NFPA 30-2008: Basic Requirements for Storage Tanks

New York City Metro Chapter
Society of Fire Protection Engineers
New York, NY — February 22, 2011

NFPA 30, Flammable and Combustible Liquids Code

Storage Tanks

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The Basics

- What is a flammable liquid?
- Fundamental hazardous property of flammable and combustible liquids is:
  - their ability to produce ignitible vapors

Properties

- vapor pressure & boiling point
- flash point
  - temperature at which vapors above liquid's surface can be ignited
- fire point
  - temperature at which liquid will ignite & sustain fire

Properties

- autoignition temperature
- vapor-air density
- liquid density
- water miscibility
  - water miscible liquids are a fire fighting challenge

Properties

Vapor Pressure	Boiling Point	Evaporation Rate	Flash Point
↑	↓	↑	↓

Classification

Class	Flash Point	Boiling Point
IA	< 73°F (22.8°C)	< 100°F (37.8°C)
IB	< 73°F (22.8°C)	≥ 100°F (37.8°C)
IC	≥ 73°F – 100 °F (≥22.8 - 37.8°C)	
II	>100°F - <140°F (>60 - <37.8°C))	
III	≥ 140°F (≥ 60°C)	
IIIA	≥ 140°F - < 200°F (≥60°C - < 93°C)	
IIIB	>200°F (> 93°C)	

NFPA 30 Reorganized in 2008

Old Chapters	New Chapter Groups
1 - 3 Administrative	1 - 4 Administrative
4 Tank Storage	5 - 8 General Requirements
5 Piping	9 - 16 Container Storage
6 Container Storage	17 - 20 Operations
7 Operations	21 - 26 Tank Storage
8 Electrical	27 - 29 Piping, Bulk Transfer

Bulk Storage Tanks

1 - 4 Administrative
5 - 8 General Requirements
9 - 16 Container Storage
17 - 20 Operations
21 - 26 Tank Storage
27 - 29 Piping, Bulk Transfer

21 Requirements for All Tanks
22 Aboveground Tanks
23 Underground Tanks
24 Storage Tank Bldgs.
25 Storage Tank Vaults
26 Reserved

Types of Storage Tanks

Chapter 21 – General

- applies to storage of flammable and combustible liquids in
  - fixed tanks exceeding 60 gal. (230L)
  - portable tanks and IBC'S > 793 gal. (3,000 L)
  - portable tanks connected to fixed piping
  - not used for processing

Chapter 21 – General

- basic design requirements
  - tank can be of any shape, size or type
  - must be constructed per recognized engineering standards
  - aboveground tanks cannot be used as underground tanks nor vice versa

Chapter 21 – General

- materials of construction
  - recognized engineering standards for the material of construction being used
  - steel or other approved noncombustible material
  - must be compatible with liquid stored
  - can be lined, if necessary
  - special engineering required if specific gravity of liquid > 1.0

Chapter 21 – General

- combustible materials of construction permitted:
  - underground
  - where required by liquid properties
  - Class IIIB liquids:
    - outside aboveground where not exposed to a spill/leak of Class I or Class II liquid.
    - inside a building protected by an automatic fire-extinguishing system.

Chapter 21 – General

- common design standards
  - API Standard 650, *Welded Steel Tanks*
  - UL 58, *Underground Tanks*
  - UL 80, *Steel Tanks for Oil Burner Fuel*
  - UL 142, *Steel Aboveground Tanks*
  - UL 1316, *FGRP Underground Storage Tanks*
  - UL 1746, *External Corrosion Protection Systems for Steel Underground Tanks*
  - UL 2080, *Fire Resistant Tanks*
  - UL 2085, *Protected Aboveground Tanks*

1.14

Chapter 21 – General

- maximum operating pressures for ambient pressure tanks
  - 0.5 psi gauge for vertical cone roof tanks
  - 1.0 psi gauge, if designed to Appendix F of API Standard 650
  - 1.0 psi gauge for horizontal cylindrical or rectangular tanks

Chapter 21 – General

- maximum operating pressures for low pressure tanks: 1.0 to 15 psi
  - API 620, Large, Welded, Low-Pressure Storage Tanks
  - ASME Code for Unfired Pressure Vessels, Section VIII, Division 1

Chapter 21 – General

- maximum operating pressures for pressure vessels: > 15 psi
  - ASME Code for Unfired Pressure Vessels, Section VIII, Division 1 or 2

Chapter 21 – General

- vent must prevent vacuum or pressure that:
  - can distort the roof of a cone roof tank
  - can exceed the design pressure of the tank
    - maximum rate of flow, in or out
    - atmospheric or temperature changes
- size vent per API 2000 or approved standard
  - min 1 ¼ in. (32 mm) or largest connection.

