TP-304-03
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U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 304

Compressed Natural Gas (CNG) Fuel Container Integrity

ENFORCEMENT
Office of Vehicle Safety Compliance
Room 6111, NVS-222
400 Seventh Street, SW
Washington, DC 20590

OVSC LABORATORY TEST PROCEDURE NO. 304

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REVISION CONTROL LOG
FOR OVSC LABORATORY
TEST PROCEDURES

TP-304
Compressed Natural Gas (CNG) Fuel Container Integrity

TEST PROCEDURE		FMVSS 304		DESCRIPTION
REV. No.	DATE	AMENDMENT	EFFECTIVE DATE	
01	6 Feb 97	61FR47089	6 Sep 96	Original release signed by O.D.
02	28 Mar 02	65 FR 64626	30 Oct 00	General update, and addition of temperature measurement at Pressure Relief Device for information only.
03	8 Dec 03	65 FR 64626	30 Oct 00	Clarify data acquisition requirements for all tests; clarify all bonfire test requirements including addition of wind measurements.
04				
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1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contractor laboratories with Laboratory Test Procedures as guidelines for obtaining compliance test data. The data are used to determine if a specific vehicle or item of motor vehicle equipment meets the minimum performance requirements of the subject Federal Motor Vehicle Safety Standard (FMVSS). The purpose of the OVSC Laboratory Test Procedures is to present a uniform testing and data recording format, and provide suggestions for the use of specific equipment and procedures. If any contractor views any part of an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard (FMVSS) or observes deficiencies in a Laboratory Test Procedure, the contractor is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Every contractor is required to submit a detailed test procedure to the COTR before initiating the compliance test program. The procedure must include a step-by-step description of the methodology to be used. The contractor's test procedure shall contain a complete listing of test equipment with make and model number and a detailed check-off sheet. The list of test equipment shall include instrument accuracy and calibration dates. All equipment shall be calibrated in accordance with the manufacturer's instructions. There shall be no contradictions between the OVSC Laboratory Test Procedure and the contractor's in-house test procedure. Written approval of the in-house test procedures shall be obtained from the COTR before initiating the compliance test program. The OVSC Laboratory Test Procedures are not intended to limit or restrain a contractor from developing or utilizing any testing techniques or equipment which will assist in procuring the required compliance test data. These Laboratory Test Procedures do not constitute an endorsement or recommendation for use of any product or method. However, the application of any such testing technique or equipment is subject to prior approval of the COTR.

NOTE: The OVSC Laboratory Test Procedures, prepared for the limited purpose of use by independent laboratories under contract to conduct compliance tests for the OVSC, are not rules, regulations or NHTSA interpretations regarding the meaning of a FMVSS. The Laboratory Test Procedures are not intended to limit the requirements of the applicable FMVSS(s). In some cases, the OVSC Laboratory Test Procedures do not include all of the various FMVSS minimum performance requirements. Recognizing applicable test tolerances, the Laboratory Test Procedures may specify test conditions that are less severe than the minimum requirements of the standard. In addition, the Laboratory Test Procedures may be modified by the OVSC at any time without notice, and the COTR may direct or authorize contractors to deviate from these procedures, as long as the tests are performed in a manner consistent with the standard itself and within the scope of the contract. Laboratory Test Procedures may not be relied upon to create any right or benefit in any person. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits its certification tests to those described in the OVSC Laboratory Test Procedures.

2. GENERAL REQUIREMENTS

Federal Motor Vehicle Safety Standard (FMVSS) No. 304 specifies requirements for the integrity of compressed natural gas (CNG) motor vehicle fuel containers. When used as a motor fuel, natural gas is stored on-board a vehicle in cylindrical containers at pressures of approximately 20,684 kPa (3,000 psi) and 24,821 kPa (3,600 psi). The purpose of this standard is to reduce deaths and injuries occurring from fires that result from fuel leakage during and after motor vehicle crashes. This standard applies to containers designed to store CNG as motor fuel onboard any motor vehicle. Figure 1 shows a typical CNG fuel container. FMVSS 304 is patterned after the American National Standards Institute's (ANSI's) voluntary industry standard known as ANSI/NGV2.

A. **Type 1** container is a metallic non-composite container.

B. **Type 2** container is a metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a hoop wrapped pattern over the liner's cylinder sidewall.

C. **Type 3** container is a metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a full wrapped pattern over the entire liner, including the domes.

D. **Type 4** container is non-metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a full wrapped pattern over the entire liner, including the domes.

Test procedures and methods outlined herein are based upon the requirements of FMVSS No. 304 which specifies the following tests for the purpose of ensuring the durability, initial strength, and venting of CNG containers.

A. **Pressure Cycling Test** to evaluate a container's durability by requiring a container to withstand, without any leakage, 18,000 cycles of pressurization and depressurization (based on 15 years of service with 4 refuelings per day, 300 days per year). This requirement helps to ensure that a CNG container is capable of sustaining the cycling loads imposed on the container during refuelings over its entire service life. See Figure 2.

B. **Burst Test** to evaluate a container's initial strength and resistance to degradation over time. This requirement helps to ensure that a container's design and material are appropriately strong over the container's life.
See Figure 3.

2. GENERAL REQUIREMENTS....Continued

C. **Bonfire Test** to evaluate a container's pressure relief characteristics when pressure builds in a container, primarily due to temperature rise. See Figure 4. The Bonfire Test is designed to demonstrate that CNG fuel containers, complete with the fire protection system (container valve, pressure relief devices and/or integral thermal insulation) specified in the design, will prevent the rupture of the container when tested under the specified fire conditions.

D. **Labeling Requirements**. See Figure 6.

3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test specimens from unauthorized personnel during the entire compliance testing program. The contractor is financially responsible for any acts of theft and/or vandalism which occur during the storage of test specimens. Any security problems which arise shall be reported by telephone to the Office of Contracts and Procurement (OCP) within two working days after the incident. A letter containing specific details of the security problem will be sent to the OCP (with copy to the COTR) within 48 hours.

The contractor shall protect and segregate the data that evolve from compliance testing before and after each test. No information concerning the compliance testing program shall be released to anyone except the COTR, unless specifically authorized by the COTR, the COTR's Branch or Division Chief or by the Contracting Officer.

NOTE: NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL, SHALL BE ALLOWED TO WITNESS ANY COMPLIANCE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COTR.

4. GOOD HOUSEKEEPING

Contractors shall maintain the entire compliance testing area, test fixtures and instrumentation in a neat and clean condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

5. TEST SCHEDULING AND MONITORING

The contractor shall submit a test schedule to the COTR prior to testing. Tests shall be completed as required in the contract. All testing shall be coordinated with the COTR to allow monitoring by the COTR or other OVSC personnel.

6. TEST DATA DISPOSITION

The contractor shall make all preliminary compliance test data available to the COTR within 24 hours after the test. Final test data, including digital printouts and computer generated plots (if applicable), shall be furnished to the COTR in accordance with the contract schedule. Additionally, the contractor shall analyze the preliminary test results as directed by the COTR.

All backup data sheets, strip charts, recordings, plots, technicians notes, etc., shall be retained by the contractor for a minimum of 3 years after conclusion of each delivery order, purchase order, etc. The COTR shall direct final disposition at that time.

7. GOVERNMENT FURNISHED PROPERTY (GFP) AND TEST SAMPLES

CNG FUEL CONTAINER IDENTIFICATION AND STORAGE

For compliance tests of CNG fuel containers a total of four (4) containers shall be delivered to the laboratory for each compliance test. The serial numbers for all containers shall be recorded, and a laboratory identification number shall be assigned to each tank.

All tanks shall be subjected to the Labeling Test. Specific usage of the tanks for a test is as follows:

Tank #1 - Pressure Cycling Test

Tank #2 - Hydrostatic Burst Test

Tank #3 - Bonfire Test (24% of Service Pressure (S.P.))

Tank #4 - Bonfire Test (98% of S.P.)

NOTE: If an integral thermal protection system is used in place of a pressure relief device, then Tank #3 and Tank #4 are both filled to 98% of S.P. and tested as described in section 12(B)(3).

The "as received" condition of CNG fuel containers shall be noted and recorded, and then the containers shall be stored in a dry, clean, dark, and dust free area to prevent damage to them in any manner which may affect test results. The as received condition of the CNG fuel containers shall be documented in section 1 of the Final Test Report.

8. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system will be implemented and maintained in accordance with established calibration practices. Guidelines for setting up and maintaining such calibration systems are described in American National Standard ANSI/NCSL Z540-1, "Calibration Laboratories and Measuring and Test Equipment General Requirements". The calibration system shall be set up and maintained as follows:

A. Standards for calibrating the measuring and test equipment will be stored and used under appropriate environmental conditions to assure their accuracy and stability.

