



REPORT
INTERTEK TESTING SERVICES
1717 Arlingate Lane COLUMBUS, OHIO 43228

ORDER NO.: 3118569COL-001

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DATE: April 23, 2007

REPORT NO. 3118569COL-001

RENDERED TO:

AutoICE
3583 Rio Jo Way
Rancho Cordova, CA 95670

STANDARD AND TEST USED: SAE J2670, Stability and Compatibility Criteria for Additives and Flushing Materials Intended for Use in Vehicle Air-Conditioning Systems Using R-134a (Proposed Draft).

AUTHORIZATION: The test was authorized by Mr. Jason Bruecker.

SPECIMEN DESCRIPTION: The tests were performed on specimen identified by the client as Ice Cold. The samples arrived in good condition. The sample has been retained until further notice from customer.

CONCLUSION: This report describes the results of Auto Ice sample in accordance with SAE J2670. The test evaluations were conducted at Intertek Testing Services located in Columbus, OH between 3/15/07 and 4/16/07. See Appendix A, B, C, and D for reported data.

Test Performed by:

Report Approved by:

Aaron Payne
Chemist
Analytical Laboratory

John Senediak
Lab Manager
Analytical Laboratory

Subject: **An independent organization testing for safety, performance, and certification.**

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Appendix A

Stability Testing

Results, Physical Properties

Tube ID	Refrigerant	Lubricant	Additive	Total Acid Number (mgKOH/g)			Refrigerant Decomposition (% by weight)			Dissolved Copper (ppm)			Dissolved Aluminum (ppm)			Dissolved Iron (ppm)		
Control	99% 134a 1% R-12	¾ PAG ¼ Mineral Oil	Blank	.05	.06	.05	<.05	<.05	<.05	2	1	2	<1	<1	<1	2	2	2
Ice Cold	99% 134a 1% R-12	¾ PAG ¼ Mineral Oil	Ice Cold	.05	.05	.04	<.05	<.05	<.05	2	2	2	<1	<1	<1	2	2	2

Results, Visual Inspections

Tube ID	Refrigerant	Lubricant	Additive	Visual Inspection, liquid phase			Visual Inspection, Copper			Visual Inspection, Steel			Visual Inspection, Aluminum			Particles/Precipitates/ Insolubles					
Control	99% 134a 1% R-12	¾ PAG ¼ Mineral Oil	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	None	None	None
Ice Cold	99% 134a 1% R-12	¾ PAG ¼ Mineral Oil	Ice Cold	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	None	None	None

Liquid Phase Visual Inspection Legend

▪0 = No change ▪1a = Slight darkening ▪1b = Cloudy 1a ▪2a = Moderate darkening ▪2b = Cloudy 2a
 ▪3a = Extreme darkening ▪3b = Cloudy 3a ▪4a = Opaque

Steel Coupon Visual Inspection Legend

▪0 = No change ▪1 = Slight darkening ▪2 = Slight discoloration ▪3 = Moderate copper plating ▪4 = Heavy copper plating

Copper and Aluminum Visual Inspection Legend

▪0 = No change ▪1 = Slight tarnish ▪2 = Slight corrosion ▪3 = Moderate corrosion ▪4 = Heavy corrosion

The above samples **comply** with the following acceptance criteria:

1. The presence of the additive or flushing agent shall not cause an increase of refrigerant and/or lubricant decomposition when compared to the neat samples via rank order analysis* of total acid increases.
2. The presence of the additive or flushing agent shall not cause an increase of corrosion or copper plating of the tested metal coupons when compared to those tested in the neat samples via rank order analysis*.
3. The presence of the additive or flushing agent shall not cause an increase in particle, precipitates, or insolubles in the sealed tubes when compared to those tested in the neat samples via rank order analysis*.

***Rank order analysis** is defined as ordering both the three control groups' and the three samples' numeric results. A test failure is defined as a total separation of the numeric results of the sample and control groups where the sample's results negatively affected the desirable properties of the flushing agent or process fluid. A pass test is defined as having overlapping sets of numeric results of the sample and control groups, or a total separation of the numeric results of the sample and the control groups where the samples' results positively affected the desirable properties of the flushing agent or process fluid.