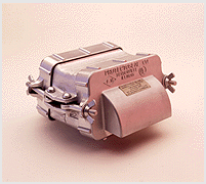
Chapter 21 – General

- vent termination devices for Class IA liquids:
  - normally closed venting devices
  - pressure-vacuum (conservation vent)

typical pressure-vacuum vent

Chapter 21 – General

- vent termination devices for Class IB and Class IC liquids
  - normally-closed venting devices
  - listed flame arresters



- no vent termination devices required for Class II or Class III liquids

Chapter 21 – General

- protection from internal corrosion
  - additional metal thickness
  - approved protective coatings or linings

This tank failed at the weld between the shell and the tank bottom due to corrosion.

Chapter 21 – General

- testing requirements
  - Shop-built and site-built tanks must be tested before being placed in service.
    - use tank construction standard
    - listed tanks exempt
  - Tightness Test (21.6)
    - for site-built tanks, test above is sufficient
    - use water or air – 3 to 5 psig

Chapter 21 – General

- fire hazard analysis required
  - fire & explosion hazards on the site
  - local conditions
    - threat from adjacent properties
    - environmental conditions
  - fire protection systems where indicated
  - emergency action plan
  - training and drills
  - inspection and maintenance

Chapter 21 – General

- overfill prevention procedures / systems
  - required for tanks > 1,320 gal. (5,000 L) storing Class I or Class II liquids
  - aboveground tanks receiving / transferring Class I liquids from pipelines or marine vessels must have written procedures

Chapter 21 – General

- identification and security
  - NFPA 704 placard
  - unsupervised, isolated aboveground tanks must be secured from tampering or trespassing

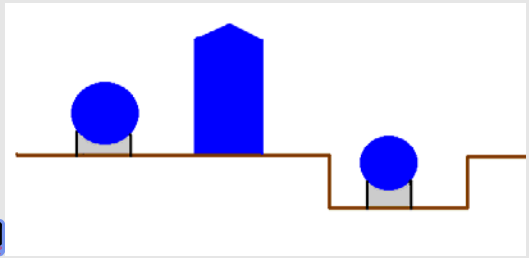
Chapter 21 – General

- tanks in areas subject to floods must have means to secure tank from displacement

Tanks after Hurricane Katrina

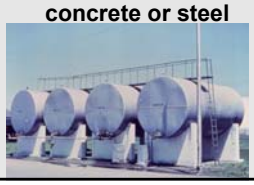
Ch. 22 – Aboveground Tanks

- covers tanks installed above grade, at grade, below grade without backfill



Ch. 22 – Aboveground Tanks

- tank supports and foundation
  - design to minimize excessive loading at supports and to minimize uneven settling
  - design for earthquakes
  - on ground or on supports of masonry, concrete or steel



Ch. 22 – Aboveground Tanks

- location (siting) of aboveground tanks
  - separation distance from
    - nearest important building
    - near and far side of public way
    - property line that is or can be built upon
    - shell-to-shell spacing

Ch. 22 – Aboveground Tanks

- factors that determine separation
  - type of tank
    - floating roof
    - vertical w/ weak roof-to-shell seam
    - horizontal or vertical with emergency relief vents*
    - Protected tank
  - protection for the tank itself
  - protection for exposed property

*predicated on maximum 2.5 psi overpressure

Ch. 22 – Aboveground Tanks

Liquid	Table(s)
Class I, II, IIIA stable liquids (up to 2.5 psi)	22.4.1.1(a) & 22.4.1.1(b)
Class I, II, IIIA stable liquids (>2.5 psi)	22.4.1.3 & 22.4.1.1(b)
liquids w/ boil-over characteristics	22.4.1.4
unstable liquids	22.4.1.5 & 22.4.1.1(b)
Class IIIB stable liquids	22.4.1.6

Table 22.4.1.1 (a)

Tank Type	Protection	Minimum Distance	
		Property Line	Important Bldg
floating roof	for exposed property	½ Diameter	$^1/_6$ Diameter
	none	Diameter, 175' max	
vertical with weak roof-to-shell seam	approved foam or inert gas system (150' max)	½ Diameter	$^1/_6$ Diameter
	for exposed property	1 X Diameter	$^1/_3$ Diameter
	none	2 X Diameter (350' max)	$^1/_3$ Diameter
tanks with emergency relief venting, 2.5 psi max	approved foam or inert gas system (150" max)	½ X Table 22.4.1.1(b)	
	for exposed property	1 X Table 22.4.1.1(b)	
	none	2 X Table 22.4.1.1(b)	
protected	none	½ Table 22.4.1.1(b)	

Table 22.4.1.1 (b)

Capacity, gal	Property Line, ft	Important Bldg. or Public Way ft (m)
< 275	5	5
276 – 750	10	5
751 – 12,000	15	5
12,001 – 30,000	20	5
30,001 – 50,000	30	10
50,001 – 100,000	50	15
100,001 – 500,000	80	25
500,001 – 1,000,000	100	35
1,000,001 – 2,000,000	135	45
2,000,001 – 3,000,000	165	55
> 3,000,000	175	60

