

## **INTRODUCTION**

Thermo Fluids Inc. Antifreeze Services Division (TFI – ASD) operates in North Las Vegas Nevada for the purpose of remanufacturing Spent (Used) Engine Antifreeze/Coolant. TFI - ASD utilizes a vacuum distillation process to recover and purify spent engine coolant to meet required ASTM performance standards. The remanufacturing process primarily produces a solution that's pre-mixed with 50% distilled water and 50% ethylene glycol. This pre-mixed solution is blended with corrosion inhibitors and additives to produce a variety of fully formulated products for use in automotive and heavy-duty engines. Concentrate engine coolant can also be achieved.

The following describes components to Thermo Fluids Quality Control/Assurance (QA/QC) Program for incoming spent antifreeze and subsequent re-manufacture at our state-of-the-art Thermal/Vacuum Distillation Facility to produce the following products:

**New Conventional and Extended Life Ready Fill™ Antifreeze**  
*Inhibited with Conventional & Extended Life Technology Additives for:*  
Light Duty Automotive Applications and  
Heavy Duty Diesel Applications

## **GENERAL PLANT INFORMATION**

Thermo Fluids Inc. - Antifreeze Services Division  
4000 Arcata Way  
North Las Vegas, Nevada 89030  
Contact: Brian Schmidt, Area Manager  
Tel: (702) 642-9994  
Fax: (702) 642-6506

## **QUALITY CONTROL / ASSURANCE**

The Quality Control laboratory at TFI - ASD keeps close watch over the entire remanufacturing process and final product specifications. Before a spent engine coolant is accepted for treatment, it must undergo a number of tests to ensure it can be treated. The laboratory tests basic areas such as percent glycol, pH, conductivity, percent oil and tests for the presence of chlorinated solvents. In addition, shipments that contain freon, gasoline, carburetor cleaners, transmission and brake fluids are also screened.

Once a shipment is accepted it is given an identification number to assist in tracking from beginning to end. The laboratory works closely with the plant personnel in determining the proper treatment procedures. Once a batch of final product is produced, additional analytical procedures are performed to ensure quality.

## **QA/QC PROCESS STEPS FOR POLICY:**

1. Raw material acceptance

- a. Each delivery of spent antifreeze will undergo screening to determine its suitability for remanufacturing
    - i. Percent glycol test - Greater than 35%
    - ii. pH test - Between 7.0 – 10.0
    - iii. Conductivity - Less than 4200  $\mu$ S
    - iv. Total Halogens - Less than 500 ppm
    - v. Insoluble oil - Less than 2%
    - vi. Soluble oil - Less than 2%
  - b. Raw material should be limited to engine coolant or other similar heating and cooling applications
  - c. Any material other than that described above must be pre-screened before delivery can be made
2. Re-manufactured ethylene glycol testing
- a. Each batch of re-manufactured ethylene glycol to be blended into final product must undergo internal laboratory testing which includes the following:
    - i. Percent glycol test
    - ii. pH test
    - iii. Anion test
      1. Chlorides must be below 25 ppm
      2. Sulfates must be below 100 ppm
3. Engine coolant additive package
- a. Each batch of additive package must have an accompanying certificate of analysis
  - b. Each additive package must have undergone and passed ASTM D6210 testing
4. Remanufactured product
- a. Each batch of product must undergo internal laboratory testing which includes the following:
    - i. Percent glycol test
    - ii. pH test
    - iii. Anion test
      1. Chlorides must be below 25 ppm
      2. Sulfates must be below 100 ppm
      3. All other anions to be reported
  - b. Once a quarter a random sample will be analyzed by a third-party laboratory which includes the following (See Attachment B):
    - i. Physical data
    - ii. Corrosion inhibitors data
    - iii. Age and wear indicators data

### **SHIPPING PAPERS**

1. Shipping papers for ethylene glycol containing products with  $\geq 5,000$  pounds of ethylene glycol when shipped in, into or through the U.S.A. will have the following description:

OTHER REGULATED SUBSTANCES, LIQUID N.O.S.  
(ETHYLENE GLYCOL)/9/NA3082/PGIII/  
RQ (ETHYLENE GLYCOL) MARKED 3082/  
HAZMAT STCC = 4941104

2. For shipments of the above entering the U.S.A. from Canada, the shipping papers will have the following additional statement in the product description:

NOT TDG REGULATED

### **RETURN OF SHIPPING CONTAINERS**

1. Case I – Portable tanks and trucks with contained  $\geq 5,000$  pounds of ethylene glycol. Leave 3082 markings on all four sides. The carrier needs to modify his/her shipping papers to show:

RESIDUE – LAST CONTAINED  
OTHER REGULATED SUBSTANCES, LIQUID N.O.S.  
(ETHYLENE GLYCOL)/9/NA3082/PGIII/  
RQ (ETHYLENE GLYCOL) MARKED 3082/  
HAZMAT STCC = 4941104

2. Case II – Tank Cars:  
Leave the 3082 markings on all sides. The return shipping papers must be revised to show: RESIDUE – LAST CONTAINED in front of the hazmat description.

