

VENTURA COUNTY AIR POLLUTION CONTROL DISTRICT

**RULE 71.2 - STORAGE OF REACTIVE ORGANIC COMPOUND LIQUIDS**

*(Adopted 6/20/78, Revised 7/10/79, 7/5/83, 11/22/88, 9/26/89)*

A. Applicability

The provisions of this rule shall apply to equipment used to store crude oil or reactive organic compound (ROC) liquids with a modified Reid vapor pressure greater than 0.5 psia. The provisions of this rule shall not apply to any storage equipment subject to Rule 71.1, to any gasoline storage container with a capacity equal to or less than 40,000 gallons, or to any other storage container with a capacity equal to or less than 5,000 gallons.

B. Storage Tank Requirements

1. Storage Tanks Equal to or Less Than 40,000 Gallons: A person shall not store crude oil or other reactive organic compound liquids in any storage tank with a capacity less than, or equal to 40,000 gallons unless such tank is equipped with at least one of the following:
  - a. A submerged fill pipe, or
  - b. One of the vapor loss control devices listed in Section C.
2. Above Ground Storage Tanks Equal to or Greater Than 10,000 Gallons and Less Than 20,000 Gallons for Crude Oil and ROC Liquids with a Modified Reid Vapor Pressure of 1.5 psia or Greater: A person shall not store crude oil or reactive organic compound liquids with a modified Reid vapor pressure equal to or greater than 1.5 psia in any above ground storage tank with a capacity equal to or greater than 10,000 gallons, and less than 20,000 gallons, unless such tank is equipped with one of the following:
  - a. A pressure-vacuum relief valve with minimum pressure and vacuum settings of 90 percent of the maximum, safe pressure and vacuum ratings of the container. The pressure-vacuum relief valve shall be properly installed, properly maintained, and in good operating order; or
  - b. One of the vapor loss control devices in Section C.
3. Storage Tanks Equal to or Greater Than 20,000 Gallons and Less Than 40,000 Gallons for Crude Oil and ROC Liquids with a Modified RVP of 1.5 psia or Greater: A person shall not store crude oil or reactive organic compound liquids with a modified Reid vapor pressure equal to or greater than 1.5 psia in any storage tank with a capacity of 20,000 gallons or greater but less than 40,000 gallons without using one of the vapor control devices in Section C.

4. Storage Tanks Equal to or Greater Than 40,000 Gallons for Crude Oil and ROC Liquids with a Modified RVP of 0.5 psia or Greater: A person shall not store crude oil or reactive organic compound liquids with a modified Reid vapor pressure equal to or greater than 0.5 psia in any storage tanks with a capacity equal to or greater than 40,000 gallons without using one of the vapor control devices in Section C.
5. Organic Liquid Storage Tanks for Crude Oil and ROC Liquids with mRVP of 11 psia or Greater: A person shall not store organic liquids with a modified Reid vapor pressure greater than 11 psia in any tank unless such tank is:
  - a. A pressure tank maintaining working pressures sufficient at all times to prevent organic vapor loss to the atmosphere, or
  - b. Designed and equipped with a vapor loss control device in Subsection C.3 or C.4.

A person shall not use an external floating roof tank or an internal floating roof tank to store organic liquids with a modified Reid vapor pressure of 11 psia, or greater.

#### C. Vapor Loss Control Devices

The following are the vapor loss control devices that satisfy the storage tank requirements of Section B.

1. External Floating Roof: A floating roof, consisting of a pontoon-type or double-deck-type cover that rests on the surface of the liquid contents and is properly installed, properly maintained and in good operating order. External floating roof seals shall comply with the criteria specified in Section D and Section E.
2. Internal Floating Roof: A fixed roof tank with an internal-floating-type cover consisting of a pan, pontoon, or double-deck that rests on the liquid surface and is properly installed, properly maintained and in good operating order. Internal floating roof seals shall comply with the criteria specified in Section D and Section F.
3. Vapor Recovery System: A closed-type vapor recovery system, consisting of a system capable of collecting all reactive organic compound vapors and gases, and one of the following: a vapor return or condensation system that connects to a gas pipeline distribution system; or a disposal system capable of processing such vapors and gases, so as to prevent their emission to the atmosphere at a vapor loss control efficiency of at least 95 percent by weight.

