Compliance Forum

Welcome Contractors and Vendors

Q1 2025

Compliance Forum

ONLINE COURTESY

WE ASK THAT YOU PLEASE MUTE YOUR MICROPHONES WHILE ATTENDING THE ONLINE COFFEE FORUM.

PLEASE UTILIZE THE Q&A SUBMITTAL OPTION IN THE TOOLBAR TO SUBMIT QUESTIONS FOR ANSWERS AFTER THE FORUM COMMENCES.

Compliance Forum

FIRE PREVENTION MISSION STATEMENT

The Fire Prevention Section will provide a high level of life safety and property protection for the community and first responders through inspection, education, engineering and enforcement.

Compliance Forum

Q-3 Compliance Forum Agenda

- Welcome Message
- Policy Updates – Aaron C
- ICC Opinion/Interpretation – Aaron C
- NFPA Council Appeal/Public Input – Aaron C
- BREAK
- Highrise Buildings – Brian M
- Hazardous Material Sites – Taylor B
- Fire Sprinkler Best Practices – Joel A
- Fire Alarm Best Practices – Tony L
- 2024 Code Adoption

Compliance Forum

Policy Updates

- 2024 Code Review & Elimination of Polices
  - ERRCS, FA In exiting buildings, Fire Command Center, FARS, Key Box, Post Fire, ITM, FA Voltage Drop are some being updated

- New policies forth coming:
  - High-pressure fire hydrant identification
  - NFPA 72 Survivability
  - Smoke Control System ITM

Compliance Forum

ICC Opinion/Interpretation Process

Understanding the Process for Clarifying Building Code Language

Aaron J Conway – Lead Fire Protection Engineer

Compliance Forum

What is a Code Interpretation?

Clarification of specific code language, not a code change or new policy.

Issued by ICC staff, not binding like code amendments.

When to submit a request?

Ambiguity in code language

Conflicting local interpretations

Need for consistent application across jurisdictions

Preparing Your Request

Identify the specific code section (e.g., IFC CH & Section)

Clearly describe the issue or ambiguity

Provide context or examples of how the code is being interpreted

Avoid hypothetical or overly broad questions

Compliance Forum

Submitting a Code Interpretation to ICC

- As a member of the International Code Council, you have exclusive access to technical experts who can clarify I-Codes text and provide a written code opinion.
- https://www.iccsafe.org/products-and-services/technical-opinions/request-for-code-opinion/
- Must have username and password associated with an ICC account to submit Code Opinion Requests.
- ICC provides Code Opinions on I-Code titles from 2009 forward.
- Use the "Question Subject" section to provide a one-sentence summary of your request. Use the "Question Details" section to provide your full question. You are also allowed to send an attachment if needed.

Compliance Forum

Code Council Interpretation

Committee Interpretations:

- Committee Interpretations provide technical support and clarification of code text for adopting jurisdictions, design professionals, and members of the construction industry.
- Committee Interpretations are processed in accordance with ICC Policy CP#11, Committee Interpretations on International Code Provisions, mandated by the ICC Board of Directors.
- https://www.iccsafe.org/products-and-services/requesting-committee-interpretations/

Compliance Forum

Code Council Interpretation

Requests for Committee Interpretations must be submitted in writing.

Questions must be written such that they can be answered "yes" or "no."

Questions requiring an "essay" type answer will not be considered, or will be returned to the petitioner to be rewritten.

Each question must address a specific code section. Questions addressing multiple code sections will be processed as a separate interpretation for each code section.

Each request may contain multiple questions regarding a single specific code section.

Compliance Forum

Code Council Interpretation

All requests for Committee Interpretations must contain the following information:

Committee Interpretations approved by the ICC Interpretation Committee represent the official position of the International Code Council; however, the final authority of code interpretations is the responsibility of the code official.

Question:

Specific ICC International Code (i.e. Building Code, Fire Code, etc.)

Code Publication Year (limited to the 2 most recent editions)

Applicable Code Section

Questions for Interpretation

Supporting Documentation as deemed necessary

Compliance Forum

NFPA Council Appeals/Public Input

Aaron J Conway – Engineering Supervisor – Lead Fire Protection Engineer

Compliance Forum

click here

NFPA Process

The four fundamental steps in the NFPA standards development process are:

1. Public Input
2. Public Comment
3. NFPA Technical Meeting (Tech Session)
4. Standards Council Action (Appeals and Issuance of Standard)

The *Regulations Governing the Development of NFPA Standards* establishes the procedure for the NFPA standards development. Other applicable NFPA rules include the *Bylaws*, the *Technical Meeting Convention Rules*, the *Guide for the Conduct of Participants in the NFPA Standards Development Process*, and the *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council*. Read the Regulations and rules.

TAKE A BREAK…
BUT PLEASE COME BACK!

Compliance Forum

Highrise Buildings

- Brian Mosberian – Fire Protection Engineer

Compliance Forum

HIGH-RISE

HIGH-RISE BUILDING. A building with an occupied floor located more than 75 feet above the lowest level of fire department vehicle access.

IBC 403.1 High-rise buildings shall comply with Sections 403.2 through 403.6.

403.2 Construction

403.3 Automatic Sprinkler System

403.4 Emergency System

403.5 Means of egress and evacuation

403.6 Elevators

Compliance Forum

HIGH-RISE

- 403.4 Automatic Sprinkler System
- 403.3.1 Number of sprinkler risers and system design Minimum two risers for each sprinkler system zone for buildings more than 420 feet in building height.
- 403.3.2 Water supply to required fire pumps Minimum two water mains shall supply required fire pumps for buildings more than 420 feet in building height.
- 403.3.3 Secondary water supply An automatic secondary on-site water supply having a capacity of not less than sprinkler demand including the hose stream requirement shall be provided in Seismic Design Category C, D, E or F.

Compliance Forum

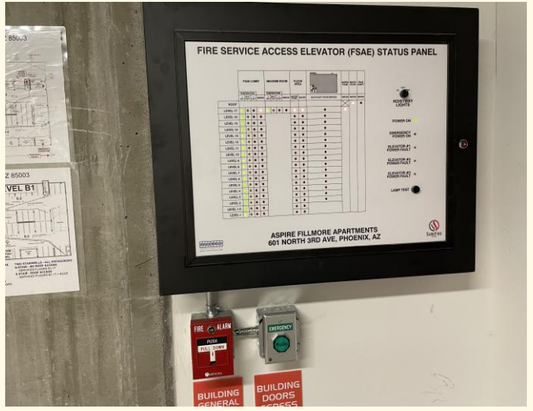
HIGH-RISE

- 403.3.4 Fire Pump Room Fire pump rooms shall be separated from the remainder of the building by not less than 2-hour fire barrier. [PFC 913]
- The location of and access to the fire pump room shall be preplanned with the fire department. [NFPA 20, 4.14.1.1.4]
- 403.4 Emergency Systems: The detection, alarm and emergency systems of high-rise buildings shall comply with Sections 403.4.1 through 403.4.8.
- 403.4.1 Smoke detection. [PFC907.2.12.1]
- 403.4.2 Fire alarm system. [PFC907.2.12]
- 403.4.3 Standpipe system. [PFC905.3]
- 403.4.4 Emergency voice/alarm communication system. [PFC907.5.2.2]
- 403.4.5 Emergency responder radio coverage. [PFC510]

Compliance Forum

HIGH-RISE

- 403.4.6 Fire command. [PFC 508]
- 403.4.7 Smoke removal.
- 403.4.8 Standby and emergency power. A standby power complying with Section 2702, and 3003 for 403.4.8.3 loads, and an emergency power complying with Section 2702 for 403.4.8.4 loads shall be provided.
  - 403.4.8.1 Equipment room. If the standby or emergency power system includes a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour fire barriers.
  - 403.4.8.2 Fuel line piping protection. Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by an approved method or assembly that has a fire-resistance rating of not less than 2 hours.



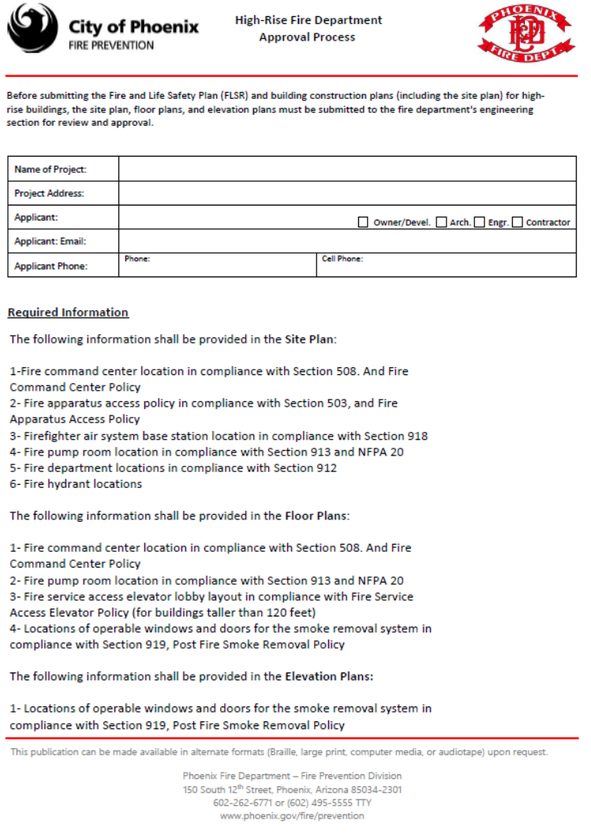
Compliance Forum

HIGH-RISE

- 403.4.8.3 Standby power loads.
  - Ventilation and automatic fire detection equipment for smokeproof enclosures.
  - Elevators
- 403.4.8.4 Emergency power loads.
  1. Exit signs and means of egress illumination
  2. Elevator car lighting
  3. Emergency voice/alarm communications systems.
  4. Automatic fire detection systems.
  5. Fire alarm systems.
  6. Electrically powered fire pumps.
  7. Power and lighting for the fire command center

Compliance Forum

HIGH-RISE



City of Phoenix
FIRE PREVENTION

High-Rise Fire Department Approval Process

Before submitting the Fire and Life Safety Plan (FLSR) and building construction plans (including the site plan) for high-rise buildings, the site plan, floor plans, and elevation plans must be submitted to the fire department's engineering section for review and approval.

Name of Project:		
Project Address:		
Applicant:	☐ Owner/Devel. ☐ Arch. ☐ Engr. ☐ Contractor	
Applicant: Email:		
Applicant Phone:	Phone:	Cell Phone:

Required Information

The following information shall be provided in the **Site Plan**:

1-Fire command center location in compliance with Section 508. And Fire Command Center Policy
2- Fire apparatus access policy in compliance with Section 503, and Fire Apparatus Access Policy
3- Firefighter air system base station location in compliance with Section 918
4- Fire pump room location in compliance with Section 913 and NFPA 20
5- Fire department locations in compliance with Section 912
6- Fire hydrant locations

The following information shall be provided in the **Floor Plans**:

1- Fire command center location in compliance with Section 508. And Fire Command Center Policy
2- Fire pump room location in compliance with Section 913 and NFPA 20
3- Fire service access elevator lobby layout in compliance with Fire Service Access Elevator Policy (for buildings taller than 120 feet)
4- Locations of operable windows and doors for the smoke removal system in compliance with Section 919, Post Fire Smoke Removal Policy

The following information shall be provided in the **Elevation Plans:**

1- Locations of operable windows and doors for the smoke removal system in compliance with Section 919, Post Fire Smoke Removal Policy

This publication can be made available in alternate formats (Braille, large print, computer media, or audiotape) upon request.

Phoenix Fire Department – Fire Prevention Division
150 South 12th Street, Phoenix, Arizona 85034-2301
602-262-6771 or (602) 495-5555 TTY
www.phoenix.gov/fire/prevention

Compliance Forum

HIGH-RISE

High-Rise Building Checklist

Before submitting the Fire and Life Safety Plan (FLSR) and building construction plans (including the site plan) for high-rise buildings, the site plan, floor plans, and elevation plans must be submitted to the fire department's engineering section for review and approval.

The following information shall be provided in the site plan:

1-Fire command center location in compliance with Section 508. And Fire Command Center Policy
2- Fire apparatus access policy in compliance with Section 503, and Fire Apparatus Access Policy
3- Firefighter air system base station location in compliance with Section 918
4- Fire pump room location in compliance with Section 913 and NFPA 20
5- Fire department connection locations in compliance with Section 912
6- Fire hydrant locations

Compliance Forum

HIGH-RISE

click here

High-Rise Building Checklist

The following information shall be provided in the floor plans:

1- Fire command center location in compliance with Section 508. And Fire Command Center Policy
2- Fire pump room location in compliance with Section 913 and NFPA 20
3- Fire service access elevator lobby layout in compliance with Fire Service Access Elevator Policy (for buildings taller than 120 feet)
4- Locations of operable windows and doors for the smoke removal system in compliance with Section 919, Post Fire Smoke Removal Policy

The following information shall be provided in the elevation plans:

1- Locations of operable windows and doors for the smoke removal system in compliance with Section 919, Post Fire Smoke Removal Policy

Hazardous Material Sites

- Taylor Bateman – Fire Protection Engineer

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Solid, Liquid, Gas
- Hazard Type – Physical + Health
- SDS and other reference sources
- Classification on a **mixture** basis
- **More than one** classification is possible

5001.2.1 Mixtures. Mixtures shall be classified in accordance with hazards of the mixture as a whole. Mixtures of hazardous materials shall be classified in accordance with nationally recognized reference standards; by an *approved* qualified organization, individual, or Safety Data Sheet (SDS); or by other *approved* methods.

