

NFPA 30 and Factory-Built Storage Tanks

**New England UST & Shop-Fabricated
Storage Tank Conference
December 4, 2014 — Worcester MA**



Topics Covered

- ◆ **organization of NFPA 30**
- ◆ **provisions for ALL storage tanks**
- ◆ **provisions for ASTs**
- ◆ **provisions for USTs**
- ◆ **changes in 2015 edition**

NFPA 30 Organization

2003 & earlier

- 1-3 Administrative**
- 4 Tank Storage**
- 5 Piping**
- 6 Container
Storage**
- 7 Operations**
- 8 Electrical**

2008 & later

- 1-4 Administrative**
- 5-8 General Reqts.**
- 9-16 Container Storage**
- 17-20 Operations**
- 21-26 Tank Storage**
- 27 Piping**
- 28 Bulk Transfer**

Bulk Storage Tanks

1-4 Administrative

5-8 General Reqts.

9-16 Container Stge.

17-20 Operations

21-26 Tank Storage

27 Piping

28 Bulk Transfer

21 Reqts. - All Tanks

22 ASTs

23 USTs

**24 Storage Tank
Bldgs.**

25 Vaults

Scope of NFPA 30

- ◆ **applies to storage, handling, use**
- ◆ **does not apply to**
 - **materials with melting point > 100°F**
 - **liquefied gases**
 - **cryogenic fluids**
 - **motor fuel dispensing**
 - **transportation**

Retroactivity (1.4)

- ◆ NFPA 30 does not apply retroactively, unless the authority having jurisdiction determines that a distinct hazard exists and must be rectified

Equivalency (1.5)

- ◆ **NFPA 30 does not prevent the use of systems, methods, or devices of equivalent or superior quality, effectiveness, or safety**
 - **equivalency must be demonstrated**

Definitions (Chapter 3)

- ◆ **approved**
- ◆ **authority having jurisdiction**
- ◆ **important building**
- ◆ **protection for exposures**
- ◆ **property line “that is or can be built upon”**

Applicability of General Chapters

- ◆ **Chapter 4 covers definition and classification of liquids**
- ◆ **Chapter 6 covers methodologies used to identify, evaluate, and control fire and explosion hazards**
- ◆ **Chapter 7 covers electrical systems and electrical area classification**

Chapter 21

- ◆ **scope covers**
 - **fixed tanks that exceed 60 gallons**
 - **intermodal tanks and IBCs that exceed 793 gallons capacity connected to fixed piping**
- ◆ **does not cover process tanks**

Chapter 21

- ◆ **basic requirements**
- ◆ **materials of construction**
- ◆ **design and construction standards**
- ◆ **provisions for normal venting**
- ◆ **corrosion protection**
- ◆ **testing requirements**
- ◆ **operating requirements**
- ◆ **inspection & maintenance**

Chapter 21

- ◆ **some provisions include:**
 - **combustible materials of construction permitted under certain conditions**
 - **maximum operating pressures for ambient pressure tanks**
 - **AST cannot be used underground**
 - **UST cannot be used aboveground**

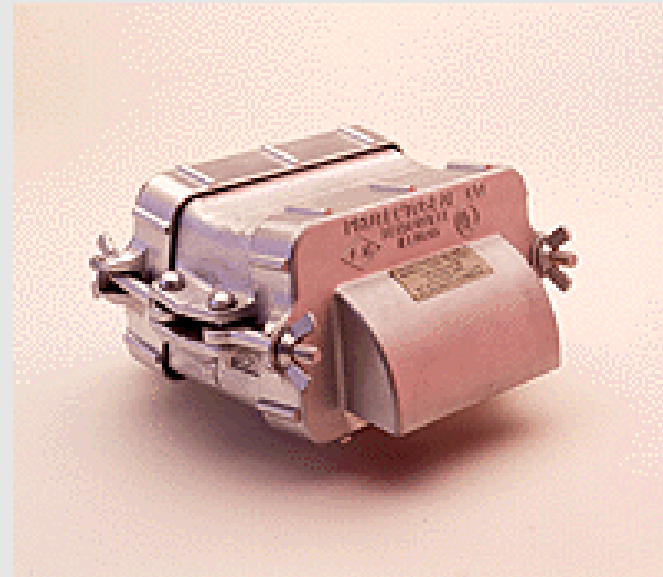
Section 21.4.3

- ◆ vent must prevent vacuum or pressure that:
 - can distort the roof
 - can exceed the design pressure
- ◆ size vent per API 2000 or other approved standard



