

APPENDIX C

PROPOSED AMENDMENTS TO TP-501, TEST PROCEDURE FOR DETERMINING INTEGRITY OF PORTABLE FUEL CONTAINER SYSTEMS

California Environmental Protection Agency



Test Procedure for Determining Integrity of ~~Spill-Proof Spouts and Spill-Proof~~Portable Fuel Container Systems

TP-501

NOTE: This is a new Certification Procedure. For clarity the proposed text is shown in normal type. This document is written in a style to indicate changes from the existing provisions. All existing regulatory language is indicated by plain type. All additions to the regulatory language are indicated by underlined type. All deletions to the regulatory language are indicated by strikeout.

Adoption Date: July 26, 2006
Amended: MM DD, YYYY

TABLE OF CONTENTS

1.	APPLICABILITY	4
1.1.	Requirement to Comply with All Other Applicable Codes and Regulations	4
1.2.	Safety	4
2.	PRINCIPLE AL AND SUMMARY OF TEST PROCEDURE	4
3.	BIASES AND INTERFERENCES	5
4.	SENSITIVITY, RANGE, AND PRECISION	5
53.	EQUIPMENT	5
64.	CALIBRATION PROCEDURE	5
75.	TEST PROCEDURE	5
75.1	System Preparation	6
75.2	Verify Initial Leak Free System Check	6
75.3	Verify Automatic Closure Test	6
75.4	Pressurized Leak Check Test	7
5.5	Pressure Cycling Test	7
5.6	UV Exposure Test	7
5.7	Slosh Test	8
8.	QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)	8
96.	RECORDING AND REPORTING DATA	8
10.	CALCULATING RESULTS	8
117.	ALTERNATIVE TEST PROCEDURES	8
128.	REFERENCES	8

439. FIGURES	9
Figure 1. Field Data Sheet	10
Figure 12. Test Fixture	11
Figure 23. Pressurized Leak Check Assembly Elevated Pressure Test Setup	11
Figure 3. Field Data Sheet	13

California Environmental Protection Agency
Air Resources Board

TP-501

**Test Procedure for Determining Integrity of
~~Spill-Proof Spouts and Spill-Proof~~ Portable Fuel Container Systems**

The definitions in ~~Section 2467.1, Article 6, Chapter 9 of Title 13, California Code of Regulations (CCR) applies~~ apply to this test procedure.

For the purpose of this procedure, the term "ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ARB Executive Officer or his or her authorized representative or designate.

1. APPLICABILITY

This ~~Test Procedure~~ is used to verify the performance of the automatic closure and leak free features of ~~spill-proof portable fuel container (PFC) systems or spill-proof spouts as required by ARB Certification Procedure "CP-501, Certification Procedure for Portable Fuel Container Systems."~~ It is applicable in all cases where portable fuel containers, spouts or both portable fuel containers and spouts systems or their components are manufactured for sale, sold, advertised for sale, or offered for sale in California or that are introduced, delivered, or imported into California for introduction into commerce.

1.1. Requirement to Comply with All Other Applicable Codes and Regulations

Certification or approval of a portable fuel container system by the Executive Officer does not exempt the portable fuel container system from compliance or with other applicable codes and regulations such as local, State, or federal safety codes and regulations.

1.2. Safety

This test procedure involves the use of flammable materials and should only be used by or under the supervision of those familiar and experienced in the use of such materials. Appropriate safety precautions should be observed at all times while performing this test procedure.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

This procedure is used to verify the performance of the automatic closure and leak free features of a ~~spill-proof spout when installed on a portable fuel container (spill-proof system).~~ Using water, the portable fuel container is filled to its rated capacity and inverted for a period of time for an initial check for leaks. The liquid is then

dispensed through the ~~spill-proof~~ spout into a test fixture. ~~The spill-proof spout~~automatic closure is allowed to close~~actuated~~ when approximately 25% percent of the container rated capacity has been dispensed to verify ~~the automatic closure~~this feature is operational, and it is then checked for leaks and liquid retention in any open parts of the spout. ~~This procedure is repeated twice more without refilling the container to check the performance at three different fill levels.~~ ~~The spill-proof~~portable fuel container system is then pressurized to 34.5 kPa (5.0 pounds per square inch, (psig)) with compressed air and immersed in a water bath for five minutes to test for high-pressure leaks.