### **TOXICOLOGY**

For complete product toxicological information on Thermo Fluids coolants, refer to the Material Safety Data Sheets (MSDS) – See Attachment A. These sheets provide the most up-to-date health and safety considerations related to use of these products and should be consulted prior to using the products.

### **STORAGE**

Storage of TFI – ASD's Antifreeze/Coolant presents no unusual problems. The fluids are premixed with water and are not flammable because they have no measurable flash point (Pensky-Martens Closed Cup) in concentrations up to 80 percent. Tank truck shipments can be emptied into storage tanks or clean drums or stored in the drums in which the shipment is

made. Since the fluids are prepared as ready to use, storage inside a heated building is not necessary. Coolants are NOT to be stored in open containers.

### **TANK STORAGE**

#### **1. STEEL**

Ordinary steel tanks are normally satisfactory for storage of TFI – ASD’s coolants. However, during extended storage, slight discoloration may occur from iron contamination. Rusting may occur in the vapor space because there is no inhibitor where condensation occurs and oxygen is present. Closing any vent to the tank to limit oxygen intake can minimize this problem. If this is not possible, suitable coatings are suggested for protection of vapor space tanks.

#### **2. PLASTIC**

Exposure to direct sunlight or external heat sources is NOT recommended for bulk storage of fluids, in tanks manufactured of high-density crosslinked polyethylene (HDPE). These heat sources can impair useful vessel life. HDPE bulk, mini-bulk and transtore totes that are not manufactured with UV resistant resins (transparent type) should NOT be exposed to direct sunlight for extended periods. Coolant dye discoloration and glycol degradation as well as reduced tank life are common risks associated with these practices.

### **WARRANTY**

TFI-ASD warrants that its Antifreeze/Coolant Products:

1. Are free from defects in materials and workmanship and
2. Conforms to all published ASTM Performance Standards relating to product type, process, and intended use.

The warranty period for TFI-ASD Antifreeze Products are a specified, fixed period commencing on the date of purchase. A valid proof of purchase may be required.

If, during the warranty period, it is proven that equipment failure was directly attributed to TFI-ASD Antifreeze/Coolant Products when used in accordance with manufacturer and TFI-ASD specifications, Thermo Fluids will, at its option, repair or replace said equipment at no additional charge, except as is set forth below.

#### **Extent of Warranty**

This warranty extends from the date the glycol base fluid is introduced to the system through the duration of the OEM-recommended service life for the application. This warranty is limited to the base fluids' chemical properties prior to formulation and its physical and thermal stability during use. TFI - ASD is not responsible for the performance or fitness of corrosion control additives as supplied by third parties.

TFI - ASD has adopted a total quality management "TQM" approach to our warranty position. This ensures that all products manufactured will meet and/or exceed high quality standards. As part of our warranty position we conduct the following:

1. A batch analysis is provided for all products after formulation.
2. Duplicate samples are retained for later question of product conformance.

#### **Additional Limitations**

TFI - ASD is not responsible for failures resulting from misuse, faulty installation, alteration, neglect, or accident. TFI - ASD is not responsible for down time, loss of income, living expenses, or other incidental or consequential damages. This warranty is the sole warranty made by TFI - ASD in regards to these products. TFI - ASD makes no other warranties, express or implied, or of merchantability or fitness for a particular purpose.

#### **USER ACCEPTANCE / RELUCTANCE**

Virtually every liquid cooled engine relies on ethylene glycol (EG) to increase the boiling point and suppress the freeze point of the coolant. During use the EG retains its boil-over and freeze protection properties however, corrosion control additives deplete an eventually and the coolant loses its ability to protect cooling system components. Just as oil changes protect the lubricating system, regular coolant changes protect the cooling system. Extending or neglecting the service life of the engine coolant beyond manufacturer recommendations is an expensive gamble. Today's engines and down-sized radiators are less tolerant to dilution with common tap water. A 50/50 mix of antifreeze and high quality demineralized or distilled water, results in extended cooling system and engine life. Since the most common cause of mechanical breakdown on the road is cooling system failure, it is evident that today's motorists are still not suitably aware of its importance.

#### **SPENT ANTIFREEZE COLLECTION SUGGESTIONS – INTERNAL & EXTERNAL**

##### Collection:

- In order to minimize the risk of contaminants, spent antifreeze should be collected using only dedicated equipment (such as drain pans, funnels, transfer buckets, etc.)
- After being drained from a vehicle, spent antifreeze should be transferred immediately to a dedicated storage container.

##### Storage Prior To Collection for Remanufacturing:

- Spent antifreeze should be stored in a separate container reserved exclusively for spent antifreeze. Care should be taken to ensure that the drum or other container is not lined with paint, resin or other materials that could contaminate the spent antifreeze. If contamination is suspected, the container should be replaced, thoroughly cleaned with a detergent, or fitted with a plastic liner. The container should be in good condition with no leaks and a lid that can be secured to keep out rainwater and other contaminants.
- The spent antifreeze container should be clearly marked SPENT ANTIFREEZE in order to minimize the risk of accidental contamination.

