

California Environmental Protection Agency



Air Resources Board

Spill-Proof System and Spill-Proof Spout Test Procedure

Test Method 511

**AUTOMATIC CLOSURE TEST PROCEDURE FOR
SPILL-PROOF SYSTEMS AND SPILL-PROOF SPOUTS**

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Test Method 511
Automatic Closure Test Procedure
For Spill-Proof Systems and
Spill-Proof Spouts

1 APPLICABILITY

For the purpose of this procedure, the term "ARB" refers to the State of California Air Resources Board, and the term "ARB Executive Officer" refers to the Executive Officer of the ARB or his or her authorized representative or designate. Terms used in this test method are defined in Section 2467.1, Article 6, Chapter 9, Title 13 of the California Code of Regulations.

This procedure is used to verify the performance of the automatic closure feature of spill-proof systems or portable fuel containers and spill-proof spouts. It is applicable in all cases where a spill-proof system or a spill-proof spout is sold, supplied, offered for sale, or manufactured for use in the State of California.

2 PRINCIPAL AND SUMMARY OF TEST PROCEDURE

Using water in place of gasoline, the portable fuel container is filled to its nominal capacity and inverted for a period of time to test for leaks. Water is then dispensed through the spill-proof spout into a test fixture. The spill-proof spout is quickly removed when the test fixture is approximately 50 % full to verify the automatic closure feature is operational. Finally, the spill-proof system is pressurized to 10 pounds per square inch (psi) with compressed air and immersed in a water bath for ten minutes to test for leaks.

3 BIASES AND INTERFERENCES

This section is reserved for future specifications.

4 SENSITIVITY, RANGE, AND PRECISION

This section is reserved for future specifications.

5 EQUIPMENT

5.1 Stopwatch accurate to within 0.2 seconds.

5.2 0.5 gallon test fixture (see Figure 2).

5.3 Modified portable fuel container (see Figure 3).

5.4 Pressure gauge, 0-15 psig, 0.2 psi graduation, Grade 2A accuracy or better

5.5 Pressure gauge adapter assembly as shown in Figure 3

6 CALIBRATION PROCEDURE

This section is reserved for future specifications.

7 TEST PROCEDURE

- (1) Fill the portable fuel container of the spill-proof system to its nominal capacity with water and attach the spill-proof spout per manufacturer recommendations. 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 nominal capacity with water and attach the spill-proof spout per manufacturer recommendations. This assembly is now considered a spill-proof system.
- (2) Invert the spill-proof system with the spout in a vertical axis position for a period of five minutes to ensure that there are no leaks. Record the outcome on the field data sheet (see figure 1). If the spill-proof system is observed leaking, place the spill-proof 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. Record the outcome on the field data sheet.
- (3) Prepare the spill-proof system for dispensing per manufacturers recommendations. Following the manufacturers recommendations carefully insert the spill-proof spout into the opening on top of the test fixture (see figure 2) and begin dispensing water into the test fixture. Stop dispensing water when the test fixture is approximately 50 % full. Gently tap the spill-proof spout against the opening of the test fixture to remove any water which may adhere to the exterior surface of the spout. Verify that the spill-proof spout remains closed and sealed by removing from the test fixture and observing the spill-proof spout for any water leakage while still in the inverted position for one minute. Record observations on the field data sheet. Drain the test fixture and repeat this process three times.
- (4) Remove the spill-proof spout and modify the portable fuel container as detailed in figure 3. Fill the portable fuel container to its nominal capacity with water and attach the spill-proof spout per manufacturers recommendations. 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 spout plus six inches. Using a compressed air source, pressurize the spill-proof system to 10 psi. Observe the spill-proof system for evidence of leakage for ten minutes. Leakage shall be detected by the evidence of bubbles from the portable fuel container or the spout. Record observations on the field data sheet.

8 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

This section is reserved for future specification.

9 RECORDING DATA

Record data on a form similar to the one shown in Figure 1.

10 CALCULATING RESULTS

This section is reserved for future specifications.