Vapor recovery systems shall comply with the following requirements:

- a. Any tank gauging or sampling device on a tank vented to the vapor recovery system shall be equipped with a leak-free cover which shall be closed at all times except during gauging or sampling.
  - b. All piping, valves and fittings shall be designed and constructed in a leak-free condition, and shall be maintained and operated in a leak-free condition so as to minimize the release of reactive organic compound vapors.
  - c. Pressure vacuum valves on above ground tanks shall be set to within 10 percent of the maximum allowable working pressure of the tank, and shall be properly installed, properly maintained, and in good operating order, and shall remain in a leak-free condition except when the operating pressure exceeds the valve set pressure.
4. Other Vapor Loss Control Device: Any other equipment having a vapor loss control efficiency of at least 95% by weight, of reactive organic compound vapors, provided an application for installation of such equipment is submitted to and approved by the Air Pollution Control Officer.

D. Requirements for All Closure Devices

The closure device on any external floating roof tank or any internal floating roof tank shall meet the following criteria:

1. Secondary seals shall extend from the roof to the tank shell, shall not be attached to primary seals, and shall not be shoe-mounted.
2. All openings in the roof, except pressure vacuum valves and automatic bleeder vents, shall provide a projection at least two (2) inches below the liquid surface to prevent belching of liquid and to reduce escaping vapors. All openings and fittings shall be covered and shall have gaskets at all times with no visible gap, except when in use. For inaccessible openings on internal floating roof tanks, there shall be no visible gaps as viewed from the fixed roof manway, except when the opening is in use.
3. Pressure-vacuum valves shall be set to within 10 percent of the maximum allowable working pressure of the roof, and shall be properly installed, properly maintained, and in good operating order, and shall remain in a leak-free condition except when operating pressure exceeds the valve set pressure.
4. Solid sampling or gauging wells, and similar fixed projections through a floating roof such as an anti-rotational pipe, shall meet the following conditions:

- a. The well shall provide a projection at least two (2) inches below the liquid surface.
  - b. The well shall be equipped with a cover, seal or lid, which shall at all times be in a closed position with no gap exceeding 1/8 inch, except when the well is in use.
  - c. The gap between the well and the roof shall be added to the gaps measured to determine compliance of the secondary seal and in no case shall exceed 1/2 inch.
5. Slotted sampling or gauging wells shall meet the following conditions:
- a. The well shall provide a projection at least two (2) inches below the liquid surface.
  - b. The well shall have an internal float designed to minimize the gap between the float and the well, provided that the gap in no case exceeds 1/2 inch.
  - c. The gap between the well and the roof shall be added to the gaps measured to determine compliance of the secondary seal and in no case shall exceed 1/2 inch.
6. Any emergency roof drain that drains back to the stored liquid shall be provided with a slotted membrane fabric cover, or equivalent, that covers at least 90 percent of the area of the opening
7. Any metallic shoe-type seal for which an Authority to Construct was granted on or after October 4, 1989 shall meet the following conditions:
- a. One end of the shoe shall extend at least two (2) inches into the stored liquid and the other end shall extend a minimum vertical distance of 24 inches above the liquid surface.
  - b. The gap between the shoe and tank wall shall not exceed three (3) inches for a welded tank or five (5) inches for a riveted tank at any point from the liquid surface to 18 inches above it.
8. Any external or internal floating roof for which an Authority to Construct was granted on or after October 4, 1989 shall have at least four (4) ninety degree radial vapor barriers to minimize wind effects. An alternative device may be approved in writing by the APCO provided such device is demonstrated to be equivalent in minimizing wind effects.

## E. External Floating Roof Requirements

External floating roofs shall meet the following conditions in addition to the closure device requirements in Section D.

1. There shall be no holes or tears in, or openings in the seal or seal fabric which allow the emission of reactive organic compound vapors through the secondary seal or in the primary seal envelope surrounding the annular vapor space enclosed by the roof edge, seal fabric and secondary seal.
2. Welded Tanks with Primary Metallic Shoe Seals:
  - a. The cumulative length of all gaps between the primary seal and the tank shell exceeding 1/2 inch shall not be more than 10 percent, and exceeding 1/8 inch shall not be more than 40 percent of the tank circumference.
  - b. No gap between the tank shell and the primary seal shall exceed 1-1/2 inches; no continuous gap greater than 1/8 inch shall exceed 10 percent of the circumference of the tank.
  - c. The cumulative length of all gaps between the secondary seal and the tank shell exceeding 1/8 inch shall not be more than 5 percent of the tank circumference.
  - d. No gap between the tank shell and the secondary seal shall exceed 1/2 inch.
  - e. The secondary seal shall allow easy insertion of probes up to 1-1/2 inches in width in order to measure gaps in the primary seal.
4. Tanks with Primary Resilient-Toroid Seals:
  - a. The cumulative length of all gaps between the tank shell and the primary or secondary seal exceeding 1/8 inch shall not be more than 5 percent of the circumference of the tank.
  - b. No gap between the tank shell and the primary or secondary seal shall exceed 1/2 inch.
  - c. The secondary seal shall allow easy insertion of probes up to 1/2 inch in width in order to measure gaps in the primary seal.
  - d. The primary resilient toroid seal shall be liquid-mounted.
5. Riveted Tanks with Primary Metallic Shoe Seals:

- a. Gaps between the tank shell and the primary seal shall not exceed 2-1/2 inches. The cumulative length of all primary seal gaps exceeding 1-1/2 inches shall be not more than 10 percent of the circumference of the tank.
  - b. The secondary seal shall consist of at least two sealing surfaces, such that the sealing surfaces prevent the emission of reactive organic compounds around the rivets. Serrated sealing surfaces are allowable if the length of serration does not exceed 6 inches. No gap between the tank shell and the secondary seal shall exceed 1/2 inch. The cumulative length of all secondary seal gaps exceeding 1/8 inch shall be not more than five (5) percent of the circumference.
  - c. The secondary seal shall allow easy insertion of probes up to 1-1/2 inches in width in order to measure gaps in the primary seal.
6. Welded Tanks with Zero Gap Secondary Seals: Any secondary seal where installation or retrofit on a welded tank for which an Authority to Construct was granted on or after October 4, 1989 shall be a zero gap secondary seal. A secondary seal shall be considered to be retrofitted if at least a cumulative fifty percent of the circumference of the seal is replaced on or after October 4, 1989. A zero gap secondary seal shall meet the following conditions:
- a. No gap between the tank shell and the primary seal shall exceed 1-1/2 inches. No continuous gap in the primary seal greater than 1/8 inch shall exceed 10 percent of the circumference of the tank. The cumulative length of all primary seal gaps exceeding 1/2 inch shall be not more than 10 percent of the circumference and the cumulative length of all primary seal gaps exceeding 1/8 inch shall be not more than 40 percent of the circumference.
  - b. No gap between the tank shell and the secondary seal shall exceed 0.06 inch. The cumulative length of all secondary seal gaps exceeding 0.02 inch shall be not more than five (5) percent of the circumference of the tank excluding gaps less than two (2) inches from vertical weld seams.
7. Primary Seal Inspection for External Floating Roof Tanks (Selected Locations): The primary seal envelope shall be made available for unobstructed inspection by the APCO on an annual basis at four locations selected along its circumference at random by the APCO. In the case of riveted tanks with toroid-type seals, eight (8) such locations shall be made available; in all other cases, a minimum of four (4) but no more than eight (8) such locations shall be made available, except if any violations are suspected, 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.

8. Primary Seal Inspection for External Floating Roof Tanks (Full Circumference): For tanks with secondary seals, the primary seal envelope shall be made available for unobstructed inspection by the APCO for the full circumference at the following times:
  - a. Prior to installation of the secondary seal.
  - b. At least every five (5) years, or every ten (10) years if the seal is a zero gap secondary seal which is installed pursuant to Subsection E.6.
  - c. If the secondary seal is voluntarily removed by the owner or operator, it shall be made available for such inspection at that time. The owner or operator shall provide notification to the APCO no less than 72 hours prior to voluntary removal of the secondary seal.

F. Internal Floating Roof Requirements

Internal floating roofs shall meet the following conditions in addition to the closure device requirements in Section D.

1. For any fixed roof tank with a new or replaced internal-floating-type cover for which an Authority to Construct was granted on or after October 4, 1989, the closure device shall consist of one of the following:
  - a. A liquid mounted primary seal only, mounted in full contact with the liquid in the annular space between the tank shell and floating roof, or
  - b. 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.
2. There shall be no holes or tears in, or other openings which allow the emission of reactive organic compound vapors through the primary or secondary seals.
3. For any fixed roof tank using an internal floating-type-cover, the internal-floating-type cover shall be made available for inspection each time the tank is emptied and gas freed. Visual inspections through the manholes or roof hatches on the fixed roof shall be made available on an annual basis, provided such an inspection can be conducted safely. The APCO shall be notified at least 72 hours in advance of each gas freeing.

