

**RULE 446 STORAGE OF PETROLEUM PRODUCTS**  
**Adopted 6-1-74**  
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**100 GENERAL**

- 101 **PURPOSE:** To limit emissions from storage tanks for organic liquids with a vapor pressure greater than 1.5 psia (10.3 kPa) under actual storage conditions.
- 110 **EXEMPTIONS:** This rule shall not apply to emissions from:
- 110.1 Stationary storage tanks having a capacity of less than or equal to 150,000 liters (40,000 gallons).
- 110.2 The provisions of Section 301 shall not apply to tanks involved in periodic scheduled maintenance or replacement operations of primary or secondary seals that cause the emissions of volatile organic compounds. Such periodic scheduled maintenance must be done in accordance with a plan as defined in Section 403 which has prior written approval of the Air Pollution Control Officer. Scheduled periodic maintenance operations shall not be conducted from May 15 through October 15.

**200 DEFINITIONS**

- 201 **EFFICIENCY:** 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 loss control system. Baseline emissions shall be calculated using the criteria in American Petroleum Institute Bulletin 2518.
- 202 **GAS TIGHT:** A concentration of total organic compounds, measured one (1) cm from any source, which does not exceed 10,000 ppm (expressed as methane) above background, as determined by a method specified in Section 502.3.
- 203 **ORGANIC LIQUID:** Compounds and mixtures of compounds of carbon which are liquid under actual storage conditions.

**300 STANDARDS**

- 301 **CONTAINERS LARGER THAN 150,000 LITERS (40,000 GALLONS):** A person shall not store organic liquid in any stationary container of more than 150,000 liters (40,000 gallons) capacity, unless such container is:
- 301.1 a pressure tank maintaining working pressures sufficient at all times to prevent organic vapor or gas loss to the atmosphere, or
- 301.2 designed and equipped with one of the vapor loss control devices specified in Sections 311, 312, or 313.
- 311 **FLOATING ROOF:** The vapor loss control device may be a floating roof equipped with a closure device consisting of a floating pan-type roof or a pontoon-type or double-deck cover. All floating roofs must rest on the surface of the liquid contents.
- 311.1 The closure device shall consist of two seals, one above the other; the one below shall be referred to as the primary seal, and the one above shall be referred to as the secondary seal. The closure device shall comply with the requirements specified in Sections 314 through 317.
- 311.2 A floating roof shall not be used if the organic liquid stored has a true vapor pressure of 11 psia (75.9 kPa) or greater under actual storage conditions as determined by the methods specified in Section 502.4.
- 312 **INTERNAL FLOATING ROOF:** The vapor loss control device may be a fixed roof with an internal floating-type cover.
- 312.1 A fixed roof container with an internal-floating-type cover shall not be used if the organic liquid stored has a true vapor pressure of 11 psia (75.9 kPa) or greater under actual storage conditions as determined by the methods specified in Section 502.4.

- 313 **VAPOR RECOVERY SYSTEM:** The vapor loss control device may be a vapor recovery system capable of collecting and processing all organic vapors and gases and which meets the following requirements:
- 313.1 The system shall have a recovery efficiency of at least 95% by weight as determined by methods specified in Section 502.
  - 313.2 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.
  - 313.3 All pressure-vacuum valves shall be constructed and maintained in a gas-tight condition when the valve is seated.
- 314 **CLOSURE DEVICE REQUIREMENTS:** The closure device on any floating roof container subject to Section 311 shall meet the following requirements:
- 314.1 Any secondary seal shall extend from the roof to the tank shell and shall not be attached to the primary seal.
    - a. For secondary seals installed after December 4, 1991 no gap between the tank shell and the seal shall exceed:
      - 1. 0.15 cm (0.06 in)
      - 2. 0.05 cm (0.02 in) for a cumulative length greater than 5% of the circumference of the tank.
  - 314.2 All openings in the roof, except pressure-vacuum valves, sampling wells, and gauging wells shall meet the following requirements:
    - a. The opening 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 tanks.
    - b. The opening shall be equipped with a cover, seal or lid, which shall be closed at all times with no visible gaps, except when the opening is in use.
  - 314.3 Pressure-vacuum valves shall be set to within 10% of the maximum allowable working pressure of the roof.
  - 314.4 Solid sampling and gauging wells shall meet the following requirements:
    - a. The well shall provide a projection below the liquid surface.
    - b. The well shall be equipped with a cover, seal or lid, which shall be closed at all times with no visible gaps, except when the well is in use.
  - 314.5 Slotted sampling and gauging wells shall meet the following requirements:
    - a. The well shall provide a projection below the liquid surface.
    - b. The well shall be equipped with one of the following closure devices which shall be in place at all times except when the well is in use:
      - 1. An internal float designed to minimize the gap between the float and the well, provided that the gap shall in no case exceed 1.3 cm (1/2 in).
      - 2. A capped internal sleeve designed to minimize the gap between the sleeve and the well, provided that the gap shall in no case exceed 1.3 cm (1/2 in).
      - 3. An internal sleeve with no visible gaps between the sleeve and the well and a cover, seal or lid on the well with no visible gaps.
  - 314.6 Any roof drain shall be provided with a slotted membrane fabric cover, or equivalent, that covers at least nine-tenths of the area of the opening.
  - 314.7 The gap between sampling wells, gauging wells, and similar fixed projections through a floating roof, such as anti-rotational pipes, and the roof shall be added to the gaps measured to determine compliance of the secondary seal and in no case shall exceed 1.3 cm (1/2 in).
- 315 **METALLIC SHOE SEAL REQUIREMENTS:** For any container which uses a metallic shoe seal to comply with Section 311, the seal shall meet the following requirements:
- 315.1 There shall be no holes, tears, or openings which allow the emission of organic vapors through the secondary seal. There shall be no holes, tears, or openings in the primary seal envelope surrounding the annular vapor space enclosed by the roof edge, stored liquid surface, shoe, and seal fabric.

