-87, Multi-F

TRANSMISSION OEM'S
**J20C spec for Allison C4
Caterpillar TO-2

Hydraulic: Vickers, Denison, Commercial Intertech, Rexroth, Sauer-Sundstrand

**Lower viscosity specifications can be replaced where recommended by OEM.

Bio-Fleet™ Trans-Hydraulic meets the Environmental Protection Agency (EPA) 2013 Vessel General Permit (VGP) guidelines for Environmentally Acceptable Lubricants (EALs), and should be used where **LOW TOXICITY, BIODEGRADABILITY** and **NON-BIOACCUMULATION** properties are required. This product exceeds the acute toxicity (LC-50 / EC-50 >1000 ppm) criteria adopted by the US Fish and Wildlife Service and the US EPA. Bio-Fleet™ Trans-Hydraulic is an **ENVIRONMENTALLY ACCEPTED LUBRICANT (EAL)** that is formulated from renewable agricultural biobased resources. We believe Earth's environmental future rests in the use of renewable materials.

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

STABILIZED by Renewable Lubricants™* is RLI's trademark on their proprietary and patented anti-oxidant, anti-wear, and cold flow technology. High Oleic Base Stock (HOBS) are agricultural vegetable oils. This Stabilized technology allows the HOBS to perform as a high performance formula in high and low temperature applications, reducing oil thickening and deposits.

Patented Product: US Patent 6,383,992, US Patent 6,534,454 with additional Pending and Foreign Patents

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<u>Availability</u>	<u>F.O.B.: Hartville, Ohio, USA</u>	<u>1 Gallon</u>	<u>5 Gallon Pail</u>	<u>Drum</u>	<u>Totes</u>	<u>Bulk</u>
RLI Product Item #		81203	81204	81206	81207	81209

Test	Typical Results	Specification Limits
Viscosity @ 100°C ASTM D-445	10.26	9.10 min.
Viscosity @ 40°C ASTM D-445	47.8	Report
Viscosity Index ASTM D-2270	210	140
Shear Stability Orbahn ASTM D-6278		
Vis. @ 100°C (after shear)	9.6	9.10 min.
Brookfield Viscosity ASTM D-2983		
@ -20°C	1,650	5,500 max.
@ -35°C	21,150	70,000 max.
Flash Point, °C (ASTM D-92)	251	200 min.
Stable Pour Point, °C (ASTM D-97)	-39	-36 max.
Rust Prevention A&B, (ASTM D-665)	Pass Clean	No Visible Rust
Acid Number, mg KOH / g (ASTM D-974)	0.6	Report
Dielectric Strength (ASTM D-877)		
Dielectric Strength (ASTM D-877)	46 KV	35 KV (Minimum)
Four Ball Wear (ASTM D-4172)		
1 h, 65°C, 1500 rpm, 40 kg,	0.36	0.40 max.
Oxidation Stability JDQ 16		
Evaporation Loss	0.65%	5.0% max.
Viscosity Increase @ 100°C	5.02%	10.0% max.
Viscosity Increase @ 40°C	4.0	-----
Sludge Formation	None	None
Additive Separation	None	None
Rust Protection JDQ 22	>100	100 hrs. min.
Copper Corrosion JDQ 32	1A	1B max.
Foaming Characteristics JDQ 33		
Sequence I	0/0	25/0 ml. max.
Foam Breaktime	0	30 sec. max.
Sequence II	50/0	50/0 ml. max.
Foam Breaktime	0	30 sec. max.
Sequence III	0/0	25/0 max.
Foam Breaktime	0	30 sec. max.
Water Sensitivity JDQ 19		
Solids	0.0	0.1 %v max.
Additive Loss	0.0	15.0% wt. max.
Extreme Pressure Properties JDQ 34		
Timken Abrasion Mass Loss	0.5 mg.	1.5 mg. max
Timken OK Load	73 N	45 N min.
Rubber Compatibility JDQ 9		
Volume Change	+1	0 to +5%
Hardness Change	-0.5	0 to -5 pts.
Precipitation	None	Trace
Rubber Compatibility Reference 69X311111		
Volume Change	+2.5	0 to +5
Hardness Change	-1.5	0 to -5
Precipitation	None	None
Oil Compatibility JDQ 23		
Additive Separation	None	None
Oxidation Stability		
Evaporation Loss	1.6	5.0% max.
Viscosity Increase @ 100°C	6.0	10.0% max.