Section 21.4.3.8 &.9

◆ vent termination devices



Section 21.4.5

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



Section 21.5

- ◆ **testing requirements**
 - **all tanks must be tested before being placed in service per tank design standard**

Section 21.5.2

- ◆ **tightness test**
 - **Section 21.5.2 spells out in detail**
 - **for tank & for interstitial space**
- ◆ **2015: if tank shipped with interstitial vacuum and vacuum is maintained, no tightness test required**

Section 21.7.1

- ◆ **overfill prevention procedures/systems**
 - **required for all tanks > 1,320 gal. storing Class I or Class II liquids**
 - **aboveground tanks receiving / transferring Class I liquids from pipelines or marine vessels must have written procedures**
 - **reference API Standard 2350**
 - **reference EPA rules**

Section 21.7.2

- ◆ identification of tank contents
 - NFPA 704 placarding
- ◆ security is now an issue
 - fencing



Chapter 22

- ◆ **Scope: Aboveground Tanks**
- ◆ **NFPA 30 focuses on passive protection**
 - **proper design and installation**
 - **adequate emergency venting**
 - **proper siting with respect to neighboring property**
 - **spill control**

Section 22.4

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



Section 22.4

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

***based on maximum 2.5 psi overpressure**

Section 22.4

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	$\frac{1}{2}$ Diameter	$\frac{1}{6}$ Diameter
	None	Diameter, 175' max	
vertical with weak roof-to-shell seam	approved foam or inert gas system (150' max)	$\frac{1}{2}$ Diameter	$\frac{1}{6}$ Diameter
	for exposed property	1 X Diameter	$\frac{1}{3}$ Diameter
	None	2 X Diameter (350' max)	$\frac{1}{3}$ Diameter
tanks with emergency relief venting, 2.5 psi max	approved foam or inert gas system (150" max)	$\frac{1}{2}$ 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	$\frac{1}{2}$ 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

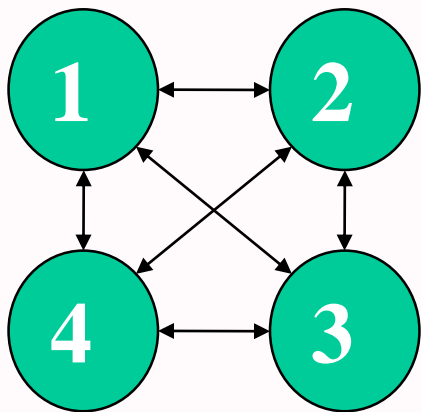


Table 22.4.2.1

Table 22.4.2.1 — Shell to Shell Spacing

Diameter, ft.	Floating Roof Tanks	Fixed Roof & Horizontal Class I /II Class IIIA	
≤ 150	$\frac{1}{6} \Sigma$ adjacent diameters	$\frac{1}{6} \Sigma$ adjacent diameters	
≥ 150 w/ remote impounding	$\frac{1}{6} \Sigma$ adjacent diameters	$\frac{1}{4} \Sigma AD$	$\frac{1}{6} \Sigma AD$
open dike	$\frac{1}{4} \Sigma$ adjacent diameters	$\frac{1}{3} \Sigma AD$	$\frac{1}{4} \Sigma AD$