- 315.2 Metallic-shoe-type seals installed on or after September 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 cm (24 in) above the stored liquid surface.
- 315.3 The geometry of the shoe shall be such that the gap between the shoe and the tank shell shall not exceed twice the seal gap requirements of Section 316 for a vertical length greater than 45.7 cm (18 in).

316 **WELDED TANKS WITH METALLIC SHOE SEALS:** For any welded tank shell which uses a metallic shoe seal to comply with Section 311, the seal shall meet the following requirements:

- 316.1 No gap between the tank shell and the primary seal shall exceed
- 3.8 cm (1-1/2 in).
  - 1.3 cm (1/2 in) for a cumulative length greater than 10% of the circumference of the tank.
  - 0.32 cm (1/8 in) for a continuous length of more than 10% of the circumference of the tank.
  - 0.32 cm (1/8 in) for a cumulative length greater than 40% of the circumference of the tank.
- 316.2 No gap between the tank shell and the secondary seal shall exceed
- 1.3 cm (1/2 in)
  - 0.32 cm (1/8 in) for a cumulative length greater than 5% of the circumference of the tank.
- 316.3 The secondary seal shall allow easy insertion of probes up to 3.8 cm (1-1/2 in) in width in order to measure gaps in the primary seal.

317 **RESILIENT TOROID SEAL REQUIREMENTS:** For any container which uses a resilient toroid seal to comply with Section 311, the seal shall meet the following requirements:

- 317.1 There shall be no holes, tears, or openings which allow the emission of organic vapors through the secondary seal. There shall be no holes, tears, or openings in the primary seal envelope surrounding the annular vapor space enclosed by the roof edge, seal fabric and primary seal.
- 317.2 For primary seals no gap between the tank shell and the seal shall exceed:
- 1.3 cm (1/2 in)
  - 0.3 cm (1/8 in) for a cumulative length greater than 5% of the circumference of the tank.
- 317.3 For secondary seals no gap between the tank shell and the secondary seal shall exceed:
- 1.3 cm (1/2 in)
  - 0.3 cm (1/8 in) for a cumulative length greater than 5% of the circumference of the tank.
- 317.4 The secondary seal shall allow easy insertion of probes up to 1.3 cm (1/2 in) in width in order to measure gaps in the primary seal.

400 **ADMINISTRATIVE REQUIREMENTS**

- 401 **INSPECTION, SELECTED LOCATIONS:** The primary seal envelope shall be available for unobstructed inspection by the APCO on an annual basis at four locations selected along its circumference at random by the APCO. 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.

- 402 **INSPECTION, FULL CIRCUMFERENCE:** For tanks with secondary seals installed after September 1, 1978, the primary seal envelope shall be made available for inspection by the APCO for its full length every 5 years after September 1, 1977, except that if the secondary seal is voluntarily removed by the owner or operator prior thereto, it shall be made available for such inspection at that time. The owner or operator shall provide notification to the APCO no less than 7 working days prior to voluntary removal of the secondary seal.
- 403 **MAINTENANCE PLAN:** Maintenance plans shall be submitted to the Air Pollution Control Officer at least thirty days prior to anticipated maintenance. The plan shall state the amount and type of emission anticipated, method of calculating emissions, and the reason that the work is necessary, including the effect of not performing the maintenance.

#### 500 **MONITORING AND RECORDS**

- 501 **RECORDS:** A person storing organic liquids shall keep an accurate record of liquids stored, the true vapor pressure ranges, and the actual storage temperature of such liquids.
- 502 **TESTING PROCEDURE:** A result by any of the below listed test methods which shows non-compliance with any provision of the rule shall constitute a violation of the rule.
- 502.1 **CONTROL DEVICE:** Control efficiency and emission rates of control devices shall be determined by EPA Method 25 or ARB Method 422.
- 502.2 **COLLECTION EFFICIENCY:** Collection efficiency shall be determined using Environmental Protection Agency Guidelines for Developing Capture Efficiency Protocols, 55 Federal Register 26865, June 29, 1990.
- 502.3 **LEAK DETECTION:** EPA Reference Method 21.
- 502.4 **VAPOR PRESSURE:** Vapor pressure may be obtained from standard reference texts or may be determined by ASTM D-2879-83 or ASTM D-323-82.