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that where specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Vinyl cyanide

Formula : C_3H_3N
Molecular weight : 53.06 g/mol
CAS-No. : 107-13-1
EC-No. : 203-466-5
Index-No. : 608-003-00-4

Component	Classification	Concentration
acrylonitrile		
	Flam. Liq. 2; Acute Tox. 3; Skin Irrit. 2; Eye Dam. 1; Skin Sens. 1B; Carc. 1B; STOT SE 3; Aquatic Acute 2; Aquatic Chronic 2; H225, H301, H331, H311, H315, H318, H317, H350, H335, H401, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

3. Composition/Information on Ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
Sodium hypochlorite		7681-52-9	1 - 5
Sodium hydroxide		1310-73-2	0.1 - 1
1-Dodecanamine, N,N-dimethyl-,N-oxide		1643-20-5	0.5

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Some are **objective** (data-based):
  - Flammable liquids – flash point & boiling point
  - Toxics – LC50 & LD50
  - Pyrophorics – autoignition temperature
  - Solid, liquid, gas – melting point & boiling point

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	alcohol-like
c)	Odor Threshold	1 ppm
d)	pH	at 20 °C (68 °F)neutral
e)	Melting point/freezing point	Melting point: -89.5 °C (-129.1 °F)
f)	Initial boiling point and boiling range	82.4 °C 180.3 °F at 1,013 hPa
g)	Flash point	12.0 °C (53.6 °F) - closed cup
h)	Evaporation rate	3.0
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 13.4 %(V) Lower explosion limit: 2 %(V)
k)	Vapor pressure	43 hPa at 20 °C (68 °F)

LIQUID. A material having a melting point that is equal to or less than 68°F (20°C) and a *boiling point* which is greater than 68°F (20°C) at 14.7 pounds per square inch absolute (psia) (101 kPa). Where not otherwise identified, the term "liquid" includes both flammable and *combustible liquids*.

FLAMMABLE LIQUID. A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class IA. Liquids having a flash point below 73°F (23°C) and having a *boiling point* below 100°F (38°C).

Class IB. Liquids having a *flash point* below 73°F (23°C) and having a *boiling point* at or above 100°F (38°C).

Class IC. Liquids having a *flash point* at or above 73°F (23°C) and below 100°F (38°C).

TOXIC. A chemical falling within any of the following categories:

1. A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
2. A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
3. A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
chlorine	LC50 Inhalation Gas.	Rat	293 ppm	1 hours

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - female - 177 mg/kg
(OECD Test Guideline 401)
Acute toxicity estimate Inhalation - 1.6 mg/l - dust/mist

(Expert judgment)
LD50 Dermal - Rabbit - male and female - 1,141 mg/kg
(OECD Test Guideline 402)
Remarks: (Regulation (EC) No 1272/2008, Annex VI)
No data available

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute toxicity estimate Oral - 95.1 mg/kg
(Calculation method)
LD50 Oral - Rat - female - 95.1 mg/kg
Remarks: (ECHA)
Acute toxicity estimate Inhalation - 4 h - 2.05 mg/l - vapor(Calculation method)

LC50 Inhalation - Rat - female - 4 h - 2.05 mg/l - vapor

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Some are **subjective** (judgment-based):
  - Unstable- and Water-Reactive
  - Oxidizer
  - Explosive
  - Organic Peroxide

UNSTABLE (REACTIVE) MATERIAL. A material, other than an *explosive*, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants, or in contact with *incompatible materials*. Unstable (reactive) materials are subdivided as follows:

Class 4. Materials that in themselves are readily capable of *detonation* or explosive decomposition or explosive reaction at *normal temperatures and pressures*. This class includes materials that are sensitive to mechanical or localized thermal shock at *normal temperatures and pressures*.

Class 3. Materials that in themselves are capable of *detonation* or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

Class 2. Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at *normal temperatures and pressures*, and that can undergo violent chemical change at elevated temperatures and pressures.

Class 1. Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure.

OXIDIZER. A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials and, if heated or contaminated, can result in vigorous self-sustained decomposition.

Class 4. An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock and that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.

Class 3. An oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes in contact.

Class 2. An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.

Class 1. An oxidizer that does not moderately increase the burning rate of combustible materials.

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- **Subjective** classifications by qualified party
- Code allows ***"approved"*** organization or individual
- May be asked to provide qualifications
- Beware – chemical evaluation could be considered "engineering practice" by state law…

11. "Engineering practice" means any professional service or creative work requiring engineering education, training and experience in applying engineering principles and interpreting engineering data to engineering activities that clearly impact the health, safety and welfare of the public and the engineering design of buildings, structures, products, machines, processes and systems to the extent that the engineering education, training and experience requirements prescribed by sections 32-122 and 32-122.01 are necessary to protect the health, safety and welfare of the public. The services or creative work may include providing planning services, studies, designs, design coordination, drawings, specifications and other technical submissions, surveying as

R4-30-221. Engineering Branches Recognized

A. The Board shall recognize the branches of engineering described below for review of experience, selection of examination, definition of examination areas, and definition of demonstrated proficiency areas to be inscribed on the registrant's seal. The branches do not limit the areas of a registrant's practice of engineering. (See R4-30-301(18))

3. Chemical: Consultation, investigation, evaluation, planning, design, location, development, and review of construction for projects concerning chemical enterprises, chemical and biological processes, plant layout, production of pilot plants, water, wastewater and pollution control plants, piping and distribution systems, heat exchanges, energy production management and distribution systems, process instrumentation and control systems, biomedical equipment, mining and minerals beneficiation, corrosion retardation, heat, mass and momentum transfer systems, reaction kinetics, thermodynamics, quality assurance controls, or systems for heat transmission.

5001.2.1 Mixtures. Mixtures shall be classified in accordance with hazards of the mixture as a whole. Mixtures of hazardous materials shall be classified in accordance with nationally recognized reference standards; by an *approved* qualified organization, individual, or Safety Data Sheet (SDS); or by other *approved* methods.

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Permit Quantity
- Maximum Allowable Quantity (MAQ, Control Area)
- Detached Building Quantity
- “Liquid Storage Warehouse” Quantity

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Permit Quantity (105.6 and 105.7):
- Depends on Classification, examples:
  - Corrosive Gas – 200 ft^3 at NTP
  - Asphyxiant – 6,000 ft^3 at NTP
  - Toxic – any amount (0 ft^3 at NTP)
- Below --> no permit needed (**but code still applies**)
- Above --> permit needed

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Aerosols --> 105.6.1
- Combustible Dust --> 105.6.6, 105.7.26.6
- Combustible Fibers --> 105.6.7, 105.7.26.6
- Compressed Gases --> 105.6.8, 105.7.4
- Carbon Dioxide --> 105.6.51.5, 105.7.26.4, 105.7.26.5

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Cryogenic Fluids --> 105.6.10, 105.7.5
- Explosives --> 105.6.14
- Combustible/Flammable Liquids --> 105.6.16, 105.7.9
- Liquefied Petroleum Gas --> 105.6.27, 105.7.16
- Others --> 105.6.20, 105.7.13

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Maximum Allowable Quantity (5003.1.1):
- Depends on a variety of factors (see next slides)
- Above --> add'l reqs apply (5004, 5005, material-specific)

TABLE 5003.1.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, l, m, n, p]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note q	NA	NA	See Note q	NA	NA	See Note q	NA
Combustible fibers[q]	Loose Baled[r]	H-3	(100) (1,000)	NA	NA	(100) (1,000)	NA	NA	(20) (200)	NA
Combustible liquid[c, i]	II IIIA IIIB	H-2 or H-3 H-2 or H-3 NA	NA	120[d, e] 330[d, e] 13,200[e, f]	NA	NA	120[d] 330[d] 13,200[f]	NA	NA	30[d] 80[d] 3,300[f]
Cryogenic Flammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Cryogenic Inert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
Cryogenic Oxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1 Division 1.2 Division 1.3 Division 1.4 Division 1.4G Division 1.5	H-1 H-1 H-1 or H-2 H-3 H-3 H-1	1[e, g] 1[e, g] 5[e, g] 50[e, g] 125[e, l] 1[e, g]	(1)[e, g] (1)[e, g] (5)[e, g] (50)[e, g] NA (1)[e, g]	NA	0.25[g] 0.25[g] 1[g] 50[g] NA 0.25[g]	(0.25)[g] (0.25)[g] (1)[g] (50)[g] NA (0.25)[g]	NA	0.25[g] 0.25[g] 1[g] NA NA 0.25[g]	(0.25)[g] (0.25)[g] (1)[g] NA NA (0.25)[g]

TABLE 5003.1.1(3)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD IN AN OUTDOOR CONTROL AREA[a, b, c, d]

MATERIAL	CLASS	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
		Solid pounds (cubic feet)	Liquid gallons (pounds)[e]	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)[e]	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)[e]
Flammable gas	Gaseous Liquefied	Not Applicable	Not Applicable (300)	3,000 Not Applicable	Not Applicable	Not Applicable (150)	1,500 Not Applicable	Not Applicable	Not Applicable
Flammable solid	Not Applicable	500	Not Applicable	Not Applicable	250	Not Applicable	Not Applicable	50	Not Applicable
Inert Gas Cryogenic inert	Gaseous Liquefied Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Limited Not Limited Not Limited	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Limited Not Limited Not Limited	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable
Organic peroxide	Unclassified Detonable	1	(1)	Not Applicable	0.25	(0.25)	Not Applicable	0.25	(0.25)
Organic peroxide	I II III IV V	20 200 500 1,000 Not Limited	(20) (200) (500) (1,000) Not Limited	Not Applicable	10 100 250 500 Not Limited	(10) (100) (250) (500) Not Limited	Not Applicable	2 20 50 100 Not Limited	(2) (20) (50) (100) Not Limited
Oxidizer	4 3	2 40	(2) (40)	Not	1 20	(1) (20)	Not	0.25 4	(0.25) (4)

TABLE 5003.8.3.2
DESIGN AND NUMBER OF CONTROL AREAS

STORY		PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA[a]	NUMBER OF CONTROL AREAS PER STORY	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOURS[b]
Above grade plane	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	3	1
	1	100	4	1
Below grade plane	1	75	3	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 5003.1.1(1) and 5003.1.1(2), with all increases allowed in the footnotes to those tables.

b. Separation shall include fire barriers and horizontal assemblies as necessary to provide separation from other portions of the building.

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Detached Building Quantity (5003.8.2):
- Depends on chemical classification & quantity
- Above --> bldg must be **dedicated** to hazmat only

DETACHED BUILDING. A separate single-story building, without a *basement* or crawl space, used for the storage or use of hazardous materials and located an *approved* distance from all structures.

TABLE 5003.8.2
DETACHED BUILDING REQUIRED

A DETACHED BUILDING IS REQUIRED WHERE THE QUANTITY OF MATERIAL EXCEEDS THAT LISTED HEREIN			
Material	**Class**	**Solids and liquids (tons)[a, b]**	**Gases (cubic feet)[a, b]**
Explosives	Division 1.1 Division 1.2 Division 1.3 Division 1.4 Division 1.4[c] Division 1.5 Division 1.6	Maximum Allowable Quantity Maximum Allowable Quantity Maximum Allowable Quantity Maximum Allowable Quantity 1 Maximum Allowable Quantity Maximum Allowable Quantity	Not Applicable
Oxidizers	Class 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Unstable (reactives) detonable	Class 3 or 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Oxidizer, liquids and solids	Class 3 Class 2	1,200 2,000	Not Applicable
Organic peroxides	Detonable Class I Class II Class III	Maximum Allowable Quantity Maximum Allowable Quantity 25 50	Not Applicable
Unstable (reactives) nondetonable	Class 3 Class 2	1 25	2,000 10,000
Water reactives	Class 3 Class 2	1 25	Not Applicable
Pyrophoric gases	Not Applicable	Not Applicable	2,000

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.02832 m^3, 1 ton = 2000 lbs. = 907.2 kg.

a. For materials that are detonable, the distance to other buildings or lot lines shall be in accordance with Section 415.6 of the *International Building Code* or Chapter 56 based on the trinitrotoluene (TNT) equivalence of the material, whichever is greater.

b. "Maximum Allowable Quantity" means the maximum allowable quantity per control area set forth in Table 5003.1.1(1).

c. Limited to Division 1.4 materials and articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco, Firearms and Explosives regulations, or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles, providing the net explosive weight of individual articles does not exceed 1 pound.

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- "Liquid Storage Warehouse" Quantity (5704.3.8):
- Applies to comb/flam liquid **container** storage
- If exceeded:
  - 5704.3.8 applies
  - **Separate and detached** building (standalone or fire wall)

TABLE 5704.3.6.3(2)
STORAGE ARRANGEMENTS FOR PALLETIZED OR SOLID-PILE STORAGE IN LIQUID STORAGE ROOMS AND WAREHOUSES

CLASS	STORAGE LEVEL	MAXIMUM STORAGE HEIGHT			MAXIMUM QUANTITY PER PILE (gallons)		MAXIMUM QUANTITY PER ROOM[a] (gallons)	
		Drums	Containers[b] (feet)	Portable tanks[b] (feet)	Containers	Portable tanks	Containers	Portable tanks
IA	Ground floor	1	5	Not Allowed	3,000	Not Allowed	12,000	Not Allowed
	Upper floors	1	5	Not Allowed	2,000	Not Allowed	8,000	Not Allowed
	Basements	0	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
IB	Ground floor	1	6.5	7	5,000	20,000	15,000	40,000
	Upper floors	1	6.5	7	3,000	10,000	12,000	20,000
	Basements	0	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
IC	Ground floor[d]	1	6.5[c]	7	5,000	20,000	15,000	40,000
	Upper floors	1	6.5[c]	7	3,000	10,000	12,000	20,000
	Basements	0	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
II	Ground floor[d]	3	10	14	10,000	40,000	25,000	80,000
	Upper floors	3	10	14	10,000	40,000	25,000	80,000
	Basements	1	5	7	7,500	20,000	7,500	20,000
III	Ground floor	5	20	14	15,000	60,000	50,000	100,000
	Upper floors	5	20	14	15,000	60,000	50,000	100,000
	Basements	3	10	7	10,000	20,000	25,000	40,000

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

a. See Section 5704.3.8.1 for unlimited quantities in liquid storage warehouses.

b. In buildings protected by an automatic sprinkler system, the storage height for containers and portable tanks shall not exceed the maximum storage height permitted for the fire protection scheme set forth in NFPA 30 or the maximum storage height demonstrated in a full-scale fire test, whichever is greater. NFPA 30 criteria and fire test results for metallic containers and portable tanks shall not be applied to nonmetallic containers and portable tanks.

c. These height limitations are allowed to be increased to 10 feet for containers having a capacity of 5 gallons or less.

d. For palletized storage of unsaturated polyester resins (UPR) in relieving-style metal containers with 50 percent or less by weight Class IC or II liquid and no Class IA or IB liquid, height and pile quantity limits shall be permitted to be 10 feet and 15,000 gallons, respectively, provided that such storage is protected by sprinklers in accordance with NFPA 30 and that the UPR storage area is not located in the same containment area or drainage path for other Class I or II liquids.