Other Liquids

- other tables for:
  - aboveground tanks, stable liquids, pressure > 2.5 psig
  - aboveground tanks, boil-over liquids
  - aboveground tanks, unstable liquids
  - aboveground tanks, Class IIIB liquids

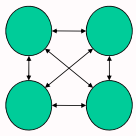


Table 22.4.2.1

Table 22.4.2.1 — Shell to Shell Spacing

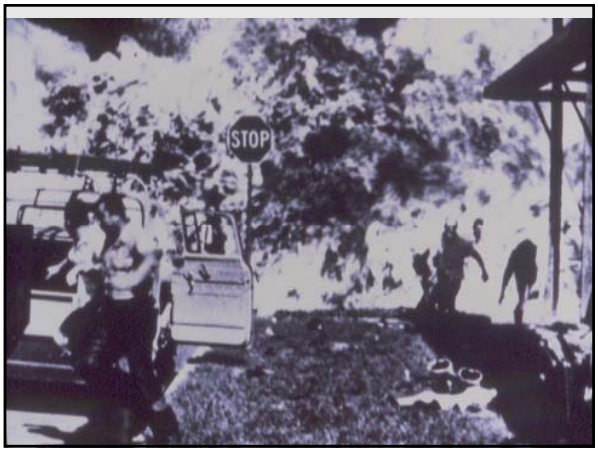
Diameter, ft.	Floating Roof Tanks	Fixed Roof & Horizontal Class I /II	Class IIIA
≤ 150	$^1/_6 \sum$ adjacent diameters	$^1/_6 \sum$ adjacent diameters	
➢150 w/ remote impounding	$^1/_6 \sum$ adjacent diameters	$^1/_4 \sum$ AD	$^1/_6 \sum$ AD
open dike	$^1/_4 \sum$ adjacent diameters	$^1/_3 \sum$ AD	$^1/_4 \sum$ AD

In no case is the separation allowed to be less than 3 ft.

Ch. 22 – Aboveground Tanks

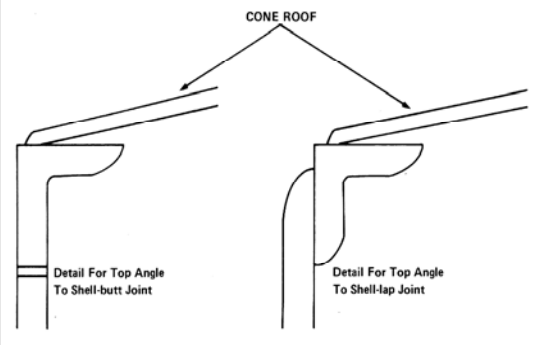
Emergency relief venting:
A means to automatically relieve excess pressure inside a tank *due to exposure from an external fire.*

Not intended for pressure relief from internal explosion or internal overpressure.

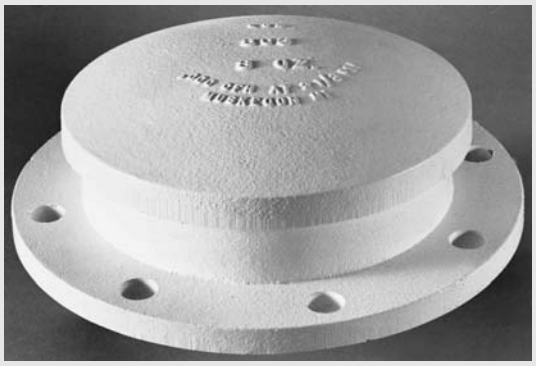


Ch. 22 – Aboveground Tanks

- emergency relief venting
  - tanks must have additional venting capacity to prevent the tank from exceeding 2.5 psig if exposed to fire
  - can use floating roof, lifter roof, weak roof-to-shell seam, loose-bolt cover, or emergency vent device



Weak roof-to-shell seam design options



Emergency Vent

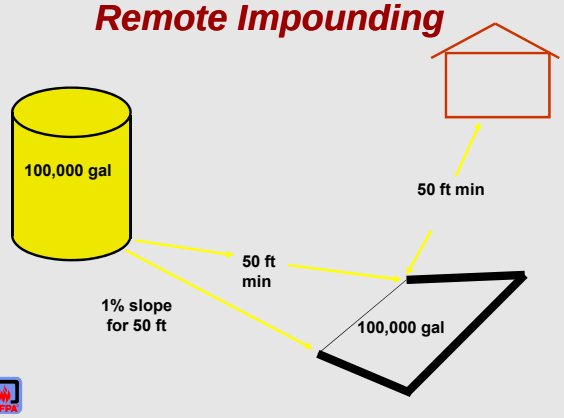
Ch. 22 – Aboveground Tanks

- emergency relief venting is required for:
  - every compartment of a compartmented tank
  - Interstitial space of a secondary containment-type tank
  - *Exception: Tanks storing Class IIIB liquids that exceed 285 bbl (11,900 gal) and not located within the diked area or drainage path of tanks storing Class I or Class II liquids.*

