



REPORT
INTERTEK-ETL SEMKO Division
1717 Arlingate Lane COLUMBUS, OHIO 43228

ORDER NO.: 3172187COL-001

Page 1 of 4

DATE: March 18, 2009

REPORT NO. 3172187COL-001

STANDARD AND TEST USED: ASHRAE 97 "Sealed Glass Tube Method to Test

Material for use within Refrigeration Systems".

Modified SAE J2670, "Stability and Compatibility Criteria for Additives and Flushing Materials Intended for Use in Vehicle Air-Conditioning Systems Using R-134a".

Modification: R-22 was used in place of R-134a.

AUTHORIZATION: The test was authorized by Hector Tomagosa.

SPECIMEN DESCRIPTION: The tests were performed on specimen identified as REFRESH Refrigeration Treatment. Sample is identified by Intertek tracking number 010961372. Sample arrived on 1/28/09, in good condition.

CONCLUSION: This report describes the results of REFRESH sample in accordance with ASHRAE 97. The test evaluations were conducted at Intertek Testing Services located in Columbus, OH between 2/9/09 and 3/9/09.

See Appendix A for SAE J2670 results.

See Appendix B for ASHRAE 97 results.

See Appendix C for Calibrated Equipment.

Test Performed by:

Aaron Payne
Chemist
Analytical Laboratory

Report Approved by:

John Senediak
Lab Manager
Analytical Laboratory

Subject:

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Appendix A

Physical Properties, hardness

	PTFE Skived Sheet*			Nylon 66*			Polyester*			HBNR O-ring**			Neoprene WRT O-ring**			NBR O-ring**			EPDM O-ring**		
Control	100	99	100	100	100	100	98	99	99	76	73	75	69	76	76	74	74	73	75	75	74
RES	99	99	99	100	100	100	100	99	99	75	75	77	76	76	74	74	73	73	74	74	75

*Shore Durometer D

**Shore Durometer A

Physical Properties, volume

	PTFE Skived Sheet*			Nylon 66*			Polyester*			HBNR O-ring**			Neoprene WRT O-ring**			NBR O-ring**			EPDM O-ring**		
Control	.81	.82	.79	.83	.84	.83	.85	.86	.86	.85	.85	.86	.85	.87	.86	.82	.84	.83	.85	.82	.84
RES	.81	.80	.79	.82	.83	.83	.86	.86	.85	.84	.85	.86	.87	.85	.85	.83	.82	.82	.82	.85	.85

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 B**Results, Physical Properties**

Tube ID	Refrigerant	Lubricant	Additive	Total Acid Number (mgKOH/g)	Refrig. Decomp. (% by weight)	Dissolved Copper (ppm)	Dissolved Aluminum (ppm)	Dissolved Iron (ppm)
Test	R-22	Mineral Oil	REFRESH AC	0.03	0.10	2	<1	2
Control	R-22	Mineral Oil	N/A	<0.01	0.07	<1	<1	<1

Results, Visual Inspections

Tube ID	Refrigerant	Lubricant	Additive	Visual Inspection, liquid phase	Visual Inspection, Copper	Visual Inspection, Aluminum	Visual Inspection, Steel
Test	R-22	Mineral Oil	REFRESH AC	0	0	0	0
Control	R-22	Mineral Oil	N/A	0	0	0	0

Liquid Phase Visual Inspection Legend

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

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Appendix C**Calibrated Equipment**

Equipment	Calibration Number	Calibration Due Date	Test/Procedure	Measurement of Uncertainty (at 95%)
Digital Thermometer	CE1102	07/09	Verify ovens temperature.	.03%
Gas Chromatograph	CE1100	Weekly	Refrigerant Decomposition testing	10% of result + .05%
ml syringe	N/A	For reference only	Adding lubricant to sealed tubes	For reference only
Burette	CE1030	2/10	Total Acid Number testing	10% of result + 0.2 mg/kg
Inductively Coupled Plasma Atomic Emissions Spectrometer	N/A	Daily	Wear metal testing	10% of result + 1ppm
U-type manometer	CE1033	For reference only	Adding refrigerant to sealed tubes	For reference only
Analytical Balance	CE1017	08/09	Determining mass of U-tube during testing	+/-1%

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