

江苏省镇江市丹徒区高资经济开发区高资镇精细化工园2号 212113

镇江利德尔复合材料有限公司

Xiangjun Xu



Xiangjun Xu
ZHENJIANG LEADER COMPOSITE CO.,LTD
DANTU DEVELOPING ZONE
ZHENJIANG
JIANGSU 212113 CHINA

Date: 2019/03/11
Subscriber: None
PartySite: 1797005
File No: MH62487
Project No: 4788159341
PD No: 19013224
Type: R
PO Number:

Subject: **Initial Production Inspection**

PLEASE NOTE: YOU ARE NOT AUTHORIZED TO SHIP ANY PRODUCTS BEARING ANY UL MARKS UNTIL THE INITIAL PRODUCTION INSPECTION HAS BEEN SUCCESSFULLY CONDUCTED BY THE UL FIELD REPRESENTATIVE.

An Initial Production Inspection (IPI) is an inspection that must be conducted prior to the first shipment of products bearing the UL Mark. This is to ensure that products being manufactured are in accordance with UL's requirements including the Follow-Up Service Procedure. After the UL Representative has verified compliance of your product(s), authorization will be granted for shipment of product(s) bearing the appropriate UL Marks as denoted in the Procedure.

LAKER HU, UL INSPECTION CENTER NANJING, CHINA NATIONAL IMPORT & EXPORT, COMMODITIES INSPECTION CORP,

1 BAIXIA RD, 8TH FL, NANJING, JIANGSU, China, 210001., PHONE: 25-5234-5767, FAX: 25-5234-5769, EMAIL:UL.InspectionCenter521@ul.com

Marks as needed may be obtained from UL LABEL CENTER GUANGZHOU, ROOM 3006-3007, TIMES PROPERTY CENTER, NO 410 DONGFENG RD MIDDLE, GUANGZHOU, GUANGDONG, China, 510030. PHONE: 208-348-7088, FAX: 208-348-7088, EMAIL: LABELCENTER.GUZ@UL.COM, ATTN: T WEN

Please file revised pages and illustrations in place of material of like identity. New material should be filed in its proper numerical order.

NOTE: Follow-Up Service Procedure revisions DO NOT include Cover Pages, Test Records and Conclusion Pages. Report revisions DO NOT include Authorization Pages, Indices, Section General Pages and Appendixes.

Please review this material and report any inaccuracies to UL's Customer Service Professionals. Contact information for all of UL's global offices can be found at <http://ul.com/aboutul/locations>.

If you'd like to receive updated materials FASTER, UL offers electronic access and/or delivery of this material. For more details, contact UL's Customer Service Professionals as shown above., referring to the above Project and/or PD Numbers.

This material is provided on behalf of UL LLC (UL) or any authorized licensee of UL.

NBK File

UL INSPECTION CENTER 521

Production Date: UNKNOWN
Contact: Mr/Ms.Xiangjun Xu
Phone: 86 17712302077
EMail: xuxiangjun@njleader.cn

ADDENDUM TO TRANSMITTAL LETTER

Xiangjun Xu
ZHENJIANG LEADER COMPOSITE CO.,LTD
DANTU DEVELOPING ZONE
ZHENJIANG
JIANGSU 212113 CHINA

Date: 2019/03/11
Subscriber: None
PartySite: 1797005
File No: MH62487
Project No: 4788159341
PD No: 19013224
Type: R
PO Number:

Subject: **Initial Production Inspection**

The following material resulting from the investigation under the above numbers is enclosed.

Issue

<u>Date</u>	<u>Vol</u>	<u>Sec</u>	<u>Pages</u>	<u>Revised Date</u>
-------------	------------	------------	--------------	---------------------

2019/03/07	1	1	Cert of Compliance	
------------	---	---	--------------------	--

2019/03/07	1	1	Add New Volume	
------------	---	---	----------------	--

PO# Xu Xiangjun 18-Sep-2017

Follow-Up Service Procedure

DO NOT DISCARD THIS PAGE

It is important to keep UL Procedures and Test Reports up-to-date as new or revised pages are received. Correct maintenance will decrease the amount of time the UL Representative spends when visiting your facility.

UL LLC offers MyHome @UL, a dedicated website providing secure access to online tools and databases that can help simplify your compliance activities. You can customize your personal MyHome @UL page to include the content needed most, including timely information about certification updates and links to other Web sites you visit regularly. Visit <http://my.home.ul.com/> to sign up today!

