California Environmental Protection Agency

Air Resources Board

Vapor Recovery Test Procedure

TP - 204.1

# DETERMINATION OF FIVE MINUTE STATIC PRESSURE PERFORMANCE OF VAPOR RECOVERY SYSTEMS OF CARGO TANKS

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**California Environmental Protection Agency**
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# Determination of Five Minute Static Pressure Performance of Vapor Recovery Systems of Cargo Tanks

## 1 APPLICABILITY

Definitions common to all certification and test procedures are in:

**D-200 Definitions for Certification Procedures and Test Procedures for Vapor Recovery Systems**

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.

### 1.1 General Applicability

This procedure applies to the determination of the five minute static pressure performance of a vapor recovery system of a cargo tank by fluid mechanical principles. This procedure applies to any vapor emissions associated with the dispensing of any fluid, although it is written to reflect application to the hydrocarbon vapors associated with the dispensing of gasoline.

### 1.2 Determinations of Compliance and Violation

Determinations of certain modes of compliance with and violation of certification specifications are outlined in § 9.

### 1.3 Modifications

Modification of this procedure may be necessary for vapors and fluids other than the hydrocarbon vapors associated with the dispensing of gasoline.
Any modification of this method shall be subject to approval by the ARB Executive Officer.

## 2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The cargo tank is to be tested in a location where it will be protected from direct sunlight. The cargo tank, mounted on either the truck or trailer, is to be pressurized, isolated from the pressure source, and the pressure drop recorded to determine the rate of pressure change. A vacuum test (for annual certification criterion testing only) is to be conducted in the same manner. Annual recertification tests shall be conducted no more than sixty days prior to the issuance of the certification.

## 3 BIASES AND INTERFERENCES

This section is reserved for future specification.

## 4 SENSITIVITY, RANGE, AND PRECISION

This section is reserved for future specification.

## 5 EQUIPMENT

5.1 Source of air or inert gas capable of pressurizing tanks to 27.7 inches of water (1 psi) above atmospheric pressure.

5.2 Low pressure (5 psi divisions) regulator for controlling pressurization of tank.

5.3 Water manometer with 0 to 25 inch range, with scale readings of 0.1 inch.

5.4 Test cap for vapor line with a shut-off valve for connection to the pressure and vacuum supply hoses. The test cap is to be equipped with a tap for connecting the manometer.

5.5 Caps for liquid delivery line.

5.6 Vacuum pump of sufficient capacity to evacuate tank to ten inches of water.

5.7 Pressure and vacuum supply hose of 1/4 inch internal diameter.

5.8 In-line, pressure vacuum relief valve set to activate at one (1) psi and with a capacity equal to the pressurizing or evacuating pumps.

## 6 CALIBRATION PROCEDURE

This section is reserved for future specification.

## 7 PRE-TEST PROTOCOL

The cargo tank shall adhere to all of the other certification conditions in CP-204 (in addition to those requirements of CP-204 to which this test procedure applies).

## 8 TEST PROCEDURE

8.1 Static Pressure Performance, Positive Pressurization

8.1.1 Static Pressure Performance Measurement

8.1.1.1 Open and close the dome covers.

8.1.1.2 Connect static electrical ground connections to tank. Attach the delivery and vapor hoses, remove the delivery elbows and plug the liquid delivery fittings.

8.1.1.3 Attach the test cap to the vapor recovery line of the cargo tank.

8.1.1.4 Connect the vacuum and pressure supply hose and the pressure-vacuum relief valve to the shut-off valve. Attach the pressure source to the hose. Attach a manometer to the pressure tap.

8.1.1.5 Connect compartments of the tank internally to each other if possible.

8.1.1.6 Applying air pressure slowly, pressurize the tank, or alternatively the first compartment, to 18 inches of water.

8.1.1.7 Close the shut-off valve, allow the pressure in the cargo tank to stabilize (adjust the pressure if necessary to maintain 18 inches of water), record the time and initial pressure.

8.1.1.8 At the end of five minutes, record the final time and pressure.

8.1.2 Pressure Change from (+18) Inches of Water, Gauge

8.1.2.1 Calculate the pressure change (inches water column) from +18 inches of water, gauge, to the final pressure.

8.1.2.2 Repeat for each compartment if they were not interconnected.

8.2 Static Pressure Performance, Negative Pressurization

This procedure does not apply unless pressurized air lines or other equipment penetrate the cargo tank headspace.

8.2.1 Static Pressure Performance Measurement

8.2.1.1 Connect vacuum source to pressure and vacuum supply hose.

8.2.1.2 Slowly evacuate the tank, or alternatively the first compartment, to six (6) inches of water vacuum. Close the shut-off valve, allow the pressure in the cargo tank to stabilize (adjust the pressure if necessary to maintain six inches of water vacuum), record the initial pressure and time. At the end of five (5) minutes, record the final pressure and time.

8.2.2 Pressure Change from (-6) Inches of Water, Gauge

Calculate the pressure change (inches water column) from -6 inches of water, gauge, to the final pressure. If pressurized air lines or other equipment penetrate the cargo tank headspace, record and report the value of the pressure change as zero.

8.3 Internal Vapor Valve Performance, Positive Pressurization

8.3.1 Static Pressure Performance Measurement

8.3.1.1 After completing the vacuum and pressure tests, pressurize the tank as in § 8.1 above to 18 inches of water.

8.3.1.2 Close the cargo tank's internal valve(s) including the internal vapor valve(s), thereby isolating the vapor return line and manifold from the cargo tank.

8.3.1.3 Relieve the pressure in the vapor return line to atmospheric pressure.

8.3.1.4 Seal the vapor return line and after five (5) minutes record the gauge pressure existing in the vapor return line and manifold.

8.3.2 Pressure Change from (+18) Inches of Water, Gauge

Calculate the pressure change (inches water column) from +18 inches of water, gauge, to the final pressure.

## 9 DETERMINATIONS OF COMPLIANCE AND VIOLATION

Determinations of certain modes of compliance with and violation of certification specifications are outlined below.

9.1 Static Pressure Performance Standard (Five Minute Yearly)

9.1.1 Determination of Compliance

Compliance is determined if the pressure change from § 8.1.2 or § 8.2.2 is equal to or less than the limit specified in CP-204 § ~~4.2~~ 4.1.1.1.

9.1.2 Determination of Violation

Violation is determined if the pressure change from § 8.1.2 or § 8.2.2 is greater than the limit specified in CP-204 § ~~4.2~~ 4.1.1.1.

9.2 Internal Vapor Valve Performance Standard (Five Minute Yearly)

9.2.1 Determination of Compliance

Compliance is determined if the pressure change from § 8.3.2 is equal to or less than the limit specified in CP-204 § ~~4.2~~ 4.1.3.1.

9.2.2 Determination of Violation

Violation is determined if the pressure change from § 8.3.2 is greater than the limit specified in CP-204 § ~~4.2~~ 4.1.3.1.

## 10 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

This section is reserved for future specification.

## 11 RECORDING DATA

This section is reserved for future specification.

## 12 CALCULATING RESULTS

This section is reserved for future specification.

## 13 REPORTING RESULTS

This section is reserved for future specification.

## 14 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. Because of the evolving nature of technology and procedures for vapor recovery systems, such approval shall not be granted in subsequent cases without a new request for approval and a new demonstration of equivalency.

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

## 15 REFERENCES

This section is reserved for future specification.

## 16 FIGURES

This section is reserved for future specification.