RYNA GROUP

Brake Fluid

Technical Data sheet (TDS)

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R-AO-BF.04
DOT 3.0, 4.0, 4.0 Plus and 5.1

Corrosion and **Oxidation** inhibitor for glycol and glycol ethers brake fluids
Such as DOT 3.0, DOT 4.0, DOT 4.0 plus and DOT 5.1

DESCRIPTION

R-AO-BF.04 is an advanced inhibitor to produce any glycol and glycol ethers-based brake fluid. This brake fluid can be made with R-AO-BF.04 as an anti-corrosion and anti-oxidation inhibitor additive.R-AO-BF.04 enhanced high temperature **oxidation** stability resists the effects of oxidising agents and thermal stress. Reduces deposit or reside formation and extends life of brake fluid.

BENEFITS OF R-AO-BF.04 INHIBITOR

- **Resistance to Oxidation** and Thermal Degradation
- Designed and formulated to exceed industry standards
- Protect against boiling and freezing
- Low pour point
- Provide industry-leading corrosion resistance
- Ensure the best performance for equipment
- Easy to handle in production and blending processes

DOSAGE

Based on your formulation, you can add R-AO-BF.04 to the proper base stock (i.e., Glycol, glycol ethers, and boric esters) to meet the requirements of S5.1.6 (Corrosion) -F.M.V.S.S. N°116

Brake Fluid DOT 3.0	4%
Brake Fluid DOT 4.0	4%
Brake Fluid DOT 4.0 plus	4%
Brake Fluid DOT 5.1	4%

Oxidation resistance

Property	unit	test specification	Test Result
Appearance of metal strips	---	None Roughness or corrosion and Gum-like deposits observed	pass
Changing the weight of metal strips - aluminum	ml/cm2	max ±0.05	-0.032
Changing the weight of metal strips - Cast iron	ml/cm2	max ±0.3	+0.012

TYPICAL CHEMICAL AND PHYSICAL PROPERTIES

Property	Unit	Value	Test Method
Appearance	---	Liquid	Visual
Color (Pt-Co)	---	Max. 200	ASTM D1209
Pour Point	---	< -30 °C	
Density (20/4 °C -g/cm³)	°C	1.086	ASTM D891/A
PH	---	8.20	ASTM D1287 (2% in DEG)

TYPICAL CHARACTERISTICS OF BRAKE FLUIDS BASE OF R-AO-BF.04

	BF DOT 3.0	BF DOT 4.0	BF DOT 5.1	F.M.V.S.S. N°116 Spec. Limits
Treat level	4%	4%	4%	
Appearance	Clear	Clear	Clear	Clear
PH	9.3	9.4		7.0 – 11.5
	Corrosion Test (Weight Loss mg/m²)			
Copper	0.0004	0.0		Max. 0.4
Tinned Iron	0.0001	0.0		Max. 0.2
Tin	0.0001	0.0		Max. 0.4
Steel	0.0005	0.0		Max. 0.4
Brass	0.0003	0.0		Max. 0.2
Cast Iron	0.0009	0.0		Max. 0.2
Aluminum	0.0001	0.0001		Max. 0.1
Final PH	7.89	7.90		7.0 – 11.5

R-AO-BF.07
DOT 3.0, 4.0, 4.0 Plus and 5.1

Corrosion and **Oxidation** inhibitor for glycol and glycol ethers brake fluids
Such as DOT 3.0, DOT 4.0, DOT 4.0 plus and DOT 5.1

DESCRIPTION

R-AO-BF.07 is an advanced inhibitor to produce any glycol and glycol ethers-based brake fluid. This brake fluid can be made with R-AO-BF.07 as an anti-corrosion and anti-oxidation inhibitor additive.R-AO-BF.07 enhanced high temperature **oxidation** stability resists the effects of **oxidising agents** and thermal stress. Reduces deposit or reside formation and extends life of brake fluid.

BENEFITS OF R-AO-BF.07 INHIBITOR

- **Resistance to Oxidation** and Thermal Degradation
- Designed and formulated to exceed industry standards
- Protect against boiling and freezing
- Low pour point
- Provide industry-leading corrosion resistance
- Ensure the best performance for equipment
- Easy to handle in production and blending processes

DOSAGE

Based on your formulation, you can add R-AO-BF.07 to the proper base stock (i.e., Glycol, glycol ethers, and boric esters) to meet the requirements of S5.1.6 (Corrosion) -F.M.V.S.S. N°116

Brake Fluid DOT 3.0	7%
Brake Fluid DOT 4.0	7%
Brake Fluid DOT 4.0 plus	7%
Brake Fluid DOT 5.1	7%