~~3. BIASES AND INTERFERENCES~~

~~This section is reserved for future specifications.~~

~~4. SENSITIVITY, RANGE, AND PRECISION~~

~~This section is reserved for future specifications.~~

~~53. EQUIPMENT~~

~~5.1(a)~~ Test fixture as shown in Figure 12.

~~5.2(b)~~ Pressure gauge, 0-100 kPa, 1 kPa graduation (0-15 psig, 0.2 psig graduation), Grade 2A accuracy or better.

~~5.3(c)~~ Pressure gauge adapter and container pressurization assembly as shown in Figure 23.

~~(d)~~ Ultraviolet light source of at least 24 W/m² (0.40 W-hr/m²/min) (optional).

~~(e)~~ Certification fuel as described in part II, section A.100.3.1.2 of the "California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light Duty Trucks, and Medium-Duty Vehicles" or in 40 C.F.R. Part 1065.710 (b), which are incorporated by reference herein.

~~64. CALIBRATION PROCEDURE~~

~~This section is reserved for future specifications.~~Calibrate the pressure gauge according to the manufacturer's recommended procedure and schedule.

~~75. TEST PROCEDURE~~

75.1 System Preparation

Fill the portable fuel container to its rated capacity with water and attach the spout per the manufacturer's instructions. For spill-proof spouts that are not part of a spill-proof system, select the largest portable fuel container specified for use by the spill-proof spout manufacturer for the test procedure. Fill the selected portable fuel container to its rated capacity with water and attach the spill-proof spout per manufacturer instructions. This assembly is now considered a spill-proof portable fuel container system.

75.2 ~~Verify~~Initial Leak Free System Check

Invert the spill-proof portable fuel container system with the spout pointing down in a vertical axis axial position for a period of five minutes to ensure that there are no leaks. Any leak from any point in the portable fuel container system during this five minute period constitutes a failure. Record the outcome on the field data sheet (see Figure 34). If the spill-proof portable fuel container system is observed leaking, place the spill-proof portable fuel container system in the upright position and ensure that the spill-proof spout is correctly and firmly attached. Invert the container again for a period of five minutes and check for leaks. Record the outcome on the field data sheet.

75.3 ~~Verify~~Automatic Closure Test

Pre-fill the test fixture with 0.25 multiplied by (5.0 gallons minus the container's rated capacity) gallons of water as shown in the following equations:

$$\text{Pre-fill Volume} = 0.25 * (5 \text{ gallons} - \text{capacity in gallons})$$

$$\text{Pre-fill Volume} = \text{Volume of Test Fixture} - (0.25 \times \text{Capacity of PFC})$$

For PFC ≤ 5 gallons

$$\text{Pre-fill Volume} = 0$$

For PFC > 5 gallons

Following the manufacturer's instructions, carefully insert the spill-proof spout into the opening on top of the test fixture (see Figure 12) and dispense water until the tip of the spout is immersed in water. Engage the automatic closure feature. Remove the spout from the test fixture and allow the spout to close, and Gently tap the spout against the opening of the test fixture to remove any water that may adhere to the exterior surface of the spout. The spout must return to the closed position without the operator pushing or pulling the spout closed. Verify that the spout remains closed and sealed by observing the spout for any water leakage while still in the inverted position for 10 seconds. Return the system to the normal upright position and check for leaks

and liquid retention while repositioning, and for 10 seconds after repositioning. If at any point the spout fails to return to the closed position, the container fails the test. Record observations on the field data sheet.

Empty test fixture and repeat test procedure two more times in sequence without refilling the fuel container.