Ch. 22 – Aboveground Tanks

- spill control – general
  - tanks holding Class I, II, or IIIA liquids must prevent accidental release from endangering important facilities, adjoining property, and waterways
    - remote impounding
    - impounding around tanks by diking
    - combined remote impounding and diking
    - closed-top diking
    - secondary containment tanks

Remote Impounding



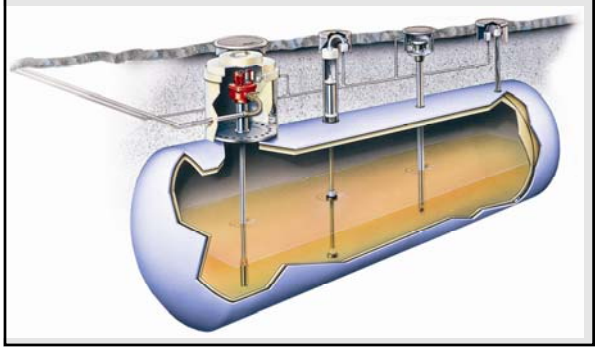
Impounding by Diking

Impounding by Diking

Ch. 22 - Aboveground Tanks

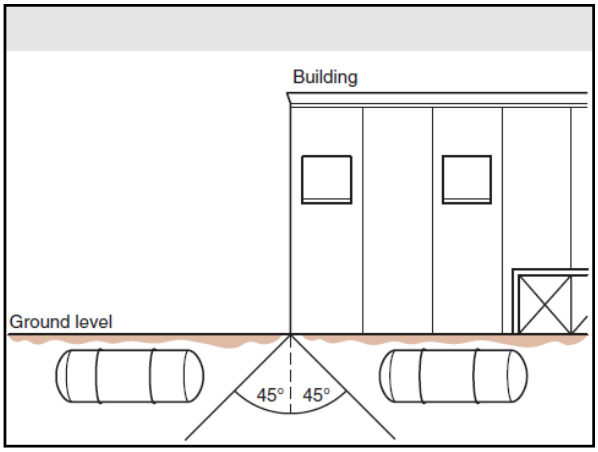
- spill control – diking
  - 1% slope from tank to dike wall for 50 ft.
  - dike capacity = the greatest volume of liquid that can be released from the largest tank (overflow point)
    - local law might require more
  - capacity calculated by deducting from gross volume of diked area the volume of all enclosed tanks below height of dike wall, except for the largest tank

Ch. 23 - Underground Tanks



Ch. 23 - Underground Tanks

- general installation requirements
  - must be installed in accordance with manufacturer's instructions
  - excavation must not undermine foundations or footings of existing structures
  - tanks must not be damaged during delivery, unloading, or placement into the excavation



Ch. 23 - Underground Tanks

- tank location
  - tank must be situated, with respect to existing foundations, footings, and supports, so that loads are not transmitted to the tank itself

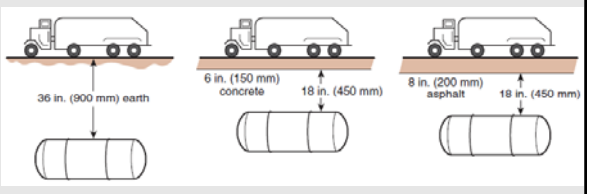
	Basement or Pit	Property Line
Class I	1 ft	3 ft
Class II	1 ft	1 ft

Ch. 23 - Underground Tanks

- top cover where tank is not subject to vehicle traffic
  - 24 in. of clean backfill, or
  - 12 in. of compacted backfill plus 4 in. minimum slab of reinforced concrete

Ch. 23 - Underground Tanks

- top cover where tank IS subject to vehicle traffic
  - 36 in. of clean backfill, or
  - 18 in. min. of compacted backfill plus 6 in. min. slab of reinforced concrete
  - 18 in. min. of compacted backfill plus 8 in. min. slab of asphalt/aggregate concrete
  - top pad must extend at least 12 in. beyond the footprint of the tank



Ch. 23 - Underground Tanks

- maximum burial depth
  - as specified by the tank manufacturer
  - consult tank manufacturer about necessary reinforcing if:
    - burial depth exceeds diameter of tank
    - pressure at bottom of tank will exceed 10 psi
  - specific gravity of the liquid stored must be considered as a design factor

Ch. 23 - Underground Tanks

- normal (breather) venting
  - sufficient capacity to prevent blowback of vapor or liquid at the fill opening while the tank is being filled
  - size vent pipe per Table 23.5.2
    - minimum 1¼ in. (32 mm)
    - based on maximum flowrate
    - lengths of pipe runs to 200 ft.

