California Code of Regulations
Title 17, Division 3
Chapter 1 – Air Resources Board
Subchapter 8 – Compliance with Nonvehicular Emission Standards
Article 1 – Vapor Recovery Systems in Gasoline Marketing Operations

§ 94014. Certification of Vapor Recovery Systems for Cargo Tanks.

The certification of gasoline vapor recovery systems for cargo tanks shall be accomplished in accordance with the Air Resources Board's CP-204 "Certification Procedure for Vapor Recovery Systems of Cargo Tanks" which is incorporated herein by reference. (Adopted: April 18, 1977, as last amended November 7, 2014).

The following test procedures (TP) cited in CP-204 are also incorporated by reference.
TP-204.1 -- "Determination of Five Minute Static Pressure Performance of Vapor Recovery Systems of Cargo Tanks" (Adopted: April 12, 1996, as last amended November 7, 2014).
TP-204.2 -- "Determination of One Minute Static Pressure Performance of Vapor Recovery Systems of Cargo Tanks" (Adopted: April 12, 1996, as last amended May 27, 2014).
TP-204.3 -- "Determination of Leak(s)" (Adopted: April 12, 1996, as last amended November 7, 2014).

Note: Authority cited: Sections 39600, 39601, 39607, 41954 and 41962, Health and Safety Code. Reference: Sections 39515, 39516, 39607, 41954 and 41962, Health and Safety Code.

HISTORY

1. **New section filed 6-11-1996; operative 7-11-1996 (Register 96, No. 24).**
2. **Amendment filed 5-6-1999; operative 6-5-1999 (Register 99, No. 19).**
3. **Amendment filed 12-10-2014; operative 4-1-2015 (Register 2014, No. 50).**

California Environmental Protection Agency

Air Resources Board

Vapor Recovery Certification Procedure

CP-204

Certification Procedure for Vapor Recovery Systems of Cargo Tanks

Adopted: April 12, 1996
Amended: March 17, 1999
Amended: November 7, 2014

[Note: This Certification Procedure is being amended and the entire March 17, 1999 version is being repealed. For ease of viewing, the document is shown in plain text.]

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Certification Procedure

CP-204

Certification Procedure for Vapor Recovery Systems of Cargo Tanks

A set of definitions common to all Certification and Test Procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purposes of this procedure, the term “ARB” or “CARB” 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 designee.

1. GENERAL INFORMATION AND APPLICABILITY

This procedure describes the process for certifying cargo tanks with a system that recovers vapors during the loading and unloading of gasoline. The cargo tank vapor recovery system prevents gasoline vapors from being emitted into the air.

Other vapor recovery certification procedures provide instructions for determining performance standards, performance specifications, and test procedures for equipment which recovers vapors emitted in association with gasoline marketing operations involving: dispensing facilities (CP-201 or CP-206); bulk plants and cargo tanks (CP-202); and supply lines, terminals, delivery lines, and cargo tanks (CP-203). This procedure establishes performance standards or specifications for cargo tanks, including trucks and trailers that transport gasoline. State law provides that no person shall operate, or allow the operation of, a cargo tank unless the cargo tank is certified and maintained in accordance with these procedures. Certifications shall be issued on an annual basis and shall expire on the last day of the month one year following the month of issuance of the certification.

1.1 Legislative and Regulatory Requirements of Other Agencies

In addition to ARB, other federal, state, or local government bodies may enforce laws and regulations applicable to vapor recovery systems. Cargo tank owners or operators are responsible for complying with all applicable laws and regulations including regulations of the California Highway Patrol, the Department of Forestry and Fire Protection, Office of the State Fire Marshal, and the Department of Industrial Relations, Division of Occupational Safety and Health.

2. SUMMARY OF CERTIFICATION PROCESS

The owner or operator of any cargo tank shall:

(1) annually test such cargo tank(s) in accordance with the provisions of section (§) 3.1 and
(2) annually apply for certification of such tank(s) in accordance with this certification procedure.

Tests shall be conducted by the owner or operator of the cargo tank, or a consultant or contractor, at the expense of the owner or operator. Prior to testing, the owner or operator shall notify the Executive Officer, no less than 48 hours prior to the start of test, of the date, time, and location of the test. The Executive Officer may observe or conduct tests referenced in § 3.1.

2.1 Application for Certification of an Individual Cargo Tank

The application for certification of individual cargo tanks shall be submitted to the Executive Officer through the ARB Online Cargo Tank Vapor Recovery Certification Program that can be accessed through the ARB webpage at www.arb.ca.gov/enf/cargotanks/cargotanks.htm, and shall contain the following information:

1. Name, address, email address, and telephone number of owner or operator, and company name (if applicable).
2. The sizes and number of compartments of the cargo tank.
3. The cargo tank number issued by CARB.
4. A statement that the tank has been tested according to the annual test procedures prescribed in § 3.1 of this certification procedure and complies with the corresponding performance standards.
5. All test data supporting the statement in item (4) above.
6. A declaration under penalty of perjury by the person conducting the test that the information contained in items (4) and (5) is true and correct.
7. A declaration under penalty of perjury by the applicant setting forth his or her property interest in the cargo tank and stating that all information is true and correct.

2.2 Compatibility

The cargo tank when connected to an ARB certified vapor recovery system at a bulk plant, terminal, gasoline dispensing facility (GDF) with an underground storage tank (UST), or GDF with an aboveground storage tank (AST) shall not prevent such systems from achieving the required vapor recovery efficiency and/or emission factor referenced in CP-202 for bulk plants, CP-203 for terminals, CP-201 for GDF with UST, and CP-206 for GDF with

AST. The connectors and fittings of the cargo tank shall be compatible with an ARB certified Phase I system installed at GDFs with USTs and ASTs. Such compatibility may be achieved by the use of adapters.

2.3 Condition of Certification

When the Executive Officer determines the application complies with all applicable provisions of this certification procedure, the Executive Officer shall issue a non-transferable and non-removable decal to be affixed to the right side of the cargo tank on the vertical mid-line, near the front of the vessel. Furthermore, the owner/operator shall ensure that the ARB issued Cargo Tank Number for the vessel shall be on the cargo tank in a location that can be readily seen. As a condition of certification, the Executive Officer shall return a copy of the application to the applicant with stamped acknowledgement of receipt thereon, or other appropriate documentation of certification. The stamped copy of the application or other documentation of certification shall be kept with the cargo tank at all times.

2.4 Fee

The Executive Officer shall charge a fee not to exceed the actual cost of certification to cover the cost of certifying cargo tanks. Payment of the fee is a condition of certification.

3. PERFORMANCE STANDARDS AND TEST PROCEDURES

3.1 Five Minute Performance Standard - Annual

All cargo tanks owner or operators shall conduct testing annually in accordance with TP-204.1, Determination of Five Minute Static Pressure Performance of Vapor Recovery Systems of Cargo Tanks, to verify compliance with performance standards referenced in this section. The results shall be submitted annually to the Executive Officer as provided by section 2.

3.1.1 Cargo Tanks or Compartment

The Five Minute performance standard listed in Table 3-1 shall be determined by TP-204.1, Determination of Five Minute Static Pressure Performance of Vapor Recovery Systems of Cargo Tanks.

Table 3-1
Pressure or Vacuum Change per Cargo Tank
or Compartment Tested

Allowed Pressure Change (inches WC)	Cargo Tank or Compartment Capacity (gallons)
0.50	2500 or more
0.75	2499 to 1500
1.00	1499 to 1000
1.25	999 or less

Table 3-2
Internal Vapor Valve Pressure Change
Per Cargo Tank or Compartment Tested

Allowed Pressure Change In 5 Minutes (inches WC)	Cargo Tank Or Compartment Capacity (gallons)
5.0	All

3.1.2 Internal Vapor Valve

Every cargo tank shall have an internal vapor valve. A check valve or cap is not an acceptable alternative. The internal vapor valve shall comply with the performance standard listed in Table 3-2 when tested in accordance with TP-204.1.

3.2 Daily Static Pressure Performance Standard

The Executive Officer shall conduct testing of cargo tanks in accordance with TP-204.2, Determination of One Minute Static Pressure Performance of Vapor Recovery Systems of Cargo Tanks, to determine compliance with applicable performance standards referenced in section 3.2.

3.2.1 The Daily Static Pressure Performance Standard, or one minute standard, is dependent on the headspace volume after loading and can vary from one load to the next. The one minute standard shall be determined by TP-204.2. All cargo tanks and compartment, including the internal vapor valve(s), shall be capable of meeting the one minute standard of Equation 3.2.

Equation 3.2

$$P_F = 18\left(\frac{N}{18}\right)^{\left(\frac{V_s}{5\,V_h}\right)}$$

where:

- P_F minimum allowable one-minute final pressure, inches water column
- V_s total cargo tank shell capacity, gallons
- V_h cargo tank headspace volume after loading, gallons
- 18 initial pressures at start of test, inches water column
- N see Table 3.2.1

Table 3.2.1

If V_s is	Then N is equal to
greater than or equal to 2,500 gallons	15.5 inches WC
between 1,500 and 2499 gallons	15.0 inches WC
between 1,000 and 1,499 gallons	14.5 inches WC
between 0 and 999 gallons	14.0 inches WC

3.2.2 Internal Vapor Valve Performance Standard

All cargo tank internal vapor vent valve(s) shall comply with the performance standard listed in Table 3.2.2 as determined by TP-204.2.