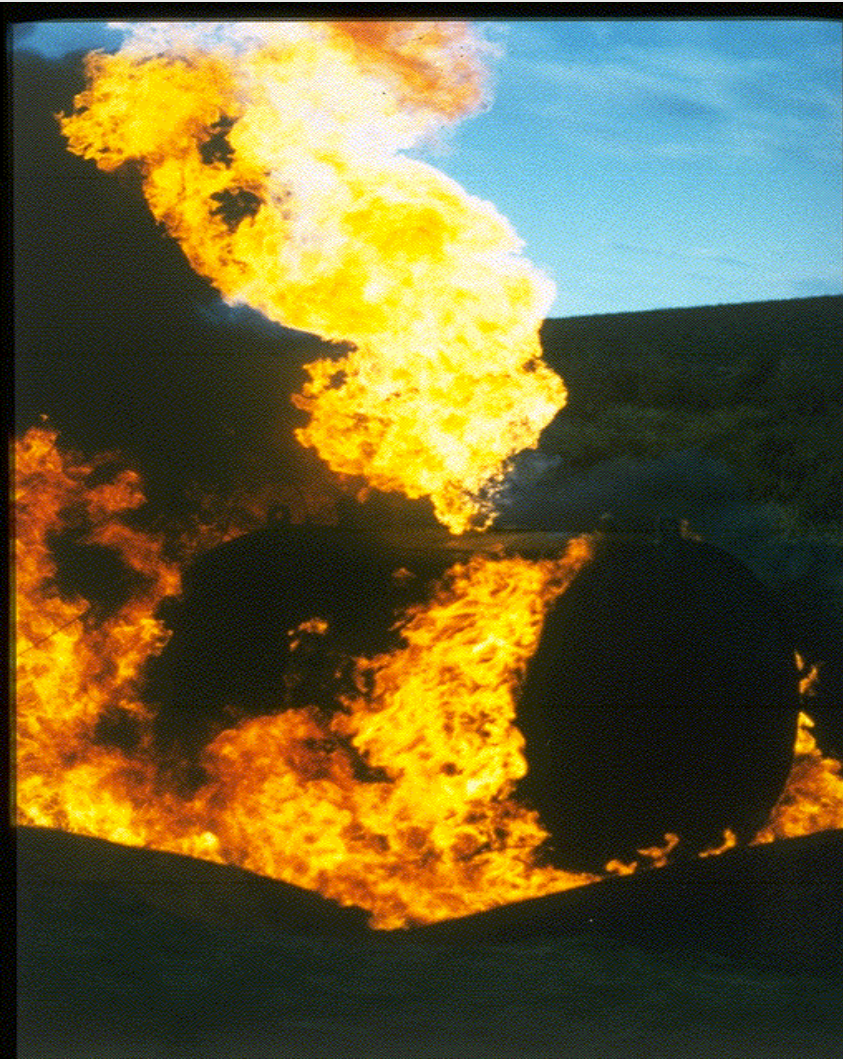
In no case is the separation allowed to be less than 3 ft.

Section 22.5

- ◆ **tank supports and foundation**
 - **minimize excessive loading at supports & minimize uneven settling**
 - **design for earthquakes**
 - **supports: masonry, concrete or steel**



Section 22.7



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 overpressure.