11. REPORTING RESULTS

Compliance with the automatic closure requirements of Section 2467.2, Article 6, Chapter 9, Title 13 of the California Code of Regulations is achieved if:

(1) No water leaks when the spill-proof system is inverted for five minutes

and

(2) No water leaks on all three trials when the spill-proof system is removed from the test fixture and observed for one minute

and

(3) No leakage is observed while the modified spill-proof system is immersed in the water bath.

12 ALTERNATIVE TEST PROCEDURES

Test procedures, other than specified above, 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.

(1) Such approval shall be granted on a case-by-case basis only.

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

13 REFERENCES

This section is reserved for future specification.

14 FIGURES

Figure 1. Field Data Sheet

Figure 2. 0.5 Gallon Test Fixture

Figure 3. Modified Portable Fuel Container

Figure 1. Field Data Sheet

Spill-Proof System Manufacturer: _____

OR

Spill-Proof Spout Manufacturer: _____ AND _____

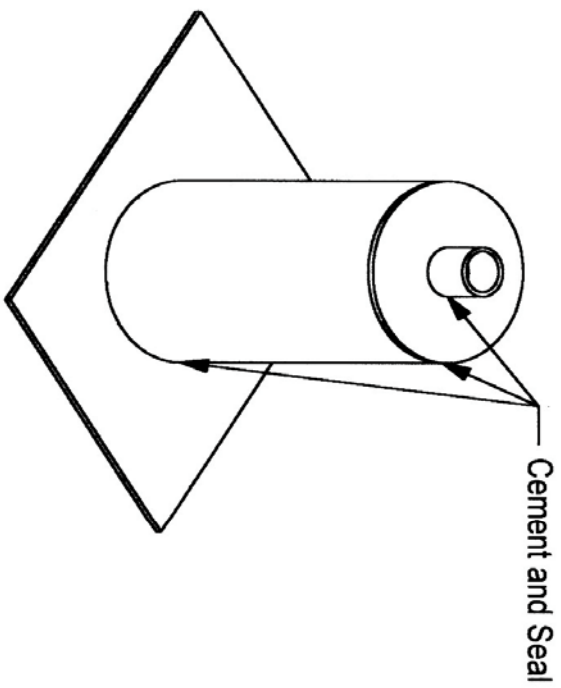
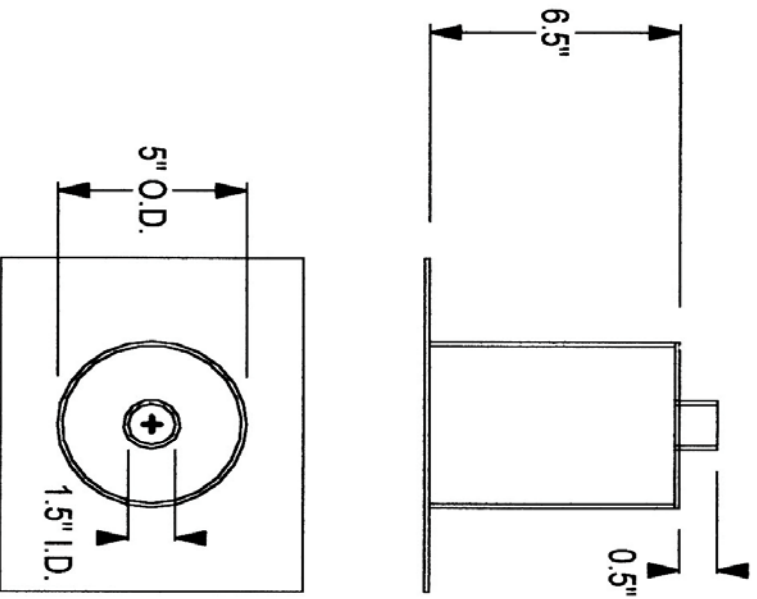
Portable Fuel Container Manufacturer: _____