PAGES (in content order)	FUNCTION	HOW TO UPDATE
Authorization Page	Displays the Product Category, the type of Follow-Up Service (Type R=Reexamination / Type L=Label), the File Number and the Volume Number associated with each Applicant's, Manufacturer's and Listee's company name and address.	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Addendum to Authorization Page*	Lists the additional names and addresses of manufacturing locations, when multiple locations exist	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Listing Mark Data (LMD), Classification Mark Data (CMD) or Recognized Component Mark Data (RCMD) Pages* #	Used only for products covered under Type R Service. Displays the correct LMD, CMD, or RCMD Mark, the Control Number for Listed and Classified categories and additional information regarding minimum size, application, procurement, and any other optional markings, in addition to the UL Mark.	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Multiple Listing (ML) Correlation Sheet	Correlates product model numbers between those products made by a Manufacturer for the Basic Applicant and those supplied to another company, the Multiple Listee.	Replace, add or delete page(s) with most current "Issued" or "Revised" date.
Index*	Catalogs the contents of the Procedure by some logical means, i.e. Section Number, Report Reference Number, or Issue Date.	Replace present page by matching the UL File Number, Volume Number, Page Number and most current "Revised" date.
Appendices* # (App.)	Contains instructions for the Manufacturer and UL Representative concerning specific responsibilities and required periodic tests. May also outline tests to be conducted on samples to be forwarded to UL's facilities.	Replace present page by matching the UL File Number, Volume Number, Appendix letter (eg. App. A), Page Number and most current "Revised" date.
	Standardized Appendix Pages are the same for all manufacturers within a particular product category.	Replace present page by matching the Appendix letter (eg. App. A), Page Number and most current "Revised" date.
Follow-Up Inspection Instructions (FUII) Pages*	Contains information similar to that in the Appendices. FUII Pages are issued as part of the Procedure when a UL Standard is used in conjunction with the Procedure, and are the same for all manufacturers within a particular category.	Replace present pages by matching the Page Number and most current "Issued" or "Revised" date.
Section General* # (Sec. Gen.)	Contains description, requirements, identifications and/or specifications that are common to all products covered by the entire volume and supplements the information provided in the Description Section.	Replace present page by matching the UL File Number, Volume Number, Page Number and most current "Revised" date.
Description, or Section (Sec.)	Contains the specific description of one or more products or systems. This includes written text supplemented by photographs, drawings, etc., as necessary, to define features that affect compliance with the applicable requirements.	Replace present page by matching the UL File Number, Volume Number, Section Number, Page Number and most current "Issued" date.

* The above page(s) may not appear in all UL Follow-Up Service Procedures; UL's Conformity Assessment Services staff determines their inclusion.

These pages are combined in the **Generic Inspection Instructions** for International Style Reports, identified, as example by Vol. X1, X2, etc.

PLEASE NOTIFY YOUR LOCAL UL OFFICE OF ANY CHANGES IN CONTACT NAME, COMPANY NAME OR ADDRESS, SO THIS MATERIAL AND IMPORTANT INFORMATION CONTINUES TO BE DELIVERED TO YOUR FACILITY WITHOUT INTERRUPTION.



FOLLOW-UP SERVICE PROCEDURE
(TYPE R)

COMPONENT - TANK ACCESSORIES FOR FLAMMABLE AND COMBUSTIBLE LIQUIDS
(EGVV2)

Manufacturer: SEE ADDENDUM FOR MANUFACTURER LOCATIONS

1797005 (Party Site)
Applicant: Zhenjiang Leader Composite Co.,Ltd
Dantu Developing Zone
Zhenjiang
Jiangsu 212113 CHINA

1797005 (Party Site)
Recognized Co.: SAME AS APPLICANT

This Follow-Up Service Procedure authorizes the above Manufacturer(s) to use the marking specified by UL LLC, or any authorized licensee of UL LLC, including the UL Contracting Party, only on products when constructed, tested and found to be in compliance with the requirements of this Follow-Up Service Procedure and in accordance with the terms of the applicable service agreement with UL Contracting Party. The UL Contracting Party for Follow-Up Services is listed on addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

UL further defines responsibilities, duties and requirements for both Manufacturers and UL representatives in the document titled, "UL Mark Surveillance Requirements" that can be located at the following web-site: <http://www.ul.com/fus>. Manufacturers without Internet access may obtain the current version of this document from their local UL customer service representative or UL field representative. For assistance, or to obtain a paper copy of this document or the Follow-Up Service Terms referenced below, please contact UL's Customer Service at <http://www.ul.com/aboutul/locations/>, select a location and enter your request, or call the number listed for that location.

The Applicant, the specified Manufacturer(s) and any Recognized Company in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable service agreement is a Global Services Agreement ("GSA"), the Applicant, the specified Manufacturer(s) and any Recognized Company will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of use of the prescribed UL Mark, acceptance of the factory inspection, or payment of the Follow-Up Service fees which will incorporate such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking here: <http://services.ul.com/fus-service-terms>. In all other events, Follow-Up Services will be governed by and incorporate the terms of your applicable service agreement and this Follow-Up Service Procedure.

It is the responsibility of the Recognized Company to make sure that only the products meeting the aforementioned requirements bear the authorized Marks of UL LLC, or any authorized licensee of UL LLC.

This Follow-Up Service Procedure contains information for the use of the above Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Manufacturer with the understanding that it will be returned upon request and is not to be copied in whole or in part.