B. All measuring instruments and standards shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals NOT TO EXCEED 12 MONTHS except for static types of measuring devices such as rulers, weights, etc., which shall be calibrated at periodic intervals not to exceed two years. Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

C. All measuring and test equipment and measuring standards will be labeled with the following information:

(1) Date of calibration
(2) Date of next scheduled calibration

D. A written calibration procedure shall be provided by the contractor which includes as a minimum the following information for all measurement and test equipment unless the calibration is performed by a licensed commercial facility.

(1) Type of equipment, manufacturer, model number, etc.
(2) Measurement range
(3) Accuracy
(4) Calibration interval
(5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)

E. Records of calibration for all test instrumentation shall be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when requested by the COTR. The calibration system will need the acceptance of the COTR before the test program commences. The calibration records of instrumentation used in a specific test are to be included in Appendix B of the Final Report.

9. PHOTOGRAPHIC DOCUMENTATION

Each final test report shall include digital photographs or glossy photographs (minimum size 4 x 6 inches) of the test setup used for each phase of testing. Each report shall also include pre-test and post-test photographs of each container tested (see section 12 (B) 3 (N) and (O) for additional bonfire test photograph requirements). One set of original photographs (or high quality digital color photographs) shall be included in the final test report which will be used for optical scanning by the OVSC. Other copies of the final test report may contain multilith copies of the original photographs. Include all photographs in Section 5 of the Final Report.

Clear photographs of tank labeling shall also be included in each final test report.

Also include photographs of test equipment and instrumentation used in conducting all phases of the following tests:

1. Pressure Cycling Test

2. Hydrostatic Burst Test

3. Bonfire Tests

Failed sample photographs shall be provided if the failure effect is visible. These photographs shall show the point of failure from each point of view that can add significant detail.

10. DEFINITIONS

BRAZING

Group of welding processes wherein coalescence is produced by heating to a suitable temperature above 800EF and by using a nonferrous filler metal, having a melting point below that of the base metals. The filler metal is distributed between the closely fitted surfaces of the joint by capillary action.

BURST PRESSURE

Highest internal pressure reached in a CNG fuel container during a burst test at a temperature of 70EF (21EC).

CNG FUEL CONTAINER

Container designed to store CNG as motor fuel onboard a motor vehicle. (See Figure 1 of typical container at end of this section).

10. DEFINITIONS....Continued

COMPOSITE

A filament and resin system.

FILL PRESSURE

Internal pressure of a CNG fuel container attained at the time of filling. Fill pressure varies according to the gas temperature in the container which is dependent on the charging parameters and the ambient conditions.

FULL WRAPPED

Applying the reinforcement of a filament or resin system over the entire liner, including the domes.

HOOP WRAPPED

Winding of filament in a substantially circumferential pattern over the cylindrical portion of the liner so that the filament does not transmit any significant stresses in a direction parallel to the cylinder longitudinal axis. See Figure 1 which shows a typical container.

HYDROSTATIC PRESSURE

Internal pressure to which a CNG fuel container is subjected during testing. Measurement of permanent volumetric expansion and total volumetric expansion are taken during this testing.

LINER

Inner gas tight container or gas cylinder to which the overwrap is applied.

SERVICE PRESSURE (S.P.)

Internal settled pressure of a CNG fuel container at a uniform gas temperature of 70EF (21EC) and full gas content. It is the pressure for which the container has been constructed under normal conditions.

10. DEFINITIONS....Continued

TYPE 1 CNG FUEL CONTAINER

A metallic non-composite container (a metal container).

TYPE 2 CNG FUEL CONTAINER

A metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a hoop wrapped pattern over the liner's cylinder sidewall. See Figure 1.

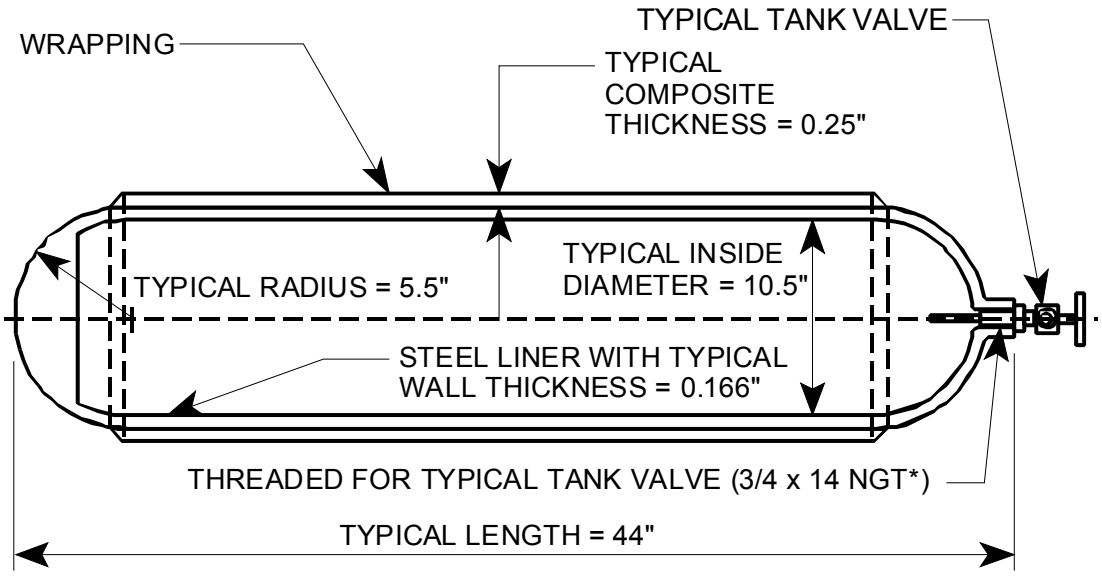
TYPE 3 CNG FUEL CONTAINER

A metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a full wrapped pattern over the entire liner, including the domes.

TYPE 4 CNG FUEL CONTAINER

A non-metallic liner over which an overwrap such as carbon fiber or fiberglass is applied in a full wrapped pattern over the entire liner, including the domes.

TYPICAL HOOP WRAPPED CNG FUEL CONTAINER
FOR 3000 PSI SERVICE PRESSURE



TYPICAL TOTAL WEIGHT = 125 LBS
TYPICAL WATER CAPACITY = 3270 IN³

* National Gas Taper Thread

SIDE VIEW

FIGURE 1

11. PRETEST REQUIREMENTS

IN-HOUSE TEST PROCEDURE

Prior to conducting any compliance test, contractors are required to submit a detailed in-house compliance test procedure to the COTR which includes a step-by-step description of the methodology to be used. Written approval must be obtained from the COTR before initiating the compliance test program so that all parties are in agreement.

The test methods and procedures shall be based on the requirements of the following NHTSA & non-NHTSA documents wherein FMVSS 304 shall take precedence, followed by this Laboratory Test Procedure, TP-304-03, in case of conflict.

NHTSA Documents —

FMVSS 304, CNG Fuel Container Integrity

OVSC Laboratory Test Procedure No. TP-304-03

American National Standards Institute (ANSI) voluntary industry standard known as ANSI/NGV2

11. PRETEST REQUIREMENTS....Continued

TEST DATA LOSS

A compliance test is not to be conducted unless all of the various test conditions specified in the applicable OVSC Laboratory Test Procedure have been met. Failure of a contractor to obtain the required test data and to maintain acceptable limits on test parameters in the manner outlined in the applicable OVSC Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs will include the cost of the replacement item of motor vehicle equipment and all costs associated with conducting the retest. The original test specimen used for the invalid test shall remain the property of OVSC, and the retest specimen shall remain the property of the contractor. If there is a test failure, the contractor shall retain the retest specimen for a period not exceeding 2 years. If there is no test failure, the Contractor may dispose of the test specimen upon notification from the COTR that the final test report has been accepted.

The Contracting Officer of NHTSA is the only NHTSA official authorized to notify the contractor that a retest is required. The retest shall be completed within two (2) weeks after receipt of notification by the Contracting Officer that a retest is required. If a retest is conducted, no test report is required for the original test.

TEST PERSONNEL PERFORMANCE

Personnel supervising and/or performing the compliance test program shall be thoroughly familiar with the requirements, test conditions, equipment for the test to be conducted, and safety requirements regarding the hazards of testing compressed gas containers.

