California Environmental Protection Agency

Air Resources Board

Test Procedure for Determining Integrity of Portable Fuel Container Systems

TP-501

Adoption Date: July 26, 2006
Amended: December 9, 2016

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The definitions in section 2467.1, title 13, California Code of Regulations 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 portable fuel container (PFC) systems as required by ARB Certification Procedure CP-501, *Certification Procedure for Portable Fuel Container Systems*. It is applicable in all cases where portable fuel container systems or their components are manufactured for sale, sold, advertised for sale, or offered for sale in California or 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 sample of six (6) portable fuel container systems. 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 spout

into a test fixture. The automatic closure is actuated when approximately 25 percent of the container rated capacity has been dispensed to verify 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. Durability is also demonstrated on the portable fuel container systems by cycling pressure, exposure to ultraviolet light, and fuel sloshing.

3. EQUIPMENT

(a) Test fixture as shown in Figure 1.

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

(c) Ultraviolet light source of at least 24 W/m^2 (0.40 $W\text{-}hr/m^2/min$) (optional).

(d) 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" (September 2, 2015) or in 40 C.F.R. Part 1065.710 (b), (November 20, 2015) which are incorporated by reference herein.

4. CALIBRATION PROCEDURE

Calibrate the pressure gauge according to the manufacturer's recommended procedure and schedule.

5. TEST PROCEDURE

5.1 System Preparation

Fill the portable fuel container to its rated capacity with water and install and tighten the spout per ASTM F852-08 section 4. This assembly is now considered a portable fuel container system.

5.2 Initial Leak Check

Invert the portable fuel container system with the spout pointing down in a vertical axial position for a period of five minutes. 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 2). If the portable fuel container system is observed leaking, place the portable fuel

container system in the upright position and ensure that the 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.

5.3 Automatic Closure Test

Pre-fill the test fixture with water as shown in the following equations:

Pre-fill Volume = Volume of Test Fixture – (0.25 × Capacity of PFC)
For PFC ≤ 5 gallons

Pre-fill Volume = 0
For PFC > 5 gallons

Following the manufacturer's instructions, carefully insert the spout into the opening on top of the test fixture (see Figure 1) and dispense water until the tip of the spout is immersed in water. Remove the spout from the test fixture and allow the spout to close. 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.

5.4 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. 5 UV Exposure Test

Perform a sunlight-exposure test by exposing the portable fuel container system to an ultraviolet light of at least 24 W/m^2 (0.40 W-hr/m^2/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. 6 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 (d) 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.

6. RECORDING AND REPORTING DATA

Record data on a form similar to the one shown in Figure 2. 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.

7. ALTERNATIVE TEST PROCEDURES

Test procedures, other than specified herein, shall only be used if prior written approval is obtained from the Executive Officer. In order to secure the Executive Officer's approval of an alternative test procedure, the applicant is responsible for demonstrating to the 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*.” The Executive Officer reserves the right to require the applicant of an innovative system to develop an alternative test procedure which demonstrates the intent of each test requirement not achieved due the innovative design.

8. REFERENCES

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 for Portable Fuel Container Systems, CP-501*.*

ARB Test Procedure for Determining Diurnal Emissions from Portable Fuel Container Systems, TP-502*.*

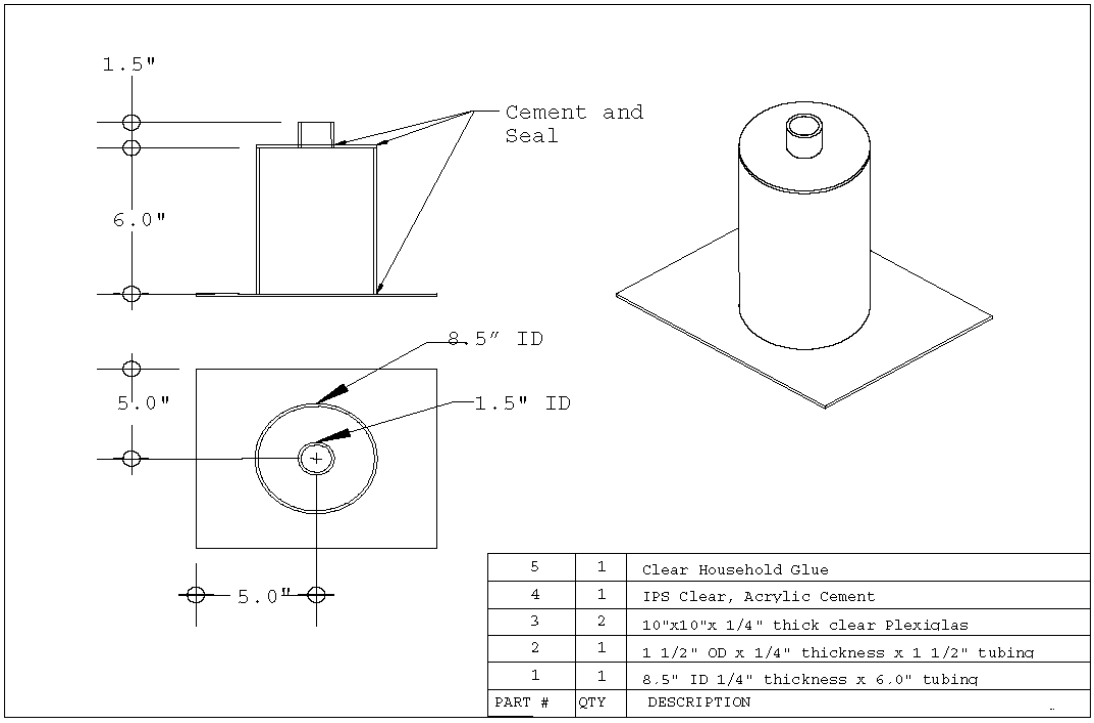
Standard Specification for Portable Gasoline Containers for Consumer Use, ASTM F852-08.

9. FIGURES

Figure 1. Test Fixture

Figure 2. Field Data Sheet

Figure 1. Test Fixture



PART #	QTY	DESCRIPTION
5	1	Clear Household Glue
4	1	IPS Clear, Acrylic Cement
3	2	10"x10"x 1/4" thick clear Plexiglas
2	1	1 1/2" OD x 1/4" thickness x 1 1/2" tubing
1	1	8.5" ID 1/4" thickness x 6.0" tubing