

RULE 411 Storage of Organic Liquids - Adopted 4/18/72, Amended 1/9/79, 6/29/79, 11/27/79, 4/5/82, 4/11/91, 9/19/91, 4/6/95, 3/7/96

I. **Applicability**

This Rule applies to equipment used to store organic liquids and petroleum distillates, with a true vapor pressure of greater than 1.5 psia.

II. **Definitions**

- A. **Emergency Standby Tank**: Tank not used (filled or partially filled) more than twice in any twelve month period.
- B. **Gas Leak**: Reading as methane on a portable hydrocarbon detection instrument in excess of 10,000 ppm above background when measured with an instrument calibrated with methane and conducted in accordance with U.S. EPA Method 21.
- C. **Gas-Tight**: Any emission of less than or equal to 10,000 ppm as methane measured with an instrument calibrated with methane and conducted in accordance with U.S. EPA Method 21.
- D. **Gasoline**: Organic liquid used as motor fuel with true vapor pressure of greater than 1.5 psia.
- E. **Metallic-Shoe Type Seal**: Floating roof tank seal with typical geometry and components as shown on Figure 1, Page 411-10.
- F. **Organic Liquid**: Any liquid containing VOC's and having a true vapor pressure (TVP) greater than 1.5 psia at actual storage conditions.
- G. **Petroleum Distillate**: The product of a distillation or condensation process obtained by condensing vapors for the purpose of purification, fractionation or the formation of new substances.
- H. **Resilient-Toroid Type Seal**: Floating roof tank seal with typical geometry and components as shown on Figure 2, Page 411-11.
- I. **Roof Drain**: Any drain located in roof of tank opening directly into organic liquid content of tank.
- J. **Tank**: Any stationary storage tank, reservoir or other container having a capacity of 251 gallons, or greater.
- K. **Visible Gap**: Gap between tank shell and seal exceeding 1.5 mm (0.06 in.).

- L. Volatile Organic Compound (VOC): Any compound containing at least one atom of carbon except for compounds exempted by Rule 102, Subsection L.
- M. "Zero" gap: No gap between tank shell and seal exceeding 1.5 mm (0.06 in.), and cumulative length of all gaps exceeding 0.5 mm (0.02 in.) not being more than 5 percent of tank circumference, excluding gaps less than 5 cm (1.79 in.) from vertical seams.

III. Exemptions

- A. Provisions of this Rule shall not apply to tanks, reservoirs or other containers which are pressure vessels maintaining working pressures sufficient at all times to prevent organic liquid or VOC loss to the atmosphere.
- B. Requirements of Subsection IV.A., IV.B. and IV.C. shall not apply to:
 - 1. Fixed or floating roof tanks, designated for emergency standby, in existence prior to May 1, 1979 storing exclusively petroleum distillates. Prior to return to emergency standby status, each tank shall be thoroughly drained. Each use of tank shall not exceed 30 days. After tank has been used (filled or partially filled) and draining of tank has begun, any further filling of tank shall constitute a separate use of tank. Each fixed roof emergency standby tank shall be equipped with pressure relief device set to within ten percent of maximum allowable working pressure of tank.
 - 2. Portable temporary tanks, with capacities of 21,000 gallons (500 Barrels), or less left on site for six months or less.

IV. Requirements

A. Floating Roof Tanks

- 1. A floating roof tank shall not be used to store organic liquid having a true vapor pressure of 11 psia, or greater under storage conditions.
- 2. No person shall place, store or hold in any floating roof tank of 19,800 gallons (471 barrels), or greater, any organic liquid unless such tank is equipped with:
 - a. A floating roof, consisting of a pontoon type or double-deck type cover, resting on the surface of liquid contents; and
 - b. A closure device between the tank shell and roof edge consisting of two seals, one above the other. The lower one shall be referred to as the primary seal, and upper one shall be referred to as the secondary seal.

3. Seal designs shall be submitted to the Control Officer and not installed or used unless approved by the Control Officer as meeting criteria of Subsections IV.A.3.a. through IV.A.3.d., as applicable.