Container Volume: _____

Tested By: _____ Date: _____ Time: _____

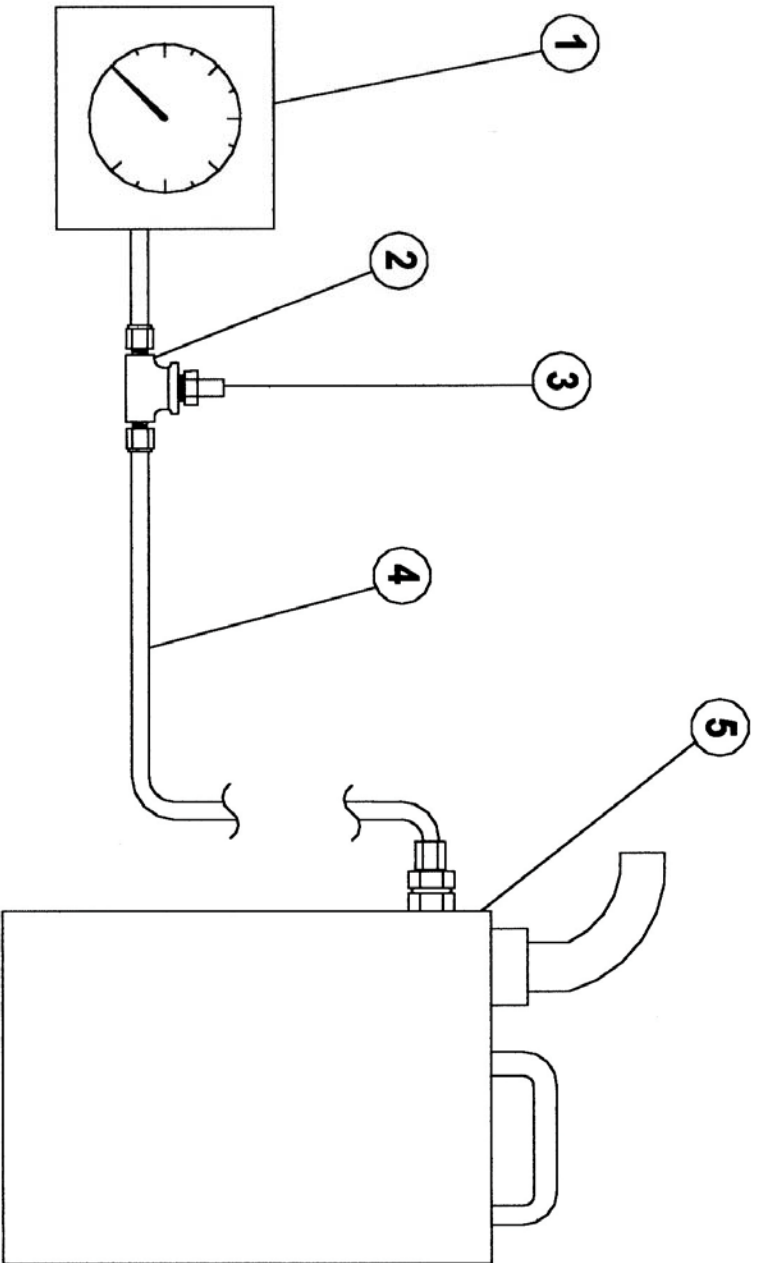
INVERTED LEAK TEST RESULTS (pass/fail)	AUTOMATIC CLOSURE TEST RESULTS (pass/fail)			PRESSURE TEST		
	Trial 1	Trial 2	Trial 3	Start Time	Stop Time	Results (pass/fail)

Figure 2. 0.5 Gallon Test Fixture



PART NO.	QTY	DESCRIPTION
5	1	Silicon Sealant
4	1	Clear, Thickened Cement for Acrylic Sheet
3	2	8"x10"x 1/8" thick clear plexiglass
2	1	1 1/2" I.D x 1/8" thickness x 5/8" clear plastic tubing
1	1	5" O.D. x 1/8" thickness x 6.5" clear plastic tubing