Compliance Forum

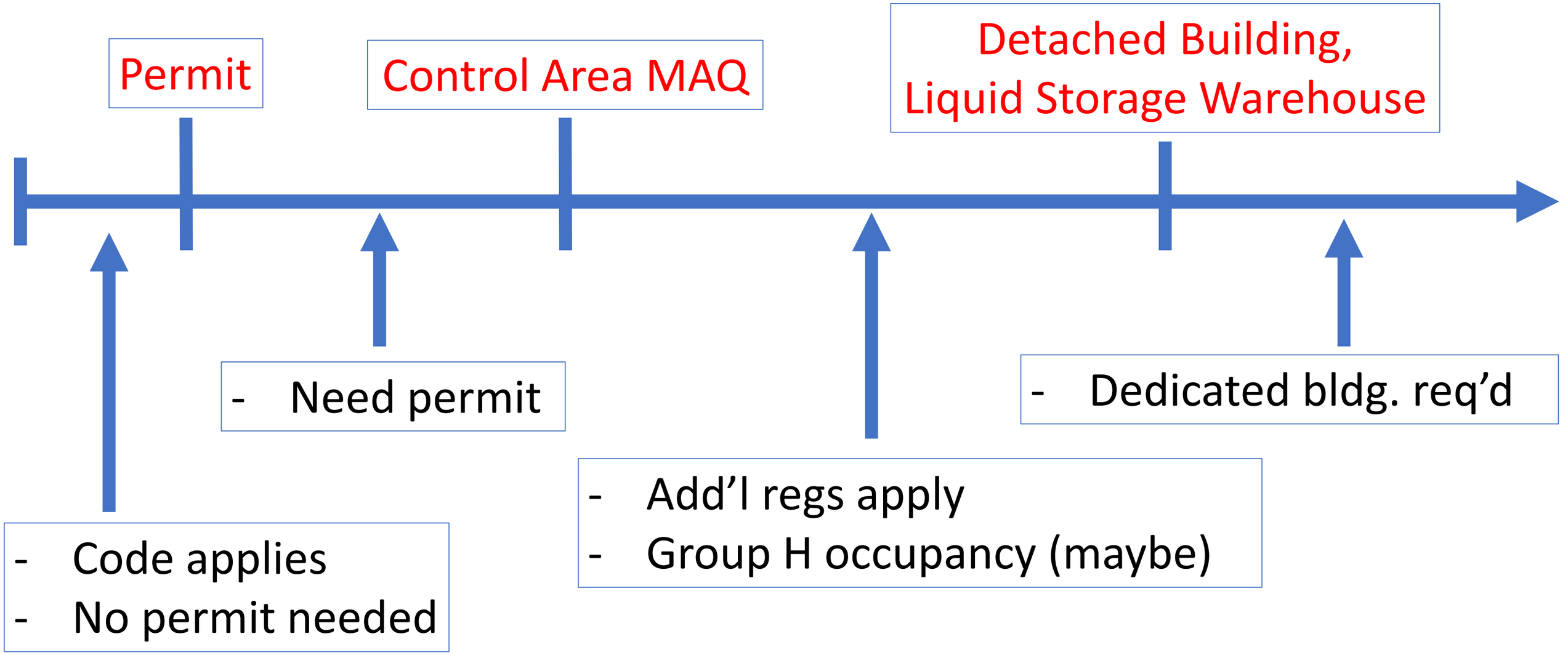
Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

C ❖ Liquid storage warehouses, as defined in Section 202, are buildings that are designed to store flammable and combustible liquids in quantities that exceed the quantities allowed in a control area or a liquid storage room. A liquid storage warehouse is classified in Group H-2 or H-3, depending on whether the liquid is (H-2) or is not (H-3) under pressure. It can be a separate, detached building or it can be an attached building separated from other parts of the structure by a fire wall complying with IBC Section 706. This section establishes the applicability of Sections 5704.3.8.1 through 5704.3.8.5 to these unique buildings. See the commentary to the definition of "Liquid storage warehouse" in Section 202 for further information.

LIQUID STORAGE WAREHOUSE. A building classified as a Group H-2 or H-3 occupancy used for the storage of flammable or *combustible liquids* in a closed condition.

C ❖ This definition clarifies both the occupancy group (Group H-2 or H-3, depending on the pressure of vessels stored) and that a liquid storage warehouse is a building as described in Section 5704.3.8. The term "liquid storage warehouse" is used in the code in Tables 903.2.11.6, 5704.3.6.3(2) and 5704.3.6.3(3) and Sections 2306.2.2, 5104.6, 5704.3.4.3. Note that the term "liquid storage warehouse" is not used in the IBC. See the commentary to Section 5704.8.3 for further information on these unique buildings.


Permit
Control Area MAQ
Detached Building,
Liquid Storage Warehouse
- Code applies
- No permit needed
- Need permit
- Add'l regs apply
- Group H occupancy (maybe)
- Dedicated bldg. req'd

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- **Material-specific** chapters (by hazard class)
- Chapters 51 – 67
- Regs address general hazards of hazard class
- Some exceptions (51, 56, 57, 59, 61, 63)

SECTION 6304
STORAGE

6304.1 Indoor storage. Indoor storage of oxidizing materials in amounts exceeding the *maximum allowable quantity per control area* indicated in Table 5003.1.1(1) shall be in accordance with Sections 5001, 5003 and 5004 and this chapter.

6304.1.1 Explosion control. Indoor storage rooms, areas and buildings containing Class 4 liquid or solid oxidizers shall be provided with explosion control in accordance with Section 911.

6304.1.2 Automatic sprinkler system. The *automatic sprinkler system* for oxidizer storage shall be designed in accordance with NFPA 400.

6304.1.3 Liquid-tight floor. In addition to Section 5004.12, floors of storage areas for liquid and solid oxidizers shall be of liquid-tight construction.

6304.1.4 Smoke detection. An *approved* supervised smoke detection system in accordance with Section 907 shall be installed in liquid and solid oxidizer storage areas. Activation of the smoke detection system shall sound a local alarm.

Exception: Detached storage buildings protected by an *approved* automatic fire-extinguishing system.

SECTION 6306
LIQUID OXYGEN IN HOME HEALTH CARE

6306.1 General. The storage and use of liquid oxygen (LOX) in home health care in Group I-1, I-4 and R occupancies shall comply with Sections 6306.2 through 6306.6, or shall be stored and used in accordance with Chapter 50.

6306.2 Information and instructions to be provided. The seller of liquid oxygen shall provide the user with information in written form that includes, but is not limited to, the following:

1. Manufacturer's instructions and labeling for safe storage and use of the containers.
2. Locating containers away from ignition sources, *exits*, electrical hazards and high-temperature devices in accordance with Section 6306.3.3.
3. Restraint of containers to prevent falling in accordance with Section 6306.3.4.
4. Requirements for handling containers in accordance with Section 6306.3.5.

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Some chapters are **application-specific**
- Chapters 20 – 39
- Regs address hazards specific to application or use

SECTION 2301
GENERAL

2301.1 Scope. Automotive motor fuel-dispensing facilities, marine motor fuel-dispensing facilities, fleet vehicle motor fuel-dispensing facilities, aircraft motor-vehicle fuel-dispensing facilities and repair garages shall be in accordance with this chapter, the *International Building Code*, *International Fuel Gas Code* and *International Mechanical Code* and NFPA 52 AND 30A. Such operations shall include both those that are open to the public and private operations.

SECTION 3901
GENERAL

3901.1 Scope. Plant processing or extraction facilities shall comply with this chapter and the *International Building Code*. The extraction process includes the act of extraction of the oils and fats by use of a solvent, desolventizing of the raw material, production of the miscella, distillation of the solvent from the miscella and solvent recovery. The use, storage, transfilling and handling of hazardous materials in these facilities shall comply with this chapter, other applicable provisions of this code and the *International Building Code*.

SECTION 2401
GENERAL

2401.1 Scope. This chapter shall apply to locations or areas where any of the following activities are conducted:

1. The application of flammable finishes to articles or materials by means of spray apparatus.
2. The application of flammable finishes by dipping or immersing articles or materials into the contents of tanks, vats or containers of flammable or *combustible liquids* for coating, finishing, treatment or similar processes.
3. The application of flammable finishes by applying combustible powders to articles or materials utilizing powder spray guns, electrostatic powder spray guns, fluidized beds or electrostatic fluidized beds.
4. Floor surfacing or finishing operations using Class I or II liquids in areas exceeding 350 square feet (32.5 m^2).
5. The application of flammable finishes consisting of dual-component coatings or Class I or II liquids where applied by brush or roller in quantities exceeding 1 gallon (4 L).

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Regulations are applied in this order:
  - General (Chapter 50)
  - Material-Specific (Chapters 51 – 67)
  - Application-Specific (Chapters 20 – 39)

[A] 102.10 Conflicting provisions. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in a specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

5003.2.1 Design and construction of containers, cylinders and tanks. Containers, cylinders and tanks shall be designed and constructed in accordance with *approved* standards. Containers, cylinders, tanks and other means used for containment of hazardous materials shall be of an *approved* type. Pressure vessels not meeting DOTn requirements for transportation shall comply with the ASME *Boiler and Pressure Vessel Code*.

5704.2.7 Design, fabrication and construction requirements for tanks. Tanks shall not be allowed to be installed inside the City of Phoenix limits when their height exceeds 66 feet (20 117 mm) measured from the lowest level of the Fire Department access road. The design, fabrication and construction of tanks shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design.

21.4.2.1.1 *

Atmospheric tanks shall be designed and constructed in accordance with recognized engineering standards. Atmospheric tanks that meet any of the following standards shall be deemed as meeting the requirements of 21.4.2.1:

(1) API Specification 12B, *Bolted Tanks for Storage of Production Liquids*
(2) API Specification 12D, *Field Welded Tanks for Storage of Production Liquids*
(3) API Specification 12F, *Shop Welded Tanks for Storage of Production Liquids*
(4) API Standard 650, *Welded Tanks for Oil Storage*
(5) UL 58, *Standard for Steel Underground Tanks for Flammable and Combustible Liquids*
(6) ANSI/UL 80, *Standard for Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids*
(7) ANSI/UL 142, *Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids*
(8) UL 1316, *Standard for Glass-Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures*
(9) ANSI/UL 1746, *Standard for External Corrosion Protection Systems for Steel Underground Storage Tanks*
(10) UL 2080, *Standard for Fire Resistant Tanks for Flammable and Combustible Liquids*
(11) ANSI/UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids*

2306.2.3 Above-ground tanks located outdoors, above grade. Above-ground tanks shall not be used for the storage of Class I, II or III liquid motor fuels, except as provided by this section.

1. Above-ground tanks used for outdoor, above-grade storage of Class I liquids shall be *listed* and *labeled* as protected above-ground tanks in accordance with UL 2085 and shall be in accordance with Chapter 57. Such tanks shall be located in accordance with Table 2306.2.3.

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Referenced standards are **part of the fire code**
- May be referenced by provision, or in entirety

SECTION 5301
GENERAL

5301.1 Scope. Storage, use and handling of *compressed gases* in *compressed gas* containers, cylinders, tanks and systems shall comply with this chapter and NFPA 55, including those gases regulated elsewhere in this code. Partially full *compressed gas* containers, cylinders or tanks containing residual gases shall be considered as full for the purposes of the controls required.

5704.3.1 Design, construction and capacity of containers and portable tanks. The design, construction and capacity of containers for the storage of Class I, II and IIIA liquids shall be in accordance with this section and Section 9.4 of NFPA 30.

[A] 102.7 Referenced codes and standards. The codes and standards referenced in this code shall be those that are listed in Chapter 80, and such codes and standards shall be considered to be part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections 102.7.1 and 102.7.2.

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Key Points:
  - Classification by competent party
  - Multiple classes may apply
  - Quantity limits vary by chemical and other factors
  - “Permit”, “Control Area MAQ”, “Detached Building”
  - Code provisions are applied from general to specific

Compliance Forum

Hazmat Code Navigation

1) Classification
2) Quantities
3) Layered Code Application

- Questions?