G. Exemptions

1. The provisions of this rule shall not apply to:
  - a. Any storage tank having a capacity of less than or equal to 5,000 gallons.
  - b. Any storage tank containing a reactive organic compound liquid having a modified Reid vapor pressure less than 0.5 psia.

Any person claiming exemption for a storage tank pursuant to this Subsection must maintain adequate records demonstrating that the modified Reid vapor pressure of all products stored in that tank is less than 0.5 psia.
  - c. Crude oil storage tanks subject to Rule 71.1, Crude Oil Production and Separation.
  - d. Gasoline storage tanks with equal to or less than 40,000 gallons capacity subject to Rule 70, Storage and Transfer of Gasoline.
2. The provisions of Subsections B.3 and B.4 shall not apply to an emergency standby tank not equipped with a vapor loss control device when:
  - a. The tank is drained of reactive organic compound liquids, or
  - b. A breakdown occurs to the primary tank and the following conditions are met:
    - 1) The breakdown is reported as soon as reasonably possible but no later than four (4) hours after its detection.
    - 2) Emissions resulting from the operation of the standby tank shall be minimized.
    - 3) Operation of the standby tank shall not occur beyond the period of the primary tank's emergency breakdown and shall not occur more than 15 days per year.
3. The provisions of Sections C, D, E, and F shall not apply to out-of-service or empty storage tanks when undergoing cleaning, stock change, tank and roof repairs or removal of contaminated stock provided that the following is accomplished:
  - a. At least 72 hours prior to such work being done, written notice is received by the APCO.



- b. The tank is in compliance with these Rules prior to notification.
  - c. For floating roof tanks, when the floating roof is resting on the leg supports, the process of filling, emptying, and refilling shall be continuous and shall be accomplished as rapidly as possible. Emissions shall be minimized during the process of filling, emptying, and refilling.
  - d. Vapor recovery shall be used on tanks so equipped during filling or flushing and emptying procedures prior to opening tanks for cleanout.
  - e. District is notified when returning a tank to service after the above listed work has been completed.
4. The provisions of Sections C, D, E, and F, shall not apply to in-service floating roof tanks undergoing preventive maintenance, including but not limited to roof repair, primary seal inspection, or removal and installation of a secondary seal, provided that the following conditions are met:
- a. At least 72 hours prior to such work being done, written notice is received by the APCO.
  - b. The tank is in compliance with these Rules prior to notification.
  - c. Product shall move neither in nor out of the storage tank and emissions shall be minimized.
  - d. If an Authority to Construct is required, in accordance with Rule 10.A, then one shall be obtained prior to commencing work.
  - e. The time of exemption allowed under this section shall not exceed 72 hours.
5. The provisions of Subsection C.3 shall not apply to in-service tanks undergoing preventive maintenance, including but not limited to repair of regulators, fittings, deck components, hatches, valves, flame arrestors, or compressors, provided that the following conditions are met:
- a. At least 72 hours prior to such work being done, written notice is received by the APCO.
  - b. The tank is in compliance with these Rules prior to notification.
  - c. District is notified when preventive maintenance work is completed.
  - d. Emissions are minimized during maintenance operations.

- e. The time of exemption allowed under this section shall not exceed 24 hours.

#### H. Inspection and Reporting Requirements

- 1. For all primary seals, actual gap measurements shall be recorded upon installation or replacement of primary seals, or prior to installation of secondary seals, and at least every five (5) years thereafter. If the secondary seal is a "zero gap seal" as per Subsection E.6, then actual gap measurements of the primary seal shall be recorded at least every 10 years. For all secondary seals, actual gap measurements shall be recorded on an annual basis.
- 2. The results of each inspection shall be reported to the APCO within 30 calendar days after the inspection date.

#### I. Recordkeeping Requirements

- 1. The operator of any tank subject to this rule shall maintain the following records:
  - a. Type of liquid stored in each tank, and the modified Reid vapor pressure ranges of such liquids.
  - b. The inspections reports required by Section H. Such records shall contain, at a minimum, the following information:
    - 1) Date of inspection and initials of inspector.
    - 2) Actual gap measurements between the tank shell and seals.
    - 3) Data, supported by calculations as necessary, to demonstrate compliance with the requirements of this rule.
    - 4) Any corrective actions or repairs taken to comply with the requirements of this rule and the date these actions were taken.
  - c. The maintenance records where excess emissions occur during operations exempted by Subsections G.3, G.4, and G.5. These records contain, at a minimum, the following:
    - 1) Permit number, tank identification, type of vapor controls, and initials of personnel performing maintenance.
    - 2) Description of specific maintenance procedure performed.
    - 3) Estimate of excess emissions caused by maintenance procedure and how determined.

