

GreensCare 46

Biodegradable Hydraulic Fluid

Manufactured exclusively for Jacobsen, A Textron Company, by

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Description

GreensCare 46 Hydraulic Fluid is a readily biodegradable and non-hazardous ISO 46 / SAE 10W30 viscosity grade hydraulic oil for use in general purpose hydraulic systems. GreensCare 46 is based on natural ester base fluid technology and is a direct replacement for petroleum oil based hydraulic fluids. GreensCare 46 is approved against Jacobsen requirements and meets or exceeds the requirements of Cushman, Ransomes, Toro, Deere and others. The fluid demonstrates excellent low and high temperature viscosity performance and has superior anti-wear characteristics.

Typical Properties

Flash Point	ASTM D-92	>250° C
Specific Gravity, 60° F	ASTM D-1298	0.92
Kinematic Viscosity @ 40° C, cst	ASTM D-445	41.4 – 50.6 (ISO 46)
Kinematic Viscosity@100°C, cst	ASTM D445	9.3 – 12.5
Viscosity Index	ASTM D-2270	200
Pour Point	ASTM D-97	<-36°C
Brookfield viscosity @ -30° C, cPs	ASTM D-2983	5100
Color	Visual	Blue

Performance Properties

Foam	ASTM D-892	
Sequence I, II, III		Pass
Fluid Compatibility w/Turf Protector (50:50) wt.; 4 weeks	Visual	
75C		Clear, homogeneous
RT		Clear, homogeneous
-20C (when warmed to RT)		Clear, homogeneous

Performance Properties - continued

Copper Corrosion 3 hours @ 100° C	ASTM D-130	1a
Hydrolytic stability, Copper loss / appearance/ NNA	ASTM D-2619	0.14 / 1b / 0.07
Filterability, seconds A.) without water, 600 max		101.2
Rust, ASTM D-665 A (Distilled Water)		Pass
Rust, ASTM D-665 B (Synthetic Sea Water)		Pass
Demulsibility ASTM D-1401 oil / water / emulsion (minutes)		40-40-0 (15)

Wear Performance

Four Ball Wear, ASTM D-4172 1 hr., 167° F, 1800 rpm, 40 kg., scar mm.		0.40
Timken Wear, ASTM D-2782 OK Load, lbs.		40-50
Hydraulic Pump Test, ASTM D-2282 mg. wt. loss, ring and vanes		3.4

Oxidative Stability

Oxidative Stability, ASTM D-2272 RBOT, min. to 25 psi loss		80 - 100
Static Oxidation Test 168 hrs. @ 150° C condition of beaker		clean

Biodegradability

Biodegradability (OECD Method) %		>60
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Biodegradable Hydraulic Fluids
Physical/Performance Test Comparison

	GreensCare 46	Commercial Competitor
Viscosity Grade	ISO 46	ISO 36 ?
Specific Gravity ASTM D1122	0.92	0.92
Kinematic Viscosity ASTM D2270		
cSt. @ 40°C	46.0	36.0
cSt. @ 100°C	10.4	8.4
VI	205	213
Rust Protection ASTM D665A Distilled Water	pass	pass
Oxidative Stability ASTM D2272 min to 25 psi loss	93	25
Pour Point ASTM D97	-39°C	-18°C
Fluidity Characteristics @-20C @-30C	fluid, homogeneous fluid, homogeneous	solid solid
Four Ball Wear 1800 rpm, 167F, 1hr., 40kg. Wear scar, mm.	0.45	0.45
Biodegradability CEC L33 T82 percent (%)	94	76

Summary of Performance

Biodegradability and Ecotoxicity Testing

Grass exposure test	
Result	Zero after 2 weeks
Biodegradability	
CEC-L-33-T-82	94%
Modified Sturm, OECD 301 B	61%
Ecotoxicity	
Fathead minnow, 96h LL50, ppm	>10,000
Daphnia magna, 48h, EC50, ppm EL	>10,000 WAF 10 - 100
Sludge respiration inhibition, EC50, ppm	>10,000 ppm 1000
Algae EL 50	100 - 1000

Pump Performance

Vickers 35VQ25 Pump

(3000 psi, 2400 rpm 93.3° C)

Total Ring & Vane Weight Loss (mg)	
First 50h Test	8.0
Second 50h Test	11.0
Third 50h Test	8.0

Vickers V-104C Pump

(2000 psi, 1200 rpm 79.4° C)

Total Ring & Vane Weight Loss (mg)	
100 hours	4.0

Denison T-5D Vane

Total weight loss	Pass
(2000 psi, 93.3° C, 100h)	

3000 hr. Jacobsen In-house Dynamometer Test ; All hydraulic components
M-46 System (Run at Racine, WI; 3rd quarter 1998) rated "as new" at EOT