Compliance Forum

Fire Sprinkler Best Practices

- Joel Asirsan – Fire Protection Engineer

Flow Test

- 2018 PFC 903.3.5.5 Sprinkler Design Safety Factor
  - When the static pressure exceeds 90 psi, the maximum design static pressure shall be 80 psi regardless of actual test pressure
  - When the static is less than 90 psi, a minimum 10 psi safety factor shall be provided between the available water supply and the system flow and pressure demand and shall include hose stream allowances required by NFPA 13, 13D and 13R
- PFD witness private hydrants only
- Flow test valid for 1 year

Compliance Forum

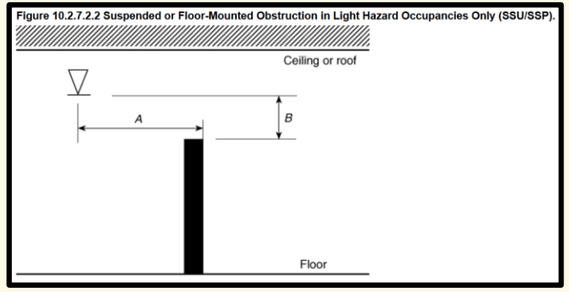
Fire Sprinkler Plans

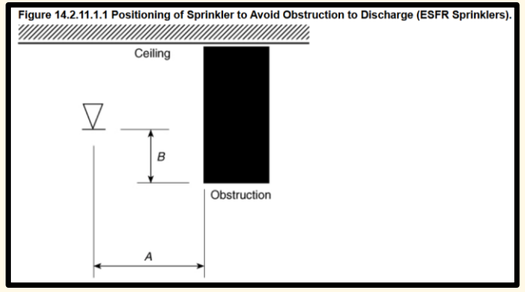
- General Information
  - Project Details – Project Name, Location, Design Professional
  - Code Compliance – What NFPA code? Include 2018 Phoenix Fire Code

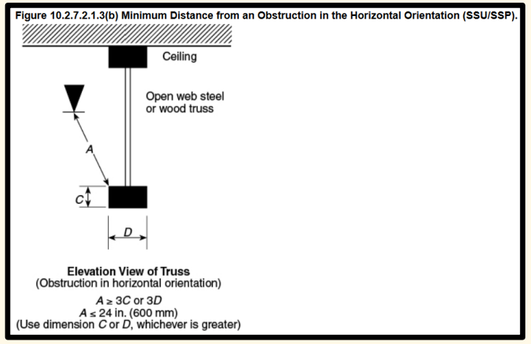
Compliance Forum

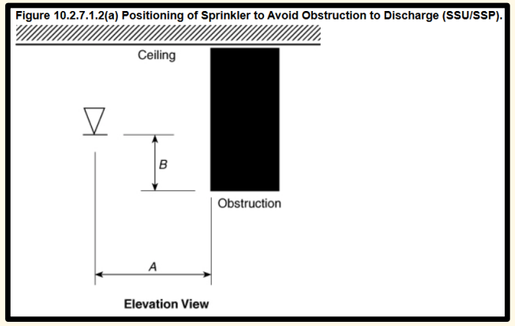
Fire Sprinkler Plans

- Pipe Layout & Location
  - Pipe Routing – Coordination
  - Obstructions
  - Installation Req
    - CH 10 – Standard Sprinklers
    - CH 11 – Extended Coverage
    - CH 12 – Residential
    - CH 13 – CMSA
    - CH 14 – ESFR









Fire Sprinkler Plans

- Hydraulic Calculations
  - Flow Data
  - Calculation Method – NFPA 13 or FM Data Sheet (Fire Marshal Appeal)
  - Include Safety Margins
  - Make it easy for the reviewer

Compliance Forum

Legend

SRC – Source

BOR – Bottom of Riser

TOR – Top of Riser

FM – Feed Main

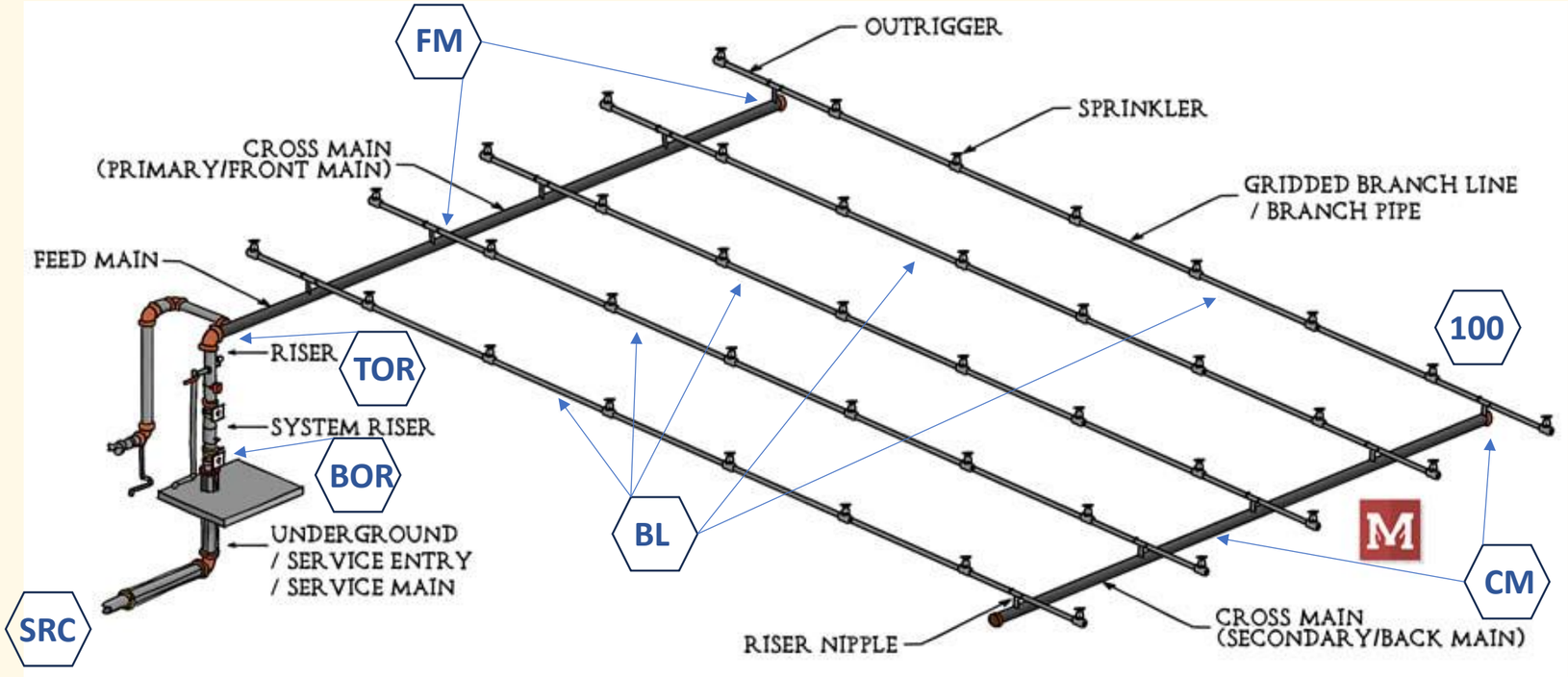
BL – Branch line

CM – Cross Main

100 - Sprinkler

Hydraulic Calculation

- Hydraulic Calculations
  - Nodes
    - Chronological Order
    - Change of Pipe Size



Inspections

- Approved Set Plan on Site
- Accurate As-Built Plans Time of Inspection
- Rough Inspection
- 200lb for 2 hours test
- Final testing

Compliance Forum

Fire Department Connection

- Visible Location (912.2.1 2018 PFC)
- Inlet Connection 2 ½” w/ Phx Threads (912.3.1 2018 PFC)
- Locking Caps
- Clear Space 36”x36”x78”
- Physical Damage
- Signs 12”x12” See Appendix D

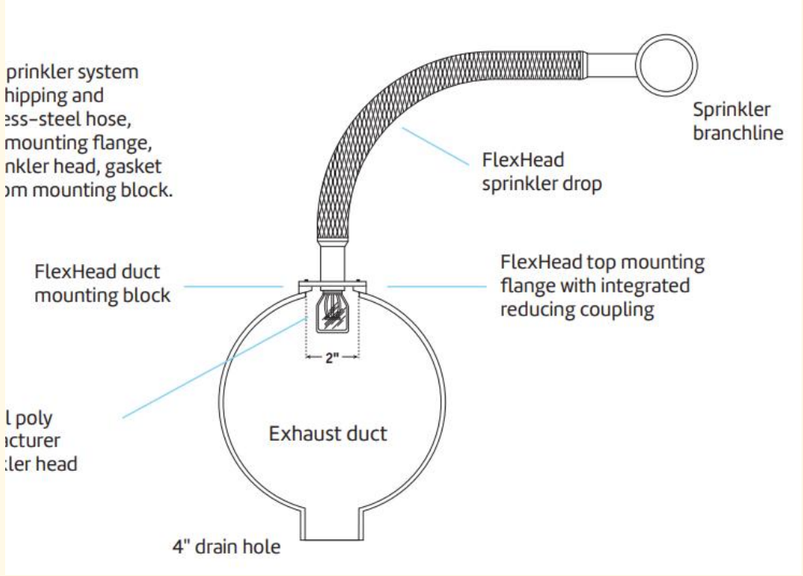
Compliance Forum

Spray Booth

- What's Required?
  - Dedicated Riser
  - Tamper Switch
  - Flow Switch (Spray Booth Waterflow)
  - Inspector Test Valve

Ducts Conveying Hazardous Exhaust

- 2018 PFC 903.2.11.4 Where required by the International Mechanical Code, automatic sprinklers shall be provided in ducts conveying hazardous exhaust or flammable or combustible materials
  - Exception: Ducts where the largest cross-sectional diameter is less than 10 inches



Compliance Forum

High Piled Storage

- 3201.3 Construction Document
- 3201.3.2 Approved Storage Layout

Compliance Forum

Construction Documents

3201.3 Construction documents.

At the time of building permit application for new structures designed to accommodate high-piled storage or for requesting a change of occupancy/use, and at the time of application for a storage permit, plans and specifications shall be submitted for review and approval. In addition to the information required by the *International Building Code*, the storage permit submittal shall include the information specified in this section. The construction documents shall include all of the following:

1. Floor plan of the building showing locations and dimensions of *high-piled storage areas*.
2. Usable storage height for each storage area.
3. Number of tiers within each rack, if applicable.
4. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
5. Aisle dimensions between each storage array.
6. Maximum pile volume for each storage array.
7. Location and classification of commodities in accordance with Section 3203.
8. Location of commodities that are banded or encapsulated.
9. Location of required fire department access doors.
10. Type of fire suppression and fire detection systems.
11. Location of valves controlling the water supply of ceiling and in-rack sprinklers.
12. Type, location and specifications of smoke removal and curtain board systems.
13. Dimension and location of transverse and longitudinal flue spaces.
14. Additional information regarding required design features, commodities, storage arrangement and fire protection features within the *high-piled storage area* shall be provided at the time of permit, where required by the *fire code official*.

Compliance Forum

Table 3206.2 2018 PFC

TABLE 3206.2
GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA[a] (square feet) (see Sections 3206.2 and 3206.3)	ALL STORAGE AREAS (See Sections 3206, 3207 and 3208)[b]				SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)		
		Automatic fire-extinguishing system (see Section 3206.4)	Fire detection system (see Section 3206.5)	Fire department access doors (see Section 3206.7)	Smoke and heat removal (see Section 3206.8)	Maximum pile dimension[c] (feet)	Maximum permissible storage height[d] (feet)	Maximum pile volume (cubic feet)
I-IV	0–500	Not Required[a]	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
	501–2,500	Not Required[a]	Yes[g]	Not Required	Not Required	120	40	100,000
	2,501–12,000 Open to the public	Yes	Not Required	Not Required	Not Required	120	40	400,000
	2,501–12,000 Not open to the public (Option 1)	Yes	Not Required	Not Required	Not Required	120	40	400,000
	2,501–12,000 Not open to the public (Option 2)	Not Required[a]	Yes	Yes	Yes[h, i]	120	30[e]	200,000
	12,001–500,000	Yes	Not Required	Yes	Yes[h, i]	120	40	400,000
	Greater than 500,000[f]	Yes	Not Required	Yes	Yes[h, i]	120	40	400,000

TABLE 3206.2
GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA[a] (square feet) (see Sections 3206.2 and 3206.3)	ALL STORAGE AREAS (See Sections 3206, 3207 and 3208)[b]				SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)		
		Automatic fire-extinguishing system (see Section 3206.4)	Fire detection system (see Section 3206.5)	Fire department access doors (see Section 3206.7)	Smoke and heat removal (see Section 3206.8)	Maximum pile dimension[c] (feet)	Maximum permissible storage height[d] (feet)	Maximum pile volume (cubic feet)
High hazard	0–500	Not Required[a]	Not Required	Not Required	Not Required	60	Not Required	Not Required
	501–2,500 Open to the public	Yes	Not Required	Not Required	Not Required	60	30	75,000
	501–2,500 Not open to the public (Option 1)	Yes	Not Required	Not Required	Not Required	60	30	75,000
	501–2,500 Not open to the public (Option 2)	Not Required[a]	Yes[g]	Yes	Yes[h, i]	60	20	50,000
	2,501–300,000	Yes	Not Required	Yes	Yes[h, i]	60	30	75,000
	Greater than 300,000[f]	Yes	Not Required	Yes	Yes[h, i]	60	30	75,000

Compliance Forum

Approved Storage Layout

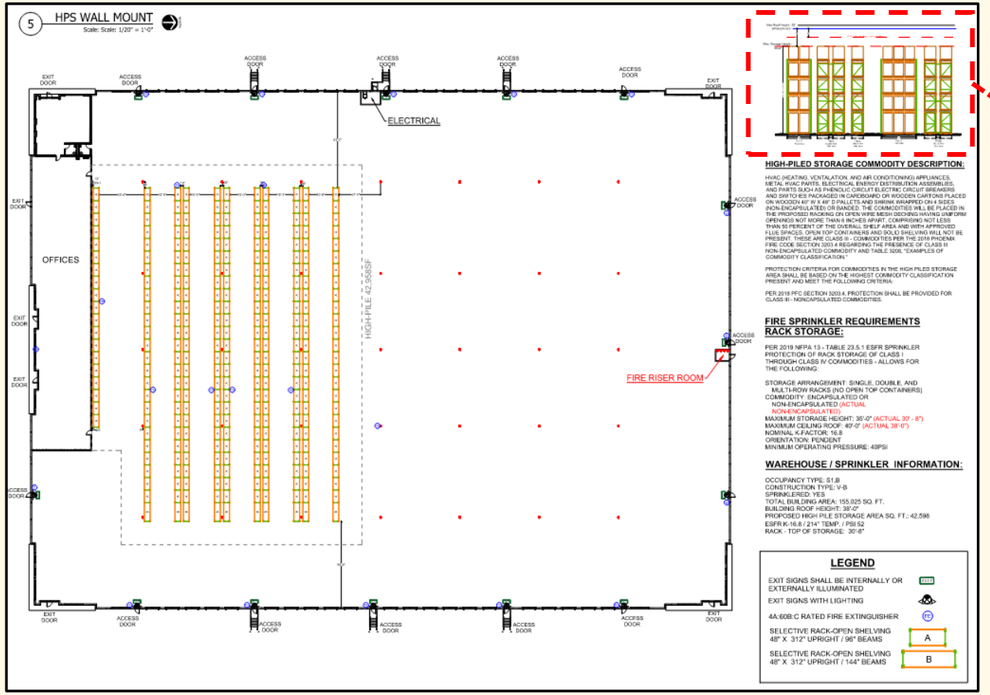
3201.3.2 Approved storage layout.