- 4) Start and finish times and dates of maintenance procedure.
- d. The breakdown records where excess emissions occur during use of emergency standby tanks allowed by Section G.2.b. These records shall contain, at a minimum, date, time and duration of breakdown and calculation of excess emissions resulting from the breakdown.
2. Records shall be maintained for a period of at least four (4) years from the date of each entry, and such records shall be made available to the APCO upon request.

J. Test Method

1. The vapor pressure of petroleum products shall be measured using a Reid vapor pressure method at product storage temperature. The Reid Method is defined by the ASTM Method No. D-323-82 Volume 5.01, Section 5. Organic liquids listed in Attachment 1 shall be deemed to be in compliance with the appropriate vapor pressure limits for the tank in which it is stored provided the actual storage temperature does not exceed the corresponding maximum temperature listed.
2. The test methods used for measuring the vapor loss control efficiency in subsections C.3 and C.4 shall be as follows:
  - a. Measurement of vapor flow through pipes shall be determined by EPA Method 2A.
  - b. Measurement of ROC vapor concentration shall be determined by EPA Method 25A or EPA Method 25B.

K. Statement of Applicability

No later than April 4, 1990, the owner or operator of any storage tank subject to this rule shall submit the following information to the APCO for each storage tank subject to this rule:

1. The location of the storage tank and APCD Permit to Operate number for the storage tank.
2. The product and modified Reid vapor pressure of the product typically stored.
3. The current compliance status of the storage tank with respect to the requirements of this rule.
4. For storage tanks with external floating roofs or internal floating roofs, the type of tank (welded or riveted), and the type of roof seals (primary and secondary).

L. Violations

Failure to comply with any provision of this rule shall constitute a violation of this rule. Each leak discovered by District personnel from equipment required to be leak-free shall constitute a violation of this rule.

M. Increments of Progress

Any person required to modify or replace an existing storage tank to comply with this rule shall submit a complete Authority to Construct application to the APCO before April 4, 1990, and shall submit to the APCO an application for a Permit to Operate and demonstrate final compliance before April 4, 1991.

ATTACHMENT 1

STORAGE TEMPERATURE VERSUS VAPOR PRESSURE

Organic Liquids	Reference Properties		Max Temp. °F Not to Exceed	
	Gravity °API	IBP °F	0.5 (psia)	1.5 (psia)
Middle Distillates				
Kerosene	42.5	350	195	250
Diesel	36.4	372	230	290
Gas Oil	26.2	390	249	310
Stove Oil	23	421	275	340
Jet Fuels				
JP-1	43.1	330	165	230
JP-3	54.7	110	--	25
JP-4	51.5	150	20	68
JP-5	39.6	355	205	260
JP-7	44-50	360	205	260
Fuel Oil				
No. 1	42.5	350	195	250
No. 2	36.4	372	230	290
No. 3	26.2	390	249	310
No. 4	23	421	275	340
No. 5	19.9	560	380	465
Residual	19-27		405	--
No. 6	16.2	625	450	--
Asphalts				
60-100 pen.	--	--	490	550
120-150 pen.	--	--	450	500
200-300 pen.	--	--	360	420

IBP = Initial Boiling Point

ATTACHMENT 1  
(Continued)

Organic Compounds	Reference Properties			Max Temp. °F Not to Exceed	
	Density lb/gal	Gravity °API	IBP °F	0.5 (psia)	1.5 (psia)
Acetone	6.6	47	133	--	35
Acrylonitrile	6.8	41.8	173	30	62
Benzene	7.4	27.7	176	34	70
Carbon Disulfide	10.6	22.1	116	--	10
Carbon Tetrachloride	13.4	--	170	20	63
Chloroform	12.5	--	142	--	40
Cyclohexane	6.5	49.7	177	30	65
1,2 Dichloroethane	10.5	--	180	35	75
Ethyl Acetate	7.5	23.6	171	38	70
Ethyl Alcohol	6.6	47.0	173	55	85
Isopropyl Alcohol	6.6	47.0	181	62	95
Methyl Alcohol	6.6	47.0	148	30	62
Methyl Ethyl Ketone	6.7	44.3	175	30	70
Toluene	7.3	30	231	75	120
Vinylacetate	7.8	19.6	163	30	65

IBP = Initial Boiling Point