AC Plastiques

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DEPT. OF TRANSPORTATION DOCKETS

99 AUG 27 PM 12: 2

August 19, 1999

RSPA-99-6179-1

99 AUG 20 PM 2:08
DOT/RSPA/OHMS EXEMPTIONS & APPROVALS

Associate Administrator for Hazardous Materials Safety,
Research and Special Programs Administration,
U. S. Department of Transport
400 th Street, S. W. , Room 8436
DHM-3 1
Washington DC, Washington
· 20590-0001

Attention: Mrs. Sandra Cureton

Project - Fiber reinforced plastic Highway vessels
Application for exemption

Dear Mrs,

We are in the process of manufacturing FRP (Fiber Reinforced Plastics) highway cargo tanks for transportation of class 8 materials. In order for our cargo tanks to be allowed in the United States, we must be granted the exemption of specific articles in the code of Federal Regulation CFR 49. We are therefore sending you our application for exemption according to article 107.105 of CFR 49.

A - Genera!

2) Address : AC Plastiques Canada (1992) inc.
13 9 5, Montee Chenier
Les Cedres, Quebec
J7T 1L9
Contact : Martin Ouellet

3) Agent for services : Design Plastic Systems
2541 General Armistead road
Norristown, PA 19403
Tel. : 1(800)-542-8265
Contact : Mr. Rick Shaw

4) AC Plastiques Canada inc. at the above address is the only manufacturer and is therefore the only applicant for the exemption.

B - Confidentiality

AC Plastiques Canada does not requests a confidential treatment.

C - Description of exemption proposal

1) Specific regulation from which the applicant seeks relief :

The specific articles from which we are seeking relief are the following : 172.102 (c), 178.345-2, -3, -4, -7, -14(b), -15 and 178.3481 and -2.

2) Mode of transportation : Public highway

3) Detailed description of the proposed exemption :

As mentioned above, we are in the process of manufacturing FRP (Fiber Reinforced Plastics) highway cargo tanks for transportation of class 8 materials. We have acquired a certificate of registration (see app. 2) which enables us to test, retest, repair, manufacture and inspect FRP (Fiber Reinforced Plastics) highway cargo tanks model TC 3 12 in Canada in accordance with CSA standard B620-87 which is the Canadian standard for such vessels. That model of cargo tank is the Canadian equivalent to the DOT 412. However, in order for our cargo tanks to be legal in the US, they must be fabricated under the regulations specified in CFR 49, article 178.345 & 178.348. The design standard applicable to those articles is Section VIII, division 1 of the ASME code. That standard deals with pressure vessels fabricated out of steel or aluminum and can therefore not be used to design an FRP cargo tank. For this reason, we will use Section X of the ASME code which deals with FRP pressure vessels as a design standard when considering the maximum allowable working pressure (MAWP). All other non FRP components on the cargo tanks such as pads, craddles or other supports will be considered in accordance with appendix G of section VIII, division 1 of the ASME code. The determination the effective stress in the shell in both normal and extreme dynamic loading conditions will be based on the equations found in articles 178.345-3(c) 1 & 2. The effective stresses at any point in the structure of the cargo tanks shall in no case be more than l/l 0 the mechanical actual mechanical properties.

4) Duration of the exemption : Two (2) years

5) Statement outlining the applicant's basis for seeking relief from compliance :

As mentioned in point 3, the reason for which we are seeking relief from the articles mentioned in point 1 is that they mainly deal with a steel structural design and is therefore not applicable to our case. We will prove in this report (app. 1) that our design is at least equivalent to the requirements established in those sections.

6) Emergency processing : n/a

7) Identification and description of the hazardous materials planned for transportation :

The following is a table contaqining a list of the hazardous materials planned for transportation :

Table 1. Packaging and hazardous materials (49 CFR 172.101)

Hazardous Materials description and proper shipping name	Hazard class number	Identification number	Packing Group
Battery fluid, acid	8	UN2796	II
Corrosive liquids	8	UN1760	I
Fluoroboric acid	8	UN1775	II
Fluorosilicic acid	8	UN1778	II
Hydrobromic acid, with more than 49% hydrobromic acid	8	UN1788	II
Hydrobromic acid, with not more than 49 percent hydrob romic acid	8	UN1788	II
Hydrochloric acid	8	UN1789	II
Hydrochloric acid and sulfuric: acid mixtures	8	UN1786	II
Hydrofluoric acid, with not more than 60% strength	8	UN1790	II
Hypochlorite solutions	8	UN1791	II
Potassium hydroxide, solution	8	UN1814	II
Sodium hydroxide solution	8	UN1824	II
Sulfuric acid with not more than 5 1% acid	8	UN2796	II
Any other class 8 materials authorized to be transportated in a DOT specification 412 cargo tank motor vehicle that are compatible with the material of construction of the cargo tank	8	Various	1, II or III

8) Description of packaging to be used in conjunction with the requested exemption : n/a

9) Alternative packaging : Refer to app. 1 & 2.