11. PRETEST REQUIREMENTS....Continued

RECORDING OF TEST DATA

Test data shall be recorded on permanent strip charts, circular recording charts, or other acceptable printout media; and/or other acceptable analog or digital data recording devices. Changes or corrections shall be made by drawing a line through the original entry, which must still remain legible, and adding the change alongside.

Test data shall be submitted on the standard form Test Data Sheets specified for use in the final test report and shown in Section 15. Data shall be typed before the sheets are submitted.

When a test sample failure does occur (the sample WILL NOT be subjected to further testing), all of the charts and/or recordings for the failed sample or copies thereof shall be retained by the contractor along with the failed sample specimen unless otherwise directed by the COTR. This shall include a copy of the original operator's hand-written data as recorded during the test failure.

TEST DATA REPORTING SHEETS

In addition to the instrument recording data (which may be in analog or digital form), all test data shall be reported, in standard engineering units, on forms specifically prepared for this purpose such as those shown as the data sheet for each test. Changes or corrections of data sheets shall be made by drawing a line through the original entry, which must still remain legible, and adding the change alongside. The initials of the person making the change shall appear alongside the change.

Data sheets presented in a final form must be typewritten, signed, and include the date of test and date of sign-off. **THE REPORT NUMBER MUST APPEAR AT THE TOP OF EACH DATA SHEET.**

SAMPLE INFORMATION AND SUMMARY OF RESULTS

Preceding the test data sheets in the Final Report, there will be test specimen information and a summary of test results. These sheets will describe the articles tested, list the various tests performed, and indicate the result as either Pass (P) or Fail (F) as supported by the information tabulated on the test data sheets.

12. COMPLIANCE TEST EXECUTION

A. GENERAL REQUIREMENTS

Each CNG fuel container shall meet the applicable requirements of (1) through (4).

(1) PRESSURE CYCLING TEST AT AMBIENT TEMPERATURE

Each CNG fuel container shall not leak when tested in accordance with Section B(1).

(2) HYDROSTATIC BURST TEST

(A) Each Type 1 metallic non-composite CNG fuel container shall not leak when subjected to 100% (+0, -2 %) of the burst pressure and tested in accordance with Section B(2). Burst pressure shall be 2.25 times the Service Pressure (S.P.) for non-welded metallic containers. Burst pressure shall be 3.5 times the Service Pressure (S.P.) for welded metallic containers.

(B) Each Type 2, Type 3 or Type 4 CNG fuel container shall not leak when subjected to 100% (+0, -2%) of the burst pressure and tested in accordance with Section B(2). Burst pressure shall be 2.25 times the Service Pressure (S.P.).

12. COMPLIANCE TEST EXECUTION....Continued

(3) BONFIRE TEST

Each CNG fuel container shall be equipped with a pressure relief device or integral thermal protection system. Each CNG fuel container shall completely vent (pressure falls below 100 psi) its contents through a pressure relief device or shall not burst while retaining its entire contents when tested in accordance with Section B(3).

(4) LABELING

Each CNG fuel container shall be inspected for compliance with the following labeling requirements.

Each CNG fuel container shall be permanently labeled (the label should be designed to remain in place and be legible for the manufacturer's recommended life of the container and shall be affixed in such a manner that it cannot be removed without destroying or defacing it) with the information specified in paragraphs [A] through [H]. The information specified in paragraphs [A] through [H] of this section shall be in English and in letters and numbers that are at least 6.35 mm (0.25 inch) high.

(A) The statement: "If there is a question about the proper use, installation, or maintenance of this container, contact _____" inserting the CNG fuel container manufacturer's name, address, and telephone number.

(B) The statement: "Manufactured in _____" inserting the month and year of manufacture of the CNG fuel container.

(C) Service Pressure _____ kPa (_____ psig).

(D) The symbol DOT, constituting a certification by the CNG container manufacturer that the container complies with all requirements of this standard.

(E) The container designation (e.g., Type 1,2,3,4).

(F) The statement “CNG Only.”

12. COMPLIANCE TEST EXECUTION....Continued

(G) The statement: “This container should be visually inspected after a motor vehicle accident or fire and at least every 36 months or 36,000 miles, which ever comes first, for damage and deterioration.”

(H) The statement: "Do Not Use After_____“ inserting the month and year that mark the end of the manufacturer’s recommended service life for the container.

B. TEST CONDITIONS: FUEL CONTAINER INTEGRITY

(1) PRESSURE CYCLING TEST

The requirements of Section A(1) shall be met under the conditions of (A) through (E) as follows. See Figure 2.

(A) Hydrostatically pressurize the CNG container to 98% of the S.P., +0%, - 5% .

Then to less than 10% of the S.P., for 13,000 +0, -0.5% cycles.

(B) After being pressurized as specified above —

Hydrostatically pressurize the container to 123% of S.P., +0%, - 5%

Then to less than 10% of S.P., for 5,000 +0, -0.5% cycles.

(C) The cycling rate for (A) and (B) shall be less than 10 cycles per minute (cpm).

(D) The cycling shall be conducted at ambient temperature. Record the ambient temperature at the beginning and at the end of the test.

(E) Record sufficient pressure and time measurements to adequately document the entire pressure/time cycle history. Minimum pressure cycle dwell time at maximum and minimum set pressures shall be greater than twice the data acquisition sampling rate. All pressure cycles shall be counted. For all pressure cycles, ensure that the maximum pressure and minimum pressure is recorded and matched to each specific pressure cycle.

12. COMPLIANCE TEST EXECUTION....Continued

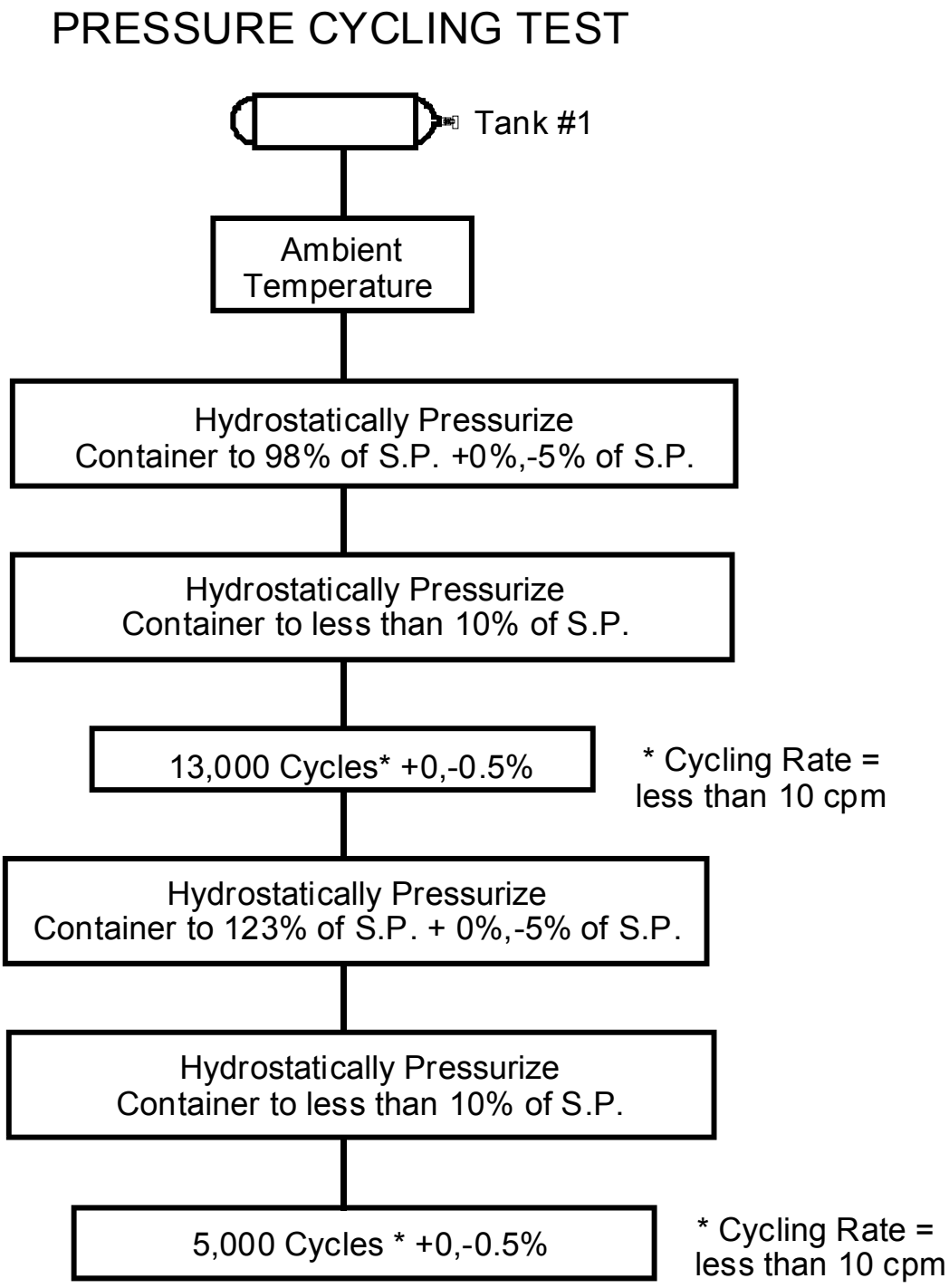


FIGURE 2

12. COMPLIANCE TEST EXECUTION....Continued

(2) HYDROSTATIC BURST TEST

The requirements of Section A(2) shall be met under the conditions of Sections (A) through (D) as follows. See Figure 3.

