

# **ABIC TESTING LABORATORIES, INC.**

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## **Antifreeze Compliance Testing**

Client: Magistral-NN, LTD  
603016, 13/3 Monastyrka St.  
Nizhny Novgorod  
Russia

Attention: Mr. Nikolay Lazarev

Product Identification: **Niagara Titan HD**

Test Method: ASTM D3306

Report No.: 5487-03

Date: December 21, 2017

### **Methodology**

Niagara Titan HD Antifreeze was tested for compliance to ASTM D3306. The following tests were required:

- Specific Gravity@ 15.5°C
- Freezing Point, 50% Volume
- Boiling Point, 50% Volume, Undiluted
- Effect on Automotive Finish
- Ash Content
- pH, 50% Diluted
- Chloride Content
- Reserve Alkalinity
- Corrosion in Glassware
- Foaming
- Corrosion of Cast Aluminum Alloys at Heat Rejection
- Simulated Service Performance
- Cavitation-Erosion

### **Test Results:**

- Results of ASTM D-3306 shown in Exhibit I attached

### **Discussion**

The sample of Niagara Titan HD Antifreeze meets all the listed requirements of ASTM D3306

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**ABIC Testing Laboratories, Inc**

Respectfully Submitted

A handwritten signature in black ink, appearing to read "Leonard Mackowiak".

Leonard Mackowiak  
Vice President

**Exhibit I**  
**"Magistral-NN", LTD**

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

**Product Identification: Titan HD Antifreeze**

<u>Test</u>	<u>Requirement</u>	<u>Results</u>	<u>Comments</u>	<u>Test Method</u>
<u>Specific Gravity @ 15.5°C</u>	1.110 to 1.145max	1.145	Passes	ASTM D-1122
<u>Freezing Point 50 % Volume</u>	min. -37 °C (-34 °F)	-37.5 °C (-35 °F)	Passes	ASTM D-1177
<u>Boiling Point</u>				
<u>50 % Volume</u>	min. 108 °C (226 °F)	110 °C (230 °F)	Passes	ASTM D-1120
<u>Undiluted</u>	min. 163°C (325 °F)	177 °C (352 °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 %	2.88 %	Passes	ASTM D-1119
<u>pH Diluted 50%</u>	7.5 to 11.0	8.4	Passes	ASTM D-1287
<u>Chloride Content</u>	max 25 ppm	12.0 ppm	Passes	ASTM D-3634
<u>Reserve Alkalinity ml</u>	Information only	3.8 ml	Information	ASTM D-1121
<u>Corrosion in Glassware</u>				ASTM D-1384
Weight Loss,				
• Copper	max.10 mg/specimen	4.4 mg.*	Passes	
• Solder	max 30 mg/specimen	0.0 mg*	Passes	
• Brass	max 10 mg/specimen	2.2 mg*.	Passes	
• Steel	max 10 mg/specimen	0.0 mg*.	Passes	
• Cast Iron	max 10 mg/specimen	2.5 mg*.	Passes	
• Aluminum	max 30 mg/specimen	0.0 mg*.	Passes	

\*Average of triplicate samples

**Exhibit I, continued  
"Magistral-NN", LLC**

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

**Product Identification: Titan HD Antifreeze**

<u>Test</u>	<u>Requirement</u>	<u>Results</u>	<u>Comments</u>	<u>Test Method</u>
<b><u>Foaming</u></b>				
<b>Volume</b>	max. 150 ml	1 ml	Passes	ASTM D-1881
<b>Break Time</b>	max 5 sec.	1 sec.	Passes	
<b><u>Corrosion of Cast Aluminum Alloys at Heat Rejection</u></b>				ASTM D-4340

<b>Weight Change, mg/cm<sup>2</sup> / week</b>	1.0 mg/cm <sup>2</sup> / week	0.43 mg/cm <sup>2</sup> / week*	Passes
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\* Average of duplicate samples

**Simulated Service Performance** ASTM D-2570

Weight Loss,				
• Copper	max.20 mg/specimen	5.4 mg*	Passes	
• Solder	max 60 mg/specimen	14.4 mg*	Passes	
• Brass	max 20 mg/specimen	2.5 mg.*	Passes	
• Steel	max 20 mg/specimen	0.0 mg.*	Passes	
• Cast Iron	max 20 mg/specimen	1.3 mg.*	Passes	
• Aluminum	max 60 mg/specimen	57.0 mg.*	Passes	

\*Average of triplicate samples

**Cavitation-Erosion** ASTM D-2809

Rating for pitting, cavitation, or erosion of water pump 8 minimum	9	Passes
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