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Appendix B

Nonmetallic Materials Compatibility

Tube ID	Refrigerant	Lubricant	Additive	Visual Inspection, liquid phase	Particles/Precipitates/ Insolubles		
Control	134a	¾ PAG ¼ Mineral Oil	Blank	0	None	None	None
Ice Cold	134a	¾ PAG ¼ Mineral Oil	Ice Cold	0	None	None	None

Physical Properties

Control

	PTFE Skived Sheet*			Nylon 66*			Polyester*			HBNR O-ring**			Neoprene WRT O-ring**			NBR O-ring**			EPDM O-ring**		
Hardness	100	99	100	100	100	100	98	99	99	76	73	75	69	76	76	74	74	73	74	75	74
Volume (in cm³)	.81	.82	.79	.83	.84	.83	.85	.86	.86	.85	.85	.86	.85	.87	.86	.82	.84	.83	.85	.85	.85

*Shore Durometer D
**Shore Durometer A

Ice Cold Sample

	PTFE Skived Sheet*			Nylon 66*			Polyester*			HBNR O-ring**			Neoprene WRT O-ring**			NBR O-ring**			EPDM O-ring**		
Hardness	99	99	99	100	100	100	100	99	99	75	75	77	76	76	74	74	73	73	75	76	76
Volume (in cm³)	.81	.80	.79	.82	.83	.83	.86	.86	.85	.84	.85	.86	.87	.85	.85	.83	.82	.82	.85	.83	.81

*Shore Durometer D
**Shore Durometer A

The above samples **comply** with the following acceptance criteria:

1. The presence of the additive or flushing agent shall not cause an increase or decrease in hardness when compared to those tested in the neat oil via rank order analysis*.
2. The presence of the additive or flushing agent shall not cause an increase in particles, precipitates, or insolubles in the sealed tubes when compared to those tested in the neat oil via rank order analysis*.
3. The presence of the additive or flushing agent shall not cause an increase or decrease in volume when compared to those tested in the neat oil via rank order analysis*.

***Rank order analysis** is defined as ordering both the three control groups' and the three samples' numeric results. A test failure is defined as a total separation of the numeric results of the sample and control groups where the sample's results negatively affected the desirable properties of the flushing agent or process fluid. A pass test is defined as having overlapping sets of numeric results of the sample and control groups, or a total separation of the numeric results of the sample and the control groups where the samples' results positively affected the desirable properties of the flushing agent or process fluid.

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Appendix C

Viscosity Testing

Tube ID	Lubricant	Additive	Viscosity @ 40°C			Viscosity @ 100°C		
Control	¾ PAG ¼ Mineral Oil	N/A	92.55	92.61	92.18	9.58	9.42	9.45
			92.45			9.49		
Ice Cold	¾ PAG ¼ Mineral Oil	Ice Cold	92.41	92.51	92.38	9.38	9.25	9.33
			92.43			9.32		
		% Difference	<1			1.79		

The above samples **comply** with the following acceptance criteria:

1. The presence of the additive or flushing agent shall not cause a change of kinematic viscosity more than 5% when compared to the neat sample.

Appendix D

Wear Testing, Falex

Tube ID	Refrigerant	Lubricant	Additive	Run	Pin weight loss (grams)	V-Block Wear Scarring (microscopically)
Control	R-134a	PAG	None	1	0.1025	Minimal
				2	0.1170	Minimal
				3	0.0885	Minimal
Ice Cold	R-134a	PAG	Ice Cold	1	0.0561	Minimal
				2	0.0463	Minimal
				3	0.0590	Minimal

The above samples **comply** with the following acceptance criteria:

1. The presence of the additive or flushing agent shall not cause an increase in pin weight loss when compared to the neat samples via rank order analysis.
2. The presence of the additive or flushing agent shall not cause an increase of block wear scar measured microscopically, when compared to the neat samples via rank order analysis

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