D - Justification of exemption proposal

1) Information describing all relevant shipping and incident experience of which the applicant is aware that relates to the application :

FRP highway cargo tanks have been manufactured for several years in North America. Canadian companies who fabricate FRP cargo tanks such as TankCon and CPF Dualam have been granted exemptions (DOT-E 10878 & DOT-E 11565 respectively). We in effect want to fabricate the same types of cargo tanks and therefore see no reason why we should not be granted the exemption in a relatively short laps of time.

2) A statement identifying any increased risk to safety :

The fabrication of FRP highway tanks will in no way increased risks of accidents.

3) Substantiation, with applicable analyses, data or test results, that the proposed alternative will achieve a level of safety at lest equal to that required by the regulation from which the exemption is sought.

49 CFR article 178.345-3 (a) states that the maximum calculated design stress at any point in the cargo tank wall may not exceed the maximum allowable stress value prescribed in section VIII of the ASME code, or 25 percent of the tensile strength of the material used at design conditions. We will do better than that. We will demonstrate in our design proposal (see app. 1) that the maximum calculated design stress at any point in the cargo tank will not exceed 10 percent of the tensile strength of the material used at design conditions.

Should you. require further information, please do not hesitate to contact us.

Yours truly,

Martin buellet, ing. stag.
Estimator

APPENDIX 1
DESIGN PROPOSAL

INTRODUCTION

AC Plastiques Canada(1992) inc., as been a manufacturer of anti-corrosive products such as tanks and pipes for over 30 years. We are now in the process of manufacturing an FRP (fiberglass reinforced plastic) highway cargo tank which will be used for the transportation of hazardous materials class 8.

TANK TYPE

The cargo tank will be similar to type DOT 412.

MATERIALS

Fiberglass reinforced plastic will be used as an alternative material for tank fabrication. Thermosetting resins are used to chemically withstand the solution being stored in the tank. More particularly, Derakane epoxy vinylester resins manufactured by Dow Chemicals are used because of their outstanding corrosion resistance properties. In the case of a more severe corrosive environment, thermoplastic liners such as PVC will be used to chemically withstand the solution stored in the tank.

Corrosion liner

A corrosion allowance of at least l/&inch is used as a chemical barrier throughout the tank's shell and heads. The corrosion liner, being the surface most exposed to corrosive agents, is composed from a surface rich in resin. The reinforcements used in this surface layer are veils made of glass or synthetic materials. This layer is followed by a lamination made of glass with mat type (cut glass) chopped strands or chopped strands applied by glass / resin projection.

Structural layer

The structural layer is responsible for withstanding the hydrostatic loads, as well as all other structural load combinations that might occur (including internal or external pressure, loads on support rings, loads from attachments such as ladder clips, snow loads, wind loads, etc.).

This structural layer is made up of alternating mat and woven roving for the tank's heads, which is manufactured by contact molding, with a glass content ranging from 40 to 50%. The structural layer of the shell is made up of continuous roving deposited through the filament winding process, to achieve a glass content ranging from 60 to 70%.

Exterior coat

According to the nature of the corrosive agent and the operating conditions, exterior casings such as a flame-resistant resin can be applied to the tank.

ATTACHMENT FITTINGS AND OPENINGS

All flanged nozzles, manways and other attachments are fabricated of the same materials as the tank, consisting of an internal corrosion liner and a structural layer using the hand lay-up procedure. The flanges are designed in accordance to the ASME Boiler & pressure vessel code, section X.

The reinforcement and attachment laminates used to install all nozzles and manways are made by hand lay-up and consist of an overlay of mats and woven roving. The reinforcement thickness is given by the specifications of the ASME Boiler & pressure vessel code, section X.

FRP STRUCTURAL DESIGN PROPOSAL OF A CARGO TANK MODEL TC-312 (DOT 412) ACCORDING TO THE ASME SECTION X STANDARD

CONSTANTS

$El := 2.0 \cdot 10^{6} \cdot psi$	Tensile modulus in the axial direction
$E2 := 2.5 \cdot 10^{6} \cdot psi$	Tensile modulus in the circumferential direction
$SU := 20000 \cdot psi$	Ultimate tensile strength in the ellipsoidal heads

VARIABLES

$Di := 72 \cdot in$	Inside diameter of the cargo tank
$P := 40 \cdot psi$	Internal design pressure (MAWP)
$W := 65000 \cdot lbf$	Approximate vessel weight full of liquid with specific gravity of 1
$FS := 10$	Minimum safety factor of the FRP structure

DESIGN HYPOTHESIS

I- The design will be made according to the ASME Boiler & Pressure vessel Code, section X.

