



### ***AISIN Fully Synthetic Brake Fluid***

*PREMIUM QUALITY AUTOMOTIVE BRAKE FLUID (DOT-4)*

#### **DESCRIPTION**

Non-petroleum, automotive brake fluid designed for use in conventional hydraulic brake and clutch systems under moderate service conditions.

#### **PERFORMANCE STANDARD**

Meets or exceeds U.S. Federal Motor Vehicle Safety Standard(FMVSS) No. 116 DOT 3, SAE J1703 JUN91 AND ISO 4925 Specifications.

#### **CUSTOMER BENEFITS**

- Ensures good brake response under non-severe service conditions.
- Provides long fluid service life through good chemical stability.
- Minimizes leakage by providing the correct seal swell and lubrication characteristics.

#### **TYPICAL CHARACTERISTICS**

- Limits for some of the important physical and chemical properties stipulated in the FMVSS No.116 DOT 4 specification are shown in the following table. Brake Fluid SHD meets or exceeds these DOT 3 limits.

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### APPLICATIONS

- Recommended for hydraulically-operated motor vehicle brake systems of both drum and disc types requiring a DOT 4 fluid, operating under moderate service conditions. Also for make-up or service refill of systems requiring DOT-4 or SAE J1703 fluid.
- Not suitable for vehicles operating in service conditions or where a DOT 3 fluid is specified.
- Not to be used where DOT 5 fluids are recommended, or in brake systems designed for use of silicone or mineral oil-based fluids.

### KEY PROPERTIES

Synthetic	Equilibrium Reflux Boiling Pt., °C	pH	Kinematic Viscosity, mm <sup>2</sup> /s @-40°C	Kinematic Viscosity, mm <sup>2</sup> /s @100°C	Wet Equilibrium Reflux Boiling Pt., °C
Fully Synthetic	256	8.89	1,090	2.2	160

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### AISIN PREMIUM QUALITY AUTOMOTIVE BRAKE FLUID DOT-4

#### Heavy Duty Brake Fluid, DOT 4

TEST ITEM			SPECIFICATION	RESULT	
Boiling point, °C			235 min	259	
Wet boiling point, °C			140 min	163	
Flash point, °C			100 min	140	
Kinematic viscosity cSt mm <sup>2</sup> /s	-40°C		1500 max	1085	
	100°C		1.5 min	2.2	
pH value			7.0 to 11.5	8.84	
Stability	High temperature stability (185±2°C, 120±5min)		(1) When boiling point is 225°C or less , change of boiling point shall be within 3°C (2) When boiling point is 225°C or more, change of boiling point shall be within [3+0.05×(boiling point-225)]°C	2	
	Chemical stability		(1) When boiling point is 225°C or less, change of boiling point shall be within 2°C (2) When boiling point is 225°C or more, change of boiling point shall be within [2+0.05×(boiling point-225)]°C	2	
Metal corrosion behavior 100±2°C 120±2h	Condition of metal test piece	Change of mass (mg/cm <sup>2</sup> )	Tinplate	± 0.2	-0.01
			Steel	± 0.2	-0.02
			Aluminum	± 0.1	0.02
			Cast iron	± 0.2	-0.03
			Brass	± 0.4	-0.09
			Copper	± 0.4	-0.12

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		Zinc	± 0.4	-0.05
		Appearance	There shall be no corroded surface at the extent recognizable by naked eye. Stain or discoloration, however, is allowable.	pass
	Condition of rubber cup	Increase of base diameter, mm	1.4 max.	0.2
		Change of hardness, Hs	0 to - 15	-3
		Increase of volume, %	16 max.	8
	Properties of fluid	Appearance	On the shape and surface condition of rubber cup, remarkable change shall be not recognized.	pass
		Appearance	It shall not be jellied at room temperature. Also, there shall be no formation of crystalline materials.	pass
		Precipitated quantity v/v, %	0.10 max.	0.02
		pH value	7.0 to 11.5	8.63

TEST ITEM		SPECIFICATION	RESULT
Cold Resistance	-40±2°C 144±4h	Appearance	Through test tube, voundary line of hiding-chart shall be distinguishable clearly. Also, separation and precipitation shall not be recognized.
		Time until the air bubbles reach Fluid	10 max. 3.25