This Follow-Up Service Procedure, and any subsequent revisions, is the property of UL and is not transferable. This Follow-Up Service Procedure contains confidential information for use only by the above named Manufacturer(s) and representatives of UL and is not to be used for any other purpose. It is provided to the Subscribers with the understanding that it is not to be copied, either wholly or in part unless specifically allowed, and that it will be returned to UL, upon request.

Capitalized terms used but not defined herein have the meanings set forth in the GSA and the applicable Service Terms or any other applicable UL service agreement.

UL shall not incur any obligation or liability for any loss, expense or damages, including incidental, consequential or punitive damages arising out of or in connection with the use or reliance upon this Follow-Up Service Procedure to anyone other than the above Manufacturer(s) as provided in the agreement between UL LLC or an authorized licensee of UL LLC, including UL Contracting Party, and the Manufacturer(s).

UL LLC has signed below solely in its capacity as the accredited entity to indicate that this Follow-Up Service Procedure is in compliance with the accreditation requirements.

Bruce A. Mahrenholz
Director
Conformity Assessment Programs (CPO)
UL LLC

LOCATION

1797005 (Party Site)
Zhenjiang Leader Composite Co.,Ltd
Dantu Developing Zone
Zhenjiang
Jiangsu 212113 CHINA

Factory ID: None
UL Contracting Party for above site is: UL GmbH

Recognized Component Marking Data Page (RCMDP)

(FILE IMMEDIATELY AFTER AUTHORIZATION PAGE)

RECOGNIZED COMPONENT MARKING

Products Recognized under UL's Component Recognition Service are identified by marking elements consisting of:

1. The Recognized Company's identification specified in this document.
2. A catalog, model or other applicable product designation specified in the descriptive sections of this document.
3. The UL Recognized Component Mark shown below.

Only those components, which actually bear the Marking, should be considered as being covered under the Recognition Program. The UL Listing or Classification Mark is not authorized for use on or in connection with Recognized Components.

Recognized Component Mark



Minimum size of the Recognized Component Mark is not specified as long as it is legible. Minimum height of the registered symbol ® shall be 3/64 inch but may be omitted if it is out of proportion to the Recognized Component Mark or not legible to the naked eye.

The manufacturer may reproduce the Mark electronically. Any decision regarding the acceptability of the manufacturer's Mark reproduction will be made at the Reviewing Office.

Product	Section	Report Date
Recognized Resin Ecoleader EL-8300 for Jacketed, Composite and Nonmetallic Underground Tanks for Flammable Liquids	1	2019-03-07

APPENDIX A

SPECIAL INSTRUCTIONS

UL REPRESENTATIVE:

SAMPLES

Once each year, select a catalyzed plaque sample, mark with the appropriate identification, and forward with a MSDS sheet to the Follow-Up Services Department at the Northbrook Office.

DEPARTMENT 3027BNBK:

Conduct the following tests on samples received from the UL Representative.

Spectrums obtained shall indicate the same composition as that recorded in the spectrum obtained under the original investigation of these materials.

- A. The identification tests are to be conducted on the as received samples. Results shall compare with the original data as shown in Table I.

TABLE I

Resin System	IR
Ecoleader EL-8300, Catalyzed	N03-25-18

DESCRIPTION

PRODUCT COVERED:

Component - Resin for use in the manufacture of glass fiber reinforced plastic underground storage tanks for petroleum products, alcohols and alcohol-gasoline mixtures, and for use in the manufacture of fiberglass reinforced plastic cladding for composite and jacketed steel underground tanks, designated Ecoleader EL-8300.

GENERAL:

This resin is used in combination with specific fiberglass reinforcements in the manufacture of single wall glass fiber reinforced plastic underground storage tanks, or for the inner and/or outer wall of secondary containment Type I or Type II underground storage tanks. The tanks fabricated with this resin system are suitable for petroleum products, alcohols and alcohol-gasoline mixtures. The tanks are fabricated by a hand lamination of glass fiber reinforcing and catalyzed resin.

This resin may also be used in the manufacture of cladding that is intended for use as protection against underground corrosion on composite and jacketed underground steel tanks. The cladding is fabricated by applying catalyzed resin to fiberglass reinforcement and applying on a steel tank. The steel tank shall comply with UL Standard for Steel Underground Tanks for Flammable and Combustible Liquids, UL 58.

MARKING:

Company's name and location, resin designation, and Recognized Component Marking on each drum of resin or on the Certificate of Analysis accompanying bulk resin shipments.