Section 22.7

- ◆ **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 venting device**

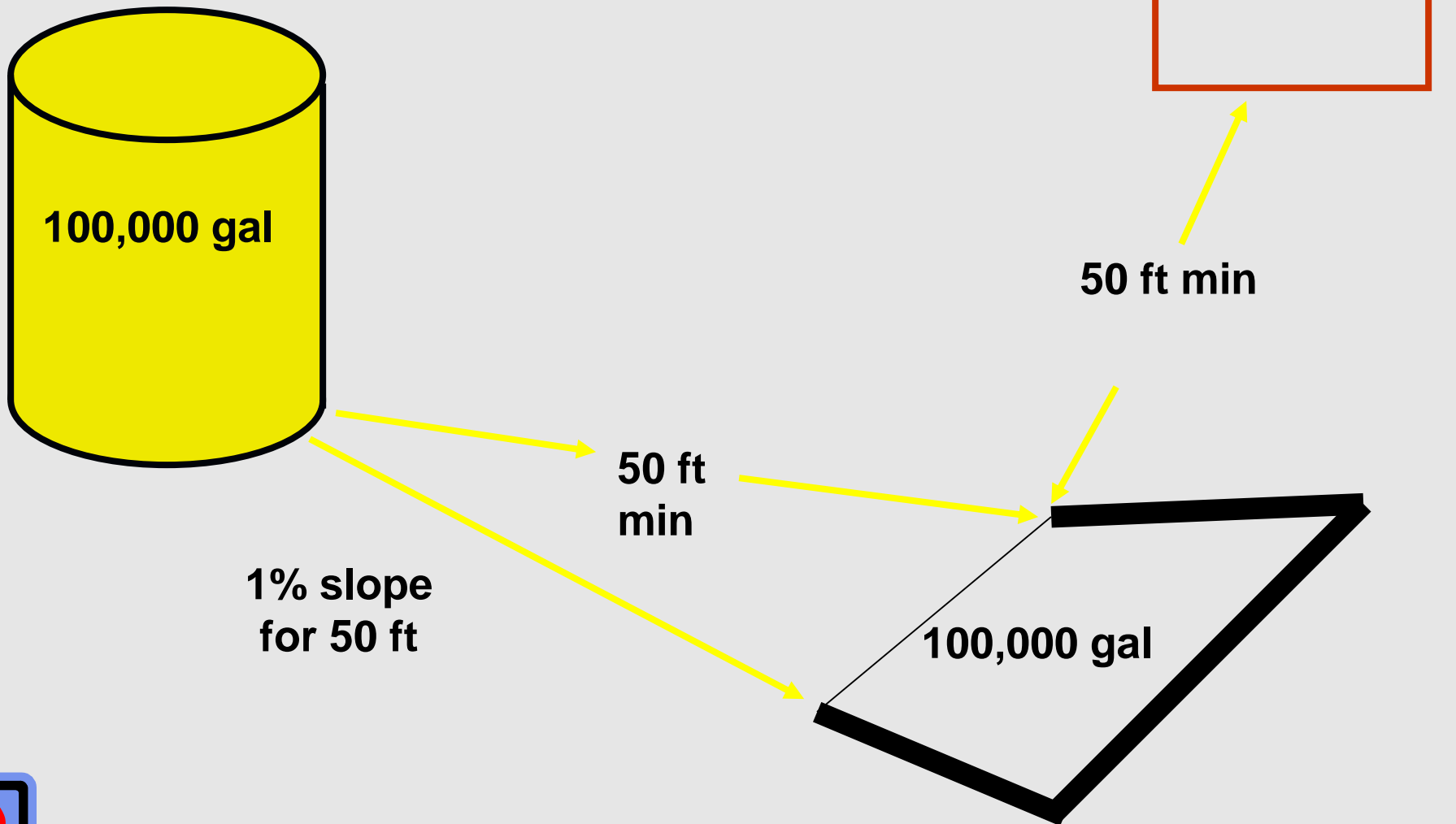
Section 22.7

- ◆ **Exception:** tank storing Class IIIB liquids that:
 - exceeds 12,000 gallons
 - is not located within the same diked area or drainage path of tanks storing Class I or Class II liquids

Section 22.11

- ◆ **spill control – tanks holding Class I, II, or IIIA liquids must have means to prevent accidental release from endangering important facilities, adjoining property, and waterways**
 - **remote impounding**
 - **diking**
 - **combination of remote impounding and diking**
 - **secondary containment-type tank**

Remote Impounding



Impounding by Diking



Section 22.11

- ◆ spill control – diking
 - 1% slope from tank to dike wall
 - dike capacity = the greatest volume of liquid that can be released from the largest tank (overflow point)
 - *local or state law might require more capacity!*

Section 22.11

- ◆ **secondary containment-type tank**
 - **prior to 2015**
 - **Class I: 12,000 gallons**
 - **Classes II & IIIA: 20,000 gallons**
 - **2015 edition**
 - **50,000 gallons**
 - **spacing per w/ Table 22.4.2.1**