Table 3.2.2
Internal Vapor Valve Performance Standard

Test Time (minutes)	Maximum Allowable One-Minute Pressure Increase (inches WC)
1.0	1.1
2.0	2.2
3.0	3.3
4.0	4.4
5.0	5.5

The values in the right hand column are adjusted upward to account for a systematic bias caused by expansion in the headspace of the cargo tank subsequent to thermal conduction from the shell. The value of 5.5 at the bottom of the column corresponds equivalently to the 5.0 inches WC pressure increase allowed by the five minute performance standard.

Important: If individual compartments are to be tested, both V_s and V_h must be the volumes relating to that compartment alone, not all compartments.

3.3 Vapor and Liquid Leaks

The Executive Officer shall conduct testing of cargo tanks during the loading or after loading of gasoline to determine compliance with the vapor and liquid leak standards of this section in accordance with TP-204.3, Determination of Leak(s).

3.3.1 Vapor Leaks

A vapor leak is defined to be any source of gasoline vapors which causes a combustible gas detector meter reading exceeding 100 percent of the LEL as determined by TP-204.3, Determination of Leak(s).

3.3.2 Liquid Leaks

A liquid leak is defined to be liquid gasoline dripping at a rate in excess of three (3) drops per minute as determined by TP-204.3.

4. REQUIREMENTS FOR DETERMINATIONS OF COMPLIANCE AND VIOLATION

The specifications of this section are primarily adopted pursuant to Health and Safety Code sections (H&SC §§ 41962 and 41974). In particular, H&SC § 41974 provides that the penalty provisions of Article 3 (commencing with Section 42400) of Chapter 4, Division 26 of the H&SC shall apply to gasoline cargo tank vapor recovery system violations.

4.1 General Requirements

It is a general requirement that any certified vapor recovery system shall comply with the specifications of certification which result from the application of this procedure to such vapor recovery system. Failure of such vapor

recovery system to comply is a violation of such vapor recovery system's specifications of certification.

4.2 Specific Requirements

It shall be a specification of certification that each cargo tank shall comply with the compliance requirements listed below; failure of a cargo tank to comply with these requirements shall be a violation of that cargo tank's specification of certification.

4.2.1 Yearly Requirements

a. On an annual basis, each cargo tank shall prepare for pressure testing to determine if that cargo tank complies with the five minute performance standard as determined by TP-204.1.
b. Any such cargo tank which fails to demonstrate such compliance with five minute performance standard, daily static pressure performance standard, or vapor leak standard or liquid leak standard shall be subject to a penalty set by the Executive Officer. (See H&SC § 41974)
c. Any such cargo tank which fails to demonstrate compliance shall be taken out of service until such cargo tank is repaired, tested, and determined to comply.

4.2.2 Daily Requirements

a. On a permanent basis, any cargo tank shall be subject to daily static pressure performance standard testing.

Any such cargo tank which fails to demonstrate such compliance shall prepare for pressure testing pending one of the following outcomes:

(1) If no maintenance has been performed on such cargo tank while preparing for testing, such cargo tank may be tested to determine if such cargo tank complies with a static pressure performance standard according to the appropriate test procedure.

i. If such cargo tank complies, such cargo tank may be placed back in service with no penalty.

ii. If such cargo tank does not comply, such cargo tank shall be subject to a penalty set by the Executive Officer (see H&SC § 41974) and shall remain out of

service until such cargo tank is repaired, tested, and determined to comply with the annual Five Minute Performance Standard as determined by TP-204.1.

(2) If maintenance has been performed on such cargo tank while preparing for testing, such cargo tank shall be permanently removed from service (salvaged) or shall be tested to determine if such cargo tank complies with the yearly standard according to the appropriate test procedure.

i. If such cargo tank complies, such cargo tank may be placed back in service and shall be subject to a penalty set by the Executive Officer. (See H&SC § 41974)

ii. If such cargo tank does not comply, the owner or operator of the cargo tank shall be subject to a penalty set by the Executive Officer (see H&SC § 41974) and shall remain out of service until such cargo tank is repaired, tested, and determined to comply with the yearly standard according to the appropriate test procedure.

(3) If the cargo tank is taken out of service permanently, such cargo tank shall be subject to a penalty set by the Executive Officer. (See H&SC § 41974)

4.3 Other Requirements

On a permanent basis, any cargo tank shall be subject to annual and daily static pressure performance testing to determine if any such cargo tank complies with the applicable annual and daily static pressure performance standards.

4.3.1 Any such cargo tank which fails to demonstrate such compliance shall be subject to a penalty set by the Executive Officer (see H&SC 41974) and shall be taken out of service.

4.3.2 Such cargo tank may be repaired and re-tested to determine if such cargo tank complies with the annual certification standard according to the appropriate test procedure.

a. If such cargo tank complies, the cargo tank may be placed back in service.
b. If such cargo tank does not comply, the cargo tank shall remain out of service until the cargo tank is repaired, tested, and

determined to comply with the annual performance standard listed in section 3.1 of this procedure.

5. ALTERNATE TEST PROCEDURES

Test procedures other than those specified in this certification procedure shall be used only if prior written approval is obtained from the Executive Officer. A test procedure is a methodology used to determine, with a high degree of accuracy, precision, and reproducibility, the value of a specified parameter. Once the test procedure is conducted, the results are compared to the applicable performance standard to determine the compliance status of the facility.

5.1 Alternate Test Procedures for Certification Testing

The Executive Officer shall approve, as required, those procedures necessary to verify the proper performance of the system.

5.2 Request for Approval of Alternate Test Procedure

Any person may request approval of an alternative test procedure. The request shall include the proposed test procedure, including equipment specifications and, if appropriate, all necessary equipment for conducting the test. If training is required to properly conduct the test, the proposed training program shall be included.

5.3 Response to Request

The Executive Officer shall respond within fifteen (15) days of receipt of a request for approval and indicating that a formal response will be sent within sixty (60) days. If the Executive Officer determines that an adequate evaluation cannot be completed within the allotted time, the Executive Officer shall explain the reason for the delay, and will include the increments of progress such as test protocol review and comment, testing, data review, and final determination. If the request is determined to be incomplete or unacceptable, the Executive Officer shall respond with identification of any deficiencies. The Executive Officer shall issue a determination regarding the alternate procedure within sixty (60) days of receipt of an acceptable request.

5.4 Testing of Alternate Test Procedures

All testing to determine the acceptability of the alternate procedure shall be conducted by the Executive Officer or by a third party responsible to and under the direction and control of Executive Officer. Testing shall be conducted in accordance with the written procedures and instructions provided by the Executive Officer. The testing shall, at a minimum, consist of nine sets of data pairs, pursuant to U.S. Environmental Protection Agency (EPA) Reference Method 301, “Field Validation of Pollutant Measurement Methods from Various Waste Media”, 40 CFR Part 63, Appendix A, 57

Federal Register page 61992. Criteria established in U.S. EPA Reference Method 301 shall be used to determine whether equivalency between the two test methods exists. For situations where Method 301 is not directly applicable, the Executive Officer shall establish equivalence based on the concepts of comparison with the established method and statistical analysis of bias and variance. Method approval of the procedure shall be granted, on a case-by-case basis, only after all necessary testing has been conducted. Because of the evolving nature of technology and procedures for vapor recovery systems, such approval may or may not be granted in subsequent cases without a new request for approval and additional testing to determine equivalency. If, after approval is granted, subsequent information demonstrates that equivalency between the two methods no longer meets the U.S. EPA Reference Method 301 requirements or the equivalent method established by the Executive Officer, the alternate status of the procedure shall be revoked by the Executive Officer.

5.5 Documentation of Alternate Test Procedures

Any such approvals for alternate test procedures and the evaluation testing results shall be maintained in the Executive Officer's files and shall be made available upon request. Any time an alternate procedure and the reference procedure are both conducted and yield different results, the results determined by the reference procedure shall be considered the true and correct results.

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

Adopted: April 12, 1996
Amended: March 17, 1999
Amended: November 7, 2014

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

1 APPLICABILITY

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

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

1.1 General Applicability

This procedure is used to determine compliance with the five minute static pressure performance standard referenced in Vapor Recovery Certification Procedure 204 (CP-204), “Certification Procedure for Vapor Recovery Systems of Cargo Tanks.” This procedure may be used to determine the five minute static pressure associated with the dispensing of any fluid, although it is written to reflect application to the hydrocarbon vapors associated with the dispensing of gasoline.

2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The cargo tank, mounted on either the truck or trailer, is pressurized to 18 inches water column (WC) and the pressure in the system is then allowed to decay for five (5) minutes. Similarly in a separate test, the cargo tank is evacuated to negative six (-6) inches WC and the pressure in the system is then allow to decay for five (5) minutes. The acceptability of the final pressure or vacuum level is based on the capacity of the cargo tank and is listed in CP-204. The performance of the cargo tank internal vapor valve can be determined by pressurizing the cargo tank to 18 inches WC and then closing the internal vapor valves. The system is then allowed to decay for five (5) minutes. The acceptability of final pressure level for the internal

vapor valve is listed in CP-204.