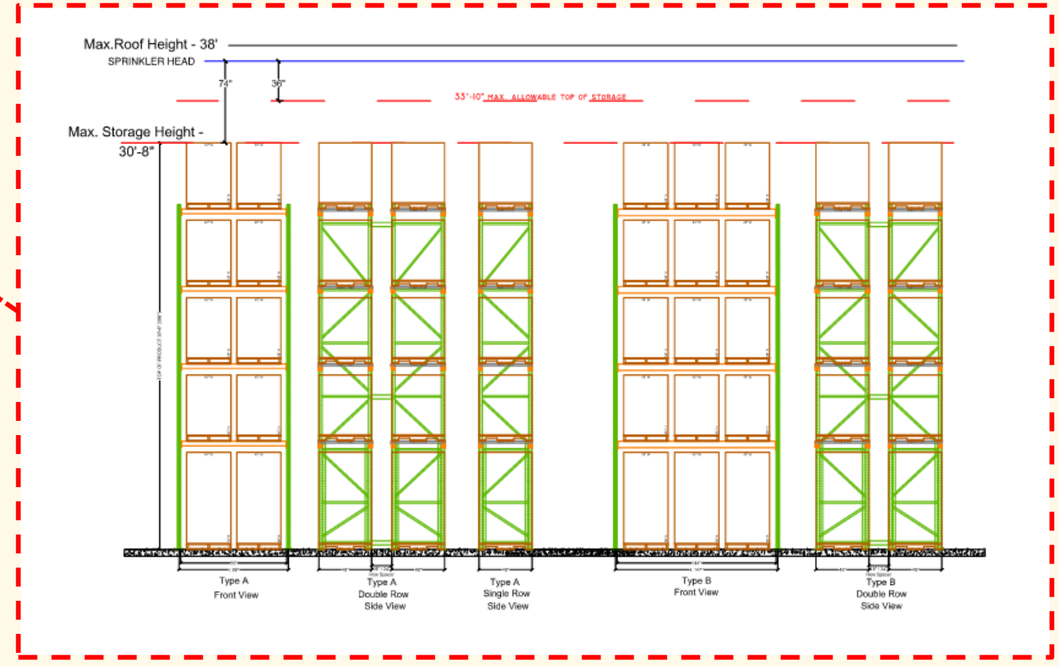
A floor plan, of legible size, shall be provided, mounted on a wall and protected from damage. The floor plan shall be mounted in an *approved* location and show the following:

1. Locations, dimensions and rack layout of *high-piled storage areas*.
2. Design storage height for each storage area.
3. Types of commodities.
4. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
5. Aisle dimensions between each storage array.
6. For palletized and solid-piled storage, the maximum pile volume for each storage array.
7. Location and classification of commodities in accordance with Section 3203.
8. Location of required fire department access doors.
9. Location of valves controlling the water supply of ceiling and in-rack sprinklers.
10. Design criteria of the sprinkler system.

Compliance Forum

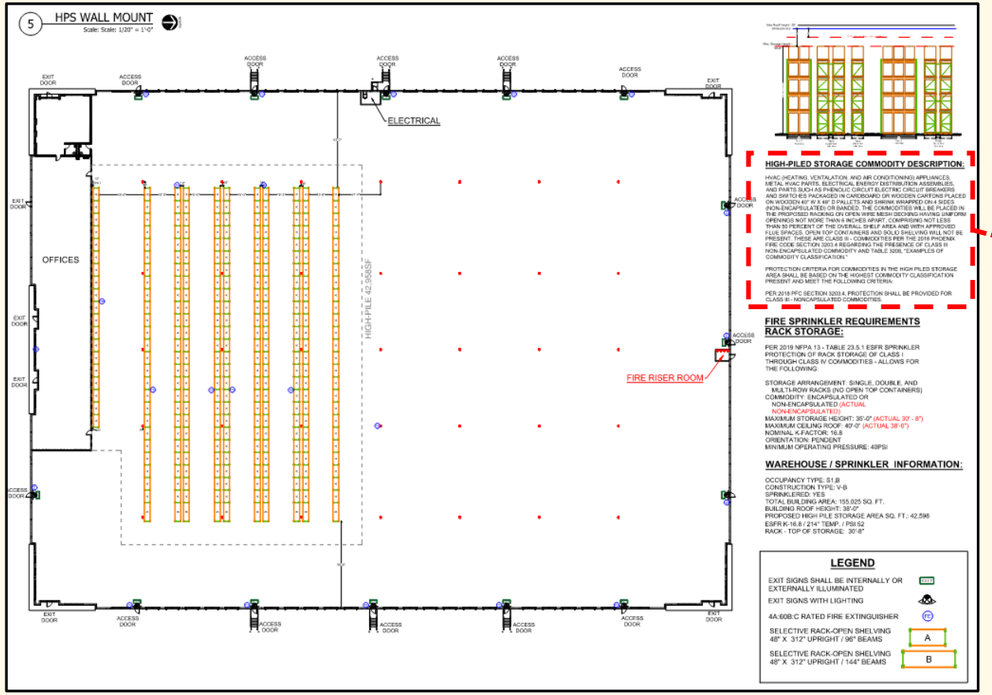
High Piled Storage Plans





Compliance Forum

High Piled Storage Plans



HIGH-PILED STORAGE COMMODITY DESCRIPTION:

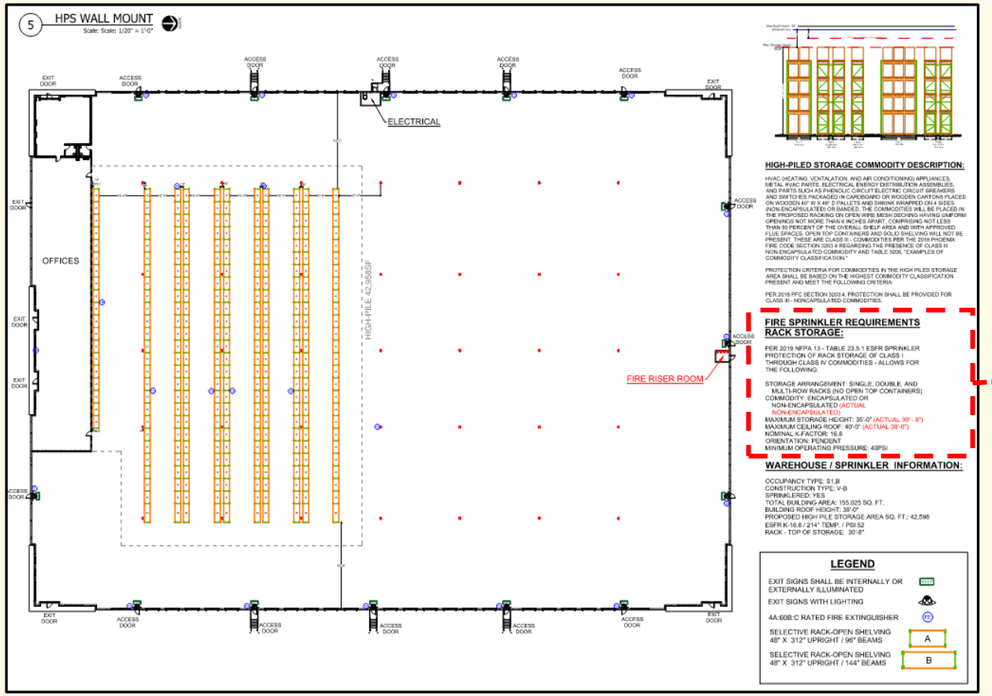
HVAC (HEATING, VENTALATION, AND AIR CONDITIONING) APPLIANCES, METAL HVAC PARTS, ELECTRICAL ENERGY DISTRIBUTION ASSEMBLIES, AND PARTS SUCH AS PHENOLIC CIRCUIT ELECTRIC CIRCUIT BREAKERS AND SWITCHES PACKAGED IN CARDBOARD OR WOODEN CARTONS PLACED ON WOODEN 40" W X 48" D PALLETS AND SHRINK WRAPPED ON 4 SIDES (NON-ENCAPSULATED) OR BANDED. THE COMMODITIES WILL BE PLACED IN THE PROPOSED RACKING ON OPEN WIRE MESH DECKING HAVING UNIFORM OPENINGS NOT MORE THAN 6 INCHES APART, COMPRISING NOT LESS THAN 50 PERCENT OF THE OVERALL SHELF AREA AND WITH APPROVED FLUE SPACES. OPEN TOP CONTAINERS AND SOLID SHELVING WILL NOT BE PRESENT. THESE ARE CLASS III - COMMODITIES PER THE 2018 PHOENIX FIRE CODE SECTION 3203.4 REGARDING THE PRESENCE OF CLASS III NON-ENCAPSULATED COMMODITY AND TABLE 3208, "EXAMPLES OF COMMODITY CLASSIFICATION."

PROTECTION CRITERIA FOR COMMODITIES IN THE HIGH PILED STORAGE AREA SHALL BE BASED ON THE HIGHEST COMMODITY CLASSIFICATION PRESENT AND MEET THE FOLLOWING CRITERIA:

PER 2018 PFC SECTION 3203.4, PROTECTION SHALL BE PROVIDED FOR CLASS III - NONCAPSULATED COMMODITIES.

Compliance Forum

High Piled Storage Plans



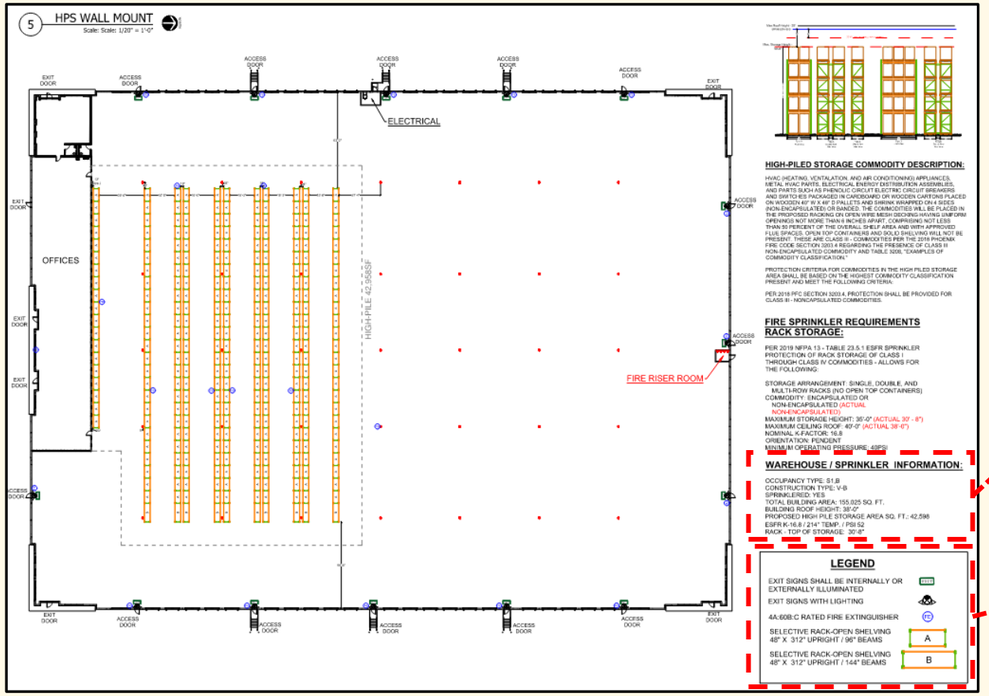
FIRE SPRINKLER REQUIREMENTS RACK STORAGE:

PER 2019 NFPA 13 - TABLE 23.5.1 ESFR SPRINKLER PROTECTION OF RACK STORAGE OF CLASS I THROUGH CLASS IV COMMODITIES - ALLOWS FOR THE FOLLOWING:

STORAGE ARRANGEMENT: SINGLE, DOUBLE, AND MULTI-ROW RACKS (NO OPEN TOP CONTAINERS)
COMMODITY: ENCAPSULATED OR NON-ENCAPSULATED (ACTUAL NON-ENCAPSULATED)
MAXIMUM STORAGE HEIGHT: 35'-0" (ACTUAL 30' - 8")
MAXIMUM CEILING ROOF: 40'-0" (ACTUAL 38'-0")
NOMINAL K-FACTOR: 16.8
ORIENTATION: PENDENT
MINIMUM OPERATING PRESSURE: 40PSI