2- The cargo tank will be entirely sitting on a steel trailer on wheels. The vertical reaction at the suspension assembly will be absorbed by the trailer. No stress due to the vertical reaction at the suspension assembly will therefore be induced on the FRP cargo tank.

3- The heads will be integrally laminated with the shell

4- The cargo tank design must include calculation of stresses generated by the MAWP, the weight of the lading and the effect of temperature gradients resulting from lading and ambient temperature extremes.

NORMAL OPERATING LOADINGS

Article 178.3453 c (1) illustrates the stress calculation on the cargo tank due to normal operating loadings. The effective stress at any point on the tank must be determined by the following equations :

$$S1 := 0.5\cdot(Sy + Sx) + \left(0.25\cdot(Sy - Sx)^2 + Ss^2\right)^{0.5}$$

$$s2 := 0.5\cdot(Sy + Sx) - \left(0.25\cdot(Sy - Sx)^2 + Ss^2\right)^{0.5}$$

Where

S is the effective stress at any given point

Sy is the circumferential stress generated by the MAWP

Sx is the net longitudinal stress

Ss is the shear stress

CYLINDRICAL SECTION

FINDING Sy, Sx AND Ss

CIRCUMFERENTIAL STRESS (Sy)

The thickness in the shell is found by using equation RD-1171 .1 (b), Cylindrical shells under uniform internal pressure : .

$$t2 := \frac{P\cdot Di}{2\cdot(0.001\cdot E2 - 0.64')}$$

$t2 = 0.582\,\text{in}$ Required thickness of the shell based on the MAWP in the circumferential axes and a safety factor of 10: 1.

The circumferential stress (Sy) in the cylindrical section is found by the following equation derived from the above equation.

$$Sy := \frac{P\cdot Di}{2\cdot t2} + 0.6\cdot P$$

$Sy = 2.5\cdot 10^3\,\text{psi}$ Circumferential stress generated by the MAWP

LONGITUDINAL STRESS (SX)

The total longitudinal stress (Sx) in the cylindrical section is the summation of the following longitudinal solicitations :

1 - Solicitation by the MA WP and weight of liquid

The thickness in the shell is found by using equation RD-1171 .1 (a), Cylindrical shells under uniform internal pressure : .

$$t1 := \frac{P \cdot Di}{2 \cdot (0.001 \cdot E1 - 0.64)}$$

$tl = 0.729 \cdot in$ Required thickness of the shell based on the MAWP in the axial axes and a safety factor of 10:1.

The axial stress (Sxl) due to the MAWP is found by the following equation derived from the above equation.

$$Sx1 := \frac{P \cdot Di}{4 \cdot t1} + 0.6 \cdot P$$

$Sxl = 1.012 \cdot 10^3 \cdot psi$ Axial stress generated by the MAWP

2 - Tensile or compressive stress resulting from acceleration or deceleration

The longitudinal tensile or compressive stress (Sx2) in the cylindrical section caused by the acceleration or deceleration of the cargo tank is equal to 0.35 times the vertical reaction at the suspension assembly, applied at the road surface, and
as transmitted to the cargo tank wall through the suspension assembly of a trailer during deceleration. However, as mentioned in the design hypothesis, the cargo tank will be fully supported by the steel trailer. Therefore, SX2 = 0.

3 - Tensile or compressive stress generated by the bending moment resulting from normal operating accelra tive force.

The longitudinal tensile or compressive stress (Sx3) in the cylindrical section caused by the bending moment is equal to 0.35 times the vertical reaction at the suspension assembly of the trailer. However, as mentioned above, the vertical reaction at the suspension assembly is 0. There is therefore no bending moment and SX3 = 0.

Summation of the longitudinal solicitations

$$sx := Sx1 + sx2 + sx3$$

$Sx = 1.012 \cdot 10^3 \cdot psi$ Total longitudinal stress

SHEAR STRESS (Ss)

The total shear stress (Ss) in the cylindrical section is the summation of the following shear solicitations :

I - Static shear

The static shear stress (Ssl) results from the vertical reaction at the suspension assembly of the trailer. The vertical reaction at the suspension is zero so Ssl = C

***2 - Vertical* shear**

The vertical shear stress (Ss2) results from normal operating accelative force equal to 0.35 times the vertical reaction at the suspension assembly of the trailer. The vertical reaction at the suspension is zero so Ss2 = 0.

3 - Lateral shear

The lateral shear stress (Ss3) results from normal operating lateral accelerate force equal to 0.2 times the vertical reaction at the suspension assembly of the trailer. The vertical reaction at the suspension is zero so Ss3 = 0.