Oxidation resistance

Property	unit	test specification	Test Result
Appearance of metal strips	---	None Roughness or corrosion and Gum-like deposits observed	pass
Changing the weight of metal strips - aluminum	ml/cm2	max ±0.05	-0.032
Changing the weight of metal strips - Cast iron	ml/cm2	max ±0.3	+0.012

TYPICAL CHEMICAL AND PHYSICAL PROPERTIES

Property	Unit	Value	Test Method
Appearance	---	Liquid	Visual
Color (Pt-Co)	---	Max. 200	ASTM D1209
Pour Point	---	< -30 °C	
Density (20/4 °C -g/cm³)	°C	1.086	ASTM D891/A
PH	---	8.20	ASTM D1287 (2% in DEG)

TYPICAL CHARACTERISTICS OF BRAKE FLUIDS BASE OF R-AO-BF.07

	BF DOT 3.0	BF DOT 4.0	BF DOT 5.1	F.M.V.S.S. N°116 Spec. Limits
Treat level	7%	7%	7%	
Appearance	Clear	Clear	Clear	Clear
PH	9.3	9.4		7.0 – 11.5
	Corrosion Test (Weight Loss mg/m²)			
Copper	0.0004	0.0		Max. 0.4
Tinned Iron	0.0001	0.0		Max. 0.2
Tin	0.0001	0.0		Max. 0.4
Steel	0.0005	0.0		Max. 0.4
Brass	0.0003	0.0		Max. 0.2
Cast Iron	0.0009	0.0		Max. 0.2
Aluminum	0.0001	0.0001		Max. 0.1
Final PH	7.89	7.90		7.0 – 11.5

TECHICAL DATA SHEET BRAKE FLUID DOT 3, 4, 4plus, 5.1

PRODUCT PERFORMANCE REQUIREMENTS

Test description	Requirements	Test methods	Result
Appearance	Homogenous transparent liquid from clear to amber, without sediment and visual mechanical impurities	Visual	Ok
Kinematic viscosity, mm2/s, at: minus (40 ± 0,25) ºC, max plus (100,0 ± 0,1) ºC, min	1500 1,5	ISO 4925:2020 subclause 6.1	1063.5 2.25
Equilibrium reflux boiling point (ERBP) Wet ERBP	230 155	ISO 4925:2020 subclause 6.2 ISO 4925:2020 subclause 6.2.6	246 172
pH	7,0 – 11,5	ISO 4925:2020 subclause 6.3	8.97
Fluid Stability: High temperature Stability, ºC, max	5	ISO 4925:2020 subclause 6.4.1	3
Metal Corrosion		SAE J1704 subclause 5.6	
Wet corrosion Metal strip characteristics after test, weight		SAE J1704 subclause 5.6.1 SAE J1704 subclause 5.6.2	
change, mg/cm², max:			
Tinned iron	±0,2		-0.042 -0.022
Aluminum	±0,1		
Cast iron	±0,2		-0.013
Steel	±0,2		-0.004
Copper	±0,4		-0.195
Brass	±0,4		-0.140
Appearance	No Pitting or roughness outside contact area		ok
Staining and discoloration	Permitted		ok
Liquid characteristics after test:			
Appearance	No gel, none adhering crystals		ok
pH Value	7,0 – 11,5		7.98

TECHICAL DATA SHEET BRAKE FLUID DOT 3, 4, 4plus, 5.1

PRODUCT PERFORMANCE REQUIREMENTS

Test description	Requirements	Test methods	Result
Fluidity and appearance at low temperatures: At -40ºC for 24 h:	Clear and homogeneous 10	ISO 4925:2020 subclause 6.6 ISO 4925:2020 subclause 6.6.1	ok
Aspect	Absence	ISO 4925:2020 subclause 6.6.2	ok
Bubble flow time, s, max			5
Sediments			
At 60ºC for 24 h: Aspect	Clear and homogeneous 35		
Bubble flow time, s, max	Absence		ok
Sediments			
Effect on rubber: Specimen 7-2462:		ISO 4925:2020 subclause 6.10	
(at plus (70±2) ºC within (72±2) hrs			
-Volume change, %, max	0 – plus 10		0.67
-hardness change, Shor A within	minus 10 - 0		7.7
Specimen 51-1524:			
(at plus (125±2) ºC within (72±2) hrs			0.71
-Volume change, %, max	0 – plus 10		
-hardness change, Shor A within	minus 15 - 0 No tackiness		4.8
Appearance after testing	and flaking		
Water content, %, max	0,15	ASTM E 1064-12	0.08
Density at 20 °C, g/cm3	to be reported	ASTM D1122	1.04