Compliance Forum

High Piled Storage Plans



WAREHOUSE / SPRINKLER INFORMATION:

OCCUPANCY TYPE: S1,B
CONSTRUCTION TYPE: V-B
SPRINKLERED: YES
TOTAL BUILDING AREA: 155,025 SQ. FT.
BUILDING ROOF HEIGHT: 38'-0"
PROPOSED HIGH PILE STORAGE AREA SQ. FT.: 42,598
ESFR K-16.8 / 214° TEMP. / PSI 52
RACK - TOP OF STORAGE: 30'-8"

LEGEND

EXIT SIGNS SHALL BE INTERNALLY OR EXTERNALLY ILLUMINATED — EXIT

EXIT SIGNS WITH LIGHTING

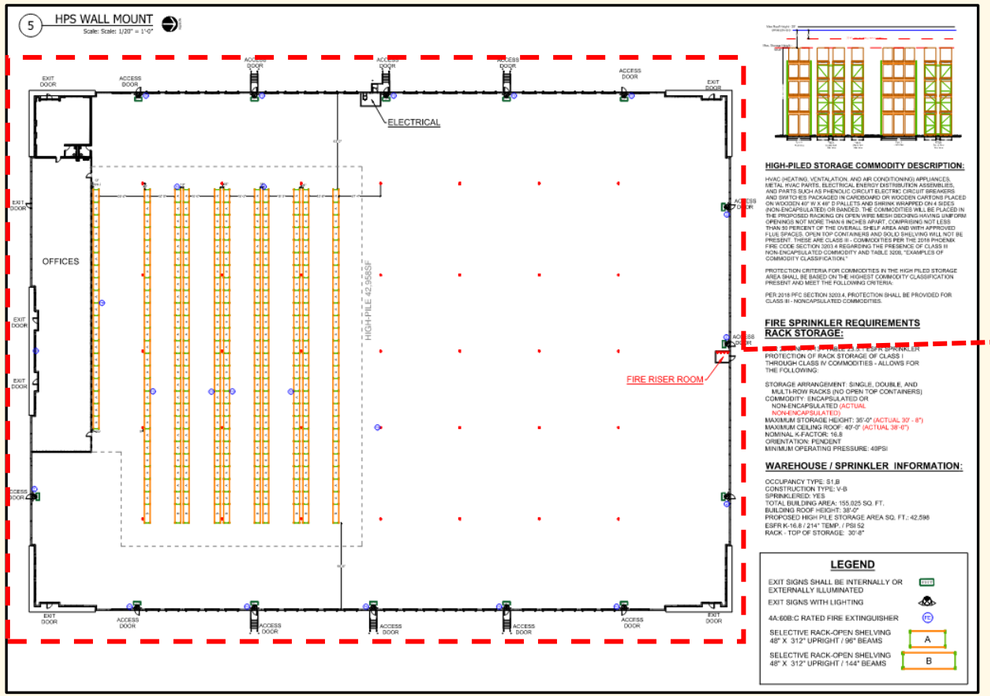
4A:60B:C RATED FIRE EXTINGUISHER — FE

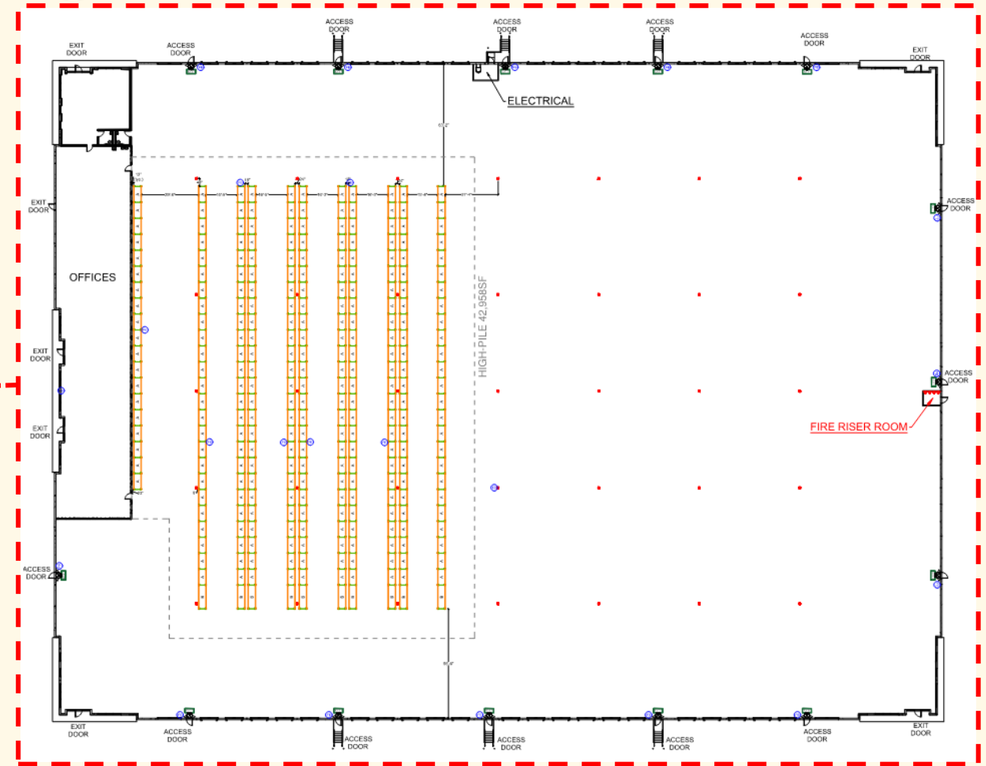
SELECTIVE RACK-OPEN SHELVING 48" X 312" UPRIGHT / 96" BEAMS — A

SELECTIVE RACK-OPEN SHELVING 48" X 312" UPRIGHT / 144" BEAMS — B

Compliance Forum

High Piled Storage Plans





Compliance Forum

Fire Extinguishing System
Battery Energy Storage System

- **1206.2.11.1.1 Fire Extinguishing System (2018 PFC)**
  - **Automatic Sprinkler System**
    - Designed and installed per Section 903.3.1.1 2018 PFC.
      - Minimum density of **0.6 gpm/ft²** based on the fire area
      - 2,500 sq. ft. design area (whichever is smaller)

  - **Sprinkler System (Approved Alternate)**:
    - Designed based on large-scale fire testing with a hazard classification as per Section 903.3.1.1. 2018 PFC

Fire Extinguishing System BESS cont.

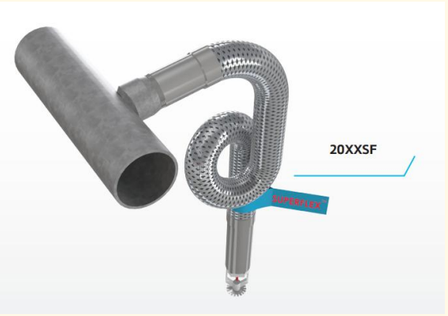
- **1206.2.11.1.1 Fire Extinguishing System 2018 PFC (cont.)**
  - **Alternate Automatic Fire Extinguishing Systems**:
    - Installed according to Section 904.
    - Must be approved by the fire code official based on large-scale fire testing.

Exception:

- Fire suppression systems for **lead-acid and nickel-cadmium battery systems** at facilities controlled by communications utilities operating at less than **50 VAC or 60 VDC** are required only if specified by **NFPA 76**.

Compliance Forum

Flexible Fire Sprinkler Drops



- Easy to Install
- Remember Equivalent Length in Calcs
  - Length of Hose
  - Type of Sprinklers
- Minimum Bend Radius

1" Internal Diameter (I.D.) Hose Series

Model Number	Outlet Orifice Size	Hose Assembly Length	Min. Bend Radius		Max. No. of 90° Bends		Equivalent Length of 1 in. Schedule 40 Pipe (ft)						Max. Rated Working Pressure	
			FM	UL	FM	UL	UL	FM 5.6 k-factor	FM 8.0 k-factor	FM 11.2 k-factor	FM 14.0 k-factor	FM 16.8 k-factor	FM	UL
No.	In./cm	In./mm	In./mm	In./mm	No.	No.	Ft./m	Ft./m	Ft./m	Ft./m	Ft./m	Ft./m	PSI/Kpa	PSI/Kpa
2036SF-50	½ (1.27)	36 (914)	7 (178.0)	2 (50.8)	2	5	16.2 (4.9)	16.2 (4.9)	16.9 (5.1)	11.5 (3.5)	–	–	175 (1205)	175 (1205)
2048SF-50		48 (1219)			3	8	28.7 (8.7)	28.7 (8.7)	29.3 (8.9)	15.4 (4.7)	–	–		175 (1205)
2072SF-50		72 (1828)			4	12	53.9 (16.4)	53.9 (16.4)	54.3 (16.5)	23.2 (7.0)	–	–		175 (1205)
2036SF-75	¾ (1.90)	36 (914)			2	5	29 (8.8)	–	21.5 (6.5)	21.6 (6.5)	21.8 (6.6)	22 (6.7)		175 (1205)
2048SF-75		48 (1219)			3	8	44 (13.4)	–	30.5 (9.2)	30.6 (9.3)	31.1 (9.4)	30.8 (9.3)		175 (1205)
2072SF-75		72 (1828)			4	12	70 (21.3)	–	48.5 (14.7)	48.8 (14.8)	49.9 (15.2)	48.6 (14.8)		175 (1205)

Compliance Forum

Hydraulic Placard

1.Location of the design area or areas

2.Size (area) of or number of sprinklers in the design area

3.Discharge densities over the design area

4.Required flow and residual pressure demand at the base of the riser

5.Occupancy classification or commodity classification and maximum permitted storage height and configuration

6.Hose stream allowance included in addition to the sprinkler demand

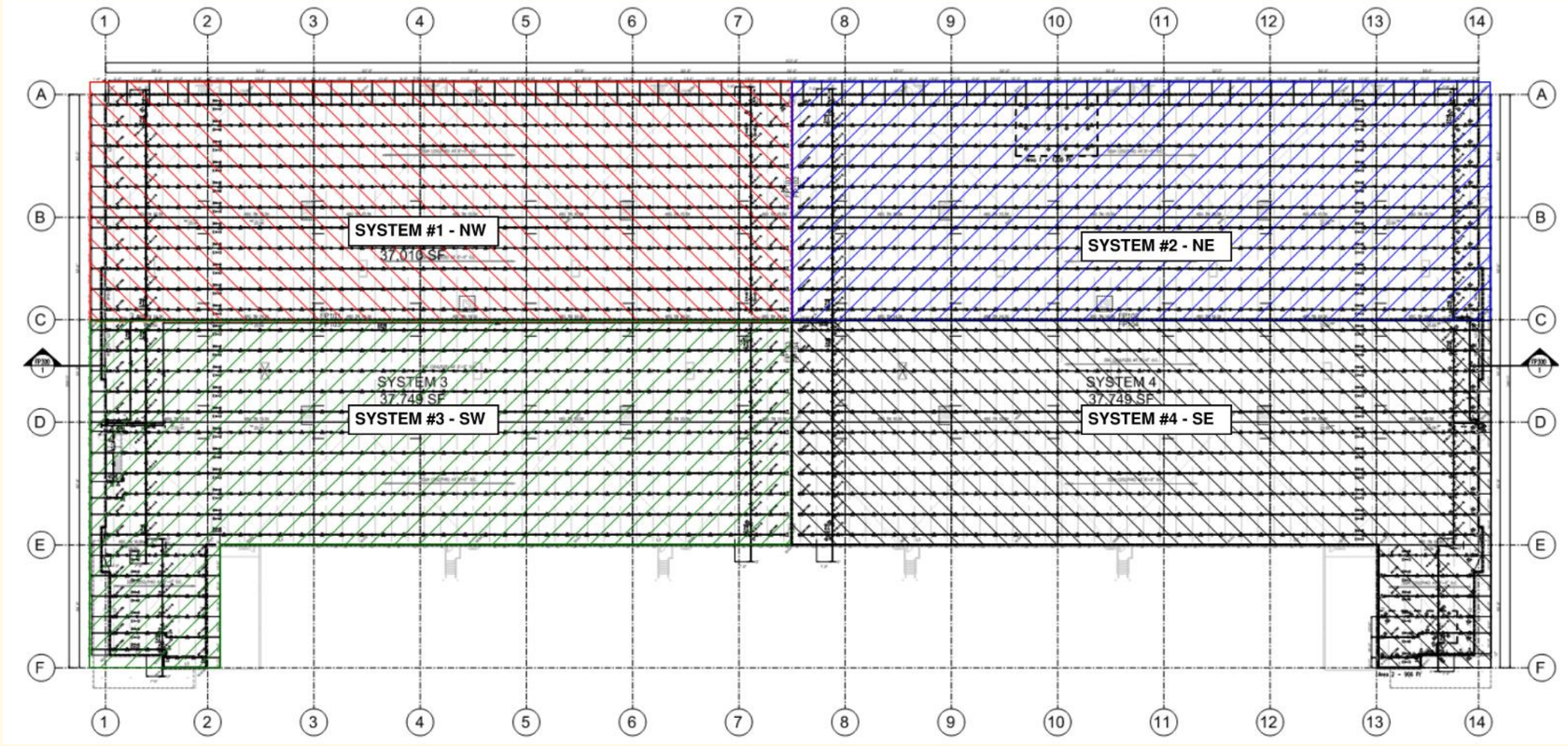
7.Name of the installing contractor

Compliance Forum

Zone Map

Zone Map

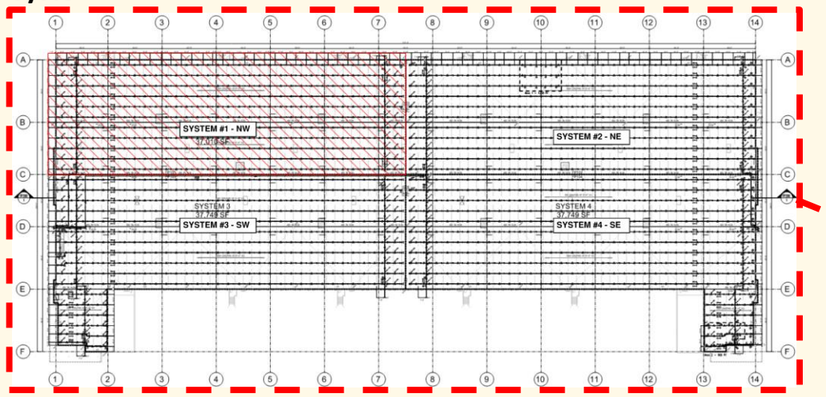
- Located on the Riser manifold
- Important for PFD Operations
- Risers Need to be labeled
  - System 1 – NW
  - System 2 – NE
  - System 3 – SW
  - System 4 – SE