4 - Torsional shear

The torsional shear stress (Ss4) is based on the lateral force. The lateral force induced on the cargo tank being 0, Ss4 = 0.

Summation of the shear solicitations

$$ss := Ss1 + ss2 + ss3 + ss4$$

$Ss = 0 \cdot psi$ Total shear stress

<u>FINDING S1 AND S2</u>

$$S1 := 0.5 \cdot (sy + Sx) + (0.25 \cdot (sy - Sx)^2 + Ss^2)^{0\ 5}$$

$Sl = 2.5 \cdot 10^3 \cdot psi$ Maximum normal stress

$$s2 := 0.5 \cdot (sy + Sx) - (0.25 \cdot (sy - Sx)^2 + Ss^2)^{0\ 5}$$

$S2 = 1.012 \cdot 10^3 \cdot psi$ Minimum normal stress

The maximum shear in the shell is found by the following equation :

$$\tau max := \frac{1}{2} \cdot (S1 - S2)$$

$\tau max = 744 \cdot psi$ Maximum shear in the shell

ELLIPSOIDAL SECTION

The thickness in the ellipsoidal heads is found by using equation RD-1173.1 (a), Heads under uniform internal pressure : .

$$th := \frac{P \cdot Di}{2 \cdot (0.001 \cdot E1 - 0.6 \cdot P)}$$

$th = 0.729 \circ in$ Required thickness of the heads based on the MAWP.

The circumferential stress (Sa) at any point in the ellipsoidal section is found by the following equation derived from the equation shown in paragraph RD-1173.1 (a) :

$$Sa := \frac{P \cdot Di}{2 \cdot th} + 0.6 \cdot P$$

$Sa = 2 \cdot 10^3 \circ psi$ Maximum stress in the ellipsoidal heads generated by the MAWP.

SAFETY FACTOR IN THE TORISPHERICAL SECTION

$$SF2 := \frac{Su}{Sa}$$

$SF2 = 10$ Minimum safety factor in the heads

CONCLUSION

The purpose of this design proposal was to is analyze the stress conditions on ar FRP cargo tank submitted to a 40 psi internal pressure. Analysis was made in accordance with article 178.3453 of 49 CFR and the Boiler and pressure vessel code, section X. Results show that a 3/4" thick cylindrical and ellipsoidal section will provide a safety factor of 10 to 1 at any point on the cargo tank and therefore exceeds the requirements in 49 CFR.

998 ASME
3OILER &
PRESSURE VESSEL CODE

N INTERNATIONAL CODE

X

FIBER-REINFORCED PLASTIC PRESSURE VESSELS

The American Society of Mechanical Engineers

RD.1165 Resin-Fiber Ratio

The percent fiber for both vessel parts and test coupons shall be within the range specified by the Procedure Specification. The fiber content, by weight, of the test coupon shall be between 90% and 100% of the minimum fiber content specified for the vessel part.

RD-1166 Characterization of Laminates

Filament-wound laminates shall be defined in terms of wind angle, number of plies, type of fiber with manufacturer's designation, type of resin with manufacturer's designation, and resin-fiber weight ratio as specified in the Procedure Specification.

Contact-molded laminates shall be defined in terms of type of fiber with manufacturer's designation, type of resin with manufacturer's designation, fiber orientation of each ply with respect to longitudinal axis of vessel or vessel part, number and sequence of various fiber configurations, and resin-fiber weight ratio as specified in the Procedure Specification.

RD-1170 DESIGN RULES — METHOD A

RD-1170.1 Scope. Laminate strength is a function of the loading combinations. The design equations specified in Method A require that the directional dependency of the laminate be considered and used. In addition, the stresses and strains of any combination of loads listed in RD-120 or the Design Specification must be computed when such loads are expected to occur simultaneously during operation or testing. Engineering constants used with the various equations must be consistent with the material axis under consideration. The size or thickness of vessel parts shall be such that the imposed strain does not exceed the allowable strain for the laminate in that axis.

RD-1170.2 Design Parameters

(a) At each point of the vessel and for each combination of load, the absolute value of membrane strain in any direction shall not exceed 0.001.

(b) Elastic constants at design temperature shall be used for calculations.

(c) Elastic constants shall be determined as specified in RD-1163.

RD-1171 Thickness of Shells

The thickness of vessel shells under internal pressure shall not be less than that computed by the following formulas. In addition, all of the loads listed in RD-120 must be provided for when such loads are specified in the Design Specification. Rules for design of vessel shells under this Section are limited to cylindrical and spherical shells. Any shell or nozzle designed under this Article shall have a minimum structural thickness of ¼ in. (6 mm).

RD-1171.1 Cylindrical Shells Under Uniform Internal Pressure. The minimum thickness of cylindrical shells under internal pressure shall be the greater of (a) or (b) below, but not less than ¼ in. (6 mm).