3 BIASES AND INTERFERENCES

Thermal expansion due to direct sunlight on an exposed cargo tank can bias the results of this test procedure. Keep 100 percent of the length of the vapor space of a cargo tank in shade during testing.

4 EQUIPMENT

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

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

4.3 Water manometer, or equivalent, with 0 to 25 inch range, with scale readings of 0.1 inch.

4.4 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.

4.5 Caps for liquid delivery line.

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

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

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

5 PRE-TEST PROTOCOL

5.1 The requirement that each compartment shall have its own internal vapor valve must be met to conduct this test.

5.2 The following shall be performed for all cargo tanks subject to testing in accordance with this test procedure:

5.2.1 Cargo tank and trailers shall be empty of gasoline or product to conduct this test.

Warning: Under no circumstances shall the vapors in any cargo tank be purged or vented directly to the atmosphere.

5.2.2 Cargo tank shall be purged by one of the following methods:

(a) Air from the purged cargo tank shall be routed to an incinerator that is certified by ARB and permitted by a district.

(b) Cargo tank vapors shall be routed to an ARB certified vapor recovery system at a bulk plant or terminal when water is used to purge the cargo tank. The water can be reused. If the water is disposed of, it shall conform to all applicable federal, state, and local regulations.

(c) Cargo tank vapors shall be routed to an ARB certified vapor recovery system at a bulk plant or terminal when a liquid with a vapor pressure of less than four pounds Reid Vapor Pressure (<4 psi RVP) is used to purge the cargo tank.

(d) Any purging method or system must be approved in writing by the Executive Officer.

6 TEST PROCEDURE

This test shall be conducted with product hoses and vapor hoses connected and exposed to the pressurized cargo tanks or compartments. The cargo tank shall meet the standards for all three tests in consecutive runs.

6.1 Static Pressure Performance, Positive Pressurization

6.1.1 Open and close the dome covers.

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

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

6.1.4 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.

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

6.1.6 Applying air pressure slowly, pressurize the tank, or alternatively the first compartment, to 18 inches WC.

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

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

6.1.9 Calculate and record the pressure change (inches WC) between initial pressure of+18 inches WC and the final pressure.

6.1.10 Repeat sections 6.1.6 through 6.1.9 for each compartment if they are not interconnected.

6.2 Static Pressure Performance, Vacuum Test (Negative Pressurization)

6.2.1 Connect vacuum source to pressure and vacuum supply hose referenced in section 6.1.4.

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

6.2.3 Calculate and record the pressure change (inches WC) from the initial 6 inches of WC and 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.

6.2.4 Repeat sections 6.2.2 to 6.2.3 for each compartment if they are not interconnected.

6.3 Internal Vapor Valve Performance, Positive Pressurization

6.3.1 After completing the vacuum and pressure tests (section 6.1 and 6.2), pressurize the tank as in section 6.1.6 18 inches WC.

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

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

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

6.3.5 Calculate the pressure change (inches WC) from + 18 inches WC to the final pressure.

7 REQUIREMENTS AT CONCLUSION OF PRESSURE TESTING

The entire cargo tank, including tank, domes, dome vents, piping hose connections, adaptors, couplings, hoses and delivery elbows shall be inspected for evidence of wear, damage, or maladjustment that could be a potential leak source. Any part found to be defective shall be adjusted, repaired or replaced as necessary.

8 REPORTING RESULTS

Results for a given cargo tank shall be reported by the company responsible for testing as listed on the 48 hour test notification that was submitted to the Board. Results can be submitted through the ARB Online Cargo Tank Vapor Recovery Certification Program that can be accessed through the ARB webpage at www.arb.ca.gov/enf/cargotanks/cargotanks.htm.

9 ALTERNATE TEST PROCEDURES

9.1 U.S. EPA Method 27

U.S. EPA Method 27 referenced in the Code of Federal Regulations – Title 40, Chapter I, Subchapter C, Part 63, Subpart R, section 63.425(e), (as last amended on December 19, 2003) may be used an alternate to the procedure described in Section 6 with the following exceptions:

a. The purging of vapor from cargo tanks and compartments shall be conducted in accordance with section 5.

b. Results of each test conducted shall comply with the performance standards reference in section 3.1 CP-204 without taking the arithmetic

mean of two successive results as allowed by section 40 CFR 63.425(e)

c. Results from three consecutive tests (pressure, vacuum, and internal vapor valve) run in any sequence shall comply with performance standards reference in section 3.1 of CP-204.

9.2 Other Alternate Test Procedures

This test procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the Executive Officer, pursuant to section 5 of Certification Procedure 204 (CP-204).

California Environmental Protection Agency

Air Resources Board

Vapor Recovery Test Procedures

TP-204.2

Determination of One Minute Static Pressure Performance of Vapor Recovery Systems of Cargo Tanks

Adopted: April 12, 1996
Amended: March 17, 1999
Amended: May 27, 2014

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

TP-204.2

Determination of One 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 Vapor Recovery Procedures

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

1.1 General Applicability

This procedure is used to determine compliance with the daily static pressure performance standard or one minute standard referenced in Vapor Recovery Certification Procedure 204 (CP-204), “Certification Procedure for Vapor Recovery Systems of Cargo Tanks.” This procedure may be used to determine daily static pressure associated with the dispensing of any fluid, although it is written to reflect application to the hydrocarbon vapors associated with the dispensing of gasoline.

2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

Upon completion of loading operations at the bulk plant or terminal, the gasoline cargo tank is pressurized with nitrogen to 18 inches water column (WC). By using the total cargo tank shell capacity, post-loading headspace volume, and the Ideal Gas Law, a one-minute maximum allowable pressure decay is calculated. The pressure decay is monitored for one minute and compliance is determined by comparison with the maximum allowable calculated value. The leak rate through the cargo tank internal vapor vent valve is similarly determined.

3 BIASES AND INTERFERENCES

Thermal expansion due to direct sunlight on an exposed cargo tank can bias the results of this test procedure. Keep at least 75% of the length of the vapor space of a cargo tank in the shade during testing.

Cargo tank leakage exceeding the nitrogen feed rate precludes the use of this method. Such leakage demonstrates the inability of the cargo tank to meet its performance standard. The

minimum nitrogen flowrate shall be calculated as shown in §9.2, or obtained from Table 5.

Pressure stability may not be achievable, within a reasonable time period, if the tank has been purged with air prior to loading gasoline. This tends to bias this test procedure toward determination of compliance. In such a case, the cargo tank shall be moved to disturb the liquid and saturate the vapor space.

Vapor leaks due to a faulty cargo tank vapor coupler or facility vapor hose coupler inherently shall constitute the violation of the one minute standard for any tank subject to this test procedure.

If the load prior to testing is diesel over gasoline, this tends to bias this test procedure toward determination of non-compliance. In such a case, the following steps shall be taken to eliminate this bias:

(1) The pressure decay portion of the test shall be conducted three times to compensate for the absorption of gasoline vapors into the diesel. For the purpose of this interference, diesel shall be defined as any petroleum distillate with a vapor pressure under 4.0 pounds Reid.

(2) The first two tests will promote absorption of the gasoline vapors into the diesel to eliminate this bias.

4 SENSITIVITY, RANGE, AND PRECISION

4.1 Mechanical Pressure Gauges

Mechanical gauges shall be a minimum of two inches in diameter.

The readability of a mechanical pressure gauge shall be:

0.20 inches WC on a full scale not to exceed thirty (30) inches WC for cargo tank tests and

0.10 inches WC on a full scale not to exceed ten (10) inches WC for internal vapor valve tests.

The accuracy of a mechanical pressure gauge shall be one (1.0) percent of full scale.

4.2 Other Pressure Gauges

The full scale range of other pressure gauges shall not exceed twenty (20) inches WC for cargo tank tests and for internal vapor valve tests.

The accuracy of other pressure gauges shall be 0.5 percent of full scale for cargo tank tests and for internal vapor valve tests.

5 EQUIPMENT

5.1 Nitrogen High Pressure Cylinder

Use a high pressure cylinder capable of maintaining a pressure of 2000 pounds per square inch gauge (psig). The cylinder shall be equipped with a compatible two-stage regulator with a one (1) psig relief valve and a flow control metering valve. The outlet of the metering valve shall be equipped with flexible tubing, a quick-connect fitting, and a one psi relief valve.

5.2 Vapor System Pressure Assembly

Use an OPW 634-B, or equivalent, cap (or OPW 634-A plug if applicable). The assembly shall be equipped with a 0-30 inch WC pressure gauge, a metering valve, and a quick connect fitting (see Figure 1).

5.3 Vapor Valve Pressure Gauge

Use a pressure measuring device with a design range suitable for the pressure being measured. The tap for the pressure measurement shall be located on the sample coupling attached to the inlet of the volume meter.

5.4 Leak Test Assembly

Use OPW 633-D, 633-F, and 633-A (or 633-B if applicable) couplers, or equivalent as shown in Figure 2 to leak test the vapor system pressure assembly.

5.5 Flexible Tubing

Use high-pressure tubing equipped with a quick-connect fitting at each end to connect the nitrogen supply to the pressure assembly.

5.6 Nitrogen

Use a commercial grade nitrogen.

5.7 Stopwatch

Use a stopwatch accurate and precise to within 0.2 second.

5.8 Liquid Leak Detector

Use leak detection solution, or equivalent, to detect vapor leaks in the vapor system pressure assembly.

5.9 Combustible Gas Detector

Use a Bacharach Instrument Company Model 0023-7356, or equivalent, to quantify any vapor leaks at the cargo tank vapor coupler during loading operations.

6 PRE-TEST PROTOCOL

The cargo tank shall adhere to all applicable certification conditions referenced in CP-204.

6.1 Leak Check of Test Equipment

Assemble the vapor system pressure assembly as shown in Figure 1.

Leak test the vapor system pressure assembly by connecting it to the leak test assembly and pressurizing, with nitrogen, to 20 inches WC. The decay rate shall not exceed 2 inches WC in five minutes.

6.2 Cargo Tank Location

Locate any cargo tank to be tested where at least 75% of its length will be in shade for the duration of the test.

6.3 Cargo Tank Preparation

6.3.1 In general, this test procedure shall be performed on cargo tanks in conditions of routine operation, maintenance, and repair. Other conditions shall be documented in the test report.

6.3.2 If performance of this test procedure is required due to demonstrated non-compliance with the leak performance standards, the test report shall document compliance with the following conditions:

6.3.2.1 No repairs or maintenance of the cargo tank shall be allowed from the time of such demonstration until after the performance of this test procedure.

6.3.2.2 Any movement or disturbance of the cargo tank or its contents shall be kept to a reasonable and practical minimum. For example:

(1) The cargo tank may be moved for business reasons if it occupies a position needed by another cargo tank.
(2) The cargo tank may be moved to meet the environmental requirements for cargo tank location.
(3) The cargo tank shall be moved to saturate the vapor space before testing if it was purged with air before gasoline loading.

7 TEST PROCEDURE

For those cargo tanks with product lines that are manifolded, this test procedure shall be conducted on a per compartment basis.

7.1 Initial Data Collection and Pressurization

7.1.1 From the identification plate on the cargo tank, determine and record

the cargo tank shell capacity.

7.1.2 Upon completion of the loading operations, record the total volume loaded.

7.1.3 If the system back pressure during loading was measured, enter the maximum observed pressure and number of arms loading.

7.1.4 If required by the safety procedures of the loading facility, ensure that a ground cable is connected to the cargo tank. If the cargo tank is remote from the loading rack so that the ground cable is not attached to the loading rack, then attach the ground cable to the nitrogen supply bottle. Connect the vapor system pressure assembly to the vapor coupler of the cargo tank. Open the internal vapor valve(s) of the cargo tank and record the initial headspace.

7.1.5 If the initial headspace pressure exceeds 18 inches water column, use the metering valve on the vapor system pressure assembly to reduce the pressure to 18.0 inches WC.

7.1.6 If the initial headspace pressure is less than 18 inches WC, adjust the delivery pressure on the nitrogen cylinder regulator such that the nitrogen feed rate exceeds the minimum allowable flow rate for an empty cargo tank. See equation in §9.2, or Table 5. Connect the nitrogen supply to the pressure assembly and increase the cargo tank headspace pressure to 18 inches WC.

7.1.7 For the next 30 ± 5 seconds, carefully adjust the headspace pressure to 18.0 inches WC.

7.2 Static Pressure Performance Measurement

7.2.1 Zero and re-start the stopwatch with the headspace pressure at 18.0 inches WC. After 60 ± 5 seconds record the headspace pressure as the "one-minute final pressure".

7.2.2 If the one-minute final pressure is less than 10 inches water column, the internal vapor valve portion of the test, as specified next, cannot be conducted.

7.3 Re-pressurization

7.3.1 Re-pressurize the cargo tank headspace to 18 inches WC. Close the internal vapor vent valve(s), wait for 30 ± 5 seconds, then, remove the pressure assembly cap to relieve the pressure, to atmospheric, downstream of the vapor vent valve. Wait for 15 ± 5 seconds. Replace the pressure assembly cap.

7.3.2 Connect the 0-10 inches WC pressure gauge to the quick connect fitting on the vapor system pressure assembly.

7.4 Internal Vapor Valve Performance Measurement

7.4.1 Interval Headspace Pressures

Zero and start the stopwatch as the pressure assembly cap is replaced. Repeat the following steps for up to five continuous intervals (each interval = 60 ± 5 seconds):

(1) record the total headspace pressure increase as the "interval pressure" in sequence, depending on the next step~~)~~; and

(2) if the total headspace pressure increase is equal to or less than the corresponding allowable value specified in section 3.2.2 of CP-204, proceed to measure the "final pressure" as specified below; otherwise return to step (1).

7.4.2 Final Headspace Pressure

Within five seconds of the end of the last continuous interval above, open the vapor valve and record the headspace pressure as the "final pressure."

Remove the vapor system pressure assembly from the cargo tank.

8.0 REQUIREMENTS AT THE CONCLUSION OF PRESSURE TESTING

At the conclusion of pressure testing, the cargo tank owner or operator shall inspect the entire cargo tank and compartments, including tank, domes, dome vents, piping hose connections, adaptors, couplings, hoses and delivery elbows for evidence of wear, damage, or maladjustment that may be a potential leak source. Any part found to be defective shall be adjusted, repaired or replaced as necessary.

9 CALCULATING RESULTS

9.1 One Minute Static Pressure Performance Standard

The minimum allowable one-minute final headspace pressure of a complying loaded cargo tank shall be obtained from the application of Tables 1 through 4, or shall be calculated as follows:

$$P_F = 18\left(\frac{N}{18}\right)^{\left(\frac{V_s}{5\,V_h}\right)}$$

Where:

P_F = minimum allowable one-minute final pressure, inches water column

V_s = total cargo tank shell capacity, gallons

V_h	=	cargo tank headspace volume after loading, gallons
18	=	initial pressure at start of test, inches water column
N	=	five minute performance standard, inches water column

Where:

If (Vs) is:			Then (N) equals:
≥		2,500	15.5
1,500	to	2,499	15.0
1,000	to	1,499	14.5
0	to	999	14.0

Important: If individual compartments are to be tested, both V_s and V_h must be the volumes relating to that compartment alone, not all compartments.

Note: Tables 1 through 5 are convenient results of the calculation described above.

In these tables, the columns are headed by values of V_h and the rows are preceded by values of V_s.

Obtain the calculated result for P_F by finding the value of P_F at the intersection of the appropriate column and row for V_h and V_s.

9.2 Minimum Nitrogen Flowrate

The minimum nitrogen flowrate required to test a cargo tank shall exceed the following calculated value by at least ten percent, or obtained from Table 6:

$$Fn = \frac{V_s (18.0 - N)}{(7.481 \times 5 \times 406.9)}$$

Where:

Fn	=	minimum required nitrogen flowrate, CFM
Vs	=	total cargo tank shell capacity, gallons
18	=	initial pressure at start of test, inches water column
N	=	five minute performance standard, inches water column
5	=	5 minutes
406.9	=	atmospheric pressure, inches water column
7.481	=	number of gallons per cubic foot

9.3 Internal Vapor Valve Performance Standard

The internal vapor valve performance standard is found in section 3.2.2 of CP-204.

9.4 Conversion from One Minute to Five Minute Pressure

The conversion of the one-minute final pressure to the equivalent five-minute final

pressure of an empty cargo tank shall be calculated as follows:

$$P_{f5} = 18\, e^{-\left[5\left(\frac{V_h}{V_s}\right)\ln\left(\frac{18}{P_{f1}}\right)\right]}$$

Where:

Pf	=	equivalent five-minute final pressure for an empty cargo tank, inches water column
V_s	=	total cargo tank shell capacity, gallons
V_h	=	cargo tank headspace volume after loading, gallons
P_{f1}	=	one-minute final pressure from Line 7 of the data sheet (Figure 3), inches water column
18	=	initial pressure at start of test, inches water column
5	=	5 minutes
ln	=	natural logarithm
e	=	constant equal to 2.71828

10 ALTERNATE PROCEDURES

This test procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the Executive Officer, pursuant to section 5 of Certification Procedure 204 (CP-204).

11 EXAMPLE FIGURES AND TABLES

Each figure or table provides an illustration of an implementation which conforms to the requirements of this test procedure; other implementations which so conform are acceptable, too. Any specifications or dimensions provided in the figures or tables are for example only, unless such specifications or dimensions are provided as requirements in the text of this or some other required test procedure.

Figure 1
Vapor System Pressure Assembly

Figure 2
Leak Test Assembly

Table 1
One-Minute Static Performance Standard (4,000 to 9,900 gallons ullage)

Table 2
One-Minute Static Performance Standard (2,500 to 3,999 gallons ullage)

Table 3
One-Minute Static Performance Standard (1,500 to 2,499 gallons ullage)

Table 4

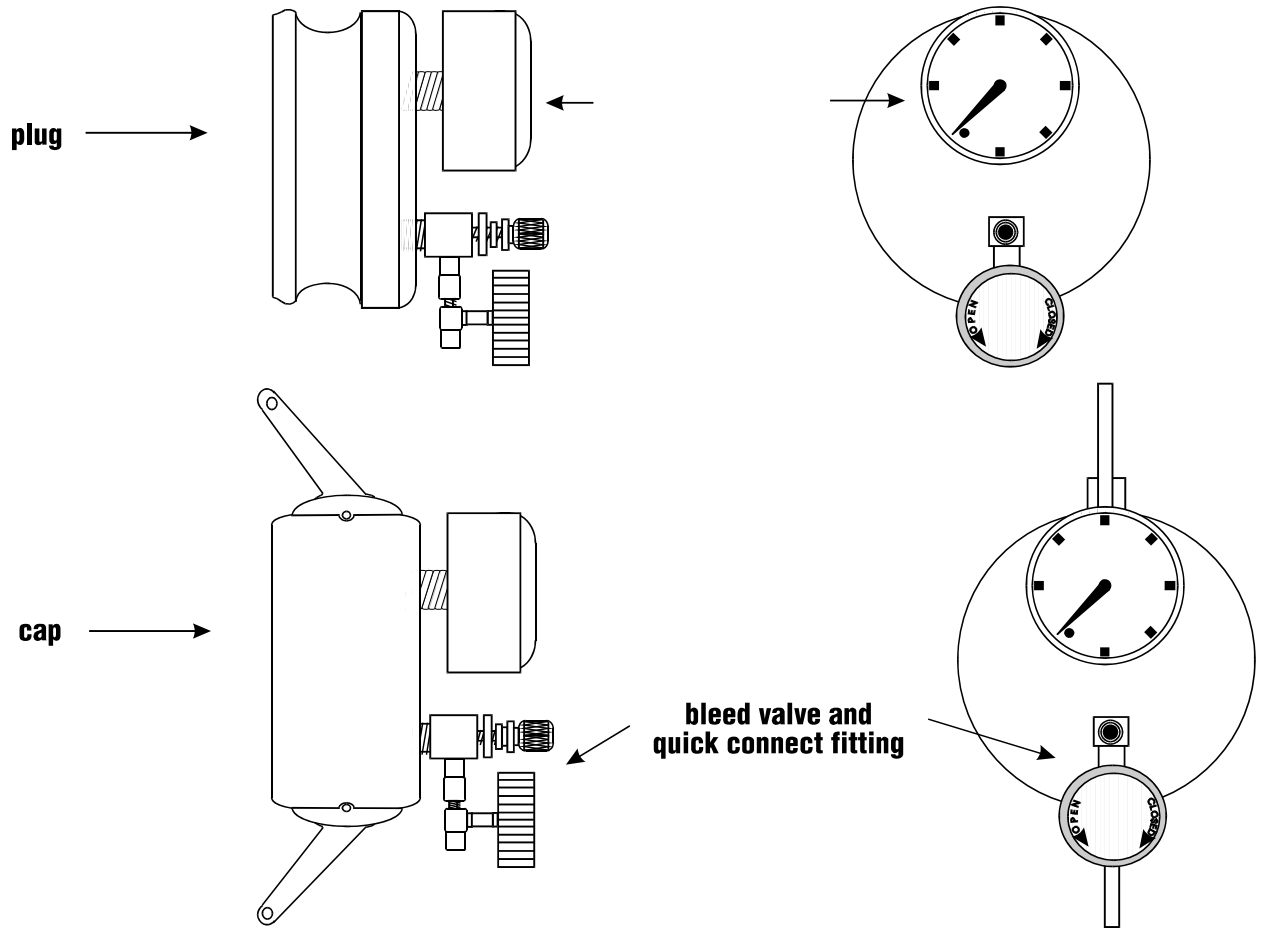
One-Minute Static Performance Standard (1,000 to 1,499 gallons ullage)

Table 5
One-Minute Static Performance Standard (300 to 999 gallons ullage)

Table 6
Minimum Nitrogen Feed Rate

FIGURE 1

Vapor System Pressure Assembly



TP 204.2 F.1/ B. CORDOVA '95

FIGURE 2
Leak Test Assembly

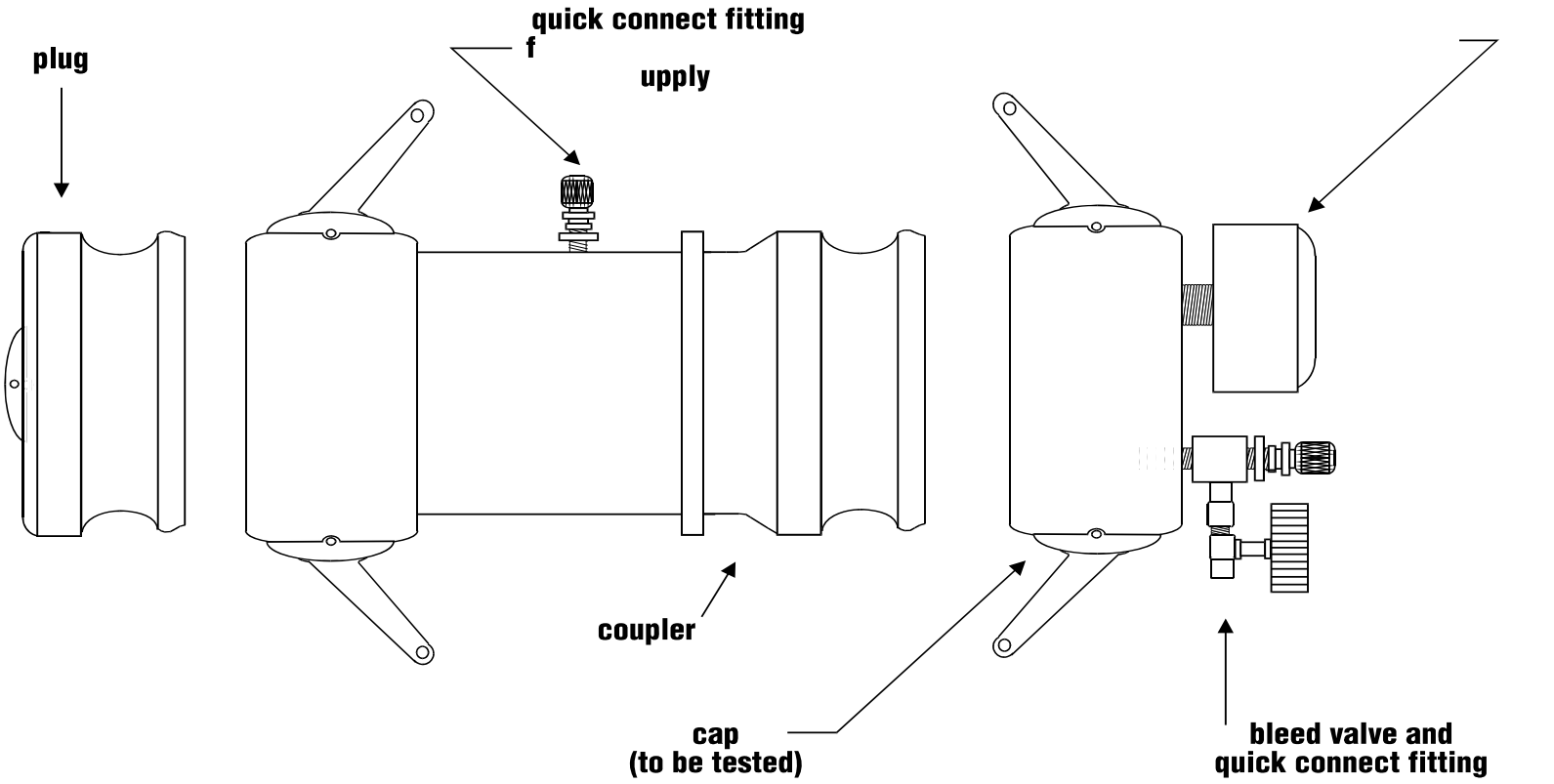


Table 1
One-Minute Static Performance Standard
(4,000 to 9,900 gallons ullage)
(See § 9.1)

	100	150	200	250	300	350	400	450	500	550	600	650	700
	----	----	----	----	----	----	----	----	----	----	----	----	----
4,000	**5.4**	**8.1**	**9.9**	**11.2**	**12.1**	**12.8**	**13.3**	**13.8**	**14.2**	**14.5**	**14.7**	**15.0**	**15.2**
4,100	5.3	7.9	9.8	11.0	12.0	12.7	13.2	13.7	14.1	14.4	14.7	14.9	15.1
4,200	**5.1**	**7.8**	**9.6**	**10.9**	**11.8**	**12.6**	**13.1**	**13.6**	**14.0**	**14.3**	**14.6**	**14.8**	**15.0**
4,300	5.0	7.6	9.5	10.8	11.7	12.5	13.1	13.5	13.9	14.2	14.5	14.8	15.0
4,400	**4.8**	**7.5**	**9.3**	**10.6**	**11.6**	**12.4**	**13.0**	**13.4**	**13.8**	**14.2**	**14.5**	**14.7**	**14.9**
4,500	4.7	7.3	9.2	10.5	11.5	12.3	12.9	13.3	13.8	14.1	14.4	14.6	14.9
4,600	**4.5**	**7.2**	**9.0**	**10.4**	**11.4**	**12.1**	**12.8**	**13.3**	**13.7**	**14.0**	**14.3**	**14.6**	**14.8**
4,700	4.4	7.1	8.9	10.3	11.3	12.0	12.7	13.2	13.6	13.9	14.2	14.5	14.7
4,800	**4.3**	**6.9**	**8.8**	**10.1**	**11.2**	**11.9**	**12.6**	**13.1**	**13.5**	**13.9**	**14.2**	**14.4**	**14.6**
4,900	4.2	6.8	8.7	10.0	11.0	11.8	12.5	13.0	13.4	13.8	14.1	14.4	14.6
5,000	**4.0**	**6.6**	**8.5**	**9.9**	**10.9**	**11.7**	**12.4**	**12.9**	**13.3**	**13.7**	**14.0**	**14.3**	**14.5**
5,100	3.9	6.5	8.4	9.8	10.8	11.6	12.3	12.8	13.3	13.6	14.0	14.2	14.5
5,200	**3.8**	**6.4**	**8.3**	**9.7**	**10.7**	**11.5**	**12.2**	**12.7**	**13.2**	**13.6**	**13.9**	**14.2**	**14.4**
5,300	3.7	6.3	8.1	9.5	10.6	11.4	12.1	12.7	13.1	13.5	13.8	14.1	14.4
5,400	**3.6**	**6.1**	**8.0**	**9.4**	**10.5**	**11.3**	**12.0**	**12.6**	**13.0**	**13.4**	**13.8**	**14.0**	**14.3**
5,500	3.5	6.0	7.9	9.3	10.4	11.3	11.9	12.5	13.0	13.3	13.7	14.0	14.2
5,600	**3.4**	**5.9**	**7.8**	**9.2**	**10.3**	**11.2**	**11.8**	**12.4**	**12.9**	**13.3**	**13.6**	**13.9**	**14.2**
5,700	3.3	5.8	7.7	9.1	10.2	11.1	11.8	12.3	12.8	13.2	13.5	13.8	14.1

	300	350	400	450	500	550	600	650	700	750	800	850	900
	----	----	----	----	----	----	----	----	----	----	----	----	----
9,200	**7.2**	**8.2**	**9.0**	**9.8**	**10.4**	**10.9**	**11.4**	**11.8**	**12.1**	**12.5**	**12.8**	**13.0**	**13.3**
9,300	7.1	8.1	8.9	9.6	10.3	10.9	11.3	11.7	12.1	12.4	12.7	13.0	13.2
9,400	**7.1**	**8.1**	**8.9**	**9.6**	**10.3**	**10.8**	**11.3**	**11.7**	**12.0**	**12.4**	**12.7**	**12.9**	**13.2**
9,500	7.0	8.0	8.8	9.6	10.2	10.7	11.2	11.6	12.0	12.3	12.6	12.9	13.1
9,600	**6.9**	**7.9**	**8.8**	**9.5**	**10.1**	**10.7**	**11.2**	**11.2**	**11.9**	**12.3**	**12.6**	**12.8**	**13.1**
9,700	6.8	7.9	8.7	9.4	10.1	10.6	11.1	11.5	11.9	12.2	12.5	12.8	13.0
9,800	**6.8**	**7.8**	**8.7**	**9.4**	**10.0**	**10.6**	**11.0**	**11.5**	**11.8**	**12.2**	**12.5**	**12.8**	**13.0**
9,900	6.7	7.7	8.6	9.3	10.0	10.5	11.0	11.4	11.8	12.1	12.4	12.7	12.9

Table 2
One-Minute Static Performance Standard
(2,500 to 3,999 gallons ullage)
(See § 9.1)

	100	150	200	250	300	350	400	450	500	550	600	650	700
	----	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**	**----**
2500	**8.5**	**10.9**	**12.4**	**13.3**	**14.0**	**14.5**	**14.9**	**15.2**	**15.5**	**15.7**	**15.9**	**16.0**	**16.2**
2600	8.3	10.7	12.2	13.2	13.9	14.4	14.8	15.1	15.4	15.6	15.8	16.0	16.1
2700	**8.0**	**10.5**	**12.0**	**13.0**	**13.8**	**14.3**	**14.7**	**15.0**	**15.3**	**15.5**	**15.7**	**15.9**	**16.0**
2800	7.8	10.3	11.8	12.9	13.6	14.2	14.6	14.9	15.2	15.5	15.7	15.8	16.0
2900	**7.6**	**10.1**	**11.7**	**12.7**	**13.5**	**14.0**	**14.5**	**14.8**	**15.1**	**15.4**	**15.6**	**15.8**	**15.9**
3000	7.3	9.9	11.5	12.6	13.3	13.9	14.4	14.7	15.0	15.3	15.5	15.7	15.8
3100	**7.1**	**9.7**	**11.3**	**12.4**	**13.2**	**13.8**	**14.3**	**14.6**	**15.0**	**15.2**	**15.4**	**15.6**	**15.8**
3200	6.9	9.5	11.2	12.1	13.1	13.7	14.2	14.6	14.9	15.1	15.3	15.5	15.7
3300	**6.7**	**9.3**	**11.0**	**12.1**	**13.0**	**13.6**	**14.1**	**14.5**	**14.8**	**15.0**	**15.2**	**15.5**	**15.6**
3400	6.5	9.1	10.8	12.0	12.8	13.5	14.0	14.4	14.7	15.0	15.2	15.4	15.6
3500	**6.3**	**9.0**	**10.7**	**11.8**	**12.7**	**13.5**	**13.9**	**14.3**	**14.6**	**14.9**	**15.1**	**15.3**	**15.5**
3600	6.1	8.8	10.5	11.7	12.6	13.2	13.8	14.2	14.5	14.8	15.0	15.3	15.4
3700	**6.0**	**8.6**	**10.4**	**11.6**	**12.4**	**13.3**	**13.6**	**14.1**	**14.4**	**14.7**	**15.0**	**15.2**	**15.4**
3800	5.8	8.4	10.2	11.4	12.3	13.0	13.5	14.0	14.3	14.6	14.9	15.1	15.3
3900	**5.6**	**8.3**	**10.0**	**11.3**	**12.2**	**12.9**	**13.4**	**13.9**	**14.3**	**14.6**	**14.8**	**15.0**	**15.2**
3999	**5.4**	**8.1**	**9.9**	**11.2**	**12.1**	**12.8**	**13.3**	**13.8**	**14.2**	**14.5**	**14.7**	**15.0**	**15.2**

TABLE 3

One-Minute Static Performance Standard
(1,500 to 2,499 gallons ullage)

(See § 9.1)

	50	100	150	200	250	300	350	400	450	500	550	600
	----	----	----	----	----	----	----	----	----	----	----	----
1,500	**6.0**	**10.4**	**12.5**	**13.7**	**14.5**	**15.0**	**15.4**	**15.7**	**15.9**	**16.1**	**16.3**	**16.4**
1,550	5.8	10.2	12.3	13.6	14.4	14.9	15.3	15.6	15.9	16.1	16.2	16.4
1,600	**5.6**	**10.0**	**12.2**	**13.4**	**14.3**	**14.8**	**15.2**	**15.6**	**15.8**	**16.0**	**16.2**	**16.3**
1,650	5.4	9.9	12.1	13.3	14.1	14.7	15.2	15.5	15.7	16.0	16.1	16.3
1,700	**5.2**	**9.7**	**11.9**	**13.2**	**14.0**	**14.6**	**15.1**	**15.4**	**15.7**	**15.9**	**16.1**	**16.2**
1,750	5.0	9.5	11.8	13.1	13.9	14.6	15.0	15.3	15.6	15.8	16.0	16.2
1,800	**4.8**	**9.3**	**11.6**	**13.0**	**13.8**	**14.5**	**14.9**	**15.3**	**15.6**	**15.8**	**16.0**	**16.1**
1,850	4.7	9.2	11.5	12.8	13.7	14.4	14.8	15.2	15.5	15.7	15.9	16.1
1,900	**4.5**	**9.0**	**11.3**	**12.7**	**13.6**	**14.3**	**14.8**	**15.1**	**15.4**	**15.7**	**15.9**	**16.0**
1,950	4.3	8.8	11.2	12.6	13.5	14.2	14.7	15.1	15.4	15.6	15.8	16.0
2,000	**4.2**	**8.7**	**11.1**	**12.5**	**13.4**	**14.1**	**14.6**	**15.0**	**15.3**	**15.6**	**15.8**	**15.9**
2,050	4.0	8.5	10.9	12.4	13.3	14.0	14.5	14.9	15.2	15.5	15.7	15.9
2,100	**3.9**	**8.4**	**10.8**	**12.3**	**13.3**	**13.9**	**14.5**	**14.9**	**15.2**	**15.4**	**15.7**	**15.8**
2,150	3.8	8.2	10.7	12.2	13.2	13.9	14.4	14.8	15.1	15.4	15.6	15.8
2,200	**3.6**	**8.1**	**10.5**	**12.1**	**13.1**	**13.8**	**14.3**	**14.7**	**15.1**	**15.3**	**15.6**	**15.7**
2,250	3.5	7.9	10.4	11.9	13.0	13.7	14.2	14.7	15.0	15.3	15.5	15.7
2,300	**3.4**	**7.8**	**10.3**	**11.8**	**12.9**	**13.6**	**14.2**	**14.6**	**14.9**	**15.2**	**15.5**	**15.7**
2,350	3.2	7.6	10.2	11.7	12.8	13.5	14.1	14.5	14.9	15.2	15.4	15.6
2,400	**3.1**	**7.5**	**10.0**	**11.6**	**12.7**	**13.4**	**14.0**	**14.5**	**14.8**	**15.1**	**15.4**	**15.6**
2,450	3.0	7.4	9.9	11.5	12.6	13.4	13.9	14.4	14.8	15.1	15.3	15.5
2,499	**2.9**	**7.2**	**9.8**	**11.4**	**12.5**	**13.3**	**13.9**	**14.3**	**14.7**	**15.0**	**15.3**	**15.5**

TABLE 4

One-Minute Static Performance Standard
(1,000 to 1,499 gallons ullage)

(See § 9.1)

	25	50	75	100	125	150	175	200	225	250
	----	----	----	----	----	----	----	----	----	----
1,000	**3.2**	**7.6**	**10.1**	**11.7**	**12.7**	**13.5**	**14.1**	**14.5**	**14.9**	**15.1**
1,050	2.9	7.3	9.8	11.4	12.5	13.3	13.9	14.3	14.7	15.0
1,100	**2.7**	**7.0**	**9.5**	**11.2**	**12.3**	**13.1**	**13.7**	**14.2**	**14.6**	**14.9**
1,150	2.5	6.7	9.3	10.9	12.1	12.9	13.5	14.0	14.4	14.8
1,200	**2.3**	**6.4**	**9.0**	**10.7**	**11.9**	**12.7**	**13.4**	**13.9**	**14.3**	**14.6**
1,250	2.1	6.1	8.8	10.5	11.7	12.6	13.2	13.7	14.2	14.5
1,300	**1.9**	**5.8**	**8.5**	**10.3**	**11.5**	**12.4**	**13.1**	**13.6**	**14.0**	**14.4**
1,350	1.7	5.6	8.3	10.0	11.3	12.2	12.9	13.4	13.9	14.3
1,400	**1.6**	**5.4**	**8.0**	**9.8**	**11.1**	**12.0**	**12.7**	**13.3**	**13.8**	**14.1**
1,450	1.5	5.1	7.8	9.6	10.9	11.8	12.6	13.2	13.6	14.0
1,499	**1.3**	**4.9**	**7.6**	**9.4**	**10.7**	**11.7**	**12.4**	**13.0**	**13.5**	**13.9**

TABLE 5

One-Minute Static Performance Standard
(300 to 999 gallons ullage)

(See § 9.1)

	25	50	75	100	125	150	175	200	225	250
	----	----	----	----	----	----	----	----	----	----
300	**9.8**	**13.3**	**14.7**	**15.5**	**16.0**	**16.3**	**16.5**	**16.7**	**16.8**	**17.0**
350	8.9	12.7	14.2	15.1	15.6	16.0	16.3	16.5	16.6	16.8
400	**8.1**	**12.0**	**13.8**	**14.7**	**15.3**	**15.7**	**16.0**	**16.3**	**16.5**	**16.6**
450	7.3	11.4	13.3	14.4	15.0	15.5	15.8	16.1	16.3	16.4
500	**6.6**	**10.9**	**12.9**	**14.0**	**14.7**	**15.2**	**15.6**	**15.9**	**16.1**	**16.3**
550	6.0	10.4	12.5	13.7	14.4	15.0	15.4	15.7	15.9	16.1
600	**5.4**	**9.8**	**12.0**	**13.3**	**14.1**	**14.7**	**15.2**	**15.5**	**15.7**	**16.0**
650	4.9	9.4	11.6	13.0	13.9	14.5	14.9	15.3	15.6	15.8
700	**4.4**	**8.9**	**11.3**	**12.7**	**13.6**	**14.2**	**14.7**	**15.1**	**15.4**	**15.6**
750	4.0	8.5	10.9	12.3	13.3	14.0	14.5	14.9	15.2	15.5
800	**3.6**	**8.1**	**10.5**	**12.0**	**13.0**	**13.8**	**14.3**	**14.7**	**15.1**	**15.3**
850	3.3	7.7	10.2	11.7	12.8	13.5	14.1	14.5	14.9	15.2
900	**2.9**	**7.3**	**9.8**	**11.4**	**12.5**	**13.3**	**13.9**	**14.4**	**14.7**	**15.0**
950	2.7	6.9	9.5	11.2	12.3	13.1	13.7	14.2	14.6	14.9
999	**2.4**	**6.6**	**9.2**	**10.9**	**12.0**	**12.9**	**13.5**	**14.0**	**14.4**	**14.7**

TABLE 6

Minimum Nitrogen Feed Rate
(See §9.2)

CARGO TANK CAPACITY (GALLONS)	MINIMUM NITROGEN FEED-RATE, CFM
2,500	**0.41**
2,700	0.49
2,900	**0.52**
3,100	0.56
3,300	**0.60**
3,500	0.63
3,700	**0.69**
3,900	0.71
4,100	**0.74**
4,300	0.78
4,500	**0.81**
4,700	0.85
4,900	**0.89**
5,100	0.92
5,300	**0.96**
5,500	0.99
5,700	**1.03**
5,900	1.07
9,000	**1.63**
9,200	1.66
9,400	**1.70**
9,600	1.74
9,800	**1.77**

California Environmental Protection Agency

Air Resources Board

Vapor Recovery Test Procedures

TP-204.3

Determination of Leak(s)

Adopted: April 12, 1996
Amended: March 17, 1999
Amended: November 7, 2014

California Environmental Protection Agency
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Vapor Recovery Test Procedure

TP-204.3

Determination of Leak(s)

1 APPLICABILITY

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

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

1.1 General Applicability

The procedure is used to determine the leak-tightness of vapor control systems used in the loading of gasoline cargo tanks. It may be utilized to determine the leak-tightness of gasoline cargo tanks during loading without taking the delivery tank out of service and to determine the leak-tightness of vapor control systems at gasoline terminals and bulk plants at any time. It is also effective to determine leak tightness when the vapor control system does not create back-pressure in excess of the pressure limits of the cargo tank certification test (18 inches of water column (WC) referenced in CP-204, Certification Procedure for Vapor Recovery Systems of Cargo Tanks**.**

2 PRINCIPLE AND SUMMARY OF TEST PROCEDURE

A portable instrument is used to detect VOC leaks from individual sources. A leak definition concentration based on a reference compound is specified in each applicable regulation. This procedure is intended to locate and classify leaks only, and is not to be used as a direct measure of mass emission rates from individual sources.

3 BIASES AND INTERFERENCES

Individual Vapor Leak Check Duration

The duration of vapor leak checks will systematically bias the results positively (toward a determination of violation). To control this bias, leak checks shall be

performed individually with a fresh air purge between each leak check. Each leak check shall have a duration of less than twice the instrument response time (typically, less than sixteen seconds). Leak checks with a duration of greater than twice the instrument response time are invalid. The probe must be purged with fresh air for more than two instrument response times (more than sixteen seconds) between individual leak checks.

4 EQUIPMENT AND SUPPLIES

4.1 Manometer

Liquid manometer, or equivalent, capable of measuring up to 7500 pascals (30 inches WC) gauge pressure with ± 25 pascals (0.1 inch WC) precision.

4.2 Combustible gas detector

A portable hydrocarbon gas analyzer with associated sampling line and probe using catalytic oxidation to detect and measure concentrations of combustible gas in air.

4.2.1 Safety

Personnel shall assume that the combustible gas detector will be operated in an explosive atmosphere and comply with all pertinent regulations.

4.2.2 Range

Minimum range of 0-100 percent of the lower explosive limit (LEL) expressed as propane (0 to 21,000 ppm).

4.2.3 Probe Diameter

Sampling probe internal diameter of 0.625 cm (1/4 inch).

4.2.4 Probe Length

Probe sampling line of sufficient length for easy maneuverability during testing.

4.2.5 Response Time

Response time to 90 percent of the final stable reading shall be less than 8 seconds for detector with sampling line and probe attached.

4.3 Stopwatch

Accurate and precise to within ±0.2 sec.

4.4 Graduated cylinder

Glass or plastic. 1 milliliter (mL) graduations, minimum volume 50 mL.

5 CALIBRATION PROCEDURE

Calibration is part of each application of the test procedure, see §6.2.

6 TEST PROCEDURE

6.1 Pressure

Place a pressure tap in the terminal or bulk plant vapor control system, as close as reasonably possible to the connection with the cargo tank and before any check valves in the terminal or bulk plant recovery system. Connect the manometer. Record the pressure periodically during testing.

6.2 Calibration

Calibrate the combustible gas detector with 2.1 percent by volume (21,000 ppm) propane in air for 100 percent LEL response. Calibration gas shall be traceable to NIST-SRM.

6.3 Monitoring Procedure - Vapor Leaks

During loading, check the periphery of all potential sources of leakage of the cargo tank and of the terminal or bulk plant, vapor collection system with a combustible gas detector.

6.3.1 Probe Distance

For a mobile leak source (e.g. cargo tank) the detector probe inlet shall be 2.5 cm from the potential leak source. The distance can be maintained during monitoring by putting a 2.5 cm extension on the probe tip.

For a stationary leak source (e.g. loading rack) the probe tip shall be placed at the surface of the suspected leak interface except for a moving part, such as a rotating shaft, for which the probe tip distance shall be 1 cm. The distance can be maintained during monitoring by putting a 1 cm extension on the probe tip.

6.3.2 Probe Movement

Move the probe slowly (approximately 4 cm/sec). If there is any meter deflection at a potential leak source, move the probe to locate the point of highest meter response.

6.3.3 Probe Position

The probe inlet shall be positioned in the path of the vapor flow from a leak so as to maximize the measured concentration.

6.3.4 Wind

Attempt to block the wind from the area being monitored.

6.3.5 Detector Response Time

The detector response time must be equal to or less than 8 seconds and the detector shall not probe any potential leak source for longer than twice the detector response time.

6.3.6 Recording

Record the highest detector reading and location for each leak being monitored.

6.4 Monitoring Procedure - Liquid Leaks

Check cargo tank and bulk plant or terminal system for liquid leaks. Count the number of drops for two minutes.

6.4.1 For Liquid Leaks during Disconnect

Capture liquid lost upon disconnect and measure the volume using graduated cylinder.

6.4.2 Recording

For liquid leaks, record location and number of drops per minute. For liquid leaks during disconnect, record location (loading arm, recovery arm), cargo tank and volume for each consecutive disconnects.

7 ALTERNATE PROCEDURES

7.1 U.S. EPA Method 21 - Determination of Volatile Organic Compound Leaks

U.S. EPA Method 21 is an approved alternative procedure as it applies to the performance of this test procedure subject to the provisions of 6.3.1 regarding probe distances.

7.2 Other Alternative Test Procedures

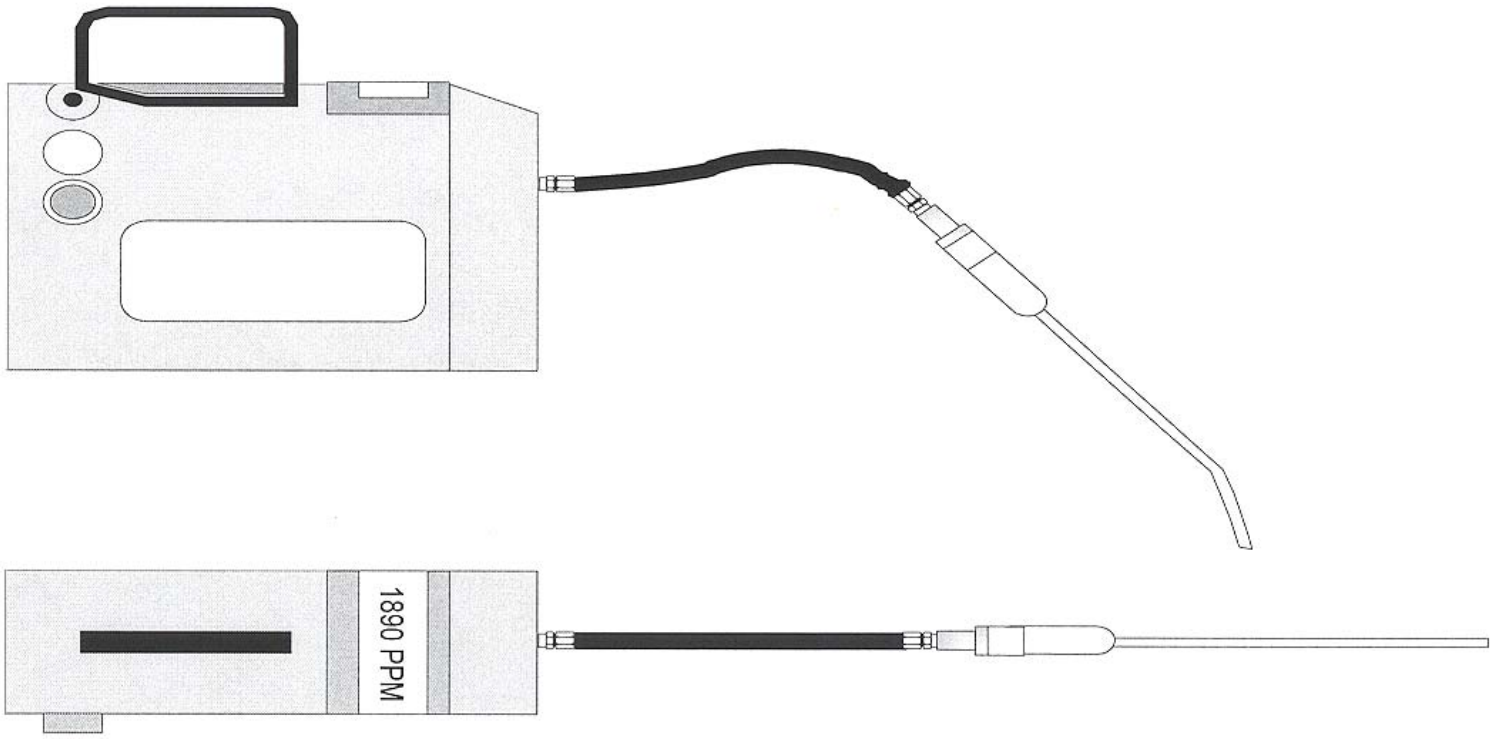
This test procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the Executive Officer, pursuant to section 5 of Certification Procedure 204 (CP-204).

8 FIGURES

Each figure provides an illustration of an implementation which conforms to the requirements of this test procedure; other implementations which so conform are acceptable, too. Any specifications or dimensions provided in the figures are for example only, unless such specifications or dimensions are provided as requirements in the text of this or some other required test procedure.

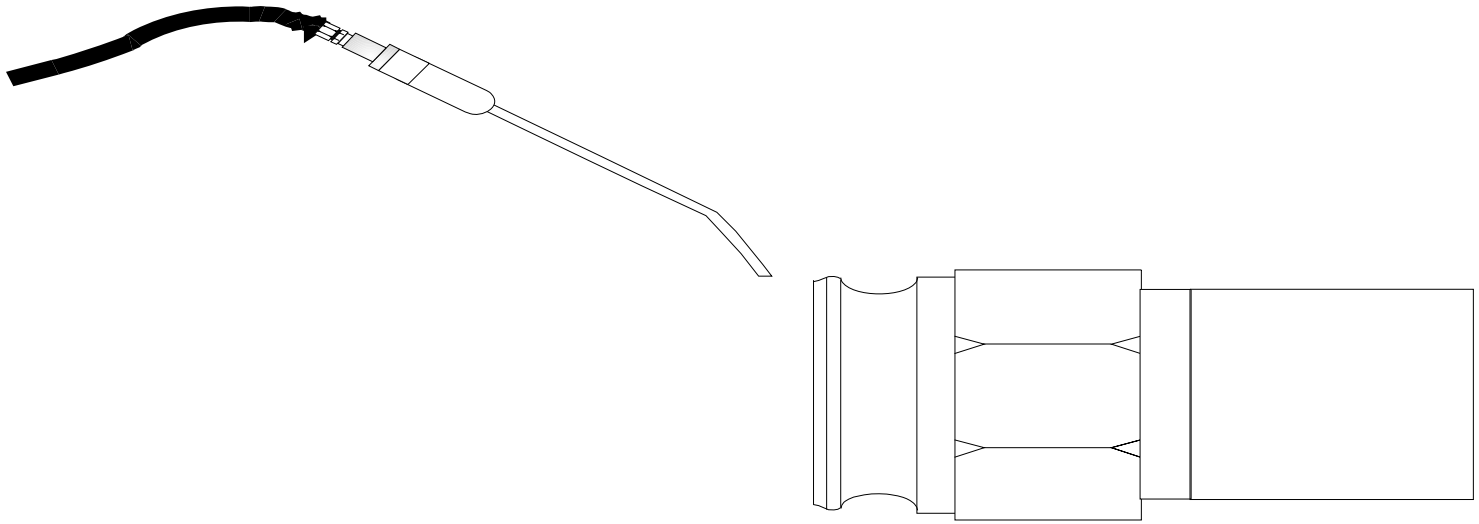
Figures 1 and 2 provide illustrations of a combustible gas meter alone and in use.

FIGURE 1
Phase I Leak Check (View of Combustible Gas Detector)



TP 204.3 F.1/ B. CORDOVA '95

FIGURE 2



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