75.4 Pressurized Leak Check Test

Remove the spill-proof spout and modify the portable fuel container as detailed in figure 3. Fill the portable fuel container to its rated capacity with water and attach the spill-proof spout per manufacturer's instructions. Using a sufficient ballast, place the modified spill-proof system upright in a water bath large enough to completely cover the portable fuel container and at least six inches. Using a compressed air source, as detailed in Figure 2, slowly pressurize the empty spill-proof portable fuel container system to 34.5 kPa (5.0 psig) by actuating the spout while the compressed air source is turned on and record the pressure at which any leaks (i.e., bubbles) may appear. After reaching 34.5 kPa (5.0 psig), stop actuating the spout to prevent air from entering the fuel container. No modifications (e.g., cutting or drilling) are to be made to the container. If the spout is not intended to be used to apply pressure, alternative pressurization methods may be used upon approval from the Executive Officer. The six portable fuel containers must continue to be tested for the subsequent TP-501 steps as well as for TP-502. Using a sufficient ballast, submerge the pressurized portable fuel container system upright in a water bath to a depth of at least six inches. Observe the system for any leaks for a period of five minutes. Leaks are determined through the evidence of any bubbles coming from the portable fuel container or spout. Any leak constitutes a failure. Record observations on the field data sheet.

5.5 Pressure Cycling Test

Perform a pressure test by sealing the container and cycling it between +13.8 and -1.7 kPa (+2.0 and -0.5 psig) for 10,000 cycles at a rate of 60 seconds per cycle. For this test, the spout may be removed and the pressure applied through the opening where the spout attaches. The purpose of this test is to represent environmental wall stresses caused by pressure changes and other factors (such as vibration or thermal expansion). If the container cannot be tested using the pressure cycles specified by this paragraph, the use of an alternative test procedure may be requested. Record observations on the field data sheet.

5.6 UV Exposure Test

Perform a sunlight-exposure test by exposing the portable fuel container system to an ultraviolet light of at least 24 W/m² (0.40 W-hr/m²/min) on the

container surface for at least 450 hours. Alternatively, the container may be exposed to direct natural sunlight for an equivalent period of time, as long as the container is exposed to at least 450 daylight hours. Record observations on the field data sheet.

5.7 Slosh Test

Perform a slosh test by filling the portable fuel container to 40 percent of its capacity with the fuel specified in section 3 (e) and rocking it at a rate of 15 cycles per minute until one million total cycles have been completed. Use an angle deviation of +15° to -15° from level. Record observations on the field data sheet.

~~8. QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)~~

~~This section is reserved for future specification.~~

96. RECORDING AND REPORTING DATA

Record data on a form similar to the one shown in Figure 34. Data forms, field notes, and any supporting documentation shall be made available to ARB upon request. The manufacturer shall maintain these documents for a period of not less than 5 years after the completion of testing.

~~10. CALCULATING RESULTS~~

~~This section is reserved for future specifications.~~

117. ALTERNATIVE TEST PROCEDURES

Test procedures, other than specified ~~above~~herein, shall only be used if prior written approval is obtained from the ARB-Executive Officer. In order to secure the ARB Executive Officer's approval of an alternative test procedure, the applicant is responsible for demonstrating to the ARB-Executive Officer's satisfaction that the alternative test procedure is equivalent to this test procedure as described in section 6 of ARB Certification Procedure "CP-501, Certification Procedure for Portable Fuel Container Systems."

~~Such approval shall be granted on a case-by-case basis only.~~

~~Documentation of any such approvals, demonstrations, and approvals shall be maintained by the ARB-Executive Officer and shall be made available upon request.~~

128. REFERENCES

~~This section is reserved for future specification.~~

Control of Evaporative Emissions From New and In-Use Portable Fuel Containers.
Title 40, Code of Federal Regulations, Part 59. United States Environmental
Protection Agency, Subpart F.

California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission
Standards and Test Procedures and 2017 and Subsequent Model Greenhouse
Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light
Duty Trucks, and Medium-Duty Vehicles. Part II, section A.100.3.1.2.

Engine Fluids, Test Fuels, Analytical Gases and Other Calibration Standards. Title
40, Code of Federal Regulations Part 1065, United States Environmental
Protection Agency, Subpart H.

ARB Certification Procedure 501 for Portable Fuel Container Systems.

