

RULE 417 -- STORAGE OF ORGANIC LIQUIDS

(Adopted 9-1-74; Revised 12-17-84 , 8-25-93, and 12-19-01)

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PART 1 GENERAL

1.1 Purpose

The purpose of this Rule is to limit the emissions of organic solvent vapors from the storage of organic liquids.

1.2 Applicability

The provisions of this Rule shall apply to any container used to store organic liquids unless specifically exempted by this Rule.

1.3 Exemptions

1.3.1 The requirements of Section 3.1 shall not apply to the following containers:

1.3.1.1 pressure tanks maintaining working pressures sufficient at all times to prevent organic vapor or gas loss to the atmosphere;

1.3.1.2 containers less than or equal to 150,000 liters (39,630 gallons) capacity; and

1.3.1.3 containers where the organic liquid stored has a maximum true vapor pressure less than 77.5 mm Hg (1.5 pounds per square inch absolute, psia) at actual storage conditions. Such containers shall be subject to the requirements of Part 4.

1.3.2 The requirements of Section 3.2 shall not apply to the containers listed below unless the containers are subject to the requirements of Rule 418:

1.3.2.1 gasoline containers less than or equal to 7,575 liters (2000 gallons) capacity;

1.3.2.2 gasoline containers used exclusively for the fueling of implements of husbandry as such vehicles are defined in Division 16 (Section 36000 *et seq.*) of the California Vehicle Code; and

1.3.2.3 gasoline containers equipped with a pressure vacuum valve which is set to within ten percent of the maximum allowable working pressure of the container.

1.4 Effective Dates

This Rule has been in effect since September 1, 1974. The Rule in its present form is effective December 19, 2001.

1.5 References

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The requirements of this Rule arise from the provisions of the California Clean Air Act and amendments (Health and Safety Code Section 40910 *et seq.*) and the federal Clean Air Act and amendments (42 U.S.C. Section 7401 *et seq.*)

PART 2 DEFINITIONS

2.1 APCO

The Air Pollution Control Officer of the District or a designated representative of the Air Pollution Control Officer.

2.2 Container

Any stationary tank or reservoir.

2.3 Efficiency

As used in Sections 3.1.3 and 3.1.4 of this Rule: a comparison of controlled emissions to those emissions which would occur from a fixed or cone roof tank in the same product service without a vapor control system. Baseline emissions shall be calculated by using the criteria outlined in American Petroleum Institute Bulletin 2518.

2.4 Leak

The uncontrolled release of liquids or vapors to the environment, including the escape of liquid at a rate of three drops per minute or more, or as visible spray or mist, and including any vapor leak which produces a concentration of 10,000 parts per million volume, when tested by an instrument calibrated with methane in accordance with EPA Method 21 (40 CFR 60, Appendix A).

2.5 Organic Liquids

Liquids which are primarily but not exclusively derived from petroleum.

2.6 Primary Seal

The lower seal of a floating roof closure device.

2.7 Secondary Seal

The upper seal of a floating roof closure.

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2.8 Vapor-mounted Primary Seal

A primary seal mounted such that there is an annular vapor space beneath the seal. The annular vapor space is bounded by the bottom of the primary seal, the tank wall, the liquid surface, and the floating roof.

2.9 Vapor Pressure

The maximum true vapor pressure of a liquid under actual storage conditions. The true vapor pressure in pounds per square inch absolute of stored liquid may be determined using the test methods specified in Part 5.

PART 3 REQUIREMENTS AND STANDARDS

3.1 Storage of Organic Liquids

No person shall place, store or hold in any container any organic liquid unless such container is designed and equipped with one of the vapor loss control devices described in Sections 3.1.1, 3.1.2, 3.1.3, or 3.1.4. The control device shall be properly installed, properly maintained and in good operating order.

3.1.1 A floating roof cover consisting of a pontoon-type or double-deck-type cover that rests on the surface of the liquid contents and is equipped with a closure device between the tank shell and roof edge. Except as provided in Section 3.1.1.4, the closure device shall consist of two seals, a primary seal and a secondary seal. Proposed seal designs shall be submitted to the APCO for review and approval. The seal designs shall meet the criteria set forth in Sections 3.1.1.1 through 3.1.1.4, as applicable.

3.1.1.1 For a closure device on a welded tank shell which uses a metallic-shoe-type seal as its primary seal the following requirements apply.

3.1.1.1.1 Gaps between the tank shell and the primary seal shall not exceed 3.8 centimeters (1½ inches) for an accumulative length of ten percent, 1.3 centimeters (½ inch) for another 30 percent, and 0.32 centimeters (1/8 inch) for the remaining 60 percent of the circumference of the tank. No gap between the tank shell and the primary seal shall exceed 3.8 centimeters (1½ inches). No continuous gap greater than 0.32 centimeters (1/8 inch) shall exceed ten percent of the circumference of the tank.