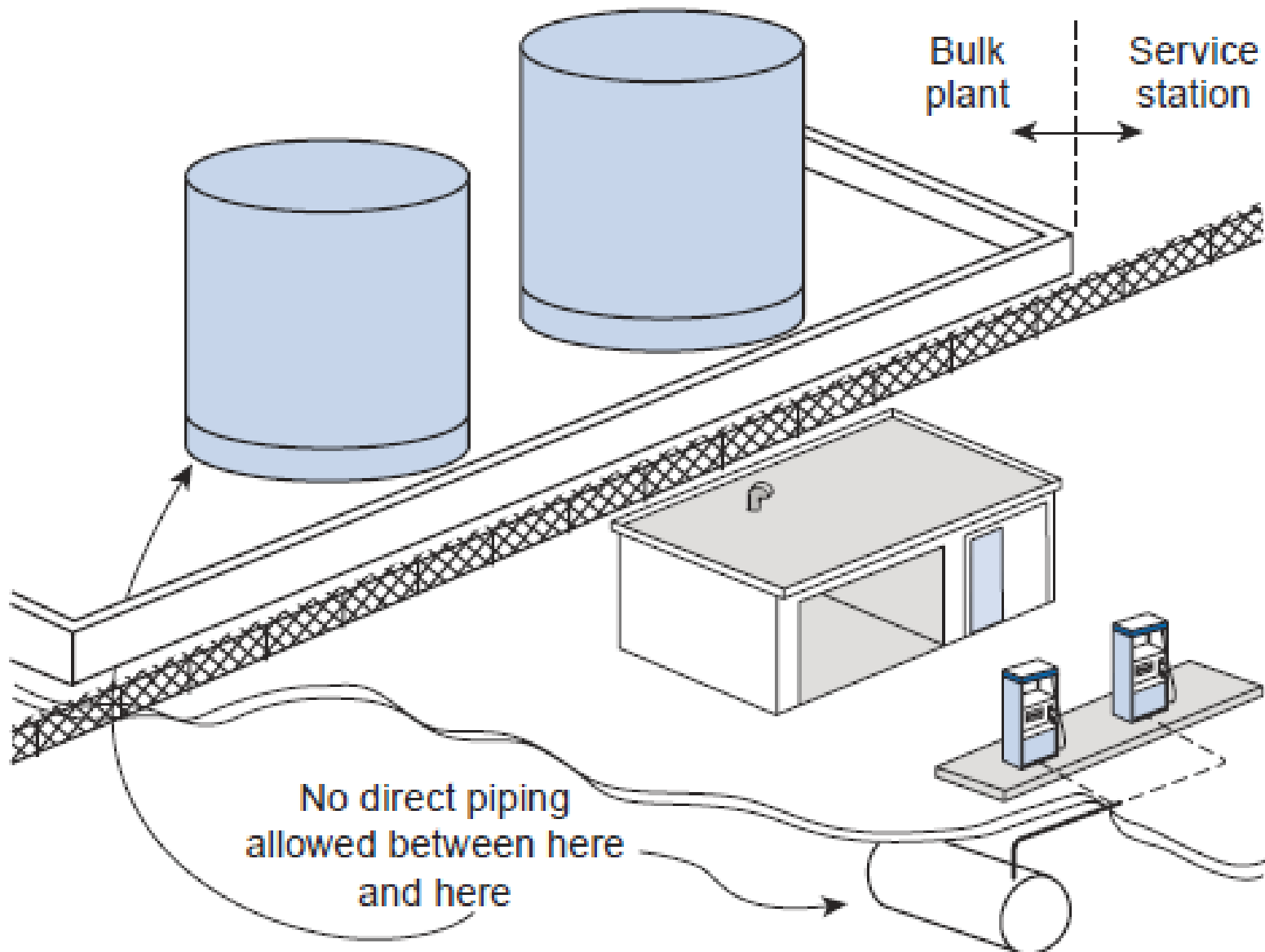
Chapter 23

- ◆ **scope covers**
 - **buried tanks, i.e. backfilled**

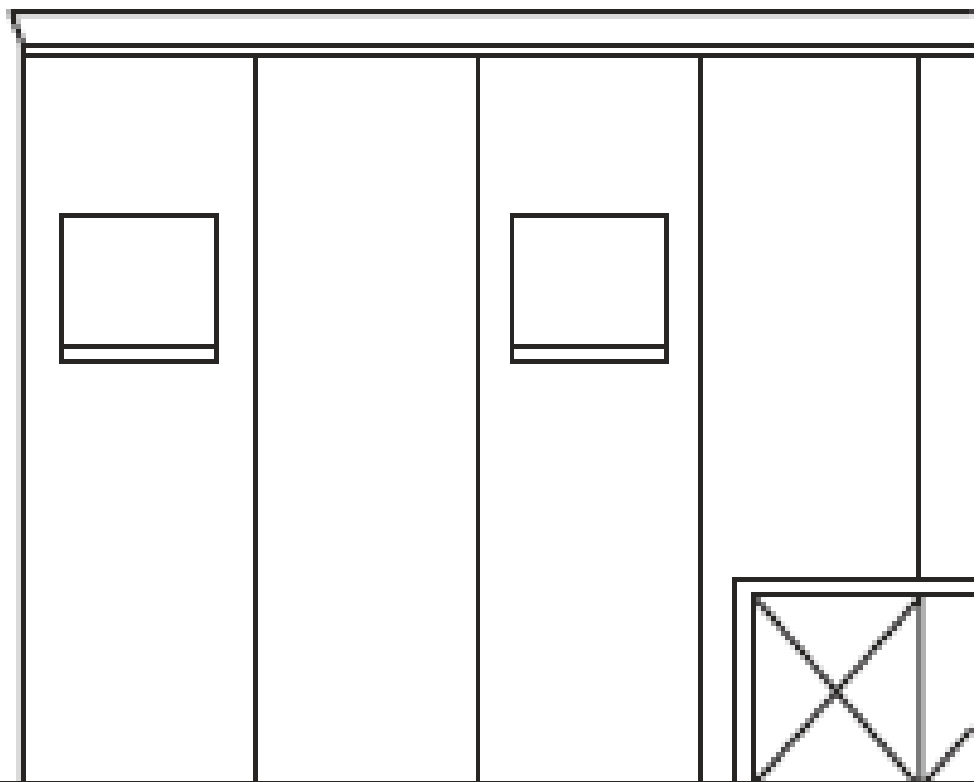
Chapter 23

- ◆ **basic requirements**
 - **excavation**
 - **external corrosion protection**
 - **siting w/ respect to structures and property lines**
 - **3 ft for Class I liquid**
 - **1 ft for Classes II and III liquids**
 - **bedding, burial depth, and backfill**

