ABIC TESTING LABORATORIES, INC.
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Applicant: Oscar Lubricants LLC July 9, 2024

Sample of: DOT 4 Motor Vehicle Brake Fluid

Submitted by: Dr. Talal El Sayed

Project No: 5687-01

Sample No: 3870

Marking: DOT 4

Sampled by: Client

RESULTS OF TESTS FOR CONFORMANCE WITH FEDERAL MOTOR VEHICLE SAFETY STANDARD 116 FOR DOT 4 MOTOR VEHICLE BRAKE FLUID

Test	Requirements	Method (para.)	Results	Comment
Original Equilibrium Reflux Boiling Point	Min. 230°C (446°F)	S5.1.1	258°C (496° F)	Passes
Wet Equilibrium Reflux Boiling Point	Min. 155°C (311°F)	S5.1.2	172°C (342° F)	Passes
Viscosity				
@ -40°C (-40°F)	Max. 1800 mm^2/s.	S5.1.3	1082 mm^2/s	Passes
@ 100°C(212°F)	Min. 1.5 mm^2/s.	S5.1.3	2.0 mm^2/s	Passes
pH	7-11.5	S5.1.4	8.02	Passes
Brake Fluid Stability		S5.1.5		
High Temperature Stability Boiling Point Change	Max. 3°C (5.4°F) + 0.05/1°F that original ERBP* exceeds 225°C (437°F)	S5.1.5.1	No Change	Passes
Chemical Stability Boiling Point Change	Max. 3°C (5.4°F) + 0.05/1°F that original ERBP exceeds 225°C (437°F)	S5.1.5.2	No Change	Passes
* ERBP: Equilibrium Reflux Boiling Point				
Source: ABIC Testing Laboratories, Inc.				

Test	**Requirements**	**Method (para.)**	**Results**	**Comment**
Corrosion 120 ± 2 hours @ 100°C (212°F)		S5.1.6		
Weight Change in mg./sq. cm.				
Tinned Iron	Max. 0.2		-0.01	Passes
Steel	Max. 0.2		-0.01	Passes
Aluminum	Max. 0.1		+0.01	Passes
Cast Iron	Max. 0.2		+0.02	Passes
Brass	Max. 0.4		-0.05	Passes
Copper	Max. 0.4		-0.02	Passes
Pitting or etching of strips discernible without magnification	None		None	Passes
Gelling of fluid /water mixture at 23 ± 5°C (73.4F ± 9°F)	None		None	Passes
Crystallization deposit on glass jar walls or on metal strips	None		None	Passes
pH of water/fluid mixture	7-11.5		8.20	Passes
Sedimentation	Max. 0.10%		None	Passes
Disintegration of rubber cup as evidenced by stickiness, blisters or sloughing	None		None	Passes
Decrease in hardness of rubber cups	Max. -15 IRHD		-2 IRHD	Passes
Increase in base diameter of rubber cup	Max. 1.4 mm. (0.055 in.)		0.18 mm (0.007 in.)	Passes
Fluidity and Appearance at Low Temperatures		S5.1.7		
144 ± 4 hours @ -40°C ± 2°C (-40°F ± 3.6°F)				
Stratification or sedimentation, sludging or crystallization	None		None	Passes
Source: ABIC Testing Laboratories, Inc				

Test	Requirements	Method (para.)	Results	Comment
Fluidity and Appearance at Low Temperatures, continued		S5.1.7		
144 ± 4 hours @ -40°C ± 2°C (-40°F ± 3.6°F)				
Time for air bubble to top	Max. 10 seconds		2 seconds	Passes
Appearance of sample after warming to room temperature	Same as before testing		Same as before testing	Passes
6 hours ± 12 minutes @ -50°C ± 2°C (-58°F ± 3.6°F)				
Stratification or sedimentation, sludging or crystallization	None		None	Passes
Time for air bubble to travel to top	Max. 35 seconds		6 seconds	Passes
Appearance of sample after warming to room temperature	Same as before testing		Same as before testing	Passes
Water Tolerance		S5.1.9		
120 hours @ -40°C ± 2°C (-40°F ± 3.6°F)				
Stratification or sedimentation, sludging or crystallization	None		None	Passes
Time for air bubble to travel to top	Max. 10 seconds		2 seconds	Passes
Appearance of sample after warming to room temperature (if sample was cloudy @-40°C (-40°F)	Same as before testing		Same as before testing	Passes
24 hours @ 60°C ± 2°C (140°F ± 3.6°F)				
Stratification	None		None	Passes
Sedimentation	0.15%		None	Passes
Source: ABIC Testing Laboratories, Inc.				