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		level (sec)		
	-50±2°C 6h±12min	Appearance	Through test tube, voundary line of hiding-chart shall be distinguishable clearly. Also, separation and precipitation shall not be recognized.	Pass
		Time until the air bubbles reach Fluid level (sec)	35 max.	10.5
Evaporative Property 100±2°C	Evaporation Loss		80 max.	67
	Appearance of Residu	Appearance (23±5°C)	There shall be no coarse sandy and abrasive precipitates.	pass
		Cold Fluidity of Reside	5 mm or more within 5 sec.	Pass
Water Resistant Property	-40±2°C 22±2h	Appearance	Through test tube, voundary line of hiding-chart shall be distinguishable clearly. Also, separation and precipitation shall not be recognized.	Pass
		Time until the air bubbles reach Fluid level (sec)	10 max.	2.5
	60±2°C 22±2h	Appearance	There shall be no separation	pass
		Precipitation v/v %	0.05 max.	0.01
	Mixing property	-40±2°C 22±2h		Through test tube, boundary line of hiding-chart shall be distinguishable clearly. Also, separation and precipitation shall not be recognized.
60±2°C 22±2h			Separation shall not be recognized, precipitate shall be not more than 0.05v/v % after centrifugal separation.	Pass 0.02

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Anti-oxidization property	Change of mass, mg/cm <sup>2</sup>	Aluminium	± 0.05	-0.02
		Cast iron	± 0.3	-0.03
	Appearance		Other than contact part with tin foil, there shall be no corroded surface at the extent recognizable by naked eye. Stain and discoloration, however are allowable. Also, on the surface other than contact part with tin foil, rubber like substances shall not be adhered.	Pass

TEST ITEM		SPECIFICATION	RESULT	
Rubber swelling property	SBR rubber cup 70±2°C 70±2h	Increase of base diameter, mm	0.15 to 1.40	0.30
		Change of hardness Hs	0 to - 10	-3
		Increase of volume, %	1 to 16	3.8
		Appearance	On the shape and surface condition of rubber cup, remarkable change shall not be recognized.	pass
	EPDM rubber cup 70±2°C 70±2h	Change of hardness HS	0 to -10	-2
		Increase of volume, %	0 to 10	3.0
		Appearance	On the shape and surface condition of rubber cup, remarkable change shall not be recognized.	pass
	SBR rubber cup 120±2°C	Increase of base diameter, mm	0.15 to 1.40	0.45
		Change of hardness	0 to -15	-5.0

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	70±2h	Hs		
		Increase of volume, %	1 to 16	6.8
		Appearance	On the shape and surface condition of rubber cup, remarkable change shall not be recognized.	pass
	EPDM 120±2°C 70±2h	Change of hardness HS	0 to -15	-3
		Increase of volume, %	0 to 10	3.65
		Appearance	On the shape and surface condition of rubber cup, remarkable change shall not be recognized.	pass
Stroking per- formance 85000 strokes 120±5°C 70.0±3.5 kg f/cm <sup>2</sup> (6.86± 0.34 MPa)	Condition of metal part		Metal part shall have no corroded surface at the extent recognizable by naked eye.	pass
	Change of diameter of cylinder and piston, mm		0.13 max.	0.01
	Condition of rubber cup	Increase of base diameter, mm	0.90 max.	0.35
		Change of hardness Hs	0 to - 15 Provided that, there shall not be 2 or more changes of - 17 or more.	-6.0
		Appearance	On rubber cup, scuffing, fissure, swell, scoring and deformation which will become the cause of abnormality in working condition shall not be recognized adhesion.	Pass
		Variation rate of interference of lip diameter of rubber cup, %		65 max.
	Loss of fluid during arbitrary 24000 strokes, ml		36 max.	19

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TEST ITEM		SPECIFICATION	RESULT	
Stroking per- formance 85000 strokes 120±5°C 70.0±3.5 kg f/cm <sup>2</sup> (6.86± 0.34 MPa)	Working condition of cylinder and piston	There shall be no sticking or inferior working of cylinder and piston.	pass	
	Loss of fluid when worked with 100 strokes in addition, ml	36 max.	5	
	Condition of fluid after test	Condition of fluid	Sludge, gellitized substance, granular sandy and abrasive substances which will cause to be recognized the abnormality in working condition shall not be recognized.	pass
		Precipitation v/v %	1.5 max.	0.02
	Sticked substance on metal part	It shall not be rubbery and abrasive, and be able to wipe away easily with cloth moistented with ethanol.	Pass	

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