(A) Hydrostatically pressurize the CNG fuel container, as follows:

The pressure shall be increased to 100% of the Burst Pressure, +0,-2%, determined in Section 12.A GENERAL REQUIREMENTS, (2)(A) or (2)(B), and held constant at the Burst Pressure for 10 seconds, +1, -0 seconds. (Note, the pass/fail criteria only apply up to 10 seconds).

(B) The pressurization rate throughout the test shall be less than 1379 kPa per second (less than 200 psi per second).

(C) Record the test temperature at the start of the test (for information only). This temperature is considered valuable information, even though it is not required per Federal Register, Volume 60, No. 141 of 24 July 1995.

(D) Record sufficient pressure and time measurements to adequately document the entire hydrostatic burst test history including the complete pressurization rate history from start to reaching test burst pressure, and the complete test burst pressure hold period. As a minimum, a strip chart recorder shall be used to provide a complete and continuous record of the hydrostatic burst test pressurization rate and the burst pressure hold period.

12. COMPLIANCE TEST EXECUTION....Continued

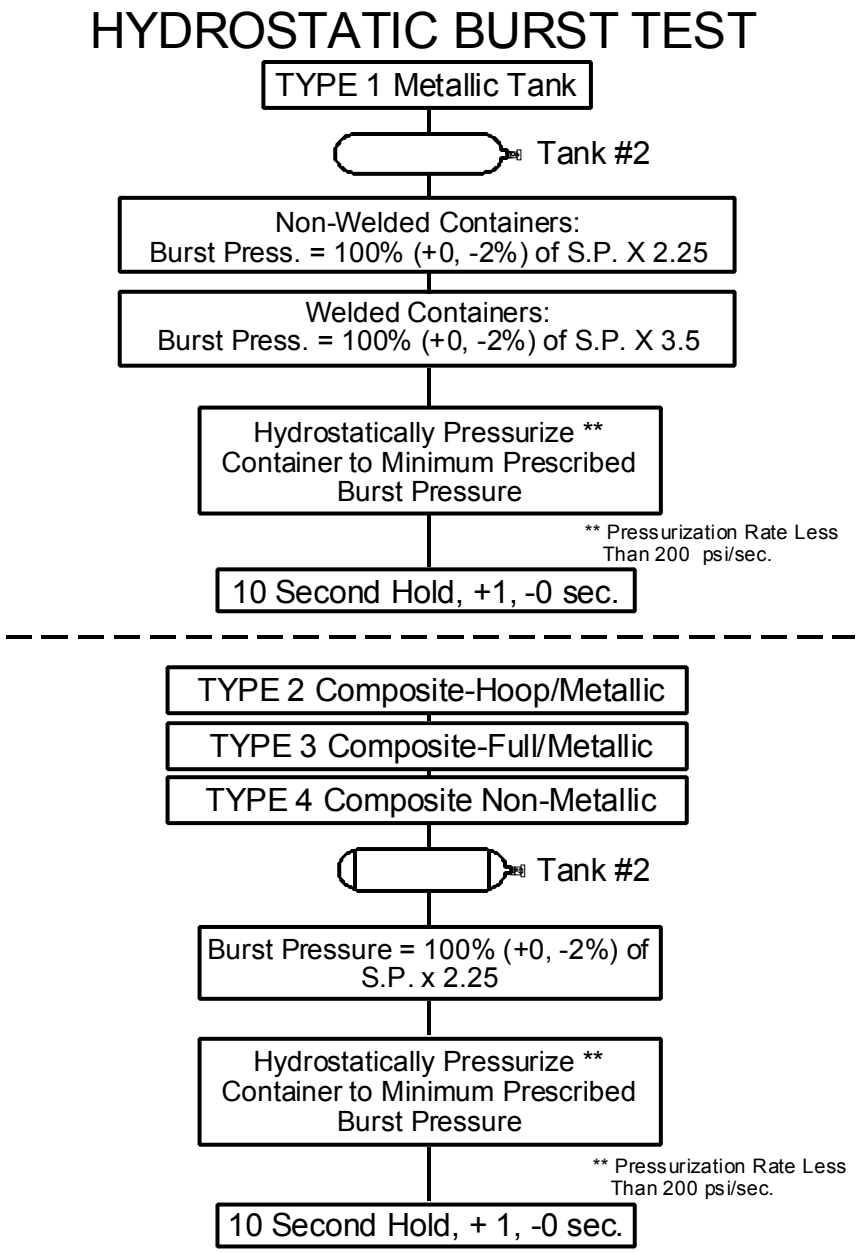


FIGURE 3

12. COMPLIANCE TEST EXECUTION....Continued

(3) BONFIRE TEST

NOTE: Extreme caution must be exercised during Bonfire Testing in the event that container rupture occurs.

The requirements of Section A(3) shall be met under the conditions of (A) through (O) as follows. See Figure 4.

(A) The fuel container shall be filled with Compressed Natural Gas (CNG) and tested at:

[1] 98% of S.P., + 0, - 2% of S.P., and

[2] 24% of S.P., + 0, - 2% of S.P.

(B) The CNG fuel container shall be positioned so that its longitudinal axis is HORIZONTAL. Place 3 thermocouples 25 mm (1 in.) from the bottom of the container surface to measure flame temperature, along a line parallel to the container's longitudinal centerline. Position thermocouples so that they are equally spaced over the fire source or the length of the container, whichever is shorter. Shield the pressure relief device(s) with a box made from thin (0.025 in. minimum nominal thickness) steel plate. Place an additional thermocouple at <u>each</u> pressure relief device (PRD).

(C) If the container is 1.65 m (65 inches) long or less – Place it in a horizontal position, centerline of the container parallel to the fire source so that the center of the container is over the center of the fire source (see Figure 5a). The flame shall not be allowed to impinge directly on any pressure relief device.

(D) If the container is longer than 1.65 m and is equipped with a single pressure relief device at one end - Place it in a horizontal position, centerline of the container parallel to the fire source. The end of the container opposite to the PRD is placed even with one end of the 1.65 m fire source and the center of the fire source will be 0.825 m along the centerline of the container (see Figure 5b).

(E) If the container is longer than 1.65 m and is equipped with more than one pressure relief device - the container is positioned over the 1.65 m fire source so that the point midway between the two pressure relief devices, that are the farthest apart, will be placed at the center of the fire source as referenced to the centerline of the container(see figure 5c).

12. COMPLIANCE TEST EXECUTION....Continued

(F) A container that is protected by thermal insulation and does not have a pressure relief device(s) is placed over the fire source so that the center of the container is positioned at the center of the fire source. If the container is greater than 1.65 m (65 in.) - Then the container is tested twice, once with the center of the container positioned over the center of the fire source; and once with the end of the container positioned so that the center of the fire source will be 0.825 m from one end of the container, measured horizontally along the centerline of the container. Container fill pressure shall be 98% of S.P. (+0, -2% of S.P.).

(G) The lowest part of the container is suspended at a distance of 100 mm (4 in.) ± 20 mm (.75 in.) above the fire source. Maintain an average flame temperature of at least 430EC (800EF) within five minutes of flame ignition, as determined by the average of the two thermocouples recording the highest flame temperatures over a 60 second interval (see equation below). If the pressure relief device(s) release before the end of the fifth minute after ignition, then the minimum flame temperature requirements do not apply. **Note:** only the three flame temperature thermocouples shall be used in the determination of the average flame temperature. The thermocouple(s) at the PRD(s) is for information only and shall <u>not</u> be used in the calculation of average flame temperature.

$$1/2\left[\left((T_{High1}+T_{High2})/2\right)_{@\ time\ 30\ sec}+\left((T_{High1}+T_{High2})/2\right)_{@\ time\ 60\ sec}\right]\geq 430^{o}C$$

(H) The CNG fuel container shall be tested with the valve and pressure relief device or devices in place.