(a) Longitudinal Stress

$$t_1 = \frac{PR}{2(0.001E_1 - 0.6P)}$$

(b) Circumferential Stress

$$t_2 = \frac{PR}{0.001E_2 - 0.6P}$$

where

E_1 = tensile modulus in longitudinal direction
E_2 = tensile modulus in circumferential direction
P = internal pressure
R = inside radius
t_1 = structural wall thickness for longitudinal stress
t_2 = structural wall thickness for circumferential stress

RD-1171.2 Spherical Shells Under Internal Pressure. The minimum structural thickness of spherical shells under internal pressure shall be computed as follows:

$$t = \frac{PR}{2(0.001E - 0.6P)}$$

where

E= lesser of E_1 or E_2, where
E_1 = modulus in meridional direction
E_2 = modulus in circumferential direction
P = internal pressure
R = inside radius
t = thickness of structural laminate

RD-1172 Vessel Shells Under External Pressure

Rules for design of shells under external pressure given in this Section are limited to cylindrical shells, with or without stiffening rings, and spherical shells.

RD-1172.1 Cylindrical Shells Under External Pressure. The required minimum thickness of a cylindrical

RD-1173 Thickness of Heads

RD-1173.1 Thickness of Heads Under Internal Pressure. The required thickness of vessel heads under internal pressure shall be computed by the appropriate formula [(a) or (b) below].

(a) Ellipsoidal Head

$$t = \frac{PD}{2(0.001E - 0.6P)}$$

(b) Hemispherical Head

$$t = \frac{PR_s}{2(0.001E - 0.6P)}$$

where

D = inside diameter

E = design modulus, defined as the lower of E_1 and E_2, where

E_1 = effective tensile modulus in meridional direction

E_2 = effective tensile modulus in circumferential direction

P = internal pressure

R_s = inside spherical radius

t = head wall thickness

RD-1173.2 Thickness of Heads Under External Pressure. Rules for design of end closures with pressure on the convex side given in this Section are limited to: hemispherical heads, or ellipsoidal heads with major-to-minor axis ratios not to exceed 2 to 1.

(a) Hemispherical Heads. The required thickness of a hemispherical lhead having pressure on the convex side shall be determined in the same manner as outlined in RD-1172.2 for determining the thickness of a spherical shell.

(b) Ellipsoidal Heads. The procedure for determining the required thickness of an ellipsoidal head under external pressure is based on the analogy between the maximum allowable compressive stress in the crown region of a head having an equivalent crown radius R_o, and the maximum allowable compressive stress in a sphere of the same radius. The radius of curvature of an ellipsoidal head varies along the meridian, allowing an average or equivalent radius based on the major-to-minor axis ratio to be used. A table of factors K_o for determining the equivalent spherical radius is given in Table RD-1173.2.

The required thickness of an ellipsoidal head under external pressure shall be determined in the same manner as outlined in RD-1172.2 using the following equation:

TABLE RD-1173.2
VALUES OF SPHERICAL RADIUS FACTOR K_o FOR ELLIPSOIDAL HEADS WITH PRESSURE ON CONVEX SIDE

Major-to-Minor Axis Ratio	K_o
2.0	0.9
1.8	0.81
1.6	0.73
1.4	0.65
1.2	0.57
1.0	0.50

$$P_A = \frac{0.41\,(E/F)\,(t)^2}{\sqrt{3(1 - \nu_1 \nu_2)}\,(K_o\,D_o)^2}$$

where

D_o = outside radius of crown portion of head

K_o = factor depending on ellipsoidal head proportions

RD-1174 Openings in Shells and Heads

RD-1174.1 General. Openings in shells and heads of Class II vessels designed using Method A shall be restricted to those formed by the intersection of the shell or head with a circular cylindrical nozzle neck. The ratio of the longest chord length of the opening to the shortest chord length shall not exceed 2.

(a) For vessel diameters 48 in. (1200 mm) and less, openings shall not exceed 50% of the vessel diameter.

(b) For vessel diameters greater than 48 in. (1200 mm), openings shall not exceed 24 in. (610 mm).

RD-1174.2 Reinforcement of Openings and Nozzle Attachments. Attachment of nozzles to vessel shell or head requires that consideration be given to both (a) the reinforcement of the opening and (b) the secondary overlay that attaches the nozzle to the shell. The requirements for both these considerations can be incorporated into the same overlay provided the laminate comprising the cutout reinforcement on the shell is projected onto and becomes part of the secondary overlay attaching the nozzle to the shell or head.

The reinforcing pad around a nozzle opening and the projection of this overlay onto the nozzle serve two purposes — provide a reinforcing pad of sufficient thickness and length to reduce the stresses at the opening to an acceptable level, and provide sufficient shear area to secure the nozzle to the vessel.