139. FIGURES

Figure 1. ~~Field Data Sheet~~Test Fixture

Figure 2. ~~Test Fixture~~Elevated Pressure Test Setup

Figure 3. ~~Elevated Pressure Test Setup~~Field Data Sheet

Figure 1. Field Data Sheet

Portable Fuel Container Compliance Tests

I.D. Number _____ Container Volume (gallons) _____

System Mfg. _____ Spout Model _____

_____ Container Model _____

Initial Leak Check P _____ F _____

Tested by: _____ Test Date: _____

Initial Leak Test Results (pass/fail)		Comments
Trial 1	Trial 2 (if necessary)	

Automatic Closure Test

Tested by: _____ Test Date: _____

Automatic Closure Test Results (pass/fail)			Comments
Trial 1	Trial 2	Trial 3	

Elevated Pressure Test

Tested by: _____ Test Date: _____

Pressure Test Results				Comments
Start Time	Stop Time	Total (minutes)	Results (pass/fail)	

_____ I.D. # of Container Used _____

Additional Comments:

Figure 12. Test Fixture

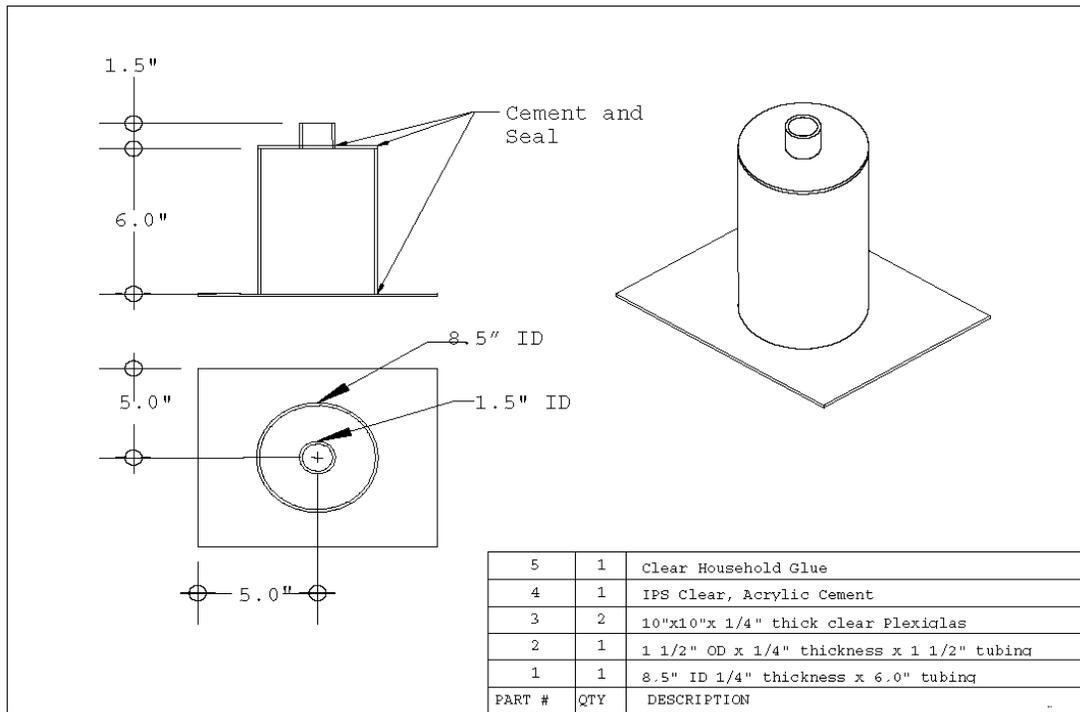


Figure 23. ~~Pressurized Leak Check Assembly~~ Elevated Pressure Test Setup

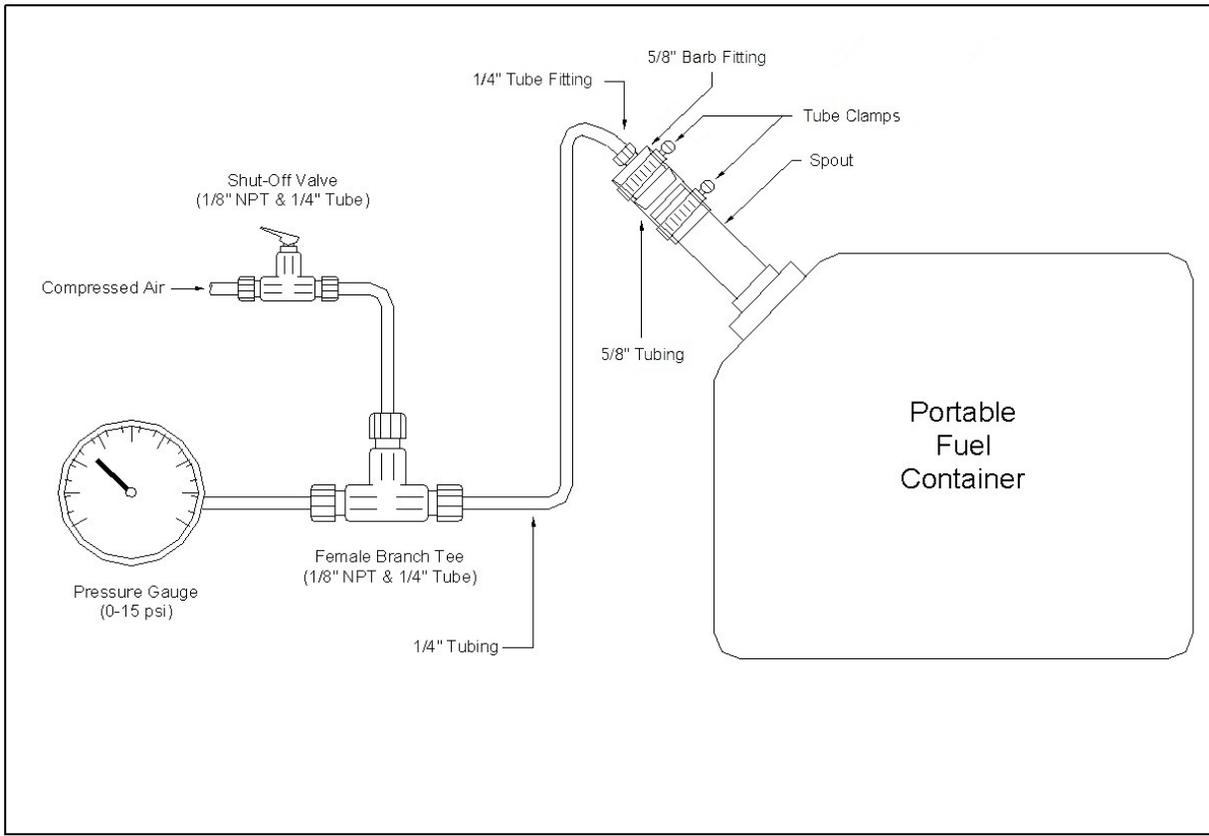
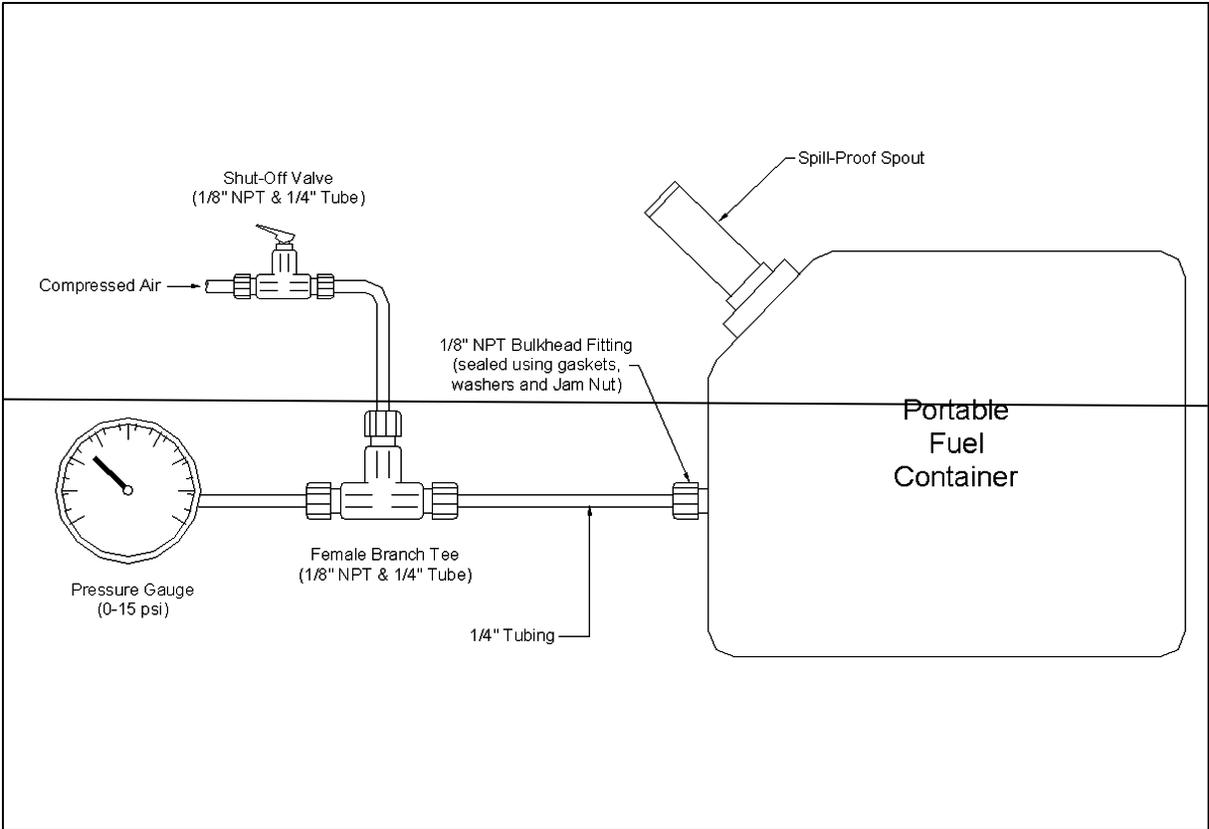