(I) Use a uniform fire source that is 1.65 meters (65 in.) in length and of a width sufficient to achieve the desired temperatures over the bottom surface of the container. The flame can be generated by No. 2 diesel fuel or a suitable substitute that can maintain an average flame temperature of at least 430EC (800EF) starting five minutes after flame ignition and continuing until the test is complete.

(J) If No. 2 diesel fuel is used as a fire source, the fuel shall be contained in a pan of the size specified in 12 (I) such that there is sufficient fuel to burn for at least 20 minutes.

(K) Time-Temperature-Pressure readings shall be recorded at 30 second intervals (minimum), beginning when the fire is ignited and continuing until the test is complete.

(L) The CNG fuel container shall be exposed to the bonfire for at least 20 minutes, or until the contents of the fuel container are completely vented (pressure less than 100 psi).

12. COMPLIANCE TEST EXECUTION....Continued

(M) The average ambient wind velocity at the container during the bonfire test (from when the fire is ignited to until the PRD releases) shall be 2.24 meters per second (5.0 mph) or less. If testing outdoors, wind velocity measurements shall be made every 30 seconds (minimum). Measurements shall be made at the level of the container and as close to the container as possible. Care shall be taken to ensure that the wind velocity measurement instrument is not placed to close to the container where the operating temperature range of the instrument would be exceeded. This can be verified with an additional thermocouple temperature measurement at the location of the wind velocity measurement instrument to record the maximum temperature during the bonfire test. If testing outdoors, wind shields can be used to enclose the bonfire test area with approval by the COTR.

(N) Pre-test photographs specified in Section 9 (Photographic Documentation) must include, in final pre-test setup position, a horizontal photograph of the entire container and flame source clearly documenting proper position of the container relative to the flame source; and close-up photographs of all container plugs, valves, and pressure relief devices.

(O) Coverage (VHS video) of the entire bonfire test shall be recorded for each test. For all bonfire test failures, a copy of the video coverage shall be provided to the COTR.