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

Use - For use only on products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

COMPONENT ELEMENTS:

- | | | |
|----|-----------|------------------------------------------------------|
| A. | Resin: | Ecoleader EL-8300 |
| B. | Glass: | Taishan Fiberglass Inc. EMC300-1040 |
| C. | Catalyst: | AkzoNobel M50 or Methyl ethyl ketone Peroxide (MEKP) |

CONDITIONS OF ACCEPTABILITY (FIBERGLASS REINFORCED PLASTIC TANKS):

The materials described in this Report may be used in the manufacture of single wall glass fiber reinforced plastic underground storage tanks or for the inner and/or outer wall of secondary containment Type I or Type II underground storage tanks provided the following conditions of acceptability are met:

1. The infrared analysis, ash content, and specific gravity test results obtained on sample coupons of the tank wall submitted by the tank manufacturer shall be compared to the identification test results in this Report. The ash content and specific gravity shall be within 10 percent of 41.6 percent and 1.537. The IR results shall be the same.
2. Filler materials, thixotropic agents, or other additives in the tank manufacturer's FRP tank material that vary from those used in the formulation of the tank material described in this Report shall be subject to an engineering investigation and may be considered as a basis for conducting comparative immersion testing to determine the effects that the additives have on the chemical resistance properties of the FRP tank material.
3. Representative tanks constructed with the Component Recognized resin system shall be tested to determine compliance with the Design, Construction, Tank Performance and Marking Requirements of the end product Standard, UL 1316.
4. Resin systems employing alternate fiberglass reinforcements shall be subjected to comparative flexural strength testing on as received samples and on samples conditioned for 24 h in boiling water.
5. The tanks fabricated with this resin system are suitable for petroleum products, alcohols, and alcohol-gasoline mixtures.
6. The tank wall shall be a minimum of 0.231 in. (5.87 mm) thick.

CONDITIONS OF ACCEPTABILITY (COMPOSITE AND JACKETED TANKS):

The materials described in this Report may be used in the fabrication of composite and jacketed tanks provided the following conditions are met:

1. The infrared analysis, ash content, and specific gravity test results obtained on composite samples of the tank FRP system composite coating or tank jacket submitted by the tank manufacturer shall be compared to the identification test results in this Report. The ash content shall be within 10 percent of 38.4 percent and specific gravity shall be within 10 percent of 1.491 and the IR results shall be the same.
2. Filler materials, thixotropic agents, or other additives in the tank manufacturer's composite material that vary from those used in the formulation of the composite described in this Report shall be subject to an engineering investigation and may be considered as a basis for conducting comparative immersion testing to determine the effects that the additives have on the chemical resistance properties of the composite material.
3. Representative tanks constructed with the Component Recognized resin system shall be tested to determine compliance with the Design, Construction, Tank Performance and Marking Requirements of the applicable end product Standard, UL 1746.
4. The cladding or jacket shall be a minimum of 0.142 inches (3.61 mm) thick.
5. Resin systems employing alternate fiberglass reinforcements shall be subjected to comparative flexural strength testing on as received samples and on samples conditioned for 24 h in boiling water.

CERTIFICATE OF COMPLIANCE

Certificate Number 20190311-MH62487
Report Reference MH62487-20190307
Issue Date 2019-MARCH-11

Issued to: Zhenjiang Leader Composite Co.,Ltd
Dantu Developing Zone
Zhenjiang
Jiangsu 212113 CHINA

**This certificate confirms that
representative samples of**

COMPONENT - TANK ACCESSORIES FOR FLAMMABLE
AND COMBUSTIBLE LIQUIDS

For Models Refer Addendum Page

Have been investigated by UL in accordance with the component requirements in the Standard(s) indicated on this Certificate. UL Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for installation in complete equipment submitted for investigation to UL LLC.

Standard(s) for Safety:

UL 1316 - Standard for Safety for Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures

Additional Information:

See the UL Online Certifications Directory at <https://iq.ulprospector.com> for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Recognized Component Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Recognized Component Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Recognized Component Mark on the product.



Bruce Mahrenholz, Director North American Certification Program

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at <http://ul.com/aboutul/locations/>



CERTIFICATE OF COMPLIANCE

Certificate Number 20190311-MH62487
Report Reference MH62487-20190307
Issue Date 2019-MARCH-11

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Models;

Component - Resin for use in the manufacture of glass fiber reinforced plastic underground storage tanks for petroleum products, alcohols and alcohol-gasoline mixtures, and for use in the manufacture of fiberglass reinforced plastic cladding for composite and jacketed steel underground tanks, designated Ecoleader EL-8300.



Bruce Mahrenholz, Director North American Certification Program

UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at <http://ul.com/aboutul/locations/>



File MH62487
Project 4788159341

March 7, 2019

REPORT

On

COMPONENT - FLAMMABLE AND COMBUSTIBLE
LIQUID TANK ACCESSORIES

ZHENJIANG LEADER
Zhenjiang, 212113 CHINA

Copyright © 2019 UL LLC

UL LLC authorizes the above named company to reproduce this Report only for purposes as described in the Conclusion. The Report should be reproduced in its entirety; however to protect confidential product information, the Construction Details Descriptive pages may be excluded.