NOTE: The secondary bond strength in shear for design purposes shall not exceed 1000 psi.

AVAILABILITY OF NON-SCANNABLE ITEMS

Research & Special Programs Administration
RSPA - 99- 6180 - 1

Document Number

Old Docket Number, If any

AC - PLAStique - Drawings

Name / Description of Item(s) non-scannable

MAY BE VIEWED IN **/Room 8421**

See Barbara Alston - 65046

Agency / Office Name / Room Number / Contact Person (if any)

during the hours of 8:45 am - 4:45 pm

(word7.0;\ R:\nscanitm)

APPENDIX 2
CANADIAN CERTIFICATION AND QUALITY CONTROL PROGRAM FOR HIGHWAY CARGO TANKS

Transport Canada
Safety and Security

Dangerous Goods

Transports Canada
Sécurité et sûreté

Marchandises dangereuses

Certificate of Registration

AS A FACILITY FOR THE TEST, RETEST, REPAIR, MANUFACTURE OR INSPECTION OF HIGHWAY TANKS AND PORTABLE TANKS IN ACCORDANCE WITH CSA STANDARD B620-87

COMPANY NAME: AC plastiques Canada Inc.

COMPANY ADDRESS: 1395 Montee Chenier, Les Cedres QC J7T IL9

CORPORATE OFFICER RESPONSIBLE FOR COMPLIANCE:

NAME: Eric Seguin

TITLE: Superviseur assurance qualité

The facility located at: 1395 Montee Chenier Les Cedres, Quebec

is hereby registered as a recognized facility for the functions listed below:

SPECIFICATON OF TANK	VISUAL INSPECTION	HYDROSTATIC RETESTING	PNEUMATIC RETESTING	REPAIR	MANUFACTURE	OTHER
TC 306						
TC 307						
TC 312	✓	✓		✓	✓	
TC 350						
TC 3301331						
TC 338/341						
TC 51						
TC 56/57						
TC GO						
TC Type 1						
TC Type 2						
TC Type 3						
OTHER						

The registration is only applicable to the above facility and only for the functions indicated above when carried out on the specification tanks and/or their US equivalents.

LIMITATIONS TO THIS CERTIFICATE:

Fabrication et reparation de citernes en composite plastique seulement.

EXPIRY DATE: OF THIS REGISTRATION:

Unless otherwise notified, this registration is valid until the date of expiry indicated below. A new application must be submitted where there is any substantive change in the information given on the application form filed with Transport Canada. Application for renewal must be made by registered mail at least three months before expiry.

DATE OF ISSIJE: 15 March 1999

DATE OF EXPIRY: 15 March 2002

REGISTRATION NUMBER: **25-** 318

JACQUES SAVARD, Director
Regulatory Affairs Branch
Transport Dangerous Goods Directorate

Canada

OUALITY CONTROL PROGRAM
CSA B620
Road Tanker TC-312

DOCUMENT # QC99(PROJECT#)

CUSTOMER :

PROJECT :

LOCATION :

ITEM NO. :

IN ACCORDANCE WITH : 1. ACNOR Quality Standards Z 299.4 (+)
2. CAN/CGSB 41.22M

AC Plastiques Canada inc.

Approved by: ____________________ Date : ____________________

Martin Ouellet

AC Plastiques Canada (1992) inc.
1395 Montée Chénier, Les Cèdres, Québec, J7T 1L9

Phone : (450) 455-3311
Fax. : (450) 452-2037

TABLE OF CONTENTS

AC Plastiques Canada (1992) inc.
1395 Montée Chénier, Les Cèdres, Quebec, J7T lL9

Phone : (450) 455-3311
Fax. : (450) 452-2037

1 - **VISUAL INSPECTION OF ROAD TANKER'S INNER WALLS**

Customer:	Customer's phone number:
Customer's address:	
Serial number:	Capacity:
DOT Spec. :	Design pressure:
Material:	Test pressure:
Cylinder wall thickness:	Fabrication date:
Heads wall thickness:	

DESCRIPTION	PASSED	FAILED
Chip (max. break dim. ¼")	0	0
Crack (none allowed)	0	0
Surface crazing, crack (max. length ¼")	0	0
Dry spot (max. dia. 9/16")	0	0
Foreign inclusion - metallic (None for electrical use, or max. dim 1/1 6", 1/ft)	0	0
Foreign inclusion - non-metallic (max. dim. 1/16", 1/ft)	0	0
Air bubble (max. dim. 1/16", 4/ft)	0	0
Wormhole (max. dim. ¼")	0	0
Wrinkle (max. length 1", depth less than 25% of wall thickness)	0	0
Burned (none allowed)	0	0
Pimple (max. dim. 1/8")	0	0
Resin pocket (max. dim. ½")	0	0
Scratch (max. length 1", max. depth 0.0 1")	0	0
Lack of fillout (max. dim. 3/8")	0	0