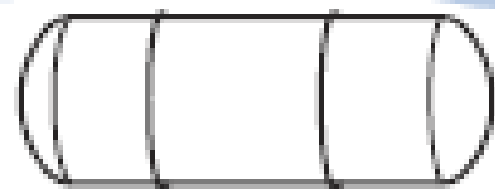
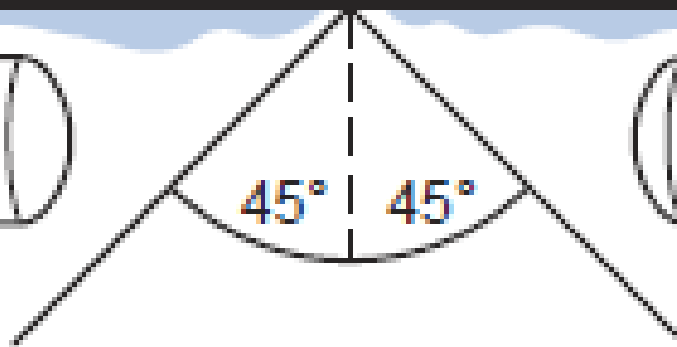
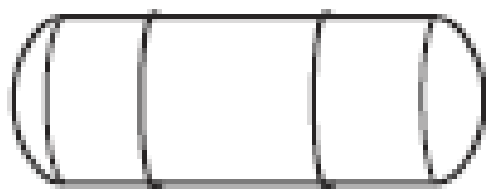
Section 4.2.2



Building

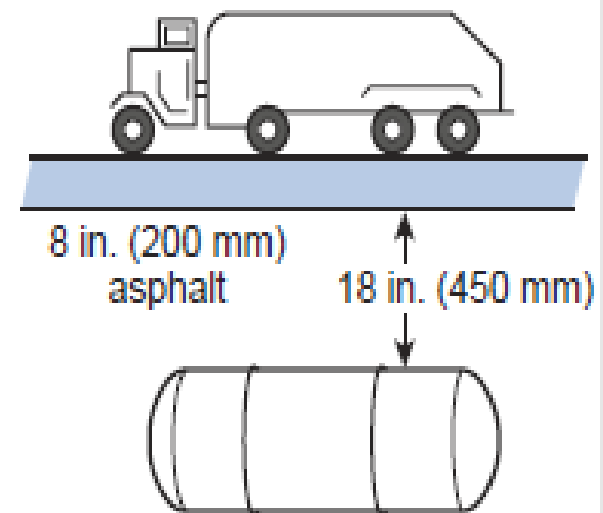
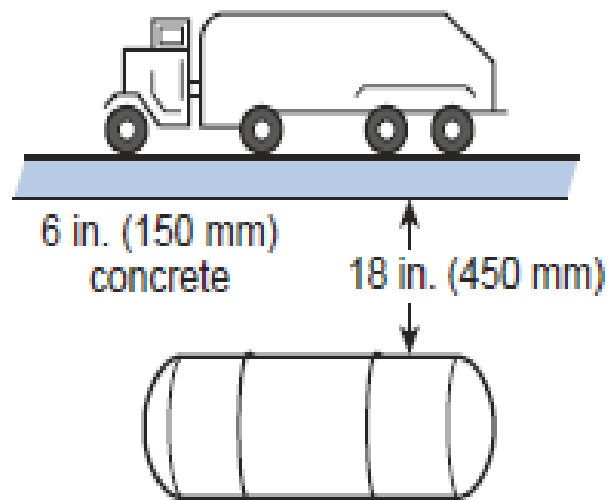
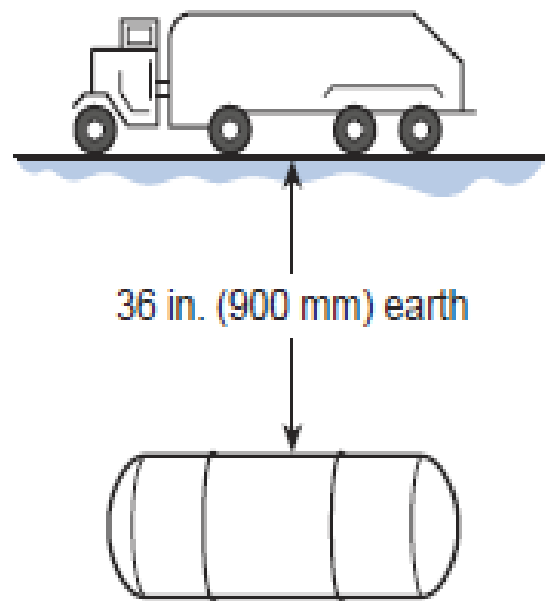