DESCRIPTION

PRODUCT COVERED:

Component - Resin for use in the manufacture of glass fiber reinforced plastic underground storage tanks for petroleum products, alcohols and alcohol-gasoline mixtures, and for use in the manufacture of fiberglass reinforced plastic cladding for composite and jacketed steel underground tanks, designated Ecoleader EL-8300.

GENERAL:

This resin is used in combination with specific fiberglass reinforcements in the manufacture of single wall glass fiber reinforced plastic underground storage tanks, or for the inner and/or outer wall of secondary containment Type I or Type II underground storage tanks. The tanks fabricated with this resin system are suitable for petroleum products, alcohols and alcohol-gasoline mixtures. The tanks are fabricated by a hand lamination of glass fiber reinforcing and catalyzed resin.

This resin may also be used in the manufacture of cladding that is intended for use as protection against underground corrosion on composite and jacketed underground steel tanks. The cladding is fabricated by applying catalyzed resin to fiberglass reinforcement and applying on a steel tank. The steel tank shall comply with UL Standard for Steel Underground Tanks for Flammable and Combustible Liquids, UL 58.

MARKING:

Company's name and location, resin designation, and Recognized Component Marking on each drum of resin or on the Certificate of Analysis accompanying bulk resin shipments.

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

Use - For use only on products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

COMPONENT ELEMENTS:

- | | | |
|----|-----------|------------------------------------------------------|
| A. | Resin: | Ecoleader EL-8300 |
| B. | Glass: | Taishan Fiberglass Inc. EMC300-1040 |
| C. | Catalyst: | AkzoNobel M50 or Methyl ethyl ketone Peroxide (MEKP) |

CONDITIONS OF ACCEPTABILITY (FIBERGLASS REINFORCED PLASTIC TANKS):

The materials described in this Report may be used in the manufacture of single wall glass fiber reinforced plastic underground storage tanks or for the inner and/or outer wall of secondary containment Type I or Type II underground storage tanks provided the following conditions of acceptability are met:

1. The infrared analysis, ash content, and specific gravity test results obtained on sample coupons of the tank wall submitted by the tank manufacturer shall be compared to the identification test results in this Report. The ash content and specific gravity shall be within 10 percent of 41.6 percent and 1.537. The IR results shall be the same.
2. Filler materials, thixotropic agents, or other additives in the tank manufacturer's FRP tank material that vary from those used in the formulation of the tank material described in this Report shall be subject to an engineering investigation and may be considered as a basis for conducting comparative immersion testing to determine the effects that the additives have on the chemical resistance properties of the FRP tank material.
3. Representative tanks constructed with the Component Recognized resin system shall be tested to determine compliance with the Design, Construction, Tank Performance and Marking Requirements of the end product Standard, UL 1316.
4. Resin systems employing alternate fiberglass reinforcements shall be subjected to comparative flexural strength testing on as received samples and on samples conditioned for 24 h in boiling water.
5. The tanks fabricated with this resin system are suitable for petroleum products, alcohols, and alcohol-gasoline mixtures.
6. The tank wall shall be a minimum of 0.231 in. (5.87 mm) thick.

CONDITIONS OF ACCEPTABILITY (COMPOSITE AND JACKETED TANKS):

The materials described in this Report may be used in the fabrication of composite and jacketed tanks provided the following conditions are met:

1. The infrared analysis, ash content, and specific gravity test results obtained on composite samples of the tank FRP system composite coating or tank jacket submitted by the tank manufacturer shall be compared to the identification test results in this Report. The ash content shall be within 10 percent of 38.4 percent and specific gravity shall be within 10 percent of 1.491 and the IR results shall be the same.
2. Filler materials, thixotropic agents, or other additives in the tank manufacturer's composite material that vary from those used in the formulation of the composite described in this Report shall be subject to an engineering investigation and may be considered as a basis for conducting comparative immersion testing to determine the effects that the additives have on the chemical resistance properties of the composite material.
3. Representative tanks constructed with the Component Recognized resin system shall be tested to determine compliance with the Design, Construction, Tank Performance and Marking Requirements of the applicable end product Standard, UL 1746.
4. The cladding or jacket shall be a minimum of 0.142 inches (3.61 mm) thick.
5. Resin systems employing alternate fiberglass reinforcements shall be subjected to comparative flexural strength testing on as received samples and on samples conditioned for 24 h in boiling water.

TEST RECORD NO. 1

SAMPLES:

The manufacturer submitted resin system for examination and Recognition for use in nonmetallic underground tanks. The material is Ecoleader EL-8300 with Taishan Fiberglass Inc. fiberglass designated EMC300-1040.

GENERAL:

The test results relate only to the items tested.

The following tests were conducted with the results indicated.

ACCELERATED AIR OVEN AGING TEST:

METHOD

Coupons of each system were placed in an air circulating oven maintained at a temperature of 70°C (158°F) for a period of 30, 90 and 180 days. After each exposure time, one coupon were removed from the oven, allowed to cool in room temperature air for 24 hours, and cut to obtain flexural property and Izod impact test specimens.