Test	Requirements	Method (para.)	Results	Comment
Compatibility		S5.1.10		
24 ± 2 hours @ -40°C ± 2°C (-40°F ± 3.6°F)				
Stratification or sedimentation, sludging or crystallization	None		None	Passes
Appearance of sample after warming to room temperature (if sample was cloudy @-40°C (-40°F)	Same as before testing		Same as before testing	Passes
24 ± 2 hours @ 60°C ± 2°C (140°F ± 3.6°F)				
Stratification	None		None	Passes
Sedimentation	0.05%		None	Passes
Oxidation: 70 ± 2 hours @ 23 ± 5°C (73.4°F) then 168 ± 2 hours @ 70°C (158°F)		S5.1.11		
Pitting or roughing of metal strips discernible without magnification outside of area in contact with tinfoil	None		None	Passes
.				
Gum deposited on metal strips	Trace		None	Passes
Weight Change in mg./sq. cm				
Aluminum	Max. 0.05		0.00	Passes
Cast Iron	Max. 0.3		0.01	Passes
Effect on Cups		S5.1.12		
70 hours @ 70°C (158°F)				
Hardness increase	None		None	Passes
Hardness decrease	Max. -10 IRHD		3	Passes
Base diameter increase	0.15 mm. (0.006 in.) to 1.40 mm. (0.055 in.)		0.38 mm (0.015 in.)	Passes
Source: ABIC Testing Laboratories, Inc.				

Test	Requirements	Method (para.)	Results	Comment
Effect on Cups, continued		S5.1.12		
70 hours @ 120°C (248°F)				
Hardness increase	None		None	Passes
Hardness decrease	Max. -15 IRHD		4	Passes
Base diameter increase	0.15 mm. (0.006 in.) to 1.40 mm. (0.055 in.)		0.56 mm (0.022 in)	Passes
Stroking Properties		S5.1.13		
85,000 Strokes @120°C (248°F)	**N/P			
Pitting or etching of metal parts discernible without magnification	None			
Change in initial diameter of any cylinder or piston	Max. 0.13 mm ((0.005 in.)			
Average lip diameter interference set of rubber cups	Max. 65%			
Average hardness decreases of rubber cups	-15 IRHD			
Number of rubber cups having a hardness decrease greater than 17 IRHD	Max. 1			
Operating conditions of rubber cups as evidenced by stickiness, blistering or sloughing	Satisfactory			
Fluid loss during any 24,000-stroke cycle	Max. 36 ml.			
Freezing or malfunction of cylinder pistons	None			
Fluid loss during 100 strokes at end of test	Max. 36 ml.			
Condition of fluid after test: evidence of gelling	None			
Source: ABIC Testing Laboratories, Inc.				

**N/P – Not Performed

Test	Requirements	Method (para.)	Results	Comment
Stroking Properties, continued		S5.1.13		
85,000 Strokes @120°C (248°F)				
Percent sediment in fluid drained from wheel cylinders and master cylinder	Max. 1.5%			
Increase in base diameter of rubber cups				
Wheel cylinder cups	Max. 0.90 mm. (0.035 in.)			
Master cylinder cups				
Primary	Max. 0.90 mm. (0.035 in.)			
Secondary	Max. 0.90 mm. (0.035 in.)			
Deposits formed or adhered to cylinders walls that are abrasive or cannot be removed with ethyl alcohol	None			
Color	Colorless to amber		Clear	Passes
Source: ABIC Testing Laboratories, Inc.				

**N/P – Not Performed

Discussion

The sample of DOT 4 tested meets all the requirements of the Federal Motor Vehicle Safety Standard 116 as published in the Federal Register and republished October 2019 for DOT 4 Motor Vehicle Brake Fluid.

Respectfully Submitted

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