NFPA13D & NYSRC P2904

Dominick Kasmauskas

YOUR PRESENTER:

- Semi-retired in 2023. Now consulting on fire protection and legislation.
- Four years US military, Honorable Discharge, GCM.
- AFSA, NFSA, SFPE, ICC- IgCC, AWWA, USGBC, NFPA Fire Service section, NFPA CFPS, 101, and 1031, NFA Fire Officer II, NJ Firefighter III, Fire Inspector II, Fire Instructor II w/Endorsements, NJ State Police HazMat Instructor.

THE FIRE CHALLENGE

Fatalities

NFPA- 3,790 (2022) 59% in 1- or 2-fam houses.
Per me- More persons have died in fires than all US military in all US wars and conflicts since 1898.

Injuries

NFPA- 14,700

Plus, injuries just don't go away over night.

Costs

Loss of productivity costing thousands of dollars

Local impact to economy.

Environment

Water used, water runoff, apparatus fuel, toxins into the atmosphere, toxins going home on firefighters, destroyed materials to landfills, new materials to be made.

THE FIRE CHALLENGE

"However, data suggest that less progress has been made in preventing deaths and injuries associated with reported fires. For overall home fires, the 2022 rate of 7.5 deaths per 1,000 reported home fires was higher than the rate of 7.1 in 1980. The death rate for one- or two-family home fires was 14 percent higher than in 1980, while the rate for apartment fires was 18 percent lower."

~ NFPA "Fire Loss in the United States" Nov 2023

Reaction vs. Action

- Progressive Fire Officers in America-
  - "We cannot protect our citizens from fires. We cannot prevent fires. We can only react to the fires that occur."
- "Reaction" vs. "Action"


WHAT IS FIRE?

7

FIRE SCIENCE

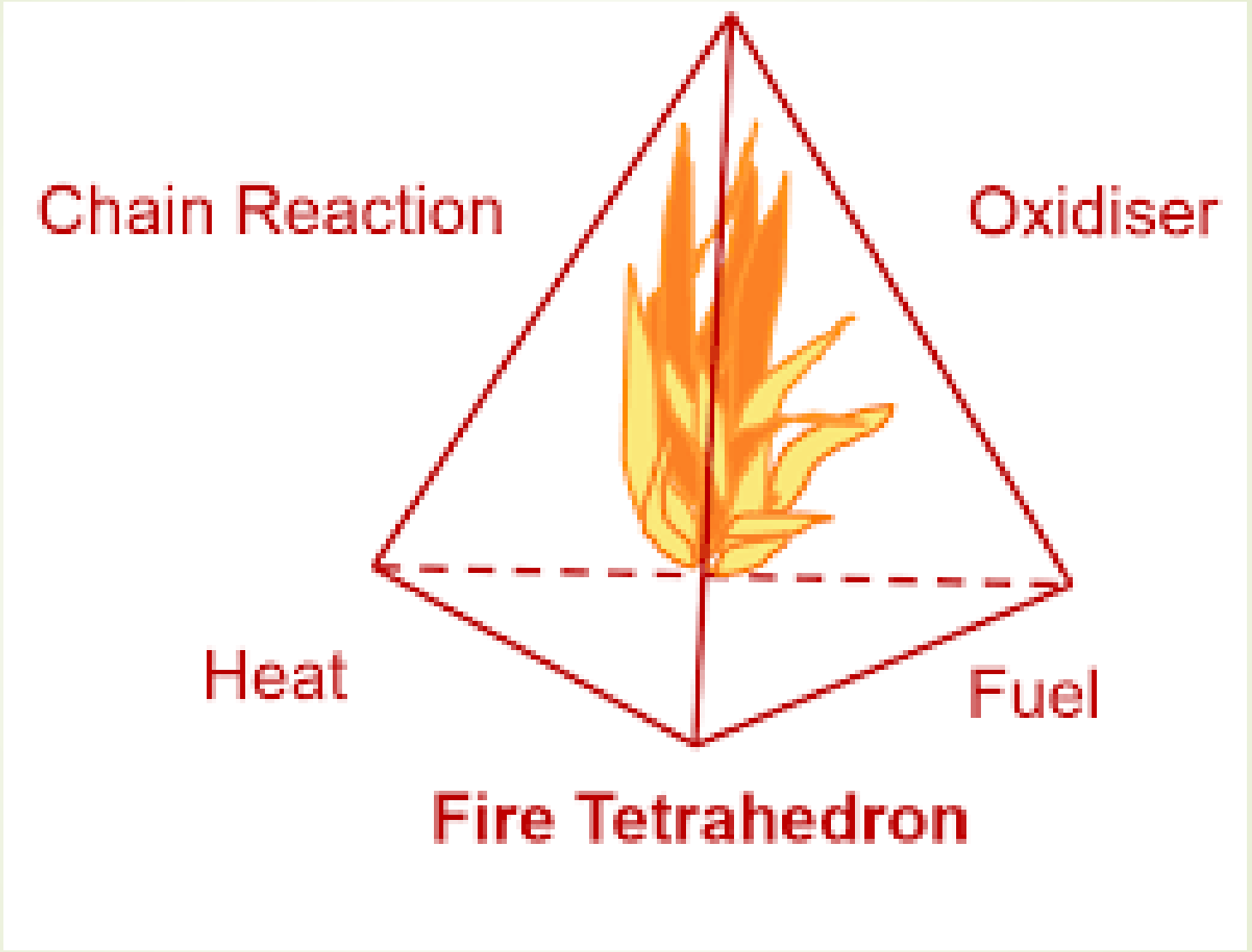
Or “why water works so well in addressing fires”.