12. COMPLIANCE TEST EXECUTION....Continued

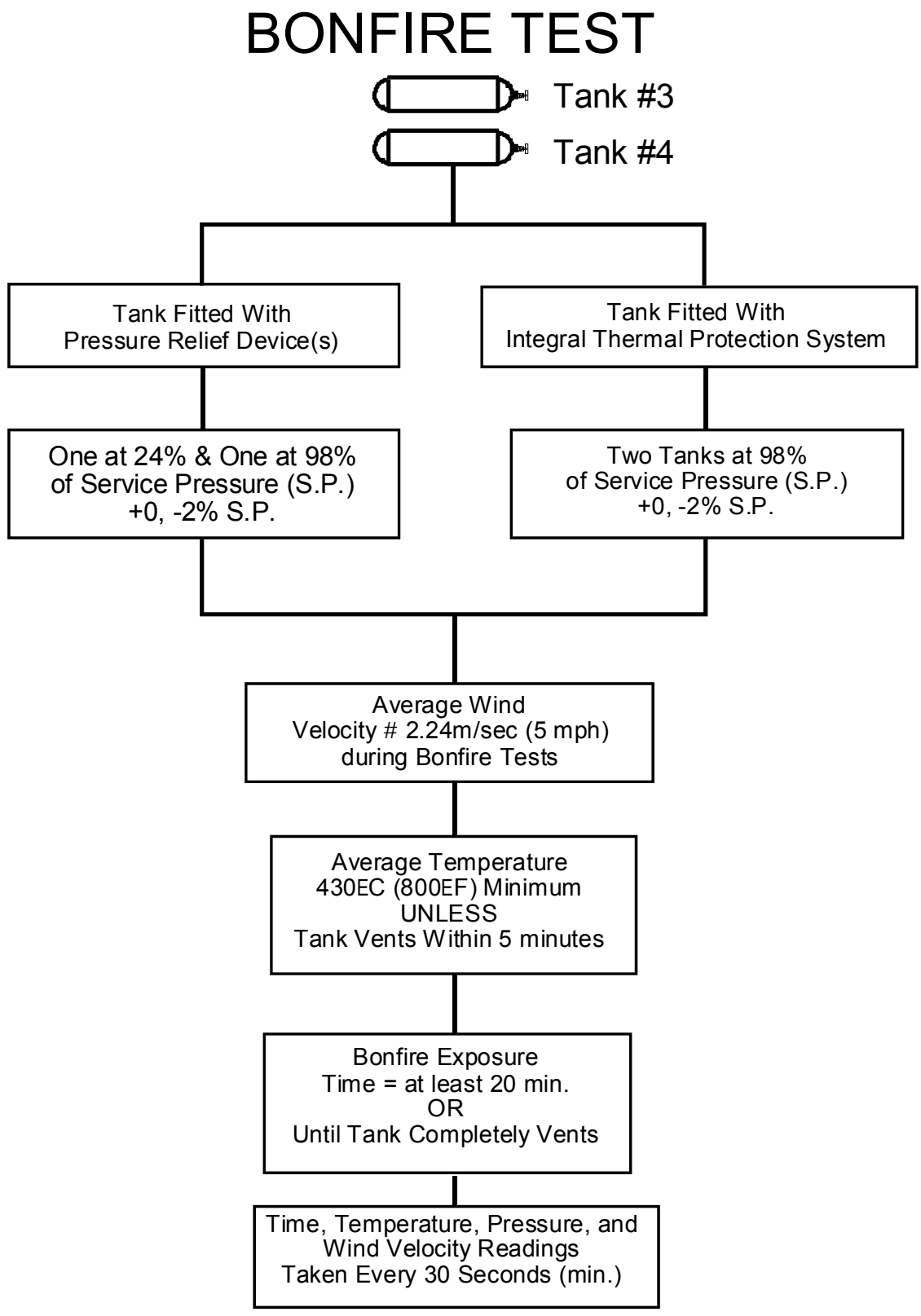


FIGURE 4

12. COMPLIANCE TEST EXECUTION....Continued

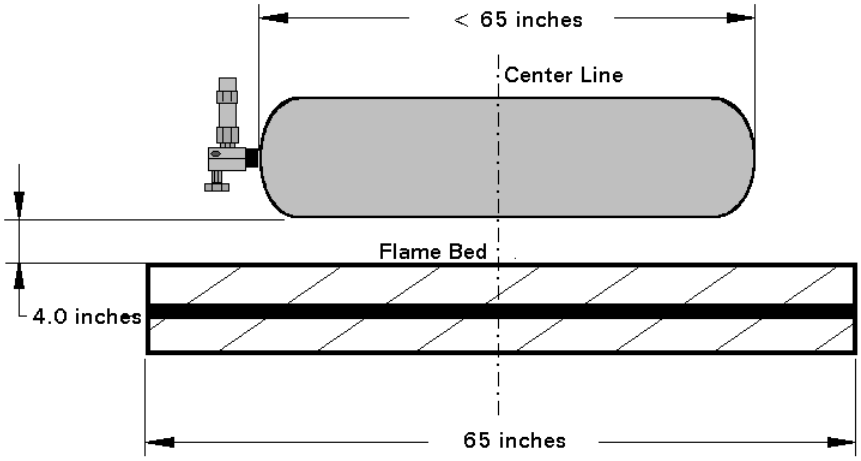


Figure 5a

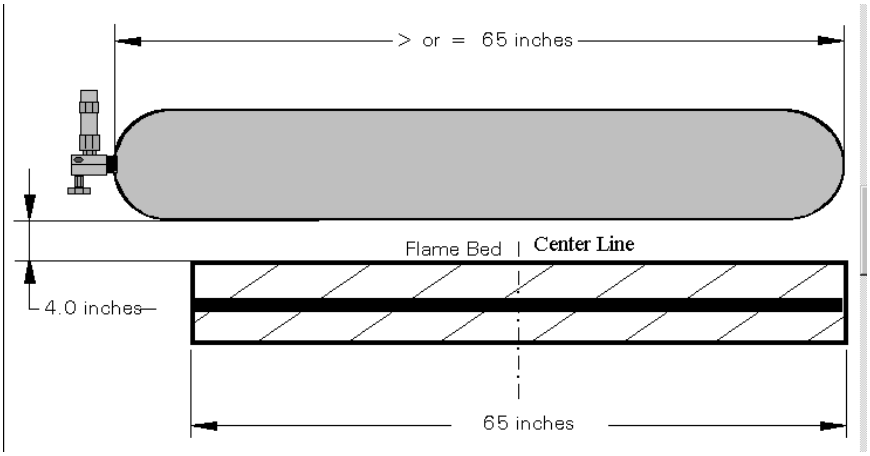


Figure 5b

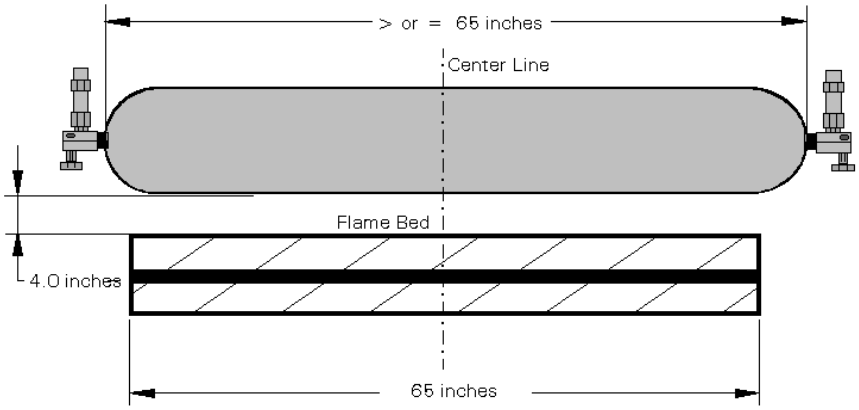


Figure 5c

Note: Other container/valve/PRD configurations are possible.

12. COMPLIANCE TEST EXECUTION....Continued

(4) LABELING TEST

The requirements of Section A(4) shall be met under the conditions of (A) through (H). See Figure 6.

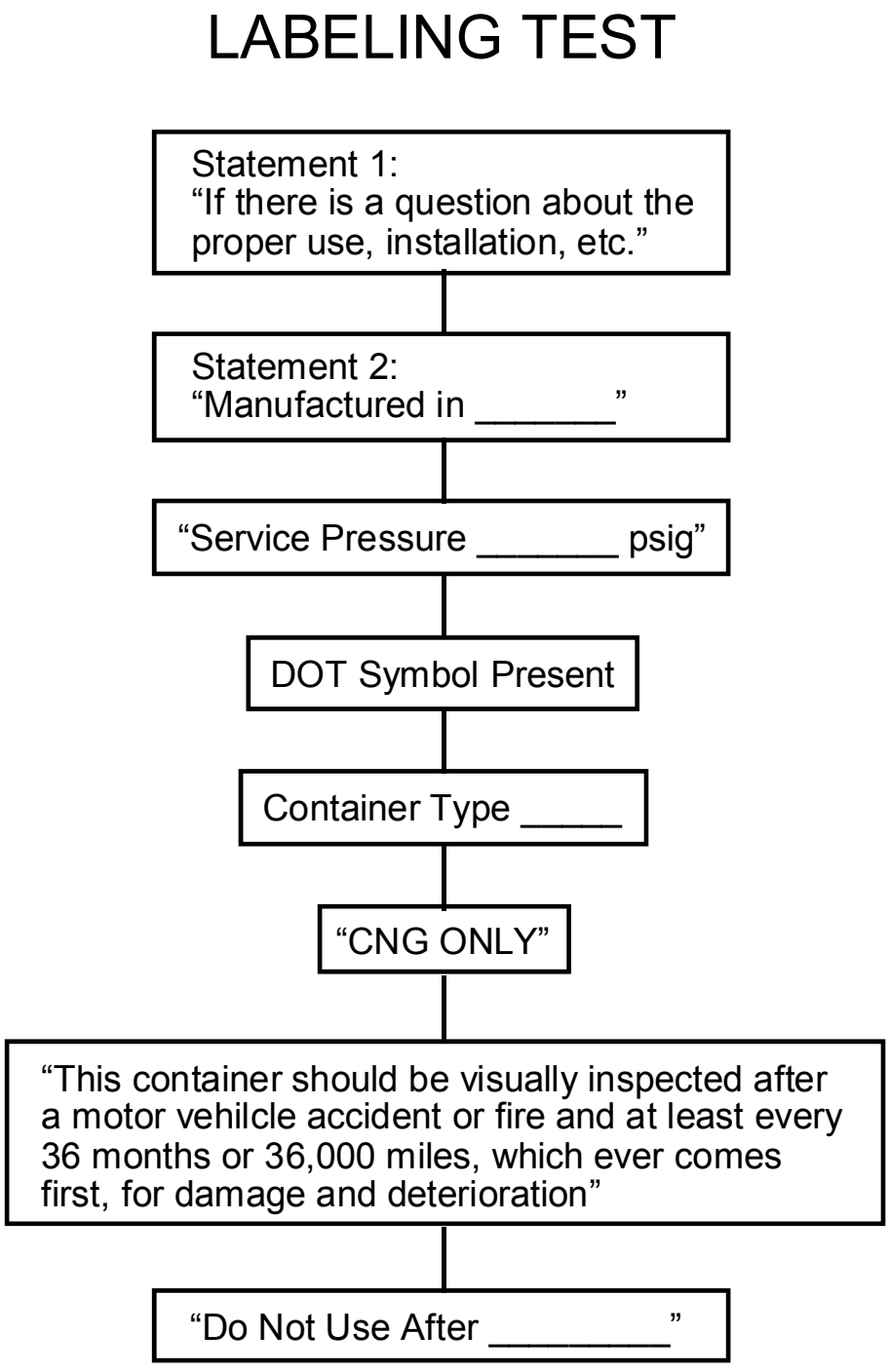


FIGURE 6

13. POST TEST REQUIREMENTS

The contractor shall re-verify all instrumentation and check data sheets and photographs. Make sure that data is recorded in all applicable data blocks on every Data Sheet.

14. REPORTS

14.1 MONTHLY STATUS REPORTS

The contractor shall submit (email or FAX) a monthly Test Status Report and an Equipment Status Report to the COTR on the first Wednesday of each month. The Equipment Status Report shall be submitted until all final reports are accepted. A sample of the required Monthly Status Reports is contained in the report forms Section 16.

14.2 APPARENT TEST FAILURE

Any indication of a test failure shall be communicated by telephone to the COTR within ONE working day with written notification mailed within TWO working days. A notice of test failure (see report forms Section 16 – Laboratory Notice of Test Failure to OVSC) with a copy of the particular compliance test data sheet(s) shall be included.

In the event of a test failure, a post test calibration check of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration shall be at the COTR's discretion and shall be performed without additional costs to the OVSC.

14.3 FINAL TEST REPORTS

14.3.1 COPIES

In the case of a test failure, FOUR copies of the Final Test Report shall be submitted to the COTR for acceptance within two weeks of test completion. The Final Test Report format to be used by all contractors is specified in Sections 14.3.2 through 14.3.4, and sample Data Sheet formats are contained in Section 15. In addition, an electronic copy of each Final Test Report shall be submitted to the COTR within two weeks of test completion. The electronic copy shall be submitted on Compact Disc Recordable (CDR) in Microsoft Soft (MS) Word format and Portable Document Format (PDF).

Where there has been no indication of a test failure, THREE copies of each Final Test Report shall be submitted to the COTR within two weeks of test completion. Payment of contractor's invoices for completed compliance tests may be withheld until the Final Test Report is accepted by the COTR. Contractors are requested to NOT submit invoices before the COTR is provided copies of the Final Test Report. In addition, an electronic copy of each Final Test Report shall be submitted to the COTR within two weeks of test completion. The electronic copy shall be submitted on CDR in MS Word format and Portable Document Format (PDF).

14. REPORTS....Continued

Contractors are required to submit each Final Test Report in typed draft form within two weeks after the compliance test is conducted. The contractor and the COTR will then be able to discuss the details of both test conduct and report content early in the compliance test program.

Contractors are required to PROOF READ all Final Test Reports before submittal to the COTR. The OVSC will not act as a report quality control office for contractors. Reports containing a significant number of errors will be returned to the contractor for correction, and a "hold" will be placed on invoice payment for the particular test.

14.3.2 REQUIREMENTS

The Final Test Report, associated documentation (including photographs) are relied upon as the chronicle of the compliance test. The Final Test Report will be released to the public domain after review and acceptance by the COTR. For these reasons, each final report must be a complete document capable of standing by itself.

The contractor should use DETAILED descriptions of all compliance test events. Any events that are not directly associated with the standard but are of technical interest should also be included. The contractor should include as much DETAIL as possible in the report.

Any interpretations and/or deviations from TP-304-03 for any specific test shall be documented in Appendix A of the Final Report.

Instructions for the preparation of the first three pages of the final test report are provided below for the purpose of standardization.