Ground level



Bedding & Backfill (23.5)

- ◆ **noncorrosive and inert**
 - **compacted pea gravel or sand**
- ◆ **bedding depth per manufacturer**
- ◆ **bedding to extend 12" beyond footprint of tank**
- ◆ **backfill to depth of 12" above tank**
 - **greater if required by manufacturer**
- ◆ **additional cover:**
 - **12" of clean earth or 4" reinforced concrete**



Vent Sizes (23.6)

<i>Maximum Flow (gpm)</i>	<i>Pipe Length*</i>		
	<i>50 ft</i>	<i>100 ft</i>	<i>200 ft</i>
100	1.25	1.25	1.25
200	1.25	1.25	1.25
300	1.25	1.25	1.5
400	1.25	1.5	2
500	1.5	1.5	2
600	1.5	2	2
700	2	2	2
800	2	2	3
900	2	2	3
1000	2	2	3

For SI units, 1 in. = 25 mm; 1 ft = 0.3 m; 1 gal = 3.8 L.

*Assumes stated length of piping, plus 7 ells.

NFPA 30A

◆ Scope:

- retail motor fuel dispensing facilities**
- fleet motor fuel dispensing facilities**
- marine motor fuel dispensing facilities**
- repair garages**

NFPA 30A

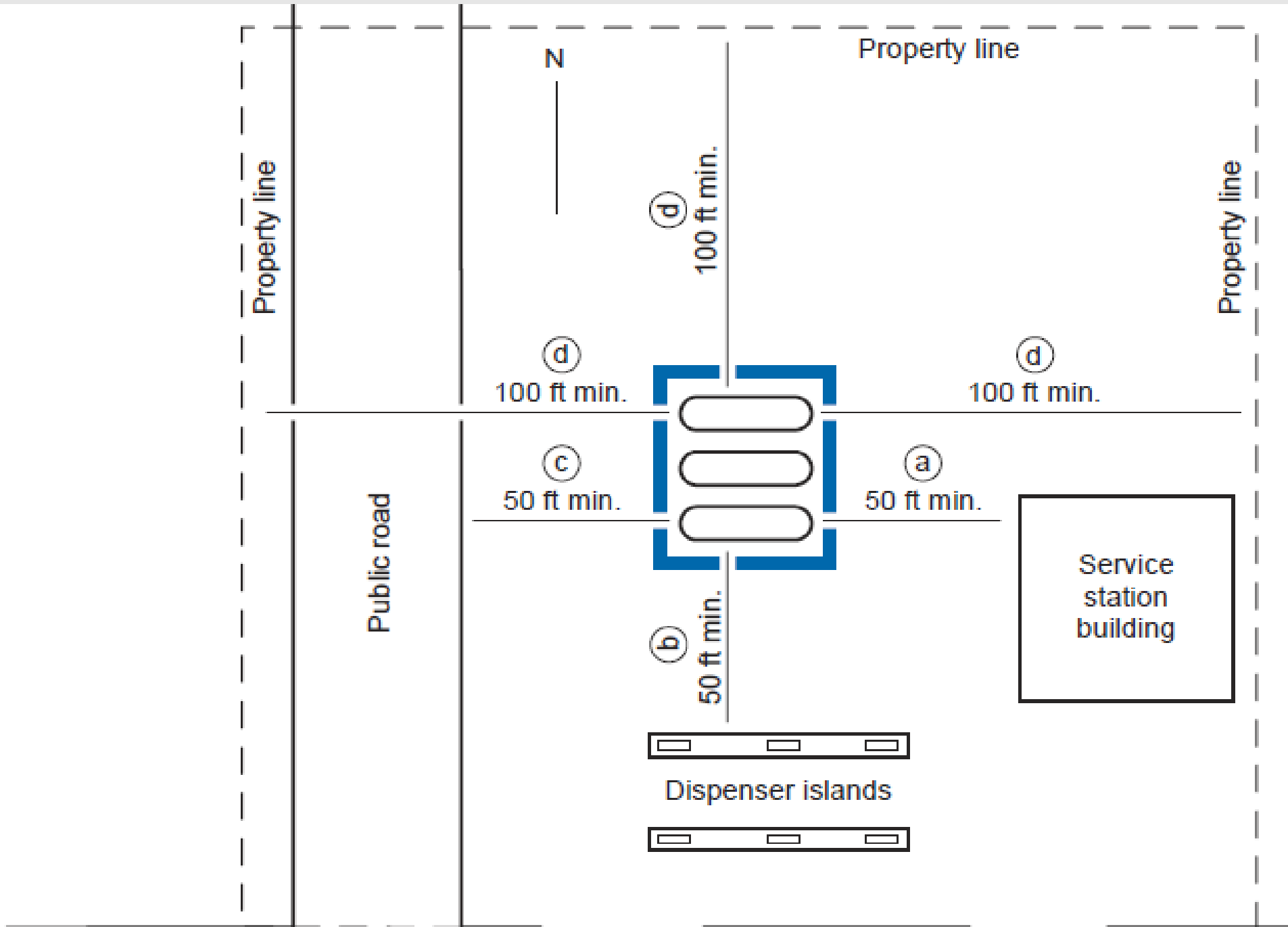
- ◆ **storage of fuels and other liquids**
 - **USTs per NFPA 30, Chapter 23**
 - **ASTs per NFPA 30, Chapter 22 and special siting requirements of 30A**
- ◆ **piping systems**
- ◆ **fuel dispensing systems**
- ◆ **electrical systems**
- ◆ **operating requirements**
- ◆ **vapor processing/collection systems**