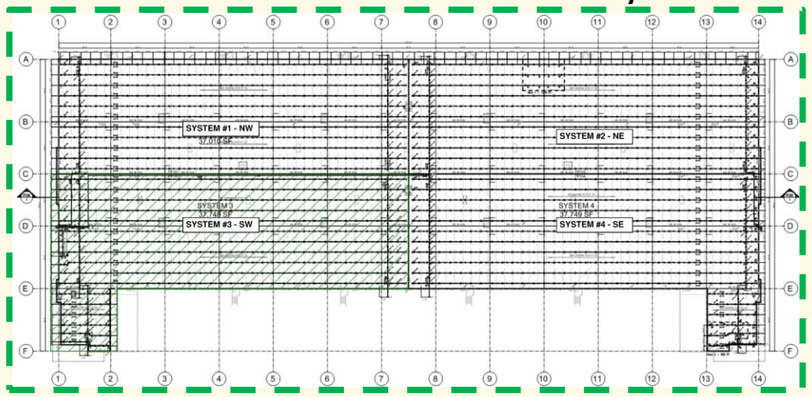
Compliance Forum

Riser Map

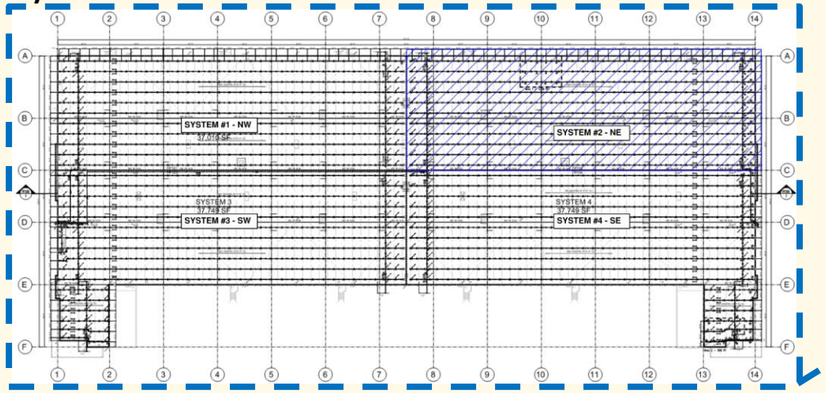
System #1 - NW



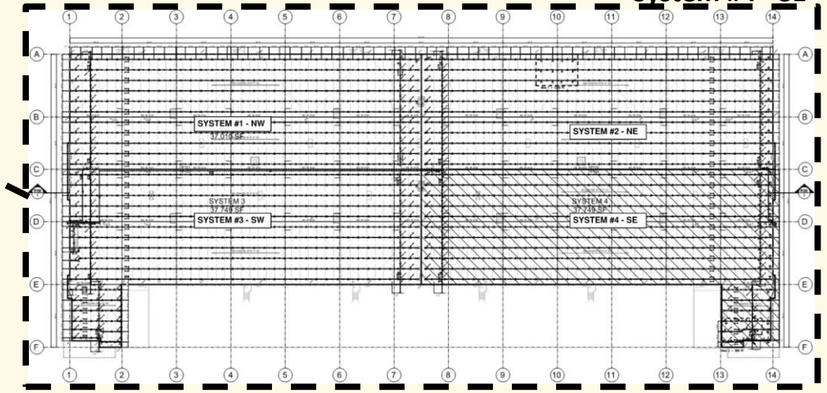
System #3 - SW



System #2 - NE



System #4 - SE



CPVC RISERS

- Label CPVC risers & remote inspector test valves before it gets covered up
  - Describe by floor
- Label risers
  - LVL 1
  - LVL 2
  - LVL 3
- Reminder: Separate shut off for each unit (NFPA 13D)

Compliance Forum

Fire Alarm Best Practices

- Tony Locatelli – Fire Protection Engineer

Identify which suite numbers the waterflow covers (WF suites 1 – 10)

Compliance Forum

Multi Tenant Commercial Buildings

Multi tenant with multiple dedicated functions systems

- We are working to make sure that Operations has good information when responding to all sites. Include the suite number on the cover of the plans and floorplans.
- Sprinkler zones need to be coordinated.
- Risers should identify which suite numbers the Waterflow monitors.
- Provide multiple maps at each dedicated system.
- Identify if and where a fire pump is installed.

Compliance Forum

High-Rise Enclosed Garage Exhaust Fan Control

- If the garage exhaust fans are on automatic controls based off CO and NO2 detectors, verify they meet the post fire smoke exhaust rate requirements
- The automatic exhaust systems need manual control - verify fire fighters smoke control panel has this.
- IMC 404.1 Enclosed parking garages. Mechanical ventilation system for enclosed parking garages shall operate continuously or shall be automatically operated by means of carbon monoxide detectors applied in conjunction with nitrogen detectors . Such detectors shall be listed in accordance with UL 2075 and installed in accordance with their listing and the manufacturers instructions. Automatic operation shall cycle the ventilation system between the following two modes of operation:
- 1. Full on at an airflow rate of not less than 0.75cfm per square ft of the floor area served.
- 2. Standby at an airflow rate of not less than 0.05cfm per sq foot of the floor area served.
- For high-rise post fire smoke removal, airflow is 1 exchange per every 15 minutes.

Compliance Forum

FSD Detector application

[BF] 607.3.3.2 Smoke Damper Actuation

The smoke damper shall close upon actuation of a listed smoke detector or detectors installed in accordance with Section 907.3 of the International Building Code and one of the following methods, as applicable:

1. Where a smoke damper is installed within a duct, a smoke detector shall be installed inside the duct or outside the duct with sampling tubes protruding into the duct. The detector or tubes within the duct shall be within 5 feet (1524 mm) of the damper. Air outlets and inlets shall not be located between the detector or tubes and the damper. The detector shall be listed for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, dampers shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.

2. Where a smoke damper is installed above smoke barrier doors in a smoke barrier, a spot-type detector shall be installed on either side of the smoke barrier door opening. The detector shall be listed for releasing service if used for direct interface with the damper.

3. Where a smoke damper is installed within an unducted opening in a wall, a spot-type detector shall be installed within 5 feet (1524 mm) horizontally of the damper. The detector shall be listed for releasing service if used for direct interface with the damper.

4. Where a smoke damper is installed in a corridor wall or ceiling, the damper shall be permitted to be controlled by a smoke detection system installed in the corridor.

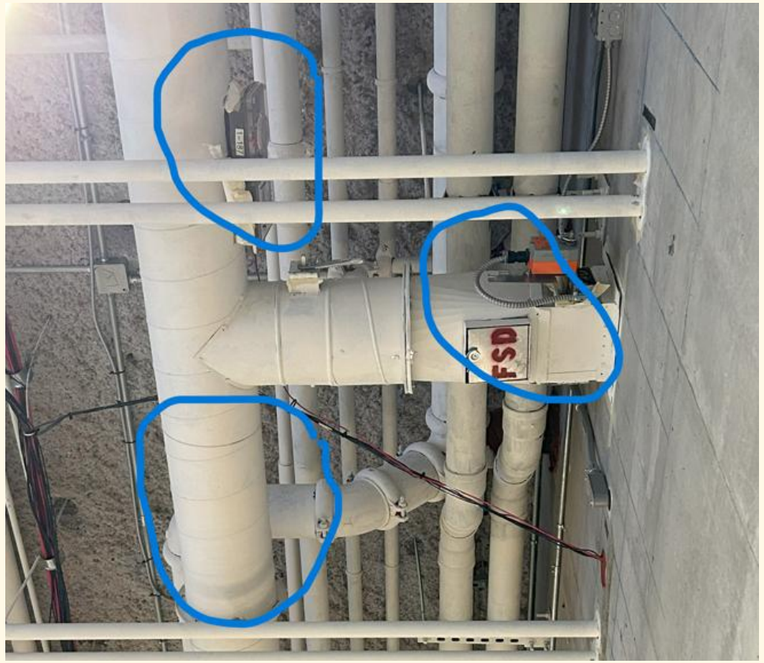
5. Where a smoke detection system is installed in all areas served by the duct in which the damper will be located, the smoke dampers shall be permitted to be controlled by the smoke detection system.

Compliance Forum

FSD Detector application

In the application here, if the contractor must install past the split in the duct, a detector would need to be installed on both legs of the split because per 2018 IMC 607.3.3.2. [1], Air outlets and inlets shall not be located between the detector or tubes and the damper.

Additionally, if the HVAC system feeding this FSD is shut down for service or normal operations, does this device meet the low velocity code requirement?



Compliance Forum

Smoke Detector in high ceilings

2019 NFPA 72 17.7.3.2.1 *

Spot-type smoke detectors shall be located on the ceiling or, if on a sidewall, between the ceiling and 12 in. (300 mm) down from the ceiling to the top of the detector.

A.17.7.3.2

In high-ceiling areas, such as atriums, where spot-type smoke detectors are not accessible for periodic maintenance and testing, projected beam–type or air sampling–type detectors should be considered where access can be provided.

Compliance Forum

Smoke Detector in high ceilings

2019 NFPA 72 17.7.3.2.4.2

For level ceilings, the following shall apply:

(b)Spot-type smoke detectors shall be permitted to be located on ceilings or on the bottom of beams.

(a)Where beam spacing is equal to or greater than 40 percent of the ceiling height (0.4 H), spot-type detectors shall be located on the ceiling in each beam pocket.

ii. Location of detectors either on the ceiling or on the bottom of the beams

(b) Location of spot-type smoke detectors shall be permitted on ceilings, sidewalls, or the bottom of beams or solid joists.

(b) Location of spot-type smoke detectors shall be permitted on ceilings or on the bottom of beams.

Compliance Forum

Fire Alarm – “Jeopardy”

What type of “Performance-Based Technology” path shall be supervised at an interval of not more than 60 minutes and a failure of the path shall be annunciated at the supervising station within not more than 60 minutes?

Monitoring - Single Communications Path

- Central Station shall be identified on the plans.
- Methods shall be identified on plans in accordance with CH26.6.3.3

26.6.3.3 Single Communications Path.

Unless prohibited by the enforcing authority, governing laws, codes, or standards, where a single communications path is used, the following requirements shall be met:

(1) The path shall be supervised at an interval of not more than 60 minutes.

(2) A failure of the path shall be annunciated at the supervising station within not more than 60 minutes.

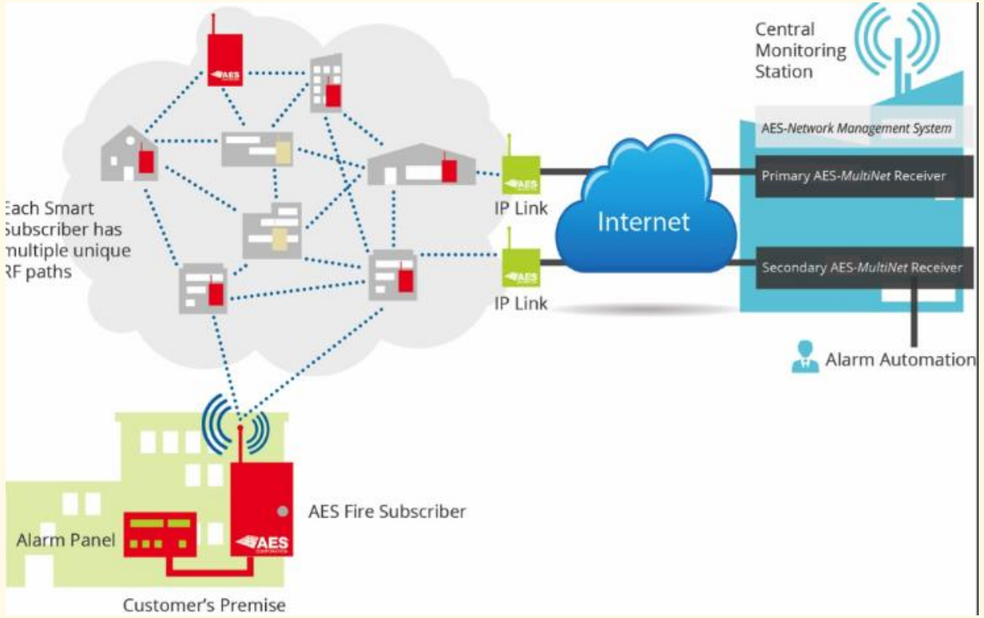
(3) The failure to complete a signal transmission shall be annunciated at the protected premises in accordance with Section 10.15.

Monitoring – Multiple Path

- 26.6.3.4 Multiple Communications Paths.
- If multiple transmission paths are used, the following requirements shall be met:
- (1) Each path shall be supervised within not more than 6 hours.
- (2) The failure of any path of a multipath system shall be annunciated at the supervising station within not more than 6 hours.
- (3) Multiple communications paths shall be arranged so that a single point of failure shall not cause more than a single path to fail.
- (4) The failure to complete a signal transmission shall be annunciated at the protected premises in accordance with Section 10.15.