3.1.1.1.2 Gaps between the tank shell and the secondary seal shall not exceed 0.32 centimeters (1/8 inch) for an accumulative length of 95 percent of the circumference of the tank and shall not exceed 1.3 centimeters (½ inch) for an accumulative length of the remaining 5 percent of the tank. No gap between the tank shell and the secondary seal shall exceed 1.3 centimeters (½ inch).

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- 3.1.1.1.3 Metallic-shoe-type seals installed on or after August 1, 1978 shall be installed so that one end of the shoe extends into the stored liquid and the other end extends a minimum vertical distance of 61 centimeters (24 inches) above the stored liquid surface.
- 3.1.1.1.4 The geometry of the shoe shall be such that the maximum gap between the shoe and the tank shell is no greater than double the gap allowed by the seal gap criteria for a length of at least 46 centimeters (18 inches) in the vertical plane above the liquid surface. There shall be no holes, tears, nor openings which allow the emission of organic vapors through the secondary seal nor in the primary seal envelope surrounding the annular vapor space enclosed by the roof edge, stored liquid surface, shoe, and seal fabric.
- 3.1.1.1.5 The secondary seal shall allow easy insertion of probes up to 3.8 centimeters (1½ inches) in width in order to measure gaps in the primary seal.
- 3.1.1.1.6 The secondary seal shall extend from the roof to the tank shell and shall not be attached to the primary seal.
- 3.1.1.1.7 The owner or operator of any container subject to Section 3.1.1.1 which is installed after August 1, 1978, shall comply with the requirements of Section 3.1.1.1 at the time of installation.
- 3.1.1.2 For a closure device which uses a resilient-toroid-type seal as its primary seal, the following requirements apply.
 - 3.1.1.2.1 If installation was or is commenced prior to April 1, 1978, gaps between the tank shell and the primary seal shall not exceed 0.32 centimeters (1/8 inch) for an accumulative length of 95 percent of the circumference of the tank, and shall not exceed 1.3 centimeters (½ inch) for an accumulative length of the remaining five percent of the tank circumference. No gap between the tank shell and the primary seal shall exceed 1.3 centimeters (½ inch).
 - 3.1.1.2.2 If installation was or is commenced prior to August 1, 1979, gaps between the tank shell and the secondary seal shall not exceed 0.32 centimeters (1/8 inch) for an accumulative length of 95 percent of the circumference of the tank, and shall not exceed 1.3 centimeters (½ inch) for an accumulative length of the remaining five percent of the tank circumference. No gap between the tank shell and the secondary seal shall exceed 1.3 centimeters (½ inch).
 - 3.1.1.2.3 If installation is commenced after August 1, 1979, the tank owner or operator shall, prior to installation, demonstrate to the APCO that the closure device controls vapor loss with an effectiveness equivalent to a closure device on a welded tank which meets the requirements of Section 3.1.1.1. If equivalence is demonstrated using primary or secondary seal gap criteria different from the criteria specified in Sections 3.1.1.2.1 or 3.1.1.2.2, then those criteria shall be controlling for all purposes of this Rule.

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- 3.1.1.2.4 There shall be no holes, tears, nor openings which allow the emission of organic vapors through the secondary seal nor in the primary seal envelope surrounding the annular vapor space enclosed by the roof edge, seal fabric and secondary seal.
- 3.1.1.2.5 The secondary seal shall allow easy insertion of probes up to 1.3 centimeters ($\frac{1}{2}$ inch) in width in order to measure gaps in the primary seal.
- 3.1.1.2.6 The secondary seal shall extend from the roof of the tank to the shell and not be attached to the primary seal.
- 3.1.1.2.7 The owner or operator of any existing container which requires modification to comply with Section 3.1.1.2 shall complete the required modifications no later than February 1, 1980.
- 3.1.1.3 For a closure device on a riveted tank shell which uses a metallic-shoe-type seal as its primary seal the following requirements apply.
 - 3.1.1.3.1 The closure device shall consist of two seals, a primary seal and a secondary seal. The closure device shall control vapor loss with an effectiveness equivalent to a closure device on a welded tank which meets the requirements of Section 3.1.1.1. The APCO shall determine whether equivalence exists in accordance with Section 3.1.1.4. Gaps between the primary and secondary seals and the tank shall not exceed the gaps (if any) associated with the closure device approved as equivalent by the APCO, and shall be controlling for all purposes of this Rule.
 - 3.1.1.3.2 Metallic-shoe-type seals installed on or after August 1, 1978 shall be installed so that one end of the shoe extends into the stored liquid and the other end extends a minimum vertical distance of 61 centimeters (24 inches) above the stored liquid surface. The geometry of the shoe shall be such that the maximum gap between the shoe and the tank shell is no greater than double the gap allowed by the seal gap criteria for a length of at least 46 centimeters (18 inches) in the vertical plane.
 - 3.1.1.3.3 There shall be no holes, tears, nor openings which allow the emission or organic vapors through the envelope surrounding the annular vapor space enclosed by the roof edge, stored liquid surface, shoe, and seal fabric.
 - 3.1.1.3.4 Any secondary seal shall allow easy insertion of probes up to 6.4 centimeters ($2\frac{1}{2}$ inches) in width in order to measure gaps in the primary seal.
 - 3.1.1.3.5 Any secondary seal shall extend from the roof to the tank shell and shall not be attached to the primary seal.
- 3.1.1.4 The requirements of Sections 3.1.1.1 through 3.1.1.5 shall not apply to any person who demonstrates to the APCO that a closure device has been installed, which by itself or in conjunction with other vapor loss control devices, controls vapor loss at all tank levels with an effectiveness equivalent to a closure device on a welded tank which meets the requirements of Section 3.1.1.1. The owner