Figure 3. Field Data Sheet

Portable Fuel Container Compliance Tests

I.D. Number _____ **Container Volume (gallons)** _____

System Mfg. _____ **Spout Model** _____

Container Model _____

Initial Leak Test

Tested by: _____ **Test Date:** _____

<u>Initial Leak Test Results</u> <u>(pass/fail)</u>		<u>Comments</u>
<u>Trial 1</u>	<u>Trial 2 (If necessary)</u>	

Automatic Closure Test

Tested by: _____ **Test Date:** _____

<u>Automatic Closure Test Results</u> <u>(pass/fail)</u>			<u>Comments</u>
<u>Trial 1</u>	<u>Trial 2</u>	<u>Trial 3</u>	

Pressurized Leak Test

Tested by: _____ **Test Date:** _____

<u>Pressure Test Results</u>				<u>Comments</u>
<u>Start Time</u>	<u>Stop Time</u>	<u>Total (minutes)</u>	<u>Results (pass/fail)</u>	

Pressure Cycling Test

Tested by: _____ **Test Date:** _____

<u>Pressure Cycling Test Results</u>			<u>Comments</u>
<u>Start Date & Time</u>	<u>Stop Date & Time</u>	<u>Total (hours)</u>	

Figure 3. Field Data Sheet (continued)

UV Exposure Test

Tested by: _____ **Test Date:** _____

<u>UV Exposure Test Results</u>			<u>Comments</u>
<u>Start Date & Time</u>	<u>Stop Date & Time</u>	<u>Total (hours)</u>	

Slosh Test

Tested by: _____ **Test Date:** _____

<u>Slosh Test Results</u>			<u>Comments</u>
<u>Start Date & Time</u>	<u>Stop Date & Time</u>	<u>Total (hours)</u>	

I.D. # of Container Used _____

Additional Comments:
