



REPORT
INTERTEK TESTING SERVICES
1717 Arlingate Lane COLUMBUS, OHIO 43228

ORDER NO.: 3087670(revised)

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DATE: January 6, 2005

REPORT NO. 3087670(revised)

RENDERED TO:

MJRD-ICE 32 Division
5607 Candlewood Drive
Houston, TX 77056

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. John Blalock; Purchase Order No. JBLALOCK.

SPECIMEN DESCRIPTION: The tests were performed on specimen identified by the client as Sample ICE32 enhancing additive, GM 12345923 PAG Refrigeration Oil, and AC Delco Mineral Oil (525 Viscosity).

CONCLUSION: This report describes the results of the sample lubricants and ICE 32 additive in accordance with SAE J2670. The test evaluations were conducted at Intertek Testing Services located in Columbus, OH between 11/16/05 and 12/16/05.

See Appendix A, B, C, and D for reported data.

Test Performed by:

Aaron Payne
Chemist
Analytical Laboratory

Report Approved by:

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	Total Acid Number (mgKOH/g)			Refrigerant Decomposition (% by weight)			Dissolved Copper (ppm)			Dissolved Aluminum (ppm)			Dissolved Iron (ppm)		
Control	99% 134a 1% R-12	¼ PAG ¼ Mineral Oil	.04	.02	.03	<.05	<.05	<.05	2	1	1	<1	<1	<1	2	1	1
Sample	99% 134a 1% R-12	¼ PAG ¼ Mineral Oil	.02	.02	.02	<.05	<.05	<.05	1	1	1	<1	<1	<1	1	1	1

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	¼ PAG ¼ Mineral Oil	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	None	None	None
Sample	99% 134a 1% R-12	¼ PAG ¼ Mineral Oil	ICE32	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	½ PAG ½ Mineral Oil	Blank	0	None	None	None
Sample	134a	½ PAG ½ Mineral Oil	ICE 32 (80/20 mix)	0	None	None	None

Physical Properties

Control

Material	PTFE Skived Sheet*			Nylon 66*			Polyester*			HBNR O-ring**			Neoprene WRT O-ring**			NBR O-ring**		
	90	91	91	91	87	88	66	66	67	73	69	72	80	80	80	71	70	69
Hardness	90	91	91	91	87	88	66	66	67	73	69	72	80	80	80	71	70	69
Volume (in cm ³)	.25	.27	.28	.31	.30	.31	.28	.29	.28	.40	.41	.42	.40	.43	.44	.41	.41	.40

*Shore Durometer D

**Shore Durometer A

Sample

Material	PTFE Skived Sheet*			Nylon 66*			Polyester*			HBNR O-ring**			Neoprene WRT O-ring**			NBR O-ring**		
	90	89	89	88	87	88	66	66	65	71	70	72	80	79	80	70	70	70
Hardness	90	89	89	88	87	88	66	66	65	71	70	72	80	79	80	70	70	70
Volume (in cm ³)	.25	.24	.25	.30	.30	.29	.28	.27	.27	.40	.40	.41	.40	.41	.42	.41	.40	.40

*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 seal 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	¼ PAG ¼ Mineral Oil	N/A	129.0	129.6	129.6	24.8	24.8	24.6
			129.4			24.7		
Sample (double concentration)	¼ PAG ¼ Mineral Oil	ICE 32 (80/20 mix)	131.0	130.8	131.1	24.8	24.8	24.8
			130.9			24.8		
		% Difference	1.15%			0.4%		

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.

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