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or operator of any tank with such a system, shall, prior to use or installation, demonstrate equivalence to the APCO by one of the following methods:

- 3.1.1.4.1 an actual emission test in a full size or scale sealed tank facility which accurately collects and measures all hydrocarbon emissions associated with a given closure device, and which accurately simulates other emission variables, such as temperature, barometric pressure and wind. The test facility shall be subject to prior approval by the APCO, or
- 3.1.1.4.2 a pressure leak test, engineering evaluation or other means where the APCO determines that the same is an accurate method of determining equivalence.
- 3.1.1.5 The primary seal envelope shall be made available for the following unobstructed inspections by the APCO.
 - 3.1.1.5.1 On an annual basis the primary seal shall be made available for unobstructed inspections by the APCO at locations selected at random along its circumference.
 - 3.1.1.5.1.1 For riveted tanks with toroid-type seals, eight random locations shall be made available for inspection. For all other cases, four such locations shall be made available.
 - 3.1.1.5.1.2 If the APCO detects one or more violations as a result of any such inspection, the APCO may require such further unobstructed inspection of the primary seal as may be necessary to determine the seal condition for its entire circumference.
 - 3.1.1.5.2 For tanks with secondary seals installed after August 1, 1978, the primary seal envelope shall be made available for inspection by the APCO prior to installation of the secondary seal.
 - 3.1.1.5.3 Every five years after August 1, 1978, the primary seal envelope shall be made available for unobstructed inspection by the APCO for its full length unless inspected pursuant to Section 3.1.1.5.4.
 - 3.1.1.5.4 If the secondary seal is voluntarily removed by the owner or operator prior to inspection pursuant to Section 3.1.1.5.3, it shall be made available for such inspection at that time. The owner or operator shall provide notification to the APCO not less than seven working days prior to voluntary removal of the secondary seal.
- 3.1.1.6 All openings in the roof, except pressure-vacuum valves, which shall be set to within ten percent of the maximum allowable working pressure of the roof, shall provide a projection below the liquid surface to prevent belching of liquid and to prevent entrained or formed organic vapor from escaping from the liquid contents of the tank and shall be equipped with a cover, seal, or lid. The cover, seal, or lid shall at all times be in a closed position, with no visible gaps, except when the device or appurtenance is in use.
- 3.1.1.7 Any emergency roof drain shall be provided with a slotted membrane fabric cover, or equivalent, that covers at least nine-tenths of the area of the openings.

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- 3.1.1.8 A floating roof shall not be used if the organic liquid to be stored has a maximum true vapor pressure of 569 mm Hg (11 psia) or greater under storage conditions.
- 3.1.1.9 For tanks with vapor-mounted primary seals, the accumulated area of gaps exceeding 0.32 centimeter (cm) (0.125 inch) in width between the secondary seal and the tank wall shall not exceed 21.2 square cm per meter (1.0 square inch per foot) of tank diameter as determined by physically measuring the length and width of all gaps around the entire circumference of the secondary seal in each place where a 0.32 cm uniform diameter probe passes freely (without forcing or binding against the seal) between the seal and tank wall, and summing the area of the individual gaps.
- 3.1.1.10 The owner or operator of a facility with a floating roof cover shall perform the visual inspections of secondary seals as described in Sections 3.1.1.1.4, 3.1.1.2.4, and 3.1.1.3.3 and shall maintain records of the annual or semiannual inspections specified in Part 4.
- 3.1.1.11 The owner or operator of a facility with a vapor-mounted primary seal shall measure the secondary seal gap areas annually as described in Section 3.1.1.9 and shall maintain the records of the measurement and visual inspections specified in Part 4.
- 3.1.2 A fixed roof with an internal-floating-type cover, provided that the following requirements are met:
 - 3.1.2.1 the cover prevents the release or emission to the atmosphere of all organic vapors or gases with an efficiency equivalent to a floating roof closure device which meets the requirements of Section 3.1.1.1. The APCO shall determine whether equivalence exists in accordance with Section 3.1.1.4; and
 - 3.1.2.2 the maximum true vapor pressure of the organic liquid does not exceed 569 mm Hg (11 psia) under storage conditions.
- 3.1.3 A vapor recovery and disposal system provided that the following requirements are met:
 - 3.1.3.1 the vapor recovery system is capable of collecting and processing the organic vapors and gases, so as to prevent their emission to the atmosphere with an efficiency of at least 95 percent by weight;
 - 3.1.3.2 any tank gauging or sampling device on a tank vented to the vapor recovery system shall be equipped with a gas tight cover which shall be closed at all times except during gauging or sampling; and
 - 3.1.3.3 all piping, valves and fittings shall be constructed and maintained in a gas-tight condition, such that no organic vapor or liquid leaks are detectable. The term leak is defined in Section 2.4. Vapor leaks shall be detected according to the test method specified in Part 5.
- 3.1.4 Other equipment having a vapor loss control efficiency of at least 95 percent by weight, provided an application for installation of such equipment is submitted to and approved by the APCO.

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3.2 Storage of Gasoline

No person shall place, store or hold in any above-ground container any gasoline unless such container is equipped with a vapor loss control device which complies with the requirements set forth in Section 3.1.

PART 4 ADMINISTRATIVE REQUIREMENTS

4.1 Organic Liquids Having a Maximum True Vapor Pressure Greater than 52 mm Hg (1.0 psia) but Less than 77.5 mm Hg (1.5 psia)

The owner or operator of a storage tank with an external floating roof cover containing an organic liquid with a true vapor pressure greater than 52 mm Hg (1.0 psia) but less than 77.5 mm Hg (1.5 psia) under actual storage conditions, shall maintain the following records for at least five years and shall make copies of the records available to the District upon request:

- 4.1.1 records of the temperature of the liquid as stored so that the maximum monthly temperature is documented;
- 4.1.2 records of the type of liquid stored; and
- 4.1.3 records of the maximum true vapor pressure of the liquid as stored.

4.2 Organic Liquids Having a Maximum True Vapor Pressure Greater than 77.5 mm Hg (1.5 psia)

The owner or operator of any storage tank with an external floating roof cover containing an organic liquid with a maximum true vapor pressure greater than 77.5 mm Hg (1.5 psia) under actual storage conditions shall maintain the following records for at least five years and shall provide copies of the records to the District upon request:

- 4.2.1 records of the temperature of the liquid as stored so that the maximum monthly temperature is documented;
- 4.2.2 records of the type of liquid stored;
- 4.2.3 records of the maximum true vapor pressure of the liquid as stored; and
- 4.2.4 records of the results of semiannual inspections that are performed by the owner or operator for verification of compliance with this Rule. The inspections shall include the following criteria:
 - 4.2.4.1 there are no visible holes, tears, nor other openings in the seal(s) or seal fabric, as described in Sections 3.1.1.1.4, 3.1.1.2.4, and 3.1.1.3.3;
 - 4.2.4.2 the seals are intact and uniformly in place around the circumference of the floating roof between the floating roof and the tank wall; and

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- 4.2.4.3 for vapor-mounted primary seals, the actual seal gap area measurement as described in Section 3.1.1.9.

PART 5 TEST METHODS

5.1 Reid Vapor Pressure for Petroleum Products

Reid vapor pressure for petroleum products shall be determined by American Society of Testing and Materials method D 323-82.

5.2 Vapor Pressure of Petroleum Products

True vapor pressure for petroleum products:

- 5.2.1 with an API gravity greater than 20E shall be determined from Reid vapor pressure using the nomographs contained in American Petroleum Institute Bulletin 2517.
- 5.2.2 with an API gravity of 20E or less shall be determined by using the latest revision of the Lawrence Berkeley National Laboratory "Test Method for Vapor Pressure of Reactive Organic Compounds in Heavy Crude Oil Using Gas Chromatography", as approved by ARB and EPA.

5.3 Vapor Pressure of Organic Liquids

True vapor pressure of organic liquids that are not petroleum products shall be determined by American Society of Testing and Materials method D 2879-86.

5.4 Vapor Control Efficiency

Vapor control efficiency shall be determined according to California Air Resources Board Method 202, Certification and Test Procedures for Vapor Recovery Systems at Gasoline Bulk Plants.

5.5 Source Testing Procedures

All source testing shall be performed in compliance with the District Source Testing Procedures Manual.

5.6 Leak Detection

Leak detection shall be performed using EPA Method 21 for determination of VOC leaks (40 CFR 60, Appendix A).

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