Seal designs other than those in Subsections IV.A.3.a. through IV.A.3.d. may be approved provided notice allowing use of such design has been published in the Federal Register pursuant to CFR 40 Part 60: Subpart Kb Paragraph 60.114b.

a. Metallic-Shoe Type Seal on Welded Tank:

For a closure device on a welded tank shell using a metallic-shoe type seal as its primary seal:

1. No gap between tank shell and primary seal shall exceed 1 1/2 inches. Cumulative length of all gaps between tank shell and primary seal greater than 1/2 inch shall not exceed 10 percent of tank circumference. Cumulative length of all primary seal gaps greater than 1/8 inch shall not exceed 30 percent of tank circumference. No continuous gap greater than 1/8 inch shall exceed 10 percent of tank circumference.
2. No gap between tank shell and secondary seal shall exceed 1/2 inch. Cumulative length of all gaps between tank shell and secondary seal greater than 1/8 inch shall not exceed 5 percent of tank circumference.
3. Metallic-shoe type seals shall be installed so that one end of shoe extends into stored liquid and other end extends a minimum vertical distance of 24 inches above stored liquid surface.
4. Geometry of shoe shall be such that maximum gap between shoe and tank shell is no greater than double gap allowed by seal gap criteria for a length of at least 18 inches in vertical plane above liquid surface.
5. There shall be no holes, tears, or openings in secondary seal or primary seal envelope surrounding annular vapor space enclosed by roof edge, stored liquid surface, shoe, and seal fabric.
6. Secondary seal shall allow easy insertion of probes up to 1 1/2 inches in width to allow measurement of gaps in primary seal.
7. Secondary seal shall extend from roof to tank shell and shall not be attached to primary seal.

b. Metallic-Shoe Type Seal on Riveted Tank:

For a closure device on a riveted tank shell using a metallic-shoe type seal as its primary seal:

1. No gap between tank shell and primary seal shall exceed 2 1/2 inches. Cumulative length of all primary seal gaps greater than 1 1/2 inch shall not exceed 10 percent of tank circumference. Cumulative length of all gaps between the tank shell and the primary seal greater than 1/8 inch shall not exceed 30 percent of tank circumference. No continuous gap greater than 1/8 inch shall exceed 10 percent of tank circumference.
2. No gap between tank shell and secondary seal shall exceed 1/2 inch. Cumulative length of all gaps between tank shell and secondary seal greater than 1/8 inch shall not exceed 5 percent of tank circumference.
3. Metallic-shoe type seals shall be installed so that one end of shoe extends into stored liquid and other end extends a minimum vertical distance of 24 inches above stored liquid surface. Geometry of shoe shall be such that maximum gap between shoe and tank shell is no greater than double gap allowed by seal gap criteria for a length of at least 18 inches in vertical plane.
4. There shall be no holes, tears, or openings in seal(s) envelope surrounding annular vapor space enclosed by roof edge, stored liquid surface, shoe, and seal fabric.
5. Any secondary seal shall allow easy insertion of probes up to 2 1/2 inches in width to allow measurement of gaps in primary seal.
6. Any secondary seal shall extend from roof to tank shell and shall not be attached to primary seal.

c. Resilient-Toroid Type Seal On Any Tank:

For a closure device on a tank using a resilient-toroid type seal:

1. No gap between tank shell and primary seal shall exceed 1/2 inch. Cumulative length of all primary seal gaps greater than 1/8 inch shall not exceed 30 percent of tank circumference. No continuous gap greater than 1/8 inch shall exceed 10 percent of tank circumference.
2. No gap between tank shell and secondary seal shall exceed 1/2 inch. Cumulative length of all gaps between tank shell and secondary seal greater than 1/8 inch shall not exceed 5 percent of the tank circumference.

3. There shall be no holes, tears, or openings in secondary seal or primary seal envelope surrounding annual vapor space enclosed by roof edge, seal fabric and secondary seal.
 4. Secondary seal shall allow easy insertion of probes up to 1/2 inch in width to allow measurement of gaps in primary seal.
 5. Secondary seal shall extend from roof of tank to shell and not be attached to primary seal.
- d. Following seal designs have been found to be equivalent to seals meeting criteria of Subsections IV.A.3.a. through IV.A.3.c.:
1. Republic Fabricators, "Weather Guard Seal" when installed and maintained with "zero" gap; and
 2. HMT, "Dual/Multi Wiper Blade Seals" when installed and maintained to meet gap criteria for primary and secondary seals as described in Subsections IV.A.3.a. or IV.A.3.b.

4. Inspection of Seals:

Primary seal envelope shall be made available for unobstructed inspection by District on annual basis at locations selected along its circumference at random. For riveted tanks with toroid-type seals, a minimum of eight locations shall be made available; for other tanks, a minimum of four locations shall be made available. If District suspects non-conformance with this Rule, District may require such further unobstructed inspection of primary seal as may be necessary to determine seal condition for its entire circumference.

