

# **ABIC TESTING LABORATORIES, INC.**

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To: OOO "Tosol-Sintez" June 24, 2009  
Mr. Stanislav Klikoduev

From: Leonard Mackowiak

Subject: Specification Testing-ASTM D-3306  
Project No 5290-02a

## **Introduction**

ABIC Testing Laboratories, Inc. was authorized to test the following samples of engine coolant for conformance to the ASTM D-3306 standard titled "Standard Specification for Ethylene Glycol Based Engine Coolant for Automotive and Light Duty Service".

- Felix Carbox G12
- Felix Carbox G12 (SQ)

The coolants were tested as received. This report shows the test results.

## **Results**

Our results are shown in Exhibit I and Exhibit II attached

## **Discussion**

The sample of Felix Carbox G12 engine coolant and Felix Carbox G12 (SQ) meets all the requirements of the ASTM D-3306 standard titled "Standard Specification for Ethylene Glycol Based Engine Coolant for Automotive and Light Duty Service".



Respectfully submitted

Leonard Mackowiak  
Vice President

**Division of ABIC INTERNATIONAL CONSULTANTS, INC.**

**Exhibit I  
OOO "Tosol-Sintez"**

**Test Results, Standard Specification for Ethylene Glycol Based Engine Coolant for Automotive and Light Duty Service". ASTM D-3306**

**Product Identification: Felix Carbox G12**

<u>Test</u>	<u>Requirement</u>	<u>Results</u>	<u>Comments</u>	<u>Test Method</u>
<u>Specific Gravity</u>	1.110 to 1.145	1.130	Passes	ASTM D-1122
<u>@ 15.5°C</u>				
<u>Freezing Point 50 % Volume</u>	min. -37 °C (-34 °F)	-38 °C (-36 °F)	Passes	ASTM D-1177
<u>Boiling Point</u>				
Undiluted	min. 163 °C (325 °F)	177 °C (350 °F)	Passes	ASTM D-1120
Diluted 50% Volume	min. 107.6 °C (226 °F)	107.6 °C (226 °F)	Passes	ASTM D-1120
<u>Effect on Automotive Finish</u>	No Effect	No Effect	Passes	ASTM D-1882
<u>Ash Content</u>	max. 5 %	1.9 %	Passes	ASTM D-1119
<u>pH 50 % Volume</u>	7.5 to 11.0	9.0	Passes	ASTM D-1287
<u>Chloride Content</u>	max 25 ppm	6 ppm	Passes	ASTM D-3634
<u>Water Content %</u>	max. 5 %	2.4 %	Passes	ASTM D-1123
<u>Reserve Alkalinity ml</u>	Information only	9.0 ml	Information	ASTM D-1121
<u>Corrosion in Glassware</u>				ASTM D-1384
Weight Loss,				
• Copper	max.10 mg/specimen	7.6 mg.*	Passes	
• Solder	max 30 mg/specimen	1.3 mg*	Passes	
• Brass	max 10 mg/specimen	3.2 mg*.	Passes	
• Steel	max 10 mg/specimen	3.5 mg*.	Passes	
• Cast Iron	max 10 mg/specimen	7.3 mg*.	Passes	
• Aluminum	max 30 mg/specimen	6.0 mg*.	Passes	

\*Average of triplicate samples

Source: ABIC Testing Laboratories, Inc.

**Exhibit I, continued  
OOO "Tosol-Sintez"**

**Test Results, Standard Specification for Ethylene Glycol Based Engine Coolant for Automotive and Light Duty Service". ASTM D-3306**

**Product Identification: Felix Carbox G12**

<u>Test</u>	<u>Requirement</u>	<u>Results</u>	<u>Comments</u>	<u>Test Method</u>
<b><u>Foaming</u></b>				
Volume	max. 150 ml	95 ml	Passes	ASTM D-2809
Break Time	max 5 sec.	3 sec.	Passes	

**Corrosion of Cast Aluminum Alloys at Heat Rejection**

ASTM D-4340

Weight Change, mg/cm <sup>2</sup> / week	1.0 mg/cm <sup>2</sup> / week	0.2 mg/cm <sup>2</sup> / week*	Passes
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\* Average of duplicate samples

Specimen Color	Information Only	Light Gray	Information Only
pH Used Solution	Information Only	7.6	Information Only
Used Solution Clarity	Information Only	Transparent	Information Only

**Simulated Service Performance**

ASTM D-2570

Weight Loss,				
• Copper	max.20 mg/specimen	8.6 mg*	Passes	
• Solder	max 60 mg/specimen	12.0 mg*	Passes	
• Brass	max 20 mg/specimen	8.8 mg.*	Passes	
• Steel	max 20 mg/specimen	3.6 mg.*	Passes	
• Cast Iron	max 20 mg/specimen	7.2 mg.*	Passes	
• Aluminum	max 60 mg/specimen	26.3 mg.*	Passes	