The conditioned specimens were then be subjected to the flexural modulus and fiber strength tests described in Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials, ANSI/ASTM D790-91, using a crosshead speed of 0.1 in/min. Additional specimens were subjected to the Izod impact strength test described in the Test Method for Impact Resistance of Plastics and Electrical Insulating Materials, ASTM D256-90b.

EVALUATION CRITERIA

The flexural properties and impact strength of the specimens that were exposed for 180 days in an air oven shall be at least 80% of the Flexural properties and impact strength of the specimens tested in the as received condition.

RESULTS

The results are presented in Table I through IV.

IMMERSION TEST:

METHOD

5 by 9 in. test coupons were immersed in internal and external fluids for 30, 90, 180 and 270 days. The liquids were maintained at 38°C throughout the test. The liquids were maintained at 38°C throughout the test. The flexural strength and izod impact strength tests were conducted on specimens prepared from the immersed samples. The results were then compared to the values obtained from "as received" specimens. In order to minimize any edge effect, the edges of the samples were coated with the resin used to fabricate the samples. The flexural strength and impact strength of the specimens shall be at least 50% of the "as received" properties for Type A fluids and 30% for the Type B fluids.

RESULTS

The flexural and impact strength after conditioning were at least 50% for Type A and 30% for Type B. See Tables I-V for results.

LIGHT AND WATER EXPOSURE TEST:

5 by 9 in. coupons of each resin system were exposed for 500 and 1000 hours of light and water exposure in accordance with Apparatus and Procedures per ASTM G155, Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials - using Table X3.1 Cycle 1 (102 min light and 18 min light/water).

Following 500 and 1000 hours of conditioning, the coupons were removed from the exposure, allowed to cool in room temperature air for 24 hours, and cut to obtain flexural property and Izod impact strength specimens. The specimens were then subjected to the flexural modulus and fiber strength tests described in the Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials, ANSI/ASTM D790-91, using a crosshead speed of 0.1 in/min. Additional specimens shall be subjected to the Izod impact strength test described in the Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials, ASTM D256-90b.

EVALUATION CRITERIA

The flexural properties and Izod impact strength of the conditioned specimens shall be at least 80% of the flexural properties and Izod impact strength of the as received specimens.

RESULTS

The results are presented in Table I through IV. are tabulated in Tables IV.

LOW TEMPERATURE TEST (IMPACT):

METHOD

Representative test coupons were subjected to an impact test at room temperature and immediately after removal from a cold chamber maintained at -29°C (-20°F) where they were conditioned for 16 h. The samples were impacted once on the outside surface with a 1.18 lb steel ball dropped from a height of 6 ft. During the test the samples were clamped between two steel rings having an inside diameter of 4-1/4 in.

RESULTS

There was no cracking or rupture of the laminate as a result of this test. There was no significant difference between the results obtained for samples impacted at room temperature and the samples impacted at -29°C (-20°F).

CORROSION EVALUATION TESTS:

METHOD

Corrosion Evaluation Test - Nonmetallic cylinders measuring approximately 5 in. diameter by 10 in. long were fitted to the sample coupons of the cladding material with steel plates prepared for this test. The cylinders were then filled with the test solutions indicated below, capped and sealed to prevent evaporation, and placed in a chamber maintained at 38°C.

1. Saturated sodium chloride solution.
2. Sodium Carbonate - Sodium bicarbonate solution (pH10).
3. Potassium biphthalate buffer solution (pH4).
4. Distilled water.
5. Sodium hydroxide (pH12).

Specimen was removed from test after 30, 90, 180, and 270 days. The FRP cladding was removed and the base steel examined for corrosion.

Permeance/Cladding Dissolution Test - Glass dishes containing the five solutions indicated above were fitted and sealed to the sample coupons of the cladding material prepared for this test. The assemblies were then weighed to determine initial weight, inverted so that the solutions contacted the jacket material and placed in a chamber maintained at 38°C. The assemblies were reweighed periodically for a period of 180 days to check for loss due to dissolution or permeation.

RESULTS

After 270 days at 38°C there was no sign of corrosion of the base steel or evidence of permeation of the test solutions through the coupons as a result of the corrosion evaluation test. The samples subjected to the permeance/cladding dissolution test at 38°C exhibited less than 1 percent weight loss.

IDENTIFICATION TESTS:

METHOD

Ash Content Test - Weighed specimens of the laminated materials were placed in porcelain crucibles and burned for approximately 15 min. Upon completion of the burning, the crucibles were placed in a muffle furnace maintained at 800°C (1472°F) until constant weights were obtained. The percent ash was then calculated.

Specific Gravity Test - Specimens of the laminate materials were weighed first in air and then in distilled water at a temperature of 24°C. From the weight of the specimens and their loss of weight in water, the specific gravities were then calculated.

Qualitative Infrared Analysis - An infrared spectra of the resin material was obtained by means of a double beam automatic recording infrared spectra photometer having a sodium chloride optical system.