Monitoring – Single Technology

- 26.6.3.5 * Single Technology.
- A single technology shall be permitted to be used to create the multiple paths provided that the requirements of 26.6.3.4(1) through 26.6.3.4(4) are met.



Change of Supervising Station

- 10.20.2 The authority having jurisdiction shall be notified prior to installation or alteration of equipment or wiring.
- An F175 permit is required for new system
- An F275 permit is required for a modification (half price)

Change of Supervising Station

- 100% retest for new Central Station
- Different receiving equipment.
- Some systems are based off databases developed by Central Station. Points lists are not automatically populated.

Cancellation of Supervising Station

- Fire Department notification required.
- NFPA 72 26.2.7.4 The supervising station shall notify the authority having jurisdiction prior to terminating service.

Fire Alarm – “Jeopardy”

- What is required when the building exit widths are reduced to utilize a smaller capacity calculation in stairwells and other egress components?

Compliance Forum

Fire Alarm – “Jeopardy”

“What is an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 and an emergency voice/alarm communication system in accordance with Section 907.5.2.2.

Exit Widths affect Fire Alarm?

- The 2018 IBC allows Architects to reduce the exit widths of a building if they use the exception that requires the building to have sprinklers AND a voice evac system. Standard capacity calc for stairwell is 0.3 per occupant and other egress components is 0.2. If they use 0.2 or 0.15 then SPRINKLERS AND VOICE EVAC ARE REQUIRED.

Compliance Forum

Exit Widths affect Fire Alarm!

- 1005.3.1 Stairways. The capacity, in inches, of means of egress stairways shall be calculated by multiplying the occupant load served by such stairways by a means of egress capacity factor of 0.3 inch (7.6 mm) per occupant. Where stairways serve more than one story, only the occupant load of each story considered individually shall be used in calculating the required capacity of the stairways serving that story.
- Exceptions:
- 1. For other than Group H and I-2 occupancies, the capacity, in inches, of means of egress stairways shall be calculated by multiplying the occupant load served by such stairways by a means of egress capacity factor of 0.2 inch (5.1 mm) per occupant in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 (NFPA 13) or 903.3.1.2 (NFPA 13R) and an emergency voice/alarm communication system in accordance with Section 907.5.2.2.

Compliance Forum

Exit Widths affect Fire Alarm.

- 1005.3.2 Other egress components. The capacity, in inches, of means of egress components other than stairways shall be calculated by multiplying the occupant load served by such component by a means of egress capacity factor of 0.2 inch (5.1 mm) per occupant.
- Exceptions:
- 1. For other than Group H and I-2 occupancies, the capacity, in inches, of means of egress components other than stairways shall be calculated by multiplying the occupant load served by such component by a means of egress capacity factor of 0.15 inch (3.8 mm) per occupant in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 (NFPA 13)or 903.3.1.2 (NFPA 13R) and an emergency voice/alarm communication system in accordance with Section 907.5.2.2.

Compliance Forum

2024 Phoenix Fire Code

202 Definition of Flammable Gas

CHANGE TYPE: Modification

CHANGE SUMMARY: The category of flammable gas has been subdivided into two subcategories based on flammability characteristics.

Compliance Forum

2024 Phoenix Fire Code

Definition of Occupiable Roof

CHANGE TYPE: Addition

CHANGE SUMMARY: The term occupiable roof now includes human occupancy on rooftops for purposes other than maintenance and repair.

Compliance Forum

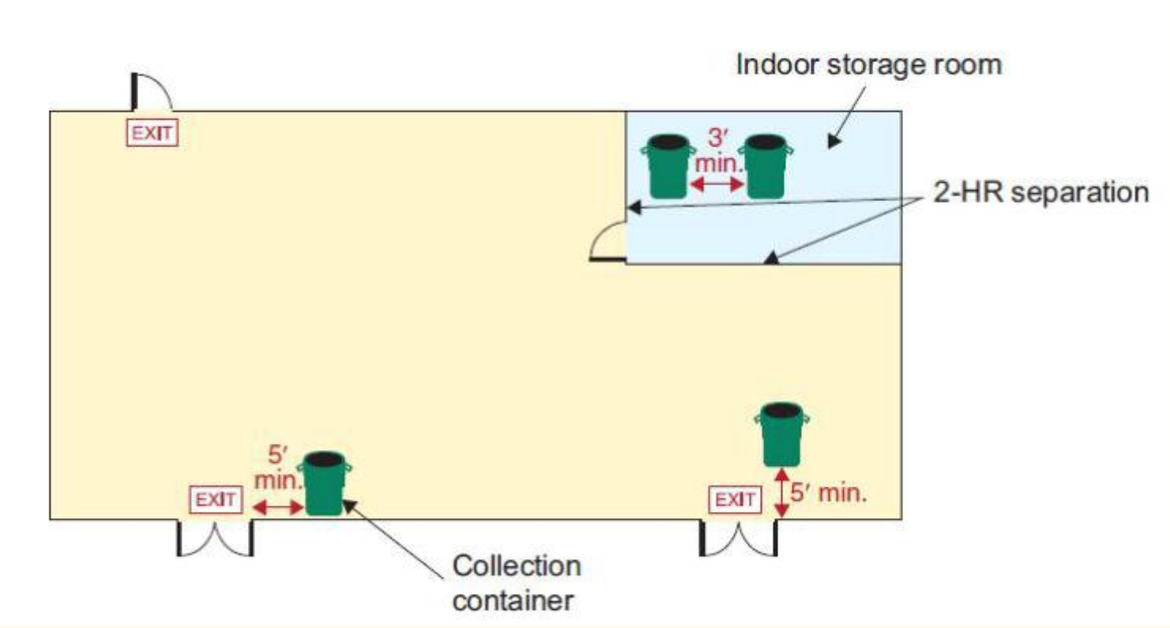
2024 Phoenix Fire Code

320 Battery Storage

CHANGE TYPE: Addition

CHANGE SUMMARY: Requirements pertaining to the storge of lithium-ion and lithium metal batteries are added to address the significant fire hazard that occurs during thermal runaway.

Compliance Forum



Waste and used batteries are collected at this facility. The maximum amount of lithium-ion and lithium metal batteries in containers is 15 cubic feet. Quantities exceeding 15 cubic feet are stored in an indoor storage area or in an outdoor storage area.

608.1.1 CO2 Mechanical Refrigeration Systems

CHANGE TYPE: Addition

CHANGE SUMMARY: Mechanical refrigeration systems utilizing carbon dioxide (CO2) as a refrigerant are now regulated in the IFC.

Compliance Forum

705.2.7 Rolling Fire Door Testing

CHANGE TYPE: Modification

CHANGE SUMMARY: Rolling steel fire doors must be inspected, tested and reset by a trained fire door systems technician on an annual basis.

2024 CODE TEXT: 705.2.6 Testing. Horizontal and vertical sliding and rolling fire doors shall be inspected and tested annually to confirm proper operation and full closure. Records of inspections and testing shall be maintained.

705.2.7 Periodic inspection and testing of rolling steel fire doors. Rolling steel fire doors shall be inspected and tested annually by a trained fire door systems technician in accordance with the applicable provisions of NFPA 80. Records of inspections and testing shall be maintained.

Compliance Forum

907.2 Fire Detection for Lithium-Ion and Lithium Metal Batteries

CHANGE TYPE: Addition

CHANGE SUMMARY: A fire alarm and detection system is required where lithium-ion or lithium metal batteries are developed, tested or manufactured, and where stored in battery storage rooms in Group M or S occupancies.

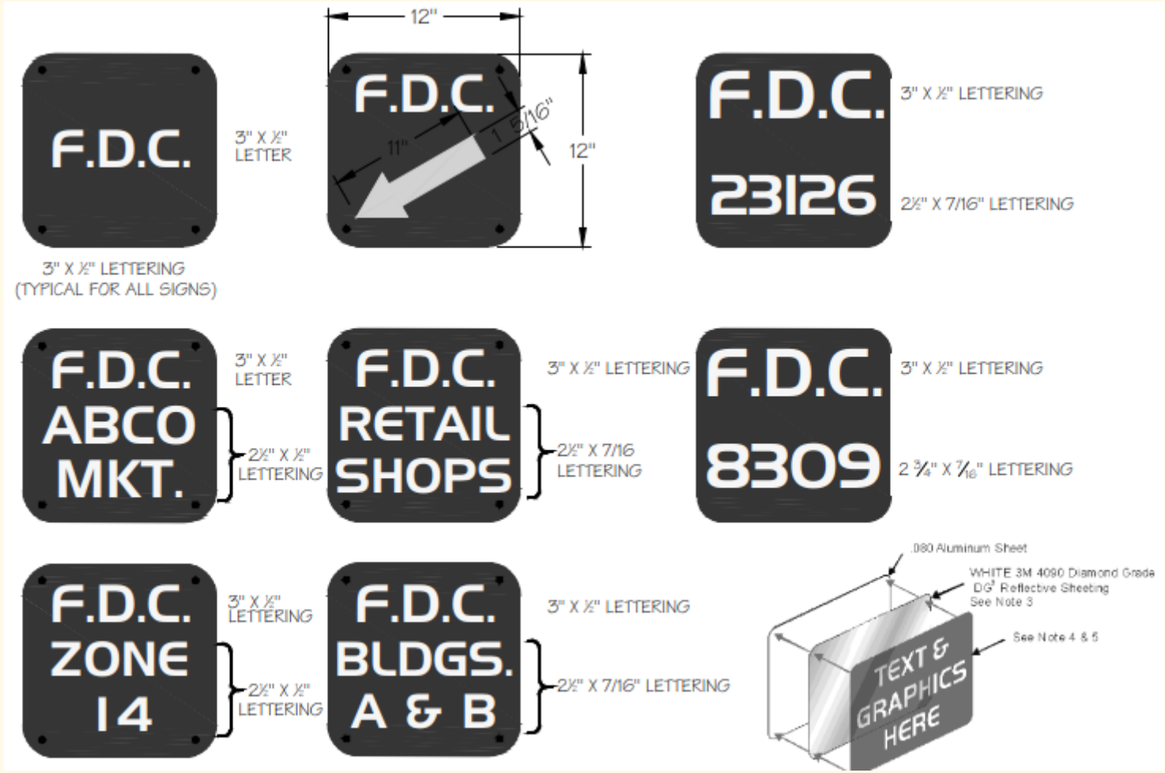
Compliance Forum

912.5 Fire Department Connection Signs

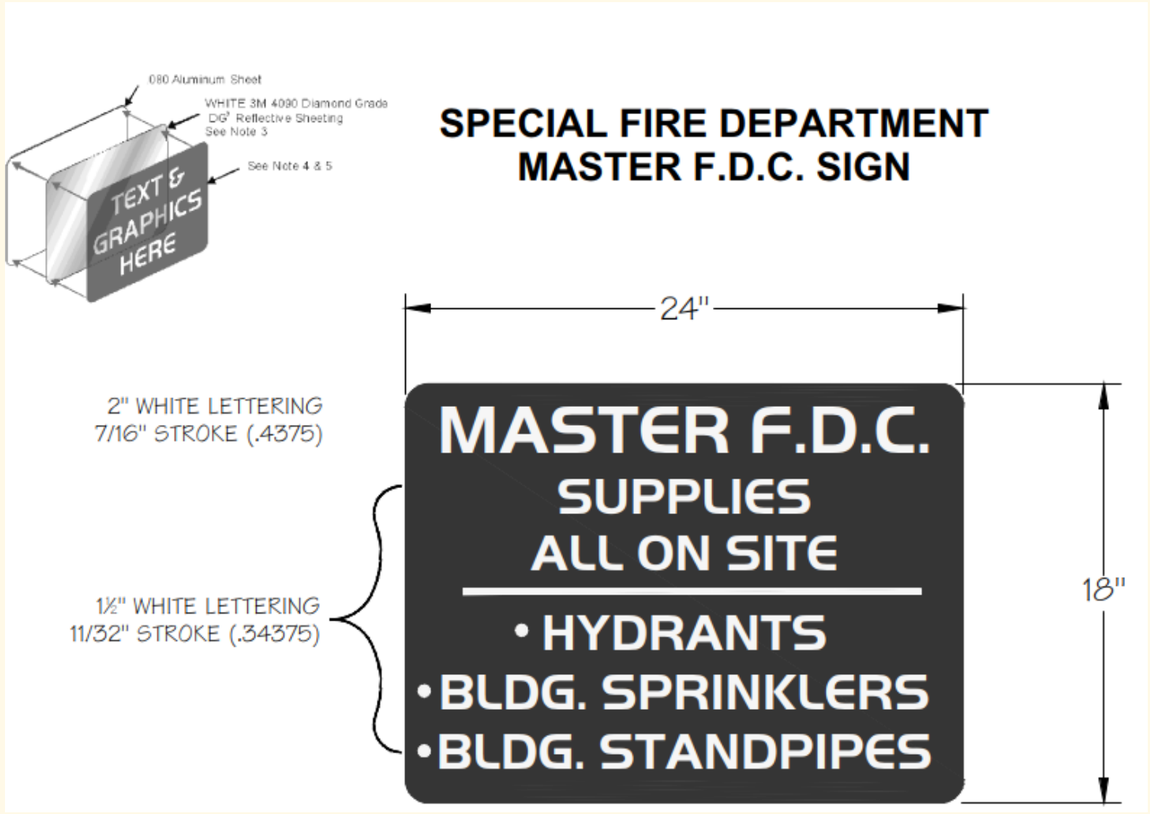
CHANGE TYPE: Modification

CHANGE SUMMARY: Signs for fire department connections must indicate the type of system served and any specific pressure requirements.

Compliance Forum



Compliance Forum



Compliance Forum

Thank you for attending we hope you will come back!