- Access to the spent antifreeze storage container should be restricted to facility employees or other authorized personnel. If located outside the building, it should be locked or otherwise protected from unauthorized use.

Other Management Considerations:

- Mixing spent antifreeze with used oil prior to collection for recycling is *strongly discouraged* and could subject the generating facility to additional liability and/or charges from the collector / recycler. In addition, the practice may violate state or local law.
- Mixing spent antifreeze with other shop materials *should not be permitted*. Such mixing can damage recycling equipment, invalidate permits required to utilize the municipal waste treatment systems and subject the facility to fines or other penalties.
- The generating facility should have an adequate spill avoidance and emergency response plan that accommodates the spent antifreeze collection and storage method utilized on-site. This plan should be periodically reviewed with employees.
- Spent antifreeze should be recycled or otherwise managed in accordance with federal, state and local laws.

*The above management suggestions are an excerpt from The Antifreeze Coalition's "Voluntary Management Standards". It does not constitute legal or regulatory advice. There is no warranty that following the above management suggestions will ensure compliance with all environmental laws and regulations or avoid other environmental liability. Please consult Federal, state and local environmental officials, or an attorney concerning compliance with environmental laws, regulations, and avoidance of environmental liability*

## ATTACHMENT “A”

Material Safety Data Sheets (MSDS)  
for

Ready Fill™ Conventional Antifreeze  
and

Ready Fill™ Extended-Life Antifreeze

## **ATTACHMENT “B”**

### **Independent laboratory report of TFI – ASD engine coolant**

**Independent laboratory report of TFI – ASD engine coolant**



Amalgamated Laboratories, Inc.  
2965 West Osborn  
Phoenix, AZ 85017  
phone: 602-252-0280  
Fax: 602-252-0282  
E-mail [mail@amalgatech.com](mailto:mail@amalgatech.com)

**Level 3 Coolant Analysis Report**

<i>Contact:</i>	<i>Brian Schmidt</i>	<i>Coolant ID</i>	<i>AFFP-1668</i>
<i>Company:</i>	<i>Thermo Fluids</i>	<i>Unit #</i>	
<i>Address:</i>	<i>4000 Arcata Way</i>	<i>Date sampled / Rc'd</i>	<i>1/2/07 1/3/2007</i>
		<i>Sample Age Mi/Hrs</i>	
<i>City, ST, Zip</i>	<i>North Las Vegas, NV 89030</i>	<i>Fluid Type</i>	<i>BTFFCA 50/50</i>
<i>E-Mail</i>	<i>bschmidt@thermofluids.com</i>	<i>Amalgatech ID</i>	<i>701010</i>
<i>Phone/Fax</i>	<i>(702) 642-9994 / (702) 642-6506</i>	<i>Promise / Report Date</i>	<i>1/17/2007 / 1/5/07</i>
<i>Notes</i>			

**Test Data:**

<b>Test performed</b>	<b>This sample</b>
Physical Data	
Color and Appearance *	Green
pH by ASTM D1287	10.13
% Antifreeze from chart *	50
Freezing Point <sup>2</sup> by ASTM D3321	-34
Corrosion Inhibitors	
Boron (mg/l B) ASTM D 6130	244
Molybdenum (mg/l Mo) ASTM D 6130	ND
Nitrites (mg/l) by ASTM D 5827	1275
Nitrates (mg/l) by ASTM D 5827	420
Phosphate (mg/l) by ASTM D 5827	ND
Silicon (mg/l Si) by ASTM D 6130	162
Age and Wear Indicators	
Aluminum (mg/l Al) ASTM D 6130	ND
Calcium (mg/l Ca) ASTM D 6130	0.7
Chloride (mg/l) ASTM D 5827	14
Copper (mg/l Cu) ASTM D 6130	ND
Formate (mg/l) glycol degradation acid*	
Glycolate (mg/l) glycol degradation acid*	90
Iron (mg/l Fe) ASTM D 6130	ND
Magnesium (mg/l Mg) ASTM D 6130	0.3
Lead (mg/l Pb) ASTM D 6130	ND
Sulfate (mg/l) ASTM D 5827	7

ND- is an abbreviation for "none was detected". Our detection limits are 1 mg/l or 1 ppm.

**Comments and recommendations:**

QC data

**Important note:** Amalgatech is ISO 17025 accredited. Amalgatech receives samples that are identified by the customer/sender and takes these identifications in good faith, reporting data to the customer using the customer's identification. Our laboratory services are not intended for marketing and are not product certifications. We are accredited to perform most ASTM coolant tests. Any test performed for which Amalgatech is not accredited is identified with an asterisk (\*). This report is © Amalgatech

division, Amalgamated Laboratories, Inc. 2006. It may not be reproduced, altered, copied or disseminated except in whole. Use of the report is permitted, including copying, as long as the entire report, including this information section, is always provided in its entirety.

Respectfully submitted,

AMALGATECH DIVISION  
AMALGAMATED LABORATORIES, INC.



Ed Eaton  
Chief Engineer