NFPA 30A

- ◆ **special provisions for marine fueling**
- ◆ **special provisions for gaseous fuels**
 - **CNG, LNP, LPG, hydrogen**
- ◆ **special provisions for farms and remote sites**

Table 4.3.2.4

<i>Tank Type</i>	<i>Individual Tank Capacity (gal)^a</i>	<i>Minimum Distance (ft)</i>				<i>Between Tanks</i>
		<i>From the Nearest Important Building on the Same Property</i>	<i>From Nearest Fuel Dispensing Device^b</i>	<i>From Lot Line That Is or Can Be Built Upon^c</i>	<i>From the Nearest Side of Any Public Way</i>	
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

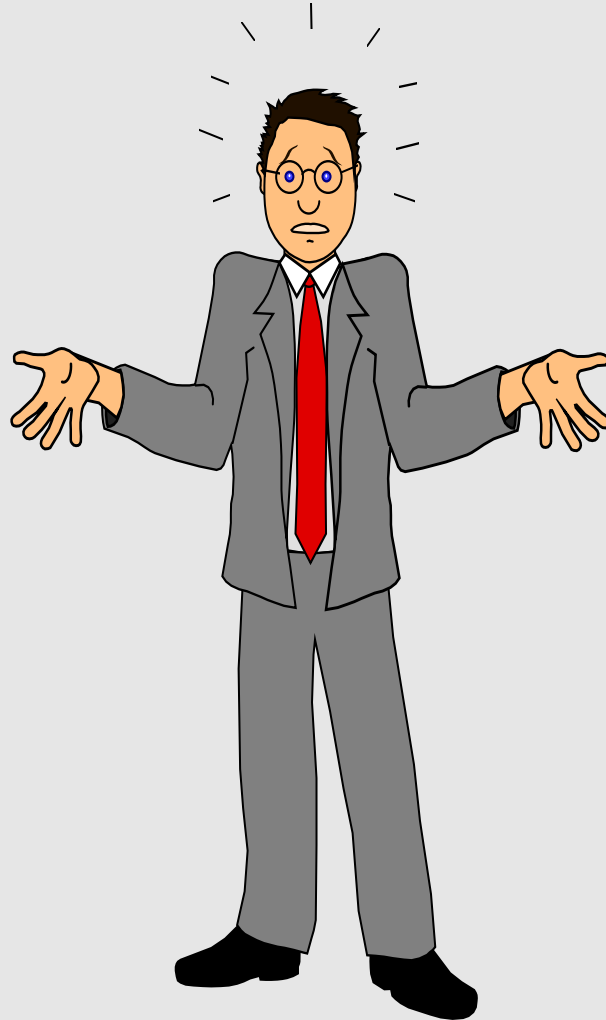


1 ft = 0.3 m

Other Applications

- ◆ **NFPA 31 governs fuel oil tanks for oil burning appliances**
 - **indoor tanks**
 - **outdoor tanks up to 660 gallons**
- ◆ **NFPA 31 governs indoor fuel tanks for stationary engines and turbines**
 - **generator sets**
 - **fire pumps**

Questions??



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