\*Average of triplicate samples

**Cavitation-Erosion**

ASTM D-2809

Rating for pitting, cavitation, 9 or erosion of water pump 8 minimum	Passes <sup>(1)</sup>
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(1) Pictures attached

Source: ABIC Testing Laboratories, Inc

**Exhibit II  
OOO "Tosol-Sintez"**

**Test Results, Standard Specification for Ethylene Glycol Based Engine Coolant for Automotive and Light Duty Service". ASTM D-3306**

**Product Identification: Felix Carbox G12 (SQ)**

<u>Test</u>	<u>Requirement</u>	<u>Results</u>	<u>Comments</u>	<u>Test Method</u>
<b><u>Specific Gravity</u></b>	1.110 to 1.145	1.125	Passes	ASTM D-1122
<b><u>@ 15.5°C</u></b>				
<b><u>Freezing Point 50 % Volume</u></b>	min. -37 °C (-34 °F)	-37 °C (-34 °F)	Passes	ASTM D-1177
<b><u>Boiling Point</u></b>				
Undiluted	min. 163 °C (325 °F)	172 °C (342 °F)	Passes	ASTM D-1120
Diluted 50% Volume	min. 107.6 °C (226 °F)	107.6 °C (226 °F)	Passes	ASTM D-1120
<b><u>Effect on Automotive Finish</u></b>	No Effect	No Effect	Passes	ASTM D-1882
<b><u>Ash Content</u></b>	max. 5 %	1.2 %	Passes	ASTM D-1119
<b><u>pH 50 % Volume</u></b>	7.5 to 11.0	8.6	Passes	ASTM D-1287
<b><u>Chloride Content</u></b>	max 25 ppm	6 ppm	Passes	ASTM D-3634
<b><u>Water Content %</u></b>	max. 5 %	2.9 %	Passes	ASTM D-1123
<b><u>Reserve Alkalinity ml</u></b>	Information only	3.9 ml	Information	ASTM D-1121
<b><u>Corrosion in Glassware</u></b>				ASTM D-1384
Weight Loss,				
• Copper	max. 10 mg/specimen	2.6 mg.*	Passes	
• Solder	max 30 mg/specimen	2.2 mg*	Passes	
• Brass	max 10 mg/specimen	1.0 mg*.	Passes	
• Steel	max 10 mg/specimen	2.6 mg*.	Passes	
• Cast Iron	max 10 mg/specimen	6.2 mg*.	Passes	
• Aluminum	max 30 mg/specimen	8.1 mg*.	Passes	

\*Average of triplicate samples

Source: ABIC Testing Laboratories, Inc.

**Exhibit II, continued  
OOO "Tosol-Sintez"**

**Test Results, Standard Specification for Ethylene Glycol Based Engine Coolant for Automotive and Light Duty Service". ASTM D-3306**

**Product Identification: Felix Carbox G12 (SQ)**

<u>Test</u>	<u>Requirement</u>	<u>Results</u>	<u>Comments</u>	<u>Test Method</u>
<b><u>Foaming</u></b>				
Volume	max. 150 ml	45 ml	Passes	ASTM D-2809
Break Time	max 5 sec.	3 sec.	Passes	
<b><u>Corrosion of Cast Aluminum Alloys at Heat Rejection</u></b>				
				ASTM D-4340
Weight Change, mg/cm <sup>2</sup> / week	1.0 mg/cm <sup>2</sup> / week	0.2 mg/cm <sup>2</sup> / week*	Passes	
* Average of duplicate samples				
Specimen Color	Information Only	Silver	Information Only	
pH Used Solution	Information Only	7.1	Information Only	
Used Solution Clarity	Information Only	Transparent	Information Only	
<b><u>Simulated Service Performance</u></b>				
				ASTM D-2570
Weight Loss,				
• Copper	max.20 mg/specimen	10.8 mg*	Passes	
• Solder	max 60 mg/specimen	1.2 mg*	Passes	
• Brass	max 20 mg/specimen	12.6 mg*	Passes	
• Steel	max 20 mg/specimen	2.0 mg*	Passes	
• Cast Iron	max 20 mg/specimen	6.3 mg*	Passes	
• Aluminum	max 60 mg/specimen	31.6 mg*	Passes	
<b><u>Cavitation-Erosion</u></b>				
				ASTM D-2809
	Rating for pitting, cavitation, 9 or erosion of water pump 8 minimum		Passes <sup>(1)</sup>	

(1) Pictures attached

Source: ABIC Testing Laboratories, Inc