5. Openings:

All openings in roof used for sampling or gauging, except pressure-vacuum valves which shall be set to within ten percent of maximum allowable working pressure of roof, shall provide a projection below liquid surface to prevent belching of liquid and to prevent entrained or formed organic vapor from escaping from liquid contents of tank and shall be equipped with a cover, seal, or lid. Such covers, seals, or lids shall, at all times, be in closed position with no visible gaps and be gas-tight, except when device or appurtenance is in use.

6. Roof Drain:

Any roof drain shall be provided with slotted membrane fabric cover, or equivalent, covering at least nine-tenths of opening area.

B. Fixed Roof Tanks with Internal Floating Roof

1. A fixed roof tank with an internal floating roof shall not be used to store organic liquid having a true vapor pressure of 11 psia, or greater under storage conditions.
2. No person shall place, store or hold in any fixed roof tank with an internal floating roof and a capacity of 19,800 gallons (471 barrels), or greater any organic liquid, or petroleum distillate unless internal floating roof is equipped with a closure device meeting requirements of Subsection IV.A.
3. A fixed roof tank with internal floating type cover shall be made available for inspection by District upon request.
4. Following seal designs for internal floating roofs have been found to be equivalent to seals meeting criteria of Subsection IV.A.:
 - a) Ultraflote "Single Ultraseal" when installed and maintained with "zero" gap; and
 - b) Ultraflote "Dual Ultraseal" when installed and maintained to meet gap criteria for primary and secondary seals as described in Subsections IV.A.3.a. or IV.A.3.b.

C. Fixed Roof Tank with Vapor Recovery System

1. No person shall place, store or hold in any fixed roof tank of 19,800 gallons (471 barrels), or greater capacity any organic liquid, or petroleum distillate unless tank is equipped with vapor recovery system. System shall be designed to collect all VOC's, and shall include system recovering or disposing of VOC's to prevent emission to the atmosphere at a control efficiency of at least 95 percent by weight.
2. Any tank gauging or sampling device on a tank vented to a vapor recovery system shall be equipped with gas-tight cover closed at all times except during gauging or sampling.
3. All piping, valves and fittings shall be constructed and maintained in gas-tight condition.

D. Aboveground Tank Containing Gasoline

A person shall not place, store, or hold in any aboveground tank of 19,800 gallons (471 barrels), or less capacity any gasoline unless such tank is equipped with a pressure relief device set to within 10 percent of maximum allowable working pressure of container or is equipped with a vapor loss control device complying with requirements of Subsection IV.C.

V. Administrative Requirements

A. Record Keeping

1. A person whose tanks are subject to requirements of this Rule shall keep an accurate record of liquids stored in each container, storage temperature and Reid vapor pressure of such liquids.
2. A person whose emergency standby tanks are exempt from requirements of Subsections IV.A., IV.B., or IV.C. of this Rule shall maintain records required in Subsection V.A.1. and date(s) liquid is first introduced to each tank and date(s) tank is fully drained. Such records shall be submitted to Control Officer 60 days prior to permit renewal.
3. A person whose portable temporary tanks are exempt by Subsection III.B.2. shall maintain records required in V.A.1. in addition to tank capacity, date(s) liquid is first introduced, and date(s) tank is fully drained and moved off-site. Such records shall be submitted to Control Officer within 45 days of tank removal.

B. Test Methods

1. Analysis of halogenated exempt compounds shall be by CARB Method 432.
2. True vapor pressure shall be measured using Reid vapor pressure ASTM Method No. D-323-82 modified by maintaining hot water bath at storage temperature. Where storage temperature is above 100 F, true vapor pressure may be determined by Reid Vapor pressure at 100 F and California Air Resources Board-approved calculations. An organic liquid listed in Table I, Page 411-9 shall be deemed in compliance with appropriate vapor pressure limits for liquid, provided actual storage temperature does not exceed corresponding maximum temperature listed.
3. Control efficiency, as used in Subsection IV.C., shall be determined by CARB Method 202 or 203, as applicable.

4. Efficiency of any VOC destruction device shall be measured by U.S. EPA Method 25, 25A, or 25B, as applicable, and analysis of halogenated exempt compounds shall be by CARB Method 422.

Table I
Organic Liquids
Maximum Storage Temperatures For Organic Liquids
For Purposes Of Subsection V.B.2.