Viscosity Increase @ 40°C	9.8	-----
Sludge Formation	None	None
Additive Separation	None	None
Low Temperature Fluidity JDQ 73/74		
Cold Soak @ -35°C	27 secs.	30.0 sec. max.*
Slow Cool		
@ -30°C	30 mm in 3 sec.	30.0 sec. max.*
@ -35°C flow in 30 sec.	30 mm in 11 sec.	10.0 mm min.**
*Must flow 30 mm in a maximum of 30 seconds to pass.		

Test	Typical Results	Specification Limits	
JDQ 94 PST Clutch Friction			
Total Cycles	2,000	2,000	
Initial Friction Coefficient	0.077	0.15 max.	
Final Friction Coefficient	0.105	0.08 min.	
Stall Time (sec.)	1.77	5.0 max.	
Disk #1 Wear (mm)	0.178	0.38 max.	
Disk #2 Wear (mm)	0.174	0.38 max.	
Disk #3 Wear (mm)	0.254	0.38 max.	
Disk #4 Wear (mm)	0.178	0.38 max.	
JDQ 102 Shear Stability			
Viscosity @ 100°C	10.51		
Viscosity @ 100°C (sheared)	9.38		
% Viscosity Loss	10.8%		
JDQ 95 Spiral Bevel/Final Drive Gear Wear			
Gear Surface Condition			
Pinion	None	No Scoring	
Ring	None	No Scoring	
Spiral Bevel Rating	9	Scale of 1-10, 10 = the best	
Sun Pinion Wear			
Left Side Average	<0.025	<0.025	
Right Side Average	<0.025	<0.025	
JDQ 84 Sundstrand Hydraulic Pump			
Flow Degradation	3.9%	Equal to or better than reference which is -2.0%.	
JDQ 96 Brake Torque Variation and Friction			
	Computer Results	Torque	SwRI
Cycles	Relative Capacity	Variation	Variation
1,000	293,131	44,470	559,780
10,000	308,090	36,730	424,130
20,000	310,651	36,220	421,620
30,000	312,768	42,380	506,220
Total	1,224,640	159,800	1,911,750
Allison C-4 Oxidation Test (J20C Spec.)			
Tan Increase	7.0	7.0 max.	
Carbonyl Absorbance	0.9	0.9 max.	
Front Pump Seal			
	Moderate to Heavy Hardening	Moderate to Heavy Hardening	
	Light Sludge	Light to Medium Sludge	
Allison C-4 Wear Test			

Total weight loss	1.4 mg		15.0 max.
Allison C-4 Paper Clutch Friction test			
	<=5,000	>5,000	<=5,000 >5,000
	Cycles		Cycles
Slip Time, max.	0.70	0.55	0.72 0.61
Mid-Point Friction Coeff. min.	0.076	0.095	0.068 0.088
Allison C-4 Graphite Clutch Friction Test			
	1,500		5,500
	Cycles		
Slip Time, max.	0.70	0.74	0.71 max.
Mid-Point Friction Coeff. min.	0.101	0.097	0.104 min.
Biodegradability CEC-L33A93 >80%			
	OECD 301B Mod. Sturm	>60%	
	ASTM D-5864	>60%	
WGK Rating 1			
Ecotoxicity			
Fathead minnow, 96h LC50,	>2000 ppm		EPA requirement >1000
Daphnia magna, 48h EC50,	>2000 ppm		EPA requirement >1000
Alga Growth Inhibition EC50	>2000 ppm		EPA requirement >1000
Meets EPA requirements 560/6-82-002, 560/6-82-003			
Energy Conserving Formulation – USDA Biobased and BioPreferred			