1 - VISUAL INSPECTION OF ROAD TANKER'S INNER WALLS

DESCRIPTION	PASSED	FAILED
Delamination - edge (max. dim. ¼")	0	0
Fracture (max. dim. 1/8")	0	0
Blister (max. dim. ¼", height from surface not to be outside tolerance)	0	0
Fish-eye (max. dim. ½")	0	0
Orange peel (max. dim. 1 1/8")	0	0
Pit - pinhole (max. dim. 1/32", depth less than 20% of wall thickness)	0	0
Porosity (max. of 50 pits by square inch)	0	0
Pre-gel (max. dim.. ½", height above surface not to be outside tolerance)	0	0
Resin rich edge (max. 1/32" form the edge)	0	0
Shrink-mark - sink (max. dia. 9/16", depth less than 25% of wall thickness)	0	0

AC Plastiques Canada (1992) inc.
1395 Montée Chénier, Les Cèdres, Quebec, J7T 1L9
Phone : (450) 455-3311
Fax. : (450) 452-2037

1 - **VISUAL INSPECTION OF ROAD TANKER'S INNER WALLS**

REPORT
CORRECTIVE MEASURES
FINAL ARRANGEMENT

INSPECTION

ACCEPTED 0

REFUSED 0

Date: ______________________

Q.A. Manager: ______________________

Verifier: ______________________

AC Plastiques Canada (1992) inc.
1395 Montée Chénier, Les Cèdres, Québec, J7T lL9

Phone : (450) 455-3311
Fax'. : (450) 452-2037

2 - VISUAL INSPECTION OF ROAD TANKER'S OUTER WALLS

Customer:	Customer's phone number:
Customer's address:	
Serial number:	Capacity:
DOT Spec.:	Design pressure:
Material:	Test pressure:
Cylinder wall thickness:	Fabrication date:
Heads wall thickness:	

DESCRIPTION	PASSED	FAILED
Tank		
Corroded spots	0	0
Cylindrical wall in good condition	0	0
Heads in good condition	0	0
Structural j 0 ints meet specification	0	0
Surface coat meet specification	0	0
Valves and piping		
Corroded spots	0	0
Gaskets in good condition	0	0
Valves in good condition	0	0
Piping in good condition	0	0
, Others components		
Corroded spots	❍	0
Man-hole in good condition	0	0
Descriptive plate meets specification	❍	❍
Attach straps well localized	0	0
Trailer meets specification	❍	❍

2 - VISUAL INSPECTION OF ROAD TANKER'S OUTER WALLS

REPORT
CORRECTIVE MEASURES
FINAL ARRANGEMENT

INSPECTION

ACCEPTED 0

REFUSED 0

Date:

Q.A. Manager: ____________________

Verifier: ____________________

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3 – LEAKING TEST

Customer:	Customer's phone number:
Customer's address:	
Serial number:	Capacity:
DOT Spec. :	Design pressure:
Material:	Test pressure:
Cylinder wall thickness:	Fabrication date:
Heads wall thickness:	

Test which allow us to detect leaks on road tanker's walls, valves and piping. The test should be 5 minutes long. The road tanker should be pressurized at 60 PSI.

DESCRIPTION	YES	NO
First Step – Seal the road tanker		
Sealed flange	0	0
Sealed manhole	0	0
Sealed valve	0	0
Second Step – Road tanker pressurized at 60 PSI	0	0
Third Step – Air leak detection		
On flanges level	0	0
On man-hole level	0	0
On valves level	0	0
On walls level	0	0
On piping level	0	0

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3 – LEAKING TEST

REPORT
CORRECTIVE MEASURES
FINAL ARRANGEMENT

INSPECTION

ACCEPTED 0

REFUSED 0

Date: ______________________

Q.A. Manager: ______________________

Verifier: ______________________

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4 – HYDROSTATIC AND PRESSURE TEST

Customer:	Customer's phone number:
Customer's address:	
Serial number:	Capacity:
DOT Spec.:	Design pressure:
Material:	Test pressure:
Cylinder wall thickness:	Fabrication date:
Heads wall thickness:	

Personnel that have a minimum of 5 years of experience in pressure and hydrostatic testing will fill up the road tanker to full capacity and pressurize it in order to detect leaks and structural weaknesses. The road tanker is then evaluated with the outer visual inspection document. When the test is done, a complete visual inspection is made on road tanker's wall. The valves are also re-tested.