Thermogravimetric Analysis - A thermogram of the material was obtained by means of a thermoanalyzer and a thermogravimetric module. Sampling methods and instrument settings used in obtaining the thermogram are recorded in the appropriate section of the thermogram record.

RESULTS

Ash Content - The average percent ash content was found to be 38.427% for UL 1746 and 41.607 for UL 1316.

Specific Gravity - The average specific gravity was found to be 1.491 for UL 1746 and 1.537 for UL 1316.

Qualitative Infrared Analysis - The reference date is N03-25-18.

Thermogravimetric Analysis - The thermogram is considered representative of the composite sample submitted. The thermogram is dated N03-26-18.

Differential Scanning Calorimetry - Thermal curve dated N03-27-18.

TABLE I

Resistance to external and internal fluids test						
	30 Day Results					
	Avg. Izod Impact	Percent Retention	Avg. Flexural Strength	Percent Retention	Tangent Modulus	Percent Retention
Conditioning						
As Received 1T	31.26	-	34513	-	1481905	-
As Received 2T	31.42	-	-	-	-	-
Air Oven 1T	32.91	105	35032	102	1464835	98.8
Premium leaded gasoline	35.1	118	38788	108	1575019	109
Regular unleaded gasoline	31.26	100	35173	98	1292479	89
No. 2 fuel oil	29.34	93	35367	99	1469607	101
ASTM Reference Fuel C	33.99	108	36349	102	1374717	95
No. 6 fuel oil	29.42	94	33506	94	1392425	96
Sulfuric acid (ph = 3)	36.23	115	31800	89	1431862	99
Saturated sodium chloride	34.35	109	33649	94	1374886	95
Toluene	30.62	98	35201	98	1311338	91
Distilled water	31.69	101	34830	97	1473077	102
Hydrochloric acid (1 percent)	31.57	101	36710	103	1560364	108
Hydrochloric acid (5 percent)	29.15	93	38210	107	1531280	106
Nitric acid (1 percent)	30.6	97	34476	96	1414861	98
Nitric acid (5 percent)	32.7	104	32684	91	1453252	100
Sodium carb/sodium bicarb (pH 10)	35.73	114	32307	90	1262299	87
Sodium hydroxide solution (pH 12)	37.34	119	34136	95	1436674	99
30% Ethanol/70% Ref. Fuel C	34.41	110	33508	94	1244420	86
15% Ethanol/85% Ref. Fuel C	33.5	107	33876	95	1235060	85
10% Ethanol/90% Ref. Fuel C	30.36	97	36504	102	1355471	94
50% Ethanol/50% Ref. Fuel C	28.33	90	30911	86	1110724	77
Ethanol (100%)	34.49	110	34154	102	1351751	93
15% Methanol/85% Ref. Fuel C	31.87	101	38385	107	1391883	96
50% Methanol/50% Ref. Fuel C	42.77	136	33843	95	1258190	87
Methanol (100%)	34.34	109	33708	94	1243767	86
500 hr. U.V.	32.14	103	37831	110	1608161	109
1000 hr. U.V.	29.27	94	36448	106	1620478	109

TABLE II

Resistance to external and internal fluids test						
90 Day Results						
	Avg. Izod Impact	Percent Retention	Avg. Flexural Strength	Percent Retention	Tangent Modulus	Percent Retention
Conditioning						
Air Oven 1T	32.79	105	36887	102	1553110	99
Premium leaded gasoline	35.02	112	37976	106	1503080	109
Regular unleaded gasoline	33.8	100	37039	98	1479643	89
No. 2 fuel oil	33.2	93	38357	99	1545594	101
ASTM Reference Fuel C	32.18	108	32999	102	1276351	95
No. 6 fuel oil	31.01	94	33522	94	1236325	96
Sulfuric acid (ph = 3)	30.27	115	37762	89	1473787	99
Saturated sodium chloride	30.27	109	37421	94	1458886	95
Toluene	33.03	98	34588	98	1222673	91
Distilled water	30.88	101	37589	97	1555379	102
Hydrochloric acid (1 percent)	28.25	101	33651	103	1440122	108
Hydrochloric acid (5 percent)	31.88	93	38683	107	1496538	106
Nitric acid (1 percent)	30.06	97	37810	96	1630945	98
Nitric acid (5 percent)	29.43	104	33399	91	1375708	100
Sodium carb/sodium bicarb (pH 10)	25.99	114	35416	90	1471660	87
Sodium hydroxide solution (pH 12)	31.36	119	35342	95	1376354	99
30% Ethanol/70% Ref. Fuel C	31.7	110	39277	94	1479651	86
15% Ethanol/85% Ref. Fuel C	30.88	107	32768	95	1217916	85
10% Ethanol/90% Ref. Fuel C	32.74	97	38397	102	1345215	94
50% Ethanol/50% Ref. Fuel C	28.45	90	30251	86	1152660	77
Ethanol (100%)	28.66	110	35956	95	1309726	93
15% Methanol/85% Ref. Fuel C	32.07	101	35239	107	1355666	96
50% Methanol/50% Ref. Fuel C	42.47	136	30251	95	1201283	87
Methanol (100%)	33.88	109	30106	94	1289780	86