<u>Organic Liquid</u>	<u>Gravity</u> <u>API</u>	<u>Initial Boiling</u> <u>Point F</u>	<u>Vapor Pressure Limit</u>	
			<u>0.5 (psia)</u>	<u>1.5 (psia)</u>
<u>Middle Distillates</u>			<u>Maximum Storage Temp.(F)</u>	
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
<u>Jet Fuels</u>				
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
JP-8	37-51	---	167	222
<u>Fuel Oil</u>				
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	---
<u>Asphalts</u>				
60 - 100 pen.	---	---	490	550
120 - 150 pen.	---	---	450	500
200 - 300 pen.	---	---	360	420

Figure 1
Metallic-Shoe-Type Seal

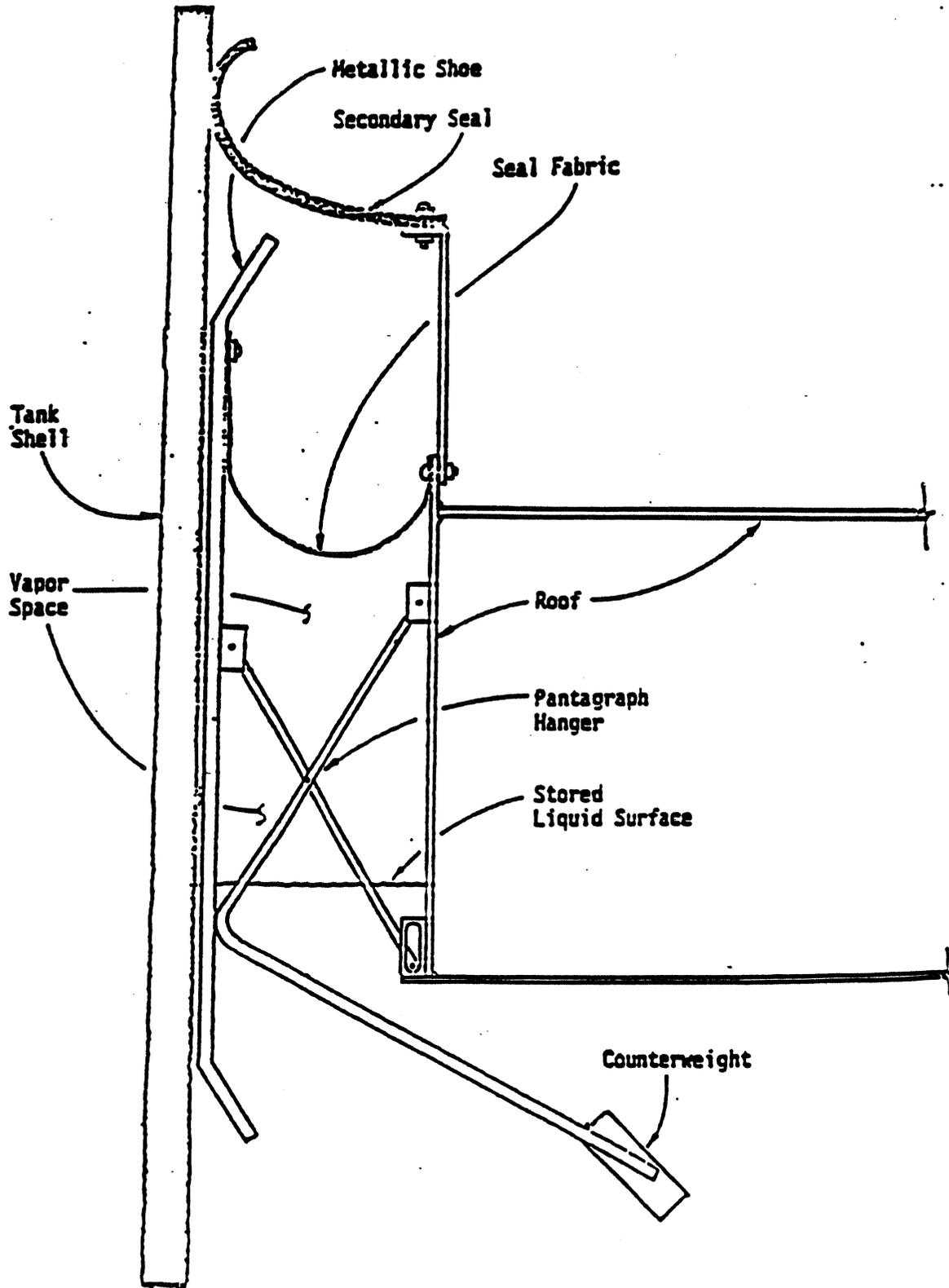


Figure 2
Resilient-Toroid-Type Seal