14.3.3 FIRST THREE PAGES

A. FRONT COVER

A heavy paperback cover (or transparency) shall be provided for the protection of the final report. The information required on the cover is as follows:

(1) Final Report Number such as 304-ABC-XX-001, where —

304 is the FMVSS tested
ABC are the initials for the laboratory
XX is the Fiscal Year (FY) of the test program (e.g. 02, 03, etc. for Fiscal Years 2002, 2003, etc.)
001 is the Group Number (001 for the 1st brand, 002 for the 2nd brand, etc.)

14. REPORTS....Continued

(2) Final Report Title And Subtitle such as

SAFETY COMPLIANCE TESTING FOR FMVSS 304
CNG Fuel Container Integrity
* *
ACE Gas Container Co.
SafeStor CNG Fuel Tank

(3) Contractor's Name and Address such as

COMPLIANCE TESTING LABORATORIES, INC.
4335 West Dearborn Street
Detroit, Michigan 48090-1234

NOTE: DOT SYMBOL WILL BE PLACED BETWEEN ITEMS (3) AND (4)

(4) Date of Final Report completion

(5) The words "FINAL REPORT"

(6) The sponsoring agency's name and address as follows

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-222
Room No. 6111
400 Seventh Street, SW
Washington, DC 20590

14. REPORTS....Continued

B. FIRST PAGE AFTER FRONT COVER

A disclaimer statement and an acceptance signature block for the COTR shall be provided as follows:

This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By: _____

Approved By: _____

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: _____

Acceptance Date: _____

14. REPORTS....Continued

C. SECOND PAGE AFTER FRONT COVER

A completed Technical Report Documentation Page (Form DOT F1700.7) shall be completed for those items that are applicable with the other spaces left blank. Sample data for the applicable block numbers of the title page follows.

Block 1 — REPORT NUMBER

304-ABC-XX-001 (XX is the FY of the test program (e.g. 02, 03, etc.)

Block 2 — GOVERNMENT ACCESSION NUMBER

Leave blank

Block 3 — RECIPIENT'S CATALOG NUMBER

Leave blank

Block 4 — TITLE AND SUBTITLE

Final Report of FMVSS 304 Compliance Testing of 200X Ace SafeStor CNG Fuel Container Model No. 12345-6789, Serial Nos. 1234-1237

Block 5 — REPORT DATE

March 1, 200X

Block 6 — PERFORMING ORGANIZATION CODE

ABC

Block 7 — AUTHOR(S)

John Smith, Project Manager
Bill Doe, Project Engineer

Block 8 — PERFORMING ORGANIZATION REPORT NUMBER

ABC-DOT-XXX-001

14. REPORTS....Continued

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070

Block 10 — WORK UNIT NUMBER

Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

DTNH22-0X-X-XXXXX

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

US Department of Transportation
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220
400 Seventh Street, SW, Room 6111
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Feb. 15 to Mar. 15, 200X

Block 14 — SPONSORING AGENCY CODE

NVS-222

Block 15 — SUPPLEMENTARY NOTES

Leave blank

14. REPORTS....Continued

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 200X Ace SafeStor CNG fuel containers in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-304-0X for the determination of FMVSS 304 compliance. Test failures identified were as follows:

1. Pressure Cycling Test - None
2. Hydrostatic Burst Test - None
3. Bonfire Test - None
4. Labeling Requirement - None

NOTE: Above wording must be shown with appropriate changes made for a particular compliance test. Any questions should be resolved with the COTR.

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 304

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from —

U.S. Department of Transportation
National Highway Traffic Safety Administration
Technology and Information Management
Room 5110 (Mail Code: NPO-230)
400 Seventh Street, SW
Washington, DC 20590

Telephone Number: 1-800-445-0197

Block 19 — SECURITY CLASSIFICATION OF REPORT

Unclassified

Block 20 — SECURITY CLASSIFICATION OF PAGE

Unclassified

14. REPORTS....Continued

Block 21 — NUMBER OF PAGES

Add appropriate number

Block 22 — PRICE

Leave blank

14.3.4 TABLE OF CONTENTS

Final test report Table of Contents shall include the following:

Section 1 — Purpose of Compliance Test

Section 2 — Compliance Test Results Summary

Section 3 — Compliance Test Data Sheets

A. Test Data Summary

B. Pressure Cycling Test

C. Hydrostatic Burst Test

D. Bonfire Test

E. Labeling Requirement

Section 4 — Noncompliance Data (if applicable)

Section 5 — Photographs

Appendix A – Interpretations and/or Deviations from TP-304-03

Appendix B – Test Instrumentation Calibration Records

15. DATA SHEETS

DATA SHEET 1

SUMMARY OF RESULTS

CNG Tanks Manufactured By:

Address of Manufacturer:

Container Type: ___ Type 1 ___ Type 2 ___ Type 3 ___ Type 4

Serial Numbers	#1	#2	#3	#4
Lab. I.D. Nos.	#1	#2	#3	#4
Approx. Weight	#1	#2	#3	#4

Service Pressure: _____ psig

TEST RESULTS:

1. Pressure Cycling Test @ Ambient Temp. Tank Serial No.:

   Pass _____ Fail _____ Test Date: _____

2. Hydrostatic Burst Test Tank Serial No.: _____

   Pass _____ Fail _____ Test Date: _____

3. Bonfire Test

   (a) Pass _____ Fail _____ Tank Serial No.: _____

   Test Date: _____

   (b) Pass _____ Fail _____ Tank Serial No.: _____

   Test Date: _____

4. Labeling Test Tank Serial Nos.: _____

   Pass _____ Fail _____ Test Date: _____

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 2

PRESSURE CYCLING TEST AT AMBIENT TEMPERATURE DATA

Tank Serial No.: _____ Test Date: _____

Container Mfr.: _____ Ambient Temp:
Test Start: ____ EF; ____ EC
Test End: ____ EF; ____ EC

Container Type/Description:

FOR TYPE 2, 3 AND 4 CONTAINERS ONLY

One container, with the composite wrapping free of any protective coating, shall be cycle tested, without showing evidence of rupture, leakage, or fiber unraveling.

PRESSURE CYCLING TEST REQUIREMENTS		
TEST TYPE	PRESSURE (98% of S.P.) REQUIREMENT	NUMBER OF CYCLES (Rate = 10 cpm, + 0, - 7 cpm)
Cycling 1	98% of S.P.+0,-5% to less than 10% of S.P.	13,000 +0% ,-0.5%
Cycling 2	123% of S.P. + 0, - 5%, to less than 10% of S.P.	5,000 +0%, -0.5%

PRESSURE CYCLING TEST DATA			
TEST TYPE	TEST PRESSURE (PSIG)	NO. OF CYCLES	PASS/ FAIL
Cycling 1			
Cycling 2			

REMARKS: (Failure Details)

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

(Partial pressure cycle test trace and data points continued on next two pages).

15. DATA SHEETS....Continued

Pressure Cycle Trace for portion of Pressure Cycle Test

(Note: pressure cycle test data for all pressure cycles is retained in test laboratory records)

15. DATA SHEETS....Continued

Pressure Cycle Data for portion of Pressure Cycle Test
(Note: pressure cycle test data for all pressure cycles is retained in test laboratory records)

13,000 (+0, -.5%) Pressure Reversal Cycles at 98% (+0, -5%) of Service Pressure _____ psi

5,000 (+0, -.5%) Pressure Reversal Cycles at 123% (+0, -5%) of Service Pressure _____ psi

Container Type and Name: _____ Test Date: _____

Container Mfr.: _____ Service Pressure: _____ psi

Container Serial No.: _____ Gage Number: _____

PRESSURE CYCLE DATA FOR PORTIONS OF PRESSURE CYCLE TEST				
Pressure Reversal Cycles at 98% (+0,-5%) of SP - Number of Cycles per minute:_____				
Date	**Time**	**Cycle Number On Counter**	**Maximum Pressure (psi)**	**Comments**
		13000		
Pressure Reversal Cycles at 123% (+0,-5%) of SP - Number of Cycles per minute:_____				
		5000		

15. DATA SHEETS....Continued

DATA SHEET 3

HYDROSTATIC BURST TEST DATA

Tank Serial No.: _____ Test Date: _____

Test Temperature at start of test (°F)_____
Test Temperature at end of test (°F)_____

Tank Type: _____ Tank Mfr.: _____

Size: Outside Diameter (OD) = _____ inches _____ mm

Overall Length (OL) = _____ inches _____ mm
(including container appurtenances)

Tank Service Pressure: _____ Kpa (_____ psig).
(Data submitted by manufacturer)

CONTAINER SHALL BE HYDROSTATICALLY PRESSURIZED TO 100% OF THE PRESCRIBED BURST PRESSURE AS DETERMINED FROM SECTION 12.A(2)A OR 12.A(2)B AND HELD FOR 10 SECONDS, +1,-0 SECONDS.