TABLE II

Resistance to external and internal fluids test						
	180 Day Results					
	Avg. Izod Impact	Percent Retention	Avg. Flexural Strength	Percent Retention	Tangent Modulus	Percent Retention
Conditioning						
Air Oven	37.56	120	36679	106.3	1633424	110.2
Premium leaded gasoline	33.1	105.4	40504	113.1	1460677	100.8
Regular unleaded gasoline	33.77	107.5	41289	115.3	1654792	114.2
No. 2 fuel oil	28.35	90.3	30865	86.2	1282898	88.5
ASTM Reference Fuel C	27.87	88.7	37949	106	1509886	104.2
No. 6 fuel oil	35.94	114.4	35813	100	1465460	101.1
Sulfuric acid (ph = 3)	40.81	129.9	32008	89.4	1410505	97.3
Saturated sodium chloride	24	76.4	38137	106.5	1510618	104.3
Toluene	36.19	115.2	33075	92.4	1215098	83.9
Distilled water	29.73	94.6	32767	91.5	1349105	93.1
Hydrochloric acid (1%)	39.21	124.8	34737	97	1534065	105.9
Hydrochloric acid (5%)	30.84	98.2	33825	94.5	1445638	99.8
Nitric acid (1 percent)	28.48	90.7	30582	85.4	1329758	91.8
Nitric acid (5 percent)	30.95	98.5	30174	84.3	1309064	90.3
Sodium carb/sodium bicarb (pH 10)	30.38	96.7	34380	96	1366328	94.3
Sodium hydroxide solution (pH 12)	30.38	96.7	32817	91.7	1434205	99
30% Ethanol/70% Ref Fuel C	35.43	112.8	34116	95.3	1268401	87.5
15% Ethanol/85% Ref Fuel C	33.54	106.8	33450	93.4	1221451	84.3
10% Ethanol/90% Ref Fuel C	30.16	96	35469	99.1	1241713	85.7
50% Ethanol/50% Ref Fuel C	32.34	102.9	29732	83	1052264	72.6
Ethanol (100%)	26.42	84.1	33184	92.7	1173145	81
15% Methanol/85% Ref Fuel C	34.59	110.1	37841	105.7	1395463	96.3
50% Methanol/50% Ref Fuel C	34.78	110.7	28681	80.1	1066159	73.6
Methanol (100%)	39.13	124.6	31830	88.9	1265509	87.3

TABLE II

Resistance to external and internal fluids test						
	270 Day Results					
	Avg. Izod Impact	Percent Retention	Avg. Flexural Strength	Percent Retention	Tangent Modulus	Percent Retention
Conditioning						
Premium leaded gasoline	34.1	108.5	37953	106	1414681	97.6
Regular unleaded gasoline	29.4	93.6	37996	106.1	1415731	97.7
No. 2 fuel oil	31.1	99	35605	99.5	1434058	99
ASTM Reference Fuel C	33.11	105.4	42706	119.3	1621765	111.9
No. 6 fuel oil	28.79	91.6	30481	85.1	1314389	90.7
Sulfuric acid (ph = 3)	29.11	92.7	30976	86.5	1322622	91.3
Saturated sodium chloride	26.71	85	32609	91.1	1349271	93.1
30% Ethanol/70% Ref. Fuel C	30.05	95.6	34417	96.1	1273714	87.9
15% Ethanol/85% Ref. Fuel C	34.3	109.2	32867	91.8	1175338	81.1
10% Ethanol/90% Ref. Fuel C	32.36	103	37724	105.4	1309603	90.4
50% Ethanol/50% Ref. Fuel C	34.8	110.8	30227	84.4	1207699	83.4
Ethanol (100%)	31.8	101.2	35131	98.1	1206085	83.2
15% Methanol/85% Ref. Fuel C	33.42	106.4	36714	102.5	1367809	94.4
50% Methanol/50% Ref. Fuel C	44.25	140.9	23673	66.1	993146	68.5
Methanol (100%)	33.79	107.5	23084	64.5	868502	59.9

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the product(s) evaluated comply with the applicable requirements in UL Standard for Safety for Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures, UL 1316, 2nd edition, revisions through and including May 12, 2006, and therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

CONCLUSION

Samples of the product covered by this Report have been found to comply with the requirements covering the category and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the UL Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories LLC. Only those products which properly bear the UL Mark are considered as Listed by Underwriters Laboratories LLC Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories LLC (UL) or any authorized licensee of UL.

Report by:

Reviewed by:

WAYNE DOVERSBERGER
Senior Staff Engineer

TIM CREWS
Staff Engineer