3 States of Matter

Solid - Liquid - Gas

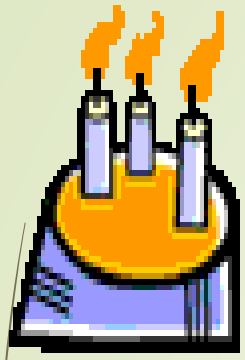
Do solids and liquids burn?

Only items in a gaseous state burn.


Chain Reaction
Oxidiser
Heat
Fuel
Fire Tetrahedron

Pyrolysis

The chemical decomposition of solids or liquids through the application of heat. Also called “gasification”.



Candle

1. Heat from the flame travels back to the wax via electromagnetic waves.
2. The heat causes pyrolysis of the wax.
3. The gases from pyrolysis mix with the oxygen in the air and burn.
4. Radiant heat from the flame travels back to the wax.

Sources of Heat Energy

1) Chemical
2) Electrical
3) Mechanical
4) Nuclear

Heat Transfer

1) Conduction - through bodies
2) Radiation - across space
3) Convection - circulation of gasses

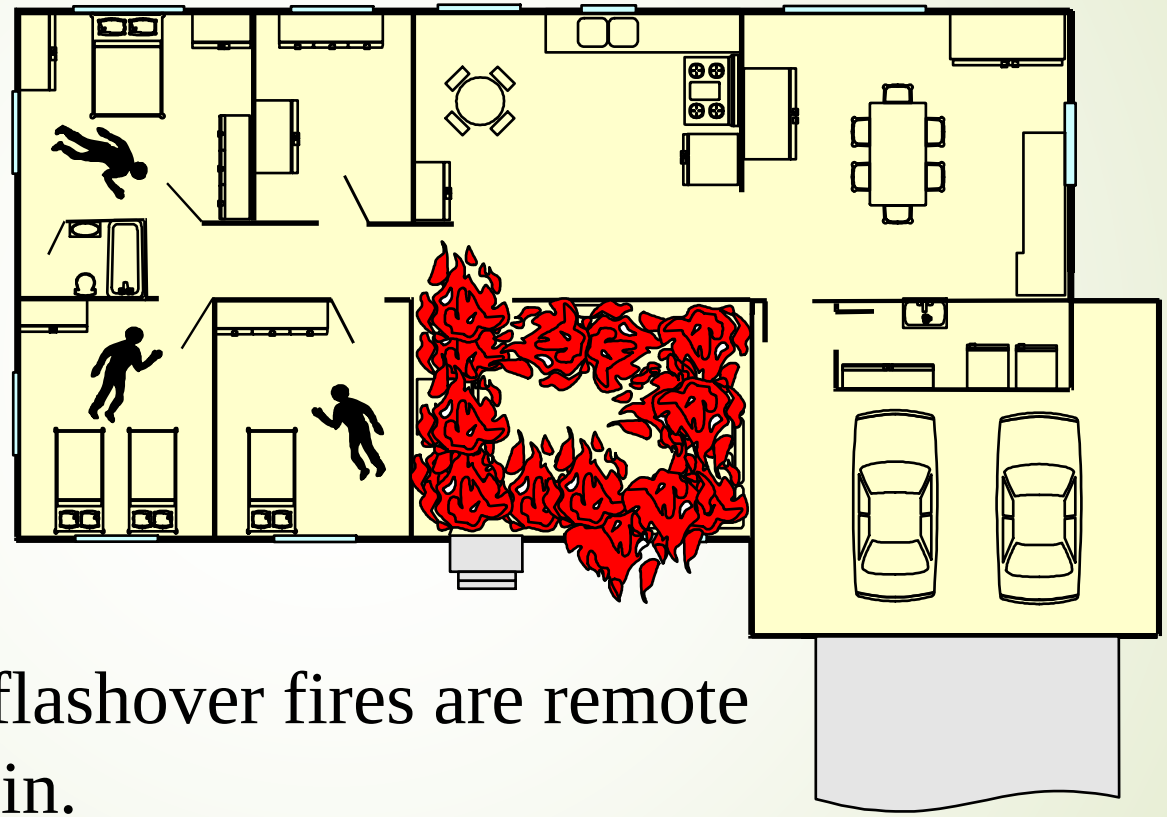
Flashover

Point at which all materials in a room are giving off sufficient vapors for combustion. Each material is at or above its ignition temperature. All combustion is now dependent upon the amount of oxygen entering the room.

(ventilation controlled fire)

NFPA13D's target…preventing flashover.

Post-flashover fires triple the number of victims.



Most victims in post-flashover fires are remote from the room of origin.

BASIC FIRE PREVENTION

- Kitchen fire safety (lids, extinguisher)
- Open flames (holidays)
- Heaters (kerosene, others)
- Electrical cords (under rugs, across paths)
- EDITH

My 2 cents…

CLOSE THE DOOR BEFORE YOU SNORE!!!

Responsibilities

- Taking the "high" road starts with you.
  - Business relationships are no different than personal relationships
- Always write violations
  - Use code section numbers
  - Identify to closest "landmark", i.e. column, floor, etc
- Working with other inspectors.
- Ditch the AHJ attitude
  - The AHJ is the city, county, municipality.
- