

California Environmental Protection Agency

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**Vapor Recovery Definitions**

**D-200**

**Definitions for  
Certification Procedures and Test Procedures for  
Vapor Recovery Systems**

**Adopted: April 12, 1996**

## D-200 TABLE OF CONTENTS

<b>1 APPLICABILITY</b> .....	1
1.1 Acronyms.....	1
1.2 Terms.....	1
1.3 Procedures and Methods.....	1
<b>2 ACRONYMS</b> .....	2
<b>3 TERMS</b> .....	3
3.1 General Terms.....	3
3.2 Terms Primarily for Dispensing Facilities.....	11
3.3 Terms Primarily for Bulk Plants.....	12
3.4 Terms Primarily for Terminals.....	12
3.5 Terms Primarily for Cargo Tanks.....	13
<b>4 METHODS</b> .....	13
<b>5 PROCEDURES</b> .....	14
5.1 Procedures Primarily for Dispensing Facilities.....	14
5.2 Procedures Primarily for Bulk Plants.....	16
5.3 Procedures Primarily for Terminals.....	16
5.4 Procedures Primarily for Cargo Tanks.....	17
5.5 Procedures Primarily for Novel Facilities.....	17

California Environmental Protection Agency  
Air Resources Board

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**1 APPLICABILITY**

**Note:** Although H&SC § 41954 is specific to the determination of "compliance of any system designed for the control of gasoline vapor emissions during gasoline marketing operations", certification and test procedures can be used in a program to reduce emissions of other substances identified as toxic or requiring control for other reasons; for example, benzene or methanol.

**1.1 Acronyms**

Acronyms are expanded and further defined, if a special meaning is intended.

**1.2 Terms**

Terms are introduced in quotation marks and defined. Further explanation may be given below each term. Some terms are defined under the subject matter to which they most frequently apply; however the definitions are applicable throughout the vapor recovery system regulations, certification procedures, and test procedures.

**1.3 Procedures and Methods**

Procedures and methods are introduced by an abbreviated title. The full title and date of adoption or date of reference for each procedure and method is given below each abbreviated title. Procedures and methods are defined under the subject matter to which they most frequently apply; however the definitions are applicable throughout the vapor recovery system regulations, certification procedures, and test procedures.

## 2 ACRONYMS

**"ACF"**

actual cubic feet (See "CF", "CFH", and "CFM".) at sampling conditions.

**"APCD"**

refers to one of California's Air Pollution Control Districts.

**"AQMD"**

refers to one of California's Air Quality Management Districts.

**"ARB"**

refers to the State of California Air Resources Board.

**"ARB Executive Officer"**

refers to the Executive Officer of the ARB or his or her authorized representative or designate.

**"BAAQMD"**

Bay Area Air Quality Management District.

**"CCR"**

California Code of Regulations.

**"CF"**

cubic feet.

**"CFH"**

cubic feet per hour.

**"CFM"**

cubic feet per minute.

**"DMS"**

California Department of Food and Agriculture,  
Division of Measurement Standards.

**"DOSH"**

California Department of Industrial Relations,  
Division of Occupational Safety and Health.

**"FID"**

flame ionization detector.

**"GC/FID"**

gas chromatograph with flame ionization detector.

**"GDF"**

gasoline dispensing facility.

**"H&SC"**

California Health and Safety Code.

**"LEL"** (See definition in "TERMS" section below.)

lower explosive limit.

**"LPM"**

liters per minute.

**"mmHg"**

millimeters of mercury (unit of pressure).

**"NDIR"**

non-dispersive infrared.

**"NIST" and "NIST-SRM"** (See definitions in "TERMS" section below.)

National Institute of Standards and Technology and  
National Institute of Standards and Technology -  
Standard Reference Materials.

**"PV"**

refers to a **P**ressure **V**acuum valve.

**"SCF"**

standard cubic feet (See "CF", "CFH", and "CFM".) at standard conditions of  
temperature (68°F) and pressure (29.92 inches of mercury).

**"SFM"**

California State Fire Marshal.

**"WC "**

inches of water column (unit of pressure).

**"WC<sub>g</sub> "**

inches of water column, gauge (unit of pressure).

### **3 TERMS**

#### **3.1 General Terms**

**"applicant"**

refers to a person applying for certification of a vapor recovery system or for  
approval of an alternative procedure. (See "person" below.)

**"assist"**

refers to a vapor recovery system, which employs a pump, blower, or other vacuum inducing devices, to collect and/or process vapors at a subject facility.

**"assist processor"**

means any device designed to control hydrocarbon emissions by changing the physical quality or quantity of an air/vapor mixture. (See "incinerator" below.)

**"balance"**

refers to a vapor recovery system which uses direct displacement to collect and/or process vapors at a subject facility.

**"certification procedures"**

document certified performance standards and performance specifications for vapor recovery systems, and document test procedures for determining compliance with such standards and specifications.

The purpose of such procedures is to provide certified performance standards and performance specifications for performance levels equal to or greater than those levels required by federal, state, and local statutes, rules, and regulations applicable at the time that any ARB Executive Order certifying a system is signed.

**"certification tests"**

are tests which, as required by a certification procedure or an ARB Executive Order:

are performed before certification to determine compliance with a certified performance standard and

are performed after certification to determine compliance with a certified performance standard.

**Note:** Some ARB Executive Orders require periodic certification testing after certification. Also, compare with "compliance tests" below.

**"certified performance specification"**

(also "performance specification" or "specification" where context is clear)

is a performance requirement for an installed vapor recovery system which:

must be met by an installed system during certification tests and compliance tests;

shall be determined by the ARB Executive Officer based on evaluation and testing of any systems subject to certification procedures; and

shall provide a basis for compliance testing of in-use systems to achieve and maintain in-use system performance levels equal to or greater than the level of the certified performance standard, defined next.

With the exception of efficiency performance standards, any certified performance standard is also a certified performance specification.

**"certified performance standard"**

(also "performance standard" or "standard" where context is clear))

is a performance requirement for an installed vapor recovery system which:

must be met by an installed system during certification tests;

shall be provided in the certification procedures for any system; and

shall provide a system performance level as a minimum requirement for certification.

**"challenge mode testing"**

is testing conducted with a system installation intentionally modified so that the certified performance standard is more difficult to meet.

The purpose of challenge mode testing is to provide a basis for determining certified performance specifications which reasonably can be met by all anticipated installations of a certified system.

**"compliance tests"**

are tests which, as required by a certification procedure or an ARB Executive Order:

are performed before certification to evaluate and determine a certified performance specification and

are performed after certification to determine compliance with a certified performance specification.

**"District"**

refers to any of California's local air pollution agencies, including the air pollution control districts and air quality management districts.

**"existing certification"**

means an ARB Executive Order which is signed and dated by the ARB Executive Officer and which certifies a vapor recovery system under procedures in effect prior to the effective date of these definitions.

**"existing installation"**

means an installation of a vapor recovery system which is installed prior to the effective date of these definitions.

**Note:** Compare with "new certification" and "new installation" below.

**"failure mode testing"**

is testing conducted with a system installation intentionally modified so that it fails to meet its certified performance standard.

The purpose of failure mode testing is to provide a basis for determining certified performance specifications which, when met, provide reasonable assurance that an installation of the system is not in the related failure mode.

**"fuel"**

means any substance containing chemical energy which can be converted to thermodynamic energy by combustion.

**"gastight"**

means exhibiting no vapor leak(s). (See definitions of "vapor tight" and "vapor leak" below.)

**"gasoline"**

"... means any petroleum distillate having a Reid vapor pressure of four pounds or greater" or

means any liquid fuel having a Reid vapor pressure of four pounds or greater.

**"incinerator"**

means any assist processor designed to control hydrocarbon emissions by any kind of oxidation which generates exhaust which is so hot and variable in volume that such volume can only be determined by correlated measurements and thermodynamic principles, rather than direct measurement. (See "assist processor" above.)

**"lb<sub>m</sub>"**

refers to a pound as a unit of mass. Sometimes, "#" is used to refer to a pound as a unit of mass.

**"lb-mole"**

refers to an amount of substance comprising as many elementary entities as there are atoms in 12 lb<sub>m</sub> of carbon 12. The elementary entities must be specified or contextually unambiguous (e.g. particles, atoms, molecules, or specified groups of such or other entities). This definition is adapted from page 1-32 of *Marks' Standard Handbook for Mechanical Engineers*, Eighth Edition, McGraw Hill, New York, 1978.

**Note:** Compare with "mole" below. The mass of a lb-mole of propane is 44 pounds. The mass of a gm-mole of propane is 44 grams.

**"liquid leak"**

A liquid leak is defined to be the dripping of liquid organic compounds at a rate in excess of three (3) drops per minute from any single leak source other than the liquid fill line and vapor line disconnect operations. For cargo tanks, a liquid leak from liquid product line and vapor line disconnect operations is defined to be:

- (1) more than two (2) milliliters liquid drainage per disconnect from a top loading operation; or
- (2) more than ten (10) milliliters liquid drainage from a bottom loading operation. Such liquid drainage for disconnect operations shall be determined by computing the average drainage from three consecutive disconnects at any one permit unit.

**"lower explosive limit"**

refers to the minimum volumetric fraction of combustible gas, in air, which will support the propagation of flame; commonly expressed in units of percent (%) or parts per million (ppm).

Standard references for physical properties of combustible gases differ by a few percent in their listed values for lower explosive limit (LEL) and differ also in terms employed. For clarity:

- (1) "LEL" shall mean the same as "lower limit of flammability", "lower end of the explosive range", and other related terms in common technical discourse.
- (2) The authoritative reference for determination of LEL values shall be the chapter "GASEOUS FUELS", by C. C. Ward, pages 7-21 to 7-24 of *Marks' Standard Handbook for Mechanical Engineers*, Eighth Edition, McGraw Hill, New York, 1978.
- (3) The LEL for propane is 2.1% (21,000 ppm).

**"mole" also "gm-mole"**

refers to an amount of substance comprising as many elementary entities as there are atoms in 0.012 kilogram of carbon 12. The elementary entities must be specified or contextually unambiguous (e.g. particles, atoms, molecules, or specified groups of such or other entities). This definition is adapted from page 1-32 of *Marks' Standard Handbook for Mechanical Engineers*, Eighth Edition, McGraw Hill, New York, 1978.

**Note:** Compare with "lb-mole" above. The mass of a gm-mole of propane is 44 grams. The mass of a lb-mole of propane is 44 pounds.

**"National Institute of Standards and Technology"**

refers to the United States Department of Commerce, National Institute of Standards and Technology (NIST) which, through its Standard Reference Materials (SRM) Program, provides science, industry, and government with a source of well-characterized materials certified for chemical composition or for some chemical or physical property. These materials are designated SRMs and are used to calibrate instruments and to evaluate analytical methods and systems, or to produce scientific data that can be referred readily to a common base.

**"new certification"**

means an ARB Executive Order which is signed and dated by the ARB Executive Officer and which certifies a vapor recovery system under procedures in effect after the effective date of these definitions.

**"new installation"**

means an installation of a vapor recovery system which is installed after the effective date of these definitions.

**Note:** Compare with "new certification" and "new installation" above.

**"novel"**

is a modifier which indicates a vapor recovery system (or system feature) or facility to which the written procedures (of general applicability) do not apply; for such a novel system or facility, new system-specific or facility-specific performance specifications and test procedures shall be developed and required as conditions of certification.

**"person"**

refers to a human being, a group of human beings, or any organization for which or to which procedures apply.

**"performance specification"**

(See definition of "certified performance specification" above.)

**"performance standard"**

(See definition of "certified performance standard" above.)

**"pressure tank"**

"... is a tank which maintains working pressure sufficient at all times to prevent hydrocarbon vapor or gas loss to the atmosphere."

**"specification"**

(See definition of "certified performance specification" above.)

**"standard"**

(See definition of "certified performance standard" above; that definition provides the most frequently intended meaning of "standard.")

**Note:** The context shall clearly establish the intended meaning of "standard" from the meanings given in these definitions.

**"standards"**

(See note for "standard" above.)

refer to well-characterized materials (other than NIST "standard reference materials" defined below) with specified procedures of preparation for chemical composition or for some chemical or physical property.

**"standard conditions"**

(See note for "standard" above.)

are defined for vapor calculations as temperature (68°F) and pressure (29.92 inches of mercury).

**"standard reference materials"**

(See note for "standard" above.)

refer to well-characterized materials certified by NIST for chemical composition or for some chemical or physical property.  
(See "National Institute of Standards and Technology" above.)

**"submerged fillpipe"**

"... means any fillpipe which has its discharge opening entirely submerged when the liquid level is six inches above the bottom of the tank."

"... when referring to a tank which is loaded from the side, means any fillpipe which has its discharge opening entirely submerged when the liquid level is 18 inches above the bottom of the tank."

**"test procedures"**

specify equipment and techniques for determining the performance and compliance status of vapor recovery systems relative to certified performance standards and associated certified performance specifications.

**"ullage"**

refers to the empty volume of any container. For example, the ullage of a tank designed primarily for containing liquid is the volume of the tank minus the volume of the liquid. (See synonym at "vapor space volume".)

**"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 when measured at a distance of one inch (2.5 cm). A marginal vapor leak may be verified by conducting a pressure/vacuum leak test. A vapor leak does not include any vapor resulting from liquid spillage or leakage.

The following requirements apply for the determination of a vapor leak as defined above:

(1) Probe Distance

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.

(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.

(3) Probe Position

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

(4) Detector Response Time

The detector response time must be equal to or less than 30 seconds and the detector shall not probe any potential leak source for longer than twice the detector response time.

**"vapor recovery system"**

" ... consists of a vapor gathering system capable of collecting the hydrocarbon vapors and gases discharged and a vapor disposal system capable of processing such hydrocarbon vapors and gases so as to prevent their emission into the atmosphere, with all tank gauging and sampling devices gastight except when gauging or sampling is taking place."

**"vapor space volume"**

means the volume of vapor and air in the plumbing and tankage at a facility determined as the volumetric capacity of such plumbing and tankage minus the volume of liquid contained. (See synonym at "ullage".)

**"vapor tight"**

means exhibiting no vapor leaks. "Vapor tight" is synonymous with "gastight" as used in H&SC § 41952. (See definition of "vapor leak" above for further definition of the procedures for determining vapor tightness.)

**"vent"**

means any plumbing which conveys an air/vapor mixture from a vapor recovery system to the atmosphere.

**3.2 Terms Primarily for Dispensing Facilities**

**"dispensing facility"**

refers to a facility which dispenses liquid to the end user of such liquid

**"phase I" and "phase II"**

refers to:

phase I - control of vapors from storage tank fueling operations

phase II - control of vapors from vehicle fueling operations

**"spillage"**

refers to liquid which enters the environment from a dispensing facility, except for liquid which leaves such dispensing facility in a vehicle tank or cargo tank

The following definitions apply for the determination of spillage as defined above:

**(1) "pre-dispensing spillage"**

refers to spillage which occurs between:

- (a) the time when a dispensing nozzle is removed from a dispenser and
- (b) the time when the dispensing nozzle is inserted into the tank receiving the dispensed liquid

**(2) "dispensing spillage"**

refers to spillage which occurs between:

- (a) the time when the dispensing nozzle is inserted into the tank receiving the dispensed liquid and
- (b) the time when the dispensing nozzle is withdrawn from the tank receiving the dispensed liquid

**(3) "post-dispensing spillage"**

refers to spillage which occurs between:

- (a) the time when the dispensing nozzle is withdrawn from the tank receiving the dispensed liquid and
- (b) the time when the dispensing nozzle is returned to a dispenser

**"transition flow"**

refers to the flow rate at which a transition occurs in the slope of the plot of flow rate versus pressure for a valve tested per TP-201.2B.

**3.3 Terms Primarily for Bulk Plants**

**"bulk plant"**

refers to an intermediate gasoline distribution facility where delivery to and from storage tanks is by cargo tank.

**3.4 Terms Primarily for Terminals**

**"terminal"**

refers to a primary distribution facility for the loading of cargo tanks that deliver gasoline to bulk plants, service stations and other distribution points; and where delivery to the facility storage tanks is by means other than by cargo tank.

### 3.5 Terms Primarily for Cargo Tanks

#### **"cargo tank"**

means any container, including associated pipes and fittings, that is used for the transportation of gasoline on any highway and is required to be certified in accordance with Section 41962 of the California Health and Safety Code.

#### **"compartment"**

means a liquid-tight division of a cargo tank.

## 4 METHODS

Identified below are the United States Environmental Protection Agency (EPA) test methods which are referenced in ARB vapor recovery system regulations. Whenever an ARB vapor recovery system certification or test procedure makes an abbreviated reference to an EPA Method, that reference shall be construed to refer to the EPA Method as fully identified and dated in this section. For example, a reference to "EPA M-2A" or "EPA Method 2A" is to be construed as a reference to "EPA Method 2A, Direct Measurement of Gas Volume through Pipes and Small Ducts, 40 CFR Part 60, Appendix A, July 1, 1992 edition [page 716]."

#### **"EPA M-2A (EPA Method 2A)"**

Direct Measurement of Gas Volume through Pipes and Small Ducts,  
40 CFR Part 60, Appendix A, July 1, 1992 edition [page 709]

#### **"EPA M-2B (EPA Method 2B)"**

Determination of Exhaust Gas Volume Flow Rate from Gasoline Vapor Incinerators,  
40 CFR Part 60, Appendix A, July 1, 1992 edition [page 712]

#### **"EPA M-18 (EPA Method 18)"**

Measurement of Gaseous Organic Compound Emissions by Gas Chromatography,  
40 CFR Part 60, Appendix A, July 1, 1992 edition [page 975]

#### **"EPA M-21 (EPA Method 21)"**

Determination of Volatile Organic Compound Leaks,  
40 CFR Part 60, Appendix A, July 1, 1992 edition [page 1022]

#### **"EPA M-25A (EPA Method 25A)"**

Determination of Total Gaseous Organic Concentration Using a Flame Ionization,  
40 CFR Part 60, Appendix A, July 1, 1992 edition [page 1063]

"EPA M-25B (EPA Method 25B)"  
Determination of Total Gaseous Organic Concentration Using a Nondispersive  
Infrared Analyzer,  
40 CFR Part 60, Appendix A, July 1, 1992 edition [page 1065]

## **5 PROCEDURES**

Identified below are the ARB certification procedures and test procedures which are referenced in ARB vapor recovery system regulations. Certification procedures document the required certified performance standards, certified performance specifications, and test procedures for the certification of vapor recovery systems. Test procedures specify equipment and techniques for determining the performance and compliance status of vapor recovery systems relative to certified performance standards and associated certified performance specifications.

Whenever an ARB vapor recovery system certification or test procedure makes an abbreviated reference to another certification or test procedure, that reference shall be construed to refer to the procedure as fully identified and dated in this section. For example, a reference to "CP-201" is to be construed as a reference to "CP-201, Certification Procedure for Vapor Recovery Systems of Dispensing Facilities, Adopted: April 12, 1996."

### **5.1 Procedures Primarily for Dispensing Facilities**

"CP-201"  
Certification Procedure for Vapor Recovery Systems of  
Dispensing Facilities  
Adopted: April 12, 1996

"TP-201.1"  
Determination of Efficiency of  
Phase I Vapor Recovery Systems of  
Dispensing Facilities without  
Assist Processors  
Adopted: April 12, 1996

"TP-201.1A"  
Determination of Efficiency of  
Phase I Vapor Recovery Systems of  
Dispensing Facilities with Assist Processors  
Adopted: April 12, 1996

"TP-201.2"

Determination of Efficiency of  
Phase II Vapor Recovery Systems of  
Dispensing Facilities

Adopted: April 12, 1996

"TP-201.2A"

Determination of Vehicle Matrix for  
Phase II Vapor Recovery Systems of  
Dispensing Facilities

Adopted: April 12, 1996

"TP-201.2B"

Determination of Flow vs. Pressure for Equipment in  
Phase II Vapor Recovery Systems of  
Dispensing Facilities

Adopted: April 12, 1996

"TP-201.2C"

Determination of Spillage of  
Phase II Vapor Recovery Systems of  
Dispensing Facilities

Adopted: April 12, 1996

"TP-201.3"

Determination of 2 Inch (WC) Static Pressure Performance of  
Vapor Recovery Systems of  
Dispensing Facilities

Adopted: April 12, 1996

"TP-201.3A"

Determination of 5 Inch (WC) Static Pressure Performance of  
Vapor Recovery Systems of  
Dispensing Facilities

Adopted: April 12, 1996

"TP-201.3B"

Determination of Static Pressure Performance of  
Vapor Recovery Systems of  
Dispensing Facilities with

Above-Ground Storage Tanks

Adopted: April 12, 1996

"TP-201.4"

Determination of Dynamic Pressure Performance of Vapor Recovery Systems of Dispensing Facilities

Adopted: April 12, 1996

"TP-201.5"

Determination (by Volume Meter) of Air to Liquid Volume Ratio of Vapor Recovery Systems of Dispensing Facilities

Adopted: April 12, 1996

"TP-201.6"

Determination of Liquid Removal of Phase II Vapor Recovery Systems of Dispensing Facilities

Adopted: April 12, 1996

## **5.2 Procedures Primarily for Bulk Plants**

"CP-202"

Certification Procedure for Vapor Recovery Systems of Bulk Plants

Adopted: April 12, 1996

"TP-202.1"

Determination of Emission Factor of Vapor Recovery Systems of Bulk Plants

Adopted: April 12, 1996

## **5.3 Procedures Primarily for Terminals**

"CP-203"

Certification Procedure for Vapor Recovery Systems of Terminals

Adopted: April 12, 1996

"TP-203.1"

Determination of Emission Factor of Vapor Recovery Systems of Terminals

Adopted: April 12, 1996

#### **5.4 Procedures Primarily for Cargo Tanks**

"CP-204"

Certification Procedure for Vapor Recovery Systems of Cargo Tanks

Adopted: April 12, 1996

"TP-204.1"

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

Adopted: April 12, 1996

"TP-204.2"

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

Adopted: April 12, 1996

"TP-204.3"

Determination of Leak(s)

Adopted: April 12, 1996

#### **5.5 Procedures Primarily for Novel Facilities**

"CP-205"

Certification Procedure for Vapor Recovery Systems of Novel Facilities

Adopted: April 12, 1996

"TP-205.1"

Determination of Efficiency of Phase I Vapor Recovery Systems of Novel Facilities

Adopted: April 12, 1996

"TP-205.2"

Determination of Efficiency of Phase II Vapor Recovery Systems of Novel Facilities

Adopted: April 12, 1996