HYDROSTATIC BURST TEST DATA				
CNG FUEL TANK SERIAL NUMBER	PRESSURIZATION RATE (Less than 200 psi/sec)	PRESCRIBED BURST PRESSURE (S.P. X 2.25) psi	ACTUAL TEST PRESSURE 100% of B..P. +0,-2% psi	PASS/ FAIL

REMARKS: (Failure Details)

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

Pressure vs. Time Strip Chart for Hydrostatic Burst Test

15. DATA SHEETS....Continued

DATA SHEET 4

BONFIRE TEST DATA

Tank Serial No.: _____ Test Date: _____

Lab I.D. No.: _____ Tank Mfr.: _____

Tank Description: _____

NOTE: Extreme caution must be exercised during Bonfire Testing in the event that container rupture occurs.

1. 98% +0,-2% of Service Pressure (S.P.) = _____ psi

2. 24% or (98%) +0,-2% of S.P. = _____ psi

NOTE: If an integral thermal protection system is used on the tank in place of a pressure relief device or devices then two tests are conducted at 98% of S.P.

3. (a) Location of 3 thermocouples for monitoring flame temperatures:

TC #1 (flame) - Container Valve End*
TC #2 (flame) - Center of Container*
TC #3 (flame) - Base of Container*

* Suspend thermocouples in flame approximately 1-inch below the bottom of container. Position thermocouples so that they are equally spaced over the fire source or the length of the container, whichever is shorter.

Length of uniform fire source is 1.65 m (65 inches).
NOTE: Any failure or inconsistency of the fire source during the test may invalidate the result.

(b) TC #4 (PRD @ valve end) – at PRD located at valve end of container.
TC #5 (PRD @ aft end) – at PRD located at aft end of container if applicable.

4. Record thermocouple temperatures and container pressure every 30 seconds (min.) during 20 minute Bonfire Test OR until container venting is complete.

AVERAGE WIND CONDITIONS:

Test 1 _____

Test 2 _____

(Continued on next page)

98% +0,-2% OF SERVICE PRESSURE (_____ psi)

ELAPSED TIME (min.)	PRESSURE (psi)	THERMOCOUPLE FLAME TEMPERATURES (EF)			AVERAGE FLAME TEMPERATURE EF	PRD TEMP. @ TC # 4 (valve end) EF	PRD TEMP. @ TC # 5 (aft end) EF
		FLAME TEMP. @ TC #1 EF	FLAME TEMP. @ TC #2 EF	FLAME TEMP. @ TC #3 EF			
0:00							
0:30							
1:00							
1:30							
2:00							
2:30							
3:00							
3:30							
4:00							
4:30							
5:00							
5:30							
6:00							
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7:00							
7:30							
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8:30							
9:00							
9:30							
10:00							
10:30							
11:00							
11:30							
12:00							
12:30							
13:00							
13:30							

(Continued on next page)

98% OF SERVICE PRESSURE....Continued

ELAPSED TIME (min.)	PRESSURE (psi)	THERMOCOUPLE FLAME TEMPERATURES (EF)			AVERAGE FLAME TEMPERATURE EF	PRD TEMP. @ TC # 4 (valve end) EF	PRD TEMP. @ TC # 5 (aft end) EF
		FLAME TEMP. @ TC #1 EF	FLAME TEMP. @ TC #2 EF	FLAME TEMP. @ TC #3 EF			
14:00							
14:30							
15:00							
15:30							
16:00							
16:30							
17:00							
17:30							
18:00							
18:30							
19:00							
19:30							
20:00							

Cylinder Vented at _____ (location) _____ (time); _____ (pressure, psi)

Cylinder Vented at _____ (location) _____ (time); _____ (pressure, psi) (if applicable)

TEST RESULTS: Pass _____ Fail _____

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

24% or (98%) +0,-2% OF SERVICE PRESSURE (_____ psi)

ELAPSED TIME (min.)	PRESSURE (psi)	THERMOCOUPLE FLAME TEMPERATURES (EF)			AVERAGE FLAME TEMPERATURE EF	PRD TEMP. @ TC # 4 (valve end) EF	PRD TEMP. @ TC # 5 (aft end) EF
		FLAME TEMP. @ TC #1 EF	FLAME TEMP. @ TC #2 EF	FLAME TEMP. @ TC #3 EF			
0:00							
0:30							
1:00							
1:30							
2:00							
2:30							
3:00							
3:30							
4:00							
4:30							
5:00							
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8:30							
9:00							
9:30							
10:00							
10:30							
11:00							
11:30							
12:00							
12:30							
13:00							
13:30							

(Continued on next page)

98% OF SERVICE PRESSURE....Continued

ELAPSED TIME (min.)	PRESSURE (psi)	THERMOCOUPLE FLAME TEMPERATURES (EF)			AVERAGE FLAME TEMPERATURE EF	PRD TEMP. @ TC # 4 (valve end) EF	PRD TEMP. @ TC # 5 (aft end) EF
		FLAME TEMP. @ TC #1 EF	FLAME TEMP. @ TC #2 EF	FLAME TEMP. @ TC #3 EF			
14:00							
14:30							
15:00							
15:30							
16:00							
16:30							
17:00							
17:30							
18:00							
18:30							
19:00							
19:30							
20:00							

Cylinder Vented at _____ (location) _____ (time); _____ (pressure, psi)

Cylinder Vented at _____ (location) _____ (time); _____ (pressure, psi) (if applicable)

TEST RESULTS: Pass _____ Fail _____

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 5

CNG FUEL CONTAINER LABELING DATA

Tanks Manufactured By:

Address of Manufacturer:

Container Type: ___ Type 1 ___ Type 2 ___ Type 3 ___ Type 4

Tank Serial Nos.	#1	#2	#3	#4
Lab I.D. Nos.	#1	#2	#3	#4

Each CNG fuel container shall be permanently labeled (the label should remain in place and be legible for the manufacturer's recommended life of the container) in English and in letters and numbers that are at least 0.25 inch (6.35 mm) high with the following information:

1. Statement: "If there is a question about the proper use, installation, or maintenance of this container, contact _____" inserting the CNG fuel container manufacturer's name, address, and telephone number.

   INSPECTION RESULTS: Pass _____ Fail _____

2. The statement: "Manufactured in _____" inserting the month and year of manufacture of the CNG fuel container.

   INSPECTION RESULTS: Pass _____ Fail _____

3. Service Pressure _____ kPa (_____ psig).

   INSPECTION RESULTS: Pass _____ Fail _____

4. The symbol DOT, constituting a certification by the CNG container manufacturer that the container complies with all requirements of this standard.

   INSPECTION RESULTS: Pass _____ Fail _____

(Continued on next page)

15. DATA SHEETS....Continued

5. The container designation (e.g. Type 1, 2, 3 or 4)

   INSPECTION RESULTS: Pass _____ Fail _____

6. The statement “CNG ONLY”

   INSPECTION RESULTS: Pass _____ Fail _____

7. The statement: “This container should be visually inspected after a motor vehicle accident or fire and at least every 36 months or 36,000 miles, which ever comes first, for damage and deterioration.”

   INSPECTION RESULTS: Pass _____ Fail _____

8. The statement: "Do Not Use After_____“ inserting the month and year that mark the end of the manufacturer’s recommended service life for the container.

   INSPECTION RESULTS: Pass _____ Fail _____

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

16. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 304 ; TEST DATE: _____

LABORATORY: _____

CONTRACT NO.: _____; DELV. ORDER NO.:_____

LAB. PROJECT ENGINEER'S NAME: _____

TEST SPECIMEN DESCRIPTION:

CNG FUEL TANK MANUFACTURER:_____

TANK PART/SERIAL NO.: _____

LAB IDENTIFICATION NO.:_____

TEST FAILURE DESCRIPTION:_____

_____

_____

_____

FMVSS REQUIREMENT, PARAGRAPHS _____ : _____

_____

_____

_____

NOTIFICATION TO NHTSA (COTR): _____

DATE: _____ ; BY: _____

REMARKS:

16. FORMS....Continued

FMVSS 304 MONTHLY TEST STATUS REPORT

DATE OF REPORT:

Tank No.	CNG FUEL TANK MFR/SERIAL NUMBER	TEST START DATE	TEST COMPLETE DATE	PASS	FAIL	DATE FINAL TEST REPORT SUBMITTED
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						