Ch. 23 - Underground Tanks

- external corrosion protection
  - a properly engineered, installed, and maintained cathodic protection system
  - approved or listed corrosion-resistant materials or systems.
  - type of protection used based on corrosion history of the area and judgment of a qualified engineer

Ch. 23 - Underground Tanks

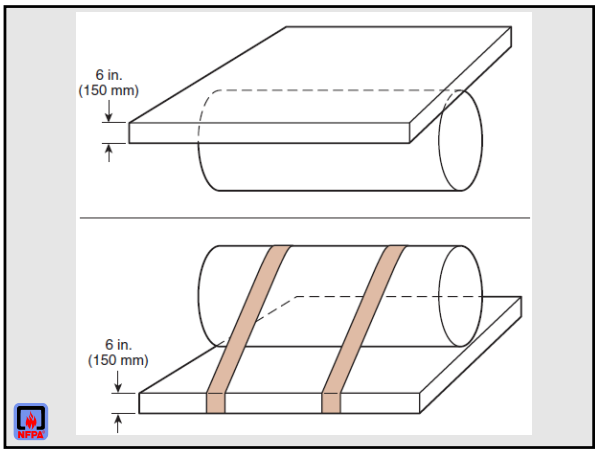
- tank openings other than vents
  - connections must be liquid & vapor tight
  - gauge openings must have liquid & vapor tight caps or covers
    - covers kept closed when not in use
  - inside building, protect each opening against liquid overflow and vapor release
    - use a spring-loaded check valve or other approved device

Ch. 23 - Underground Tanks

- tank openings other than vents
  - fill and discharge lines can enter tank only through the top
  - slope fill lines toward the tank
  - tanks for Class I liquids with a capacity > 1,000 gal. must have a tight fill device for connecting the fill hose to the tank

Ch. 23 - Underground Tanks

- see Section 23.14 for requirements
  - tanks must be anchored so that they cannot float out of the ground when subjected to maximum groundwater level or flood stage

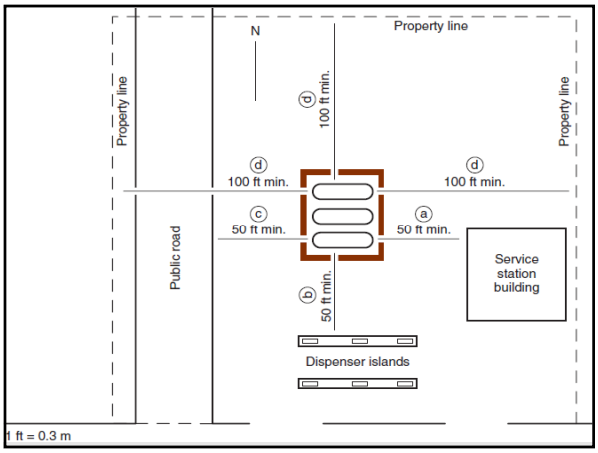


NFPA 30A, Table 4.3.2.4

TABLE 4.3.2.4 Minimum Separation Requirements for Aboveground Tanks

Tank Type	From the Individual Tank Capacity (gal)[a]	Minimum Distance (ft) From Nearest Important Building on the Same Property	From Nearest Fuel Dispensing Device[b]	From Lot Line That Is or Can Be Built Upon[c]	From the Nearest Side of Any Public Way	Between Tanks
Tanks in vaults[d]	0–15,000	0	0	0	0	Separate compartments required for each tank
Protected aboveground tanks	Less than or equal to 6,000	5	0	15	5	3
	6,001–12,000	15	0	25	15	3
Fire-resistant tanks	0–12,000	25	25	50	25	3
Other tanks meeting the requirements of NFPA 30	0–12,000	50	50	100	50	3

For SI units, 1 ft = 0.30 m; 1 gal = 3.8 L.
[a]See 4.3.2.3 and 4.3.2.5.
[b]See 4.3.2.6.
[c]Including the opposite side of a public way.
[d]The separation distances given for vaults are measured from the outer perimeter of the vault.



Questions??

Contact Information

Bob Benedetti

- Telephone: 617-984-7433
  617-571-8494 (cell)
- Telefax: 617-984-7110
- E-Mail: bbenedetti@nfpa.org

Table 4.3.2.4 from NFPA 30A-2008, Code for Motor Fuel Dispensing Facilities and Repair Garages

TABLE 4.3.2.4 Minimum Separation Requirements for Aboveground Tanks

		Minimum Distance (ft)				
Tank Type	*From the Individual Tank Capacity (gal)*[a]	*From Nearest Important Building on the Same Property*	*Nearest Fuel Dispensing Device*[b]	*From Lot Line That Is or Can Be Built Upon*[c]	*From the Nearest Side of Any Public Way*	*Between Tanks*
Tanks in vaults[d]	0–15,000	0	0	0	0	Separate compartments required for each tank
Protected aboveground tanks	Less than or equal to 6,000	5	0	15	5	3
	6,001–12,000	15	0	25	15	3
Fire-resistant tanks	0–12,000	25	25	50	25	3
Other tanks meeting the requirements of NFPA 30	0–12,000	50	50	100	50	3

For SI units, 1 ft = 0.30 m; 1 gal = 3.8 L.