DESCRIPTION	YES	NO
First Step – Seal the road tanker except the vent		
Sealed flange	0	0
Sealed marl-hole	0	0
Sealed valve	0	0
Second Step – Filling		
Fill the road tanker	0	0
Third Step – Pressurize the road tanker at 60 PSI during 10 minutes.	❍	0
Close the vent	0	0
Pressurize the road tanker	0	0
Fourth Step – Liquid leaks detection		
On flange	0	0
On man-hole	0	0
On valves	0	0

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4 – HYDROSTATIC AND PRESSURE TEST

DESCRIPTION	YES	NO
On wall	0	0
On piping	0	0
Fifth Step – Outside visual inspection	0	0
On man-hole	0	0
On valves	0	0
On walls	0	0
Sixth Step, – Empty the road tanker	0	0
Seventh Step – Inside visual inspection	0	0
Eighth Step – Safety valve re-testing	Approved	Rejected
Safety valve:	0	0
REPORT		
CORRECTIVE MEASURES		
FINAL ARRANGEMENT		

INSPECTION

ACCEPTED 0
REFUSED **0**

Date: ______________________

Q.A. Manager: ______________________

Verifier: ______________________

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5 – ROAD TANKER IDENTIFICATION PLATE AND CONFORMITY CERTIFICATE

Here is the information mentioned on the descriptive plate of the road tanker TC-3 12 according to the article 178.340.10 of the standards. Furthermore, a certificate of conformity should be given to the buyer (see section 6, final control). This certificate contains all descriptive plate information and hydrostatic test results.

Note : Before installation of the identification plate and the emission of the conformity certificate, the trailer is verified according to the standard B620-87 for the design (reversal and astern impact resistance) and the construction.

IDENTIFICATION PLATE

Vehicle's manufacturer:	Material:
Serial number:	Cvlinder wall thickness
Conformity certificate date of emission:	Head wall thickness
Capacity:	DOT spec.
Fabrication date:	Maximum weight (lbs .)
Pressure test date:	Filling debit max. (g.p.m.)
Design pressure (psig):	Test pressure:

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6 – PERIODIC TESTS ON LAMINATES

According to standard B620-87, paragraph 178.340-3c2, the following mechanical properties are validated each 6 months by test in accordance with ASTM standards. The fabrication method for the laminates, out of which the samples are made, is the same as for the road tanker walls.

PROPERTIES	RESULTS (PSI)
1- Tensile resistance – D638/D65 1	
2- Tensile elasticity modulus – D638	
3- Flexural resistance – D790	
4- Flexural elasticity modulus – D790	

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7 - FINAL CONTROL LIST

CUSTOMER :										PAGE 1 OF 2	
ROAD TANKER SERIAL NUMBER :		PROJECT :									
DRAWING # :		CONTRACT # :									
FABRICATION STANDARD :		PURCHASE ORDER # :									
INSPECTION SHOULD INCLUDE THE FOLLOWING ITEMS :		INSPECTED BY									
		AC PLASTIQUES' REPRESENTATIVE				CUSTOMER'S REPRESENTATIVE					
FABRICATION SCHEDULE	QTY	VER.	N-CONF.	LIBERATED	DATE	VER.	N-CONF.	LIBERATED	DATE		
DRAWING											
Revised by customer											
Revised by contractor											
Revised by AC Plastiques' engineering											
ROAD TANKER											
Total length without trailer											
Diameter											
Capacity											
Cylindrical wall thickness											
Torispheric wall thickness											
Corrosion liner											
Structural joints											
Man-hole localization											
Valves localization											
Draining hose											
Bolts											
Gaskets											
External coat											
GENERAL TESTS											
Tests on laminated samples each 6 months, according to standard B620.87, paragraph 178.340.3c2											

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7 - FINAL CONTROL LIST

CUSTOMER :										PAGE 2 OF 2
ROAD TANKER SERIAL NUMBER :		PROJECT :								
DRAWING # :		CONTRACT # :								
FABRICATION STANDARD :		PURCHASE ORDER # :								
INSPECTION SHOULD INCLUDE THE FOLLOWING ITEMS :		INSPECTED BY								
		AC PLASTIQUES' REPRESENTATIVE				CUSTOMER'S REPRESENTATIVE				
FABRICATION SCHEDULE	QTY	VER.	N-CONF.	LIBERATED	DATE	VER.	N-CONF.	LIBERATED	DATE	
Test on attach straps										
Test on valves before and after										
Hydrostatic										
TRAILER										
Dimensional inspection										
Hydrostatic										
FINAL INSPECTION										
According to customer's specifications										
Dimensional inspection										
Attaching point										
Axle										
Bumper										
FINAL INSPECTION										
Total length										
Road tanker hold down lugs on trailer										
Functional descriptive lights										
Valve after installation										
Road tanker identification										
QUALITY CONTROL RELEASE										
Identification plate copy										
Release copy										
Give conformity certificate to the buyer										

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