

**RESULTS OF TESTS FOR CONFORMANCE WITH FEDERAL MOTOR VEHICLE
SAFETY STANDARD 116 FOR DOT 3 MOTOR VEHICLE BRAKE FLUID**

<u>Test</u>	<u>Requirements</u>	<u>Method (para.)</u>	<u>Results</u>	<u>Comment</u>
<u>Original Equilibrium Reflux Boiling Point</u>	Min. 205°C (401°F)	S5.1.1	261°C (502°F)	Passes
<u>Wet Equilibrium Reflux Boiling Point</u>	Min. 140°C (284°F)	S5.1.2	152°C (306°F)	Passes
<u>Viscosity</u>				
@ -40°C (-40°F)	Max. 1500 mm ² /s.	S5.1.3	1295 mm ² /s.	Passes
@ 100°C(212°F)	Min. 1.5 mm ² /s.	S5.1.3	2.0 mm ² /s.	Passes
<u>pH</u>	7-11.5	S5.1.4	9.4	Passes
<u>Brake Fluid Stability</u>		S5.1.5		
<u>High Temperature Stability Boiling Point Change</u>	Max. 3°C (5.4°F) + 0.05/1°F that original ERBP* exceeds 225°C (437°F)	S5.1.5.1	4°C (8°F)	Passes
<u>Chemical Stability Boiling Point Change</u>	Max. 3°C (5.4°F) + 0.05/1°F that original ERBP exceeds 225°C (437°F)	S5.1.5.2	1°C (2°F)	Passes
* ERBP: Equilibrium Reflux Boiling Point				
Source: ABIC Testing Laboratories, Inc.				

<u>Test</u>	<u>Requirements</u>	<u>Method (para.)</u>	<u>Results</u>	<u>Comment</u>
<u>Corrosion 120 ± 2 hours @ 100°C ± 2°C (212°F ± 3.6°F)</u>		S5.1.6		
Weight Change in mg./sq. cm.				
Tinned Iron	Max. 0.2		0.00	Passes
Steel	Max. 0.2		0.05	Passes
Aluminum	Max. 0.1		0.03	Passes
Cast Iron	Max. 0.2		0.08	Passes
Brass	Max. 0.4		0.01	Passes
Copper	Max. 0.4		0.01	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		9.0	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		-1 IRHD	Passes
Increase in base diameter of rubber cup	Max. 1.4 mm. (0.055 in.)		0.10 mm. (0.004 in.)	Passes
<u>Fluidity and Appearance at Low Temperatures</u>		S5.1.7		
144 hours ± 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				

<u>Test</u>	<u>Requirements</u>	<u>Method (para.)</u>	<u>Results</u>	<u>Comment</u>
<u>Fluidity and Appearance at Low Temperatures, continued</u>		S5.1.7		
144 hours \pm 4 hours @ $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($-40^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)				
Time for air bubble to top	Max. 10 seconds		1 Seconds	Passes
Appearance of sample after warming to room temperature	Same as before testing		Same as before testing	Passes
6 hours \pm 12 minutes @ $-50^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($-58^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)				
Stratification or sedimentation, sludging or crystallization	None		None	Passes
Time for air bubble to travel to top	Max. 35 seconds		4 Seconds	Passes
Appearance of sample after warming to room temperature	Same as before testing		Same as before testing	Passes
<u>Water Tolerance</u>		S5.1.9		
120 hours \pm 2 hours @ $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($-40^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)				
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 \pm 2 hours @ $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($140^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)				
Stratification	None		None	Passes
Sedimentation	0.15%		None	Passes
Source: ABIC Testing Laboratories, Inc.				

<u>Test</u>	<u>Requirements</u>	<u>Method (para.)</u>	<u>Results</u>	<u>Comment</u>
<u>Compatibility</u>		S5.1.10		
24 hours \pm 2 hours @ $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($-40^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)				
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 hours \pm 2 hours @ $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($140^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)				
Stratification	None		None	Passes
Sedimentation	0.05%		None	Passes
<u>Oxidation: 70 \pm 2 hours @ 23 \pm 5$^{\circ}\text{C}$ (73.4$^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$) then 168 \pm 2 hours @ 70 \pm 2$^{\circ}\text{C}$ (158$^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)</u>		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				
Weight Change in mg./sq. cm				
Aluminum	Max. 0.05		0.02	Passes
Cast Iron	Max. 0.3		0.03	Passes
<u>Effect on Cups</u>		S5.1.12		
70 hours \pm 2 hours @ 70 \pm 2 $^{\circ}\text{C}$ (158 \pm 3.6 $^{\circ}\text{F}$)				
Hardness increase	None		None	Passes
Hardness decrease	Max. -10 IRHD		-3 IRHD	Passes
Base diameter increase	0.15 mm. (0.006 in.) to 1.40 mm. (0.055 in.)		0.35 mm. (0.014 in.)	Passes
Source: ABIC Testing Laboratories, Inc				

<u>Test</u>	<u>Requirements</u>	<u>Method (para.)</u>	<u>Results</u>	<u>Comment</u>
<u>Effect on Cups, continued</u>		S5.1.12		
70 hours \pm 2 hours @ 120 \pm 2°C (248 \pm 3.6°F)				
Hardness increase	None		None	Passes
Hardness decrease	Max. -15 IRHD		-2 IRHD	Passes
Base diameter increase	0.15 mm. (0.006 in.) to 1.40 mm. (0.055 in.)		0.30 mm. (0.012 in.)	Passes
<u>Stroking Properties</u>		S5.1.13		
85,000 Strokes @ 120 \pm 5°C (248 \pm 9°F)				
Pitting or etching of metal parts discernible without magnification	None		None	Passes
Change in initial diameter of any cylinder or piston	Max. 0.13 mm (0.005 in.)		None	Passes
Average lip diameter interference set of rubber cups	Max. 65%		22%	Passes
Average hardness decrease of rubber cups	-15 IRHD		-2 IRHD	Passes
Number of rubber cups having a hardness decrease greater than 17 IRHD	Max. 1		None	Passes
Operating conditions of rubber cups as evidenced by stickiness, blistering or sloughing	Satisfactory		Satisfactory	Passes
Fluid loss during any 24,000 stroke cycle	Max. 36 ml.		16 ml.	Passes
Freezing or malfunction of cylinder pistons	None		None	Passes
Fluid loss during 100 strokes at end of test	Max. 36 ml.		7 ml.	Passes
Condition of fluid after test: evidence of gelling	None		None	Passes
Source: ABIC Testing Laboratories, Inc.				

<u>Test</u>	<u>Requirements</u>	<u>Method (para.)</u>	<u>Results</u>	<u>Comment</u>
<u>Stroking Properties, continued</u>		S5.1.13		
85,000 Strokes @ 120 ± 5°C (248 ± 9°F)				
Percent sediment in fluid drained from wheel cylinders and master cylinder	Max. 1.5%		<0.05%	Passes
Increase in base diameter of rubber cups				
Wheel cylinder cups	Max. 0.90 mm. (0.035 in.)		0.53 mm (0.021 in.)	Passes
Master cylinder cups				
Primary	Max. 0.90 mm. (0.035 in.)		0.53 mm. (0.021 in.)	Passes
Secondary	Max. 0.90 mm. (0.035 in.)		0.53 mm. (0.021 in.)	Passes
Deposits formed or adhered to cylinders walls that are abrasive or cannot be removed with ethyl alcohol	None		None	Passes
<u>Color</u>	Colorless to amber		Amber	Passes
Source: ABIC Testing Laboratories, Inc.				