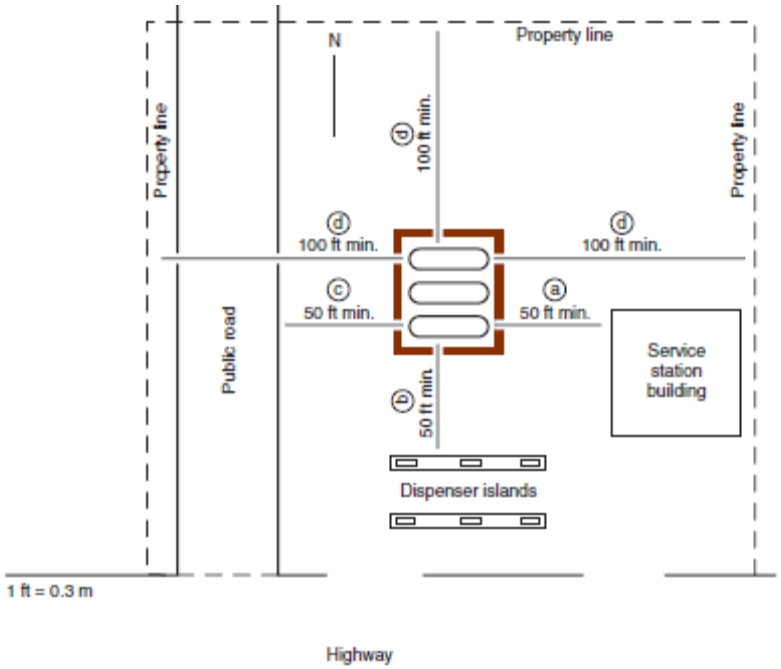
[a]See 4.3.2.3 and 4.3.2.5.

[b]See 4.3.2.6.

[c]Including the opposite side of a public way.

[d]The separation distances given for vaults are measured from the outer perimeter of the vault.

Exhibit II.4.3 from Flammable and Combustible Liquids Code Handbook, Seventh Edition



ⓐ = separation between tank and nearest important building.
ⓑ = separation between tank and dispensing device.
ⓒ = separation between tank and near side of public way.
ⓓ = separation between tank and property line.

Table 22.4.1.1(a) Location of Aboveground Storage Tanks Storing Stable Liquids — Internal Pressure Not to Exceed a Gauge Pressure of 2.5 psi (17 kPa)

Type of Tank	Protection	Minimum Distance (ft)	
		From Property Line That Is or Can Be Built Upon, Including the Opposite Side of a Public Way[a]	From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property[a]
Floating roof	Protection for exposures[b]	½ × diameter of tank	$^1/_6$ × diameter of tank
	None	Diameter of tank but need not exceed 175 ft	$^1/_6$ × diameter of tank
Vertical with weak roof-to-shell seam	Approved foam or inerting system[c] on tanks not exceeding 150 ft in diameter[d]	½ × diameter of tank	$^1/_6$ × diameter of tank
	Protection for exposures[b]	Diameter of tank	$^1/_3$ × diameter of tank
	None	2 × diameter of tank but need not exceed 350 ft	$^1/_3$ × diameter of tank
Horizontal and vertical tanks with emergency relief venting to limit pressures to 2.5 psi (gauge pressure of 17 kPa)	Approved inerting system[b] on the tank or approved foam system on vertical tanks	½ × value in Table 22.4.1.1(b)	½ × value in Table 22.4.1.1(b)
	Protection for exposures[b]	Value in Table 22.4.1.1(b)	Value in Table 22.4.1.1(b)
	None	2 × value in Table 22.4.1.1(b)	Value in Table 22.4.1.1(b)
Protected aboveground tank	None	½ × value in Table 22.4.1.1(b)	½ × value in Table 22.4.1.1(b)

For SI units, 1 ft = 0.3 m.

[a]The minimum distance cannot be less than 5 ft (1.5 m).

[b]See definition 3.3.42, Protection for Exposures.

[c]See NFPA 69, *Standard on Explosion Prevention Systems*.

[d]For tanks over 150 ft (45 m) in diameter, use "Protection for Exposures" or "None," as applicable.