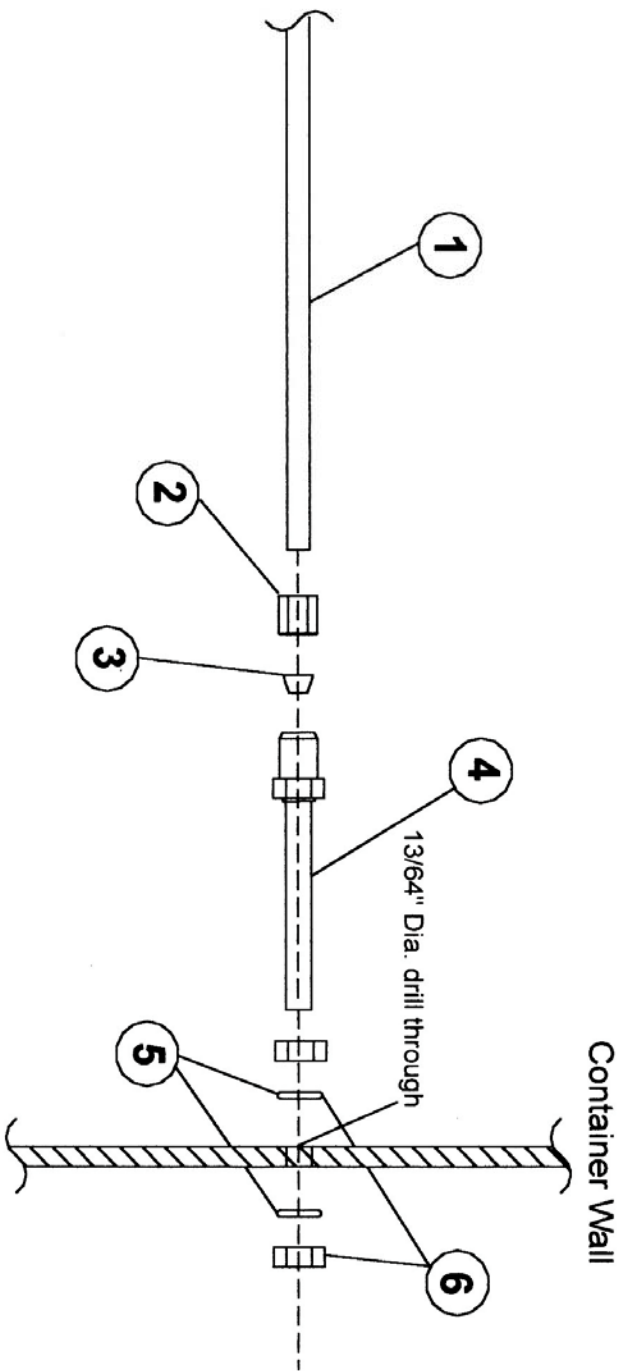
Figure 3. Modified Portable Fuel Container



Note: 1. Page 1 of 2

PART NO.	QTY	DESCRIPTION
5	1	Modified Portable Fuel Container
4	1	1/4" O.D. x 3/16" I.D. Teflon Tubing
3	1	1/8" Male NPT Tank Valve
2	1	1/8" NPT Female Branch Tee With 1/4" Tube Ports
1	1	Grade 2A 0-15psi Pressure Gauge

Figure 3. Modified Portable Fuel Container



- Notes: 1. Install 1/8" NPT bulkhead fitting through container wall. Place one Jam nut on each side of container wall with o-rings located between jam nuts and container wall.
2. If necessary, use a suitable epoxy sealant at the bulkhead and container wall joint.
3. Page 2 of 2

PART NO.	QTY	DESCRIPTION
6	2	5/8" Hex Jam Nut
5	2	7/32" x 11/32" O-ring
4	1	1/8" NPT x 1/4" Tubing Bulkhead Fitting
3	1	1/4" Tube Fitting Ferrule
2	1	1/4" Tube Fitting Cap
1	1	1/4" O.D. x 3/16" I.D. Teflon Tubing