Table 22.4.1.1(b) Reference Table for Use with Tables 22.4.1.1(a), 22.4.1.3, and 22.4.1.5

Tank Capacity (gal)	Minimum Distance (ft)	
	From Property Line That Is or Can Be Built Upon, Including the Opposite Side of a Public Way	From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property
275 or less	5	5
276 to 750	10	5
751 to 12,000	15	5
12,001 to 30,000	20	5
30,001 to 50,000	30	10
50,001 to 100,000	50	15
100,001 to 500,000	80	25
500,001 to 1,000,000	100	35
1,000,001 to 2,000,000	135	45
2,000,001 to 3,000,000	165	55
3,000,001 or more	175	60

For SI units, 1 ft = 0.3 m; 1 gal = 3.8 L.

Table 22.4.1.5 Location of Aboveground Storage Tanks Storing Unstable Liquids

Type of Tank	Protection	Minimum Distance (ft)	
		From Property Line that Is or Can Be Built Upon, Including the Opposite Side of a Public Way	From Nearest Side of Any Public Way or from Nearest Important Building on the Same Property[a]
Horizontal and vertical tanks with emergency relief venting to permit pressure not in excess of a gauge pressure of 2.5 psi (17 kPa)	Tank protected with any one of the following: approved water spray, approved inerting,[a] approved insulation and refrigeration, approved barricade	Value in Table 22.4.1.1(b) but not less than 25 ft	Not less than 25 ft
	Protection for exposures[b]	2½ × value in Table 22.4.1.1(b) but not less than 50 ft	Not less than 50 ft
	None	5 × value in Table 22.4.1.1(b) but not less than 100 ft	Not less than 100 ft
Horizontal and vertical tanks with emergency relief venting to permit pressure over a gauge pressure of 2.5 psi (17 kPa)	Tank protected with any one of the following: approved water spray, approved inerting,[a] approved insulation and refrigeration, approved barricade	2 × value in Table 22.4.1.1(b) but not less than 50 ft	Not less than 50 ft
	Protection for exposures[b]	4 × value in Table 22.4.1.1(b) but not less than 100 ft	Not less than 100 ft
	None	8 × value in Table 22.4.1.1(b) but not less than 150 ft	Not less than 150 ft

For SI units, 1 ft = 0.3 m.

[a]See NFPA 69, *Standard on Explosion Prevention Systems*.

[b]See definition 3.3.42, Protection for Exposures.

Table 22.4.2.1 Minimum Shell-to-Shell Spacing of Aboveground Storage Tanks

Tank Diameter	Floating Roof Tanks	Fixed or Horizontal Tanks	
		Class I or II Liquids	Class IIIA Liquids
All tanks not over 150 ft (45 m) in diameter	$^1/_6$ × sum of adjacent tank diameters but not less than 3 ft (0.9 m)	1/6 × sum of adjacent tank diameters but not less than 3 ft (0.9 m)	$^1/_6$ × sum of adjacent tank diameters but not less than 3 ft (0.9 m)
Tanks larger than 150 ft (45 m) in diameter:			
If remote impounding is provided in accordance with 22.11.1	$^1/_6$ × sum of adjacent tank diameters	¼ × sum of adjacent tank diameters	$^1/_6$ × sum of adjacent tank diameters
If open diking is provided in accordance with 22.11.2	¼ × sum of adjacent tank diameters	$^1/_3$ × sum of adjacent tank diameters	¼ × sum of adjacent tank diameters

Case Study No. 1
Separation Distances & Diking Requirements

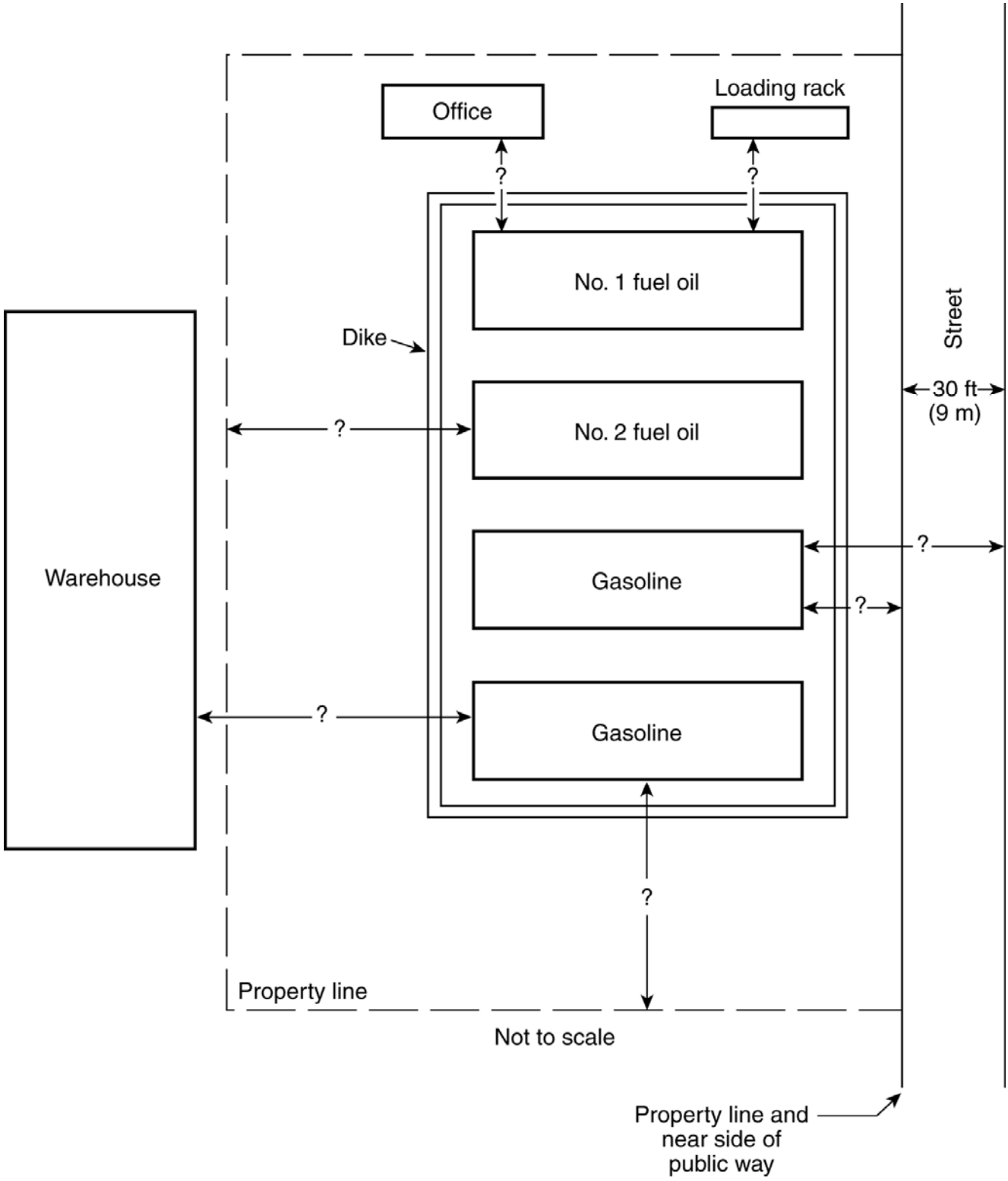
Verify that the small bulk plant shown on the next page complies with the minimum separation distance provisions of NFPA 30, *Flammable and Combustible Liquids Code*. All four tanks are horizontal and equipped with emergency relief venting to limit pressures to 2.5 psig. Protection for exposed properties ia assumed. Each tank has a capacity of 20,000 gal (25,700 L). The right hand property line coincides with the near side of the public road.

A. Determine the minimum distances required from:

1. The gasoline tank to the property line adjoining the vacant lot.
2. The gasoline tanks to the near side and opposite side of the street.
3. The tank storing No. 1 fuel oil to the loading rack.
4. The tank storing No. 1 fuel oil to the office building.
5. The tank storing No. 2 fuel oil to the property line adjacent to the warehouse.

B. Determine if the facility meets the spill control requirements of NFPA 30. The area of the interior of the dike is 60 ft. by 40 ft. and the height of the dike wall, measured at the interior toe, is 12 in. The steel tank supports are 12 in. high at the lowest point of the saddles and can be ignored in the calculation of dike capacity.

Case Study No. 1
Separation Distances & Diking Requirements



Case Study No. 2
Separation Distances & Diking Requirements

Evaluate site plans for the process plant depicted on the next page and verify compliance with the minimum separation distance provisions of NFPA 30, *Flammable and Combustible Liquids Code.*

Tanks #1 and #2 are vertical fixed roof tanks with weak roof-to-shell seams and are 25 ft. in diameter and 30 ft. high. Tank #1 contains 100,000 gal of toluene, a stable Class I liquid. Tank #2 contains 100,000 gal of xylene, also a stable Class I liquid.

Tank #3 is a vertical fixed roof tank with emergency relief venting to permit internal pressure to rise no greater than 2.5 psig. This tank is 20 ft. in diameter and 30 ft. high. It contains 70,000 gal of styrene, which is considered an unstable liquid. The tank is insulated and protected with a water spray system.

The process building houses process vessels. The wall of the process building facing the adjacent property is a blank, 2-hour rated fire wall. The right hand property line coincides with the near side of the street.

A. Determine the required distance from:

1. The process building to the property line.
2. Tank #3 to the property line and to the process building.
3. The tanks to the near side of the street.
4. The tanks to the far side of the street.
5. Tank #1 to the process building.
6. One tank to another, that is, the shell-to-shell spacing.

B. Determine if the facility meets the spill control requirements of NFPA 30. The area of the interior of the dike is 50 ft. by 80 ft. and the height of the dike wall, measured at the interior toe, is 18 in. high.

Case Study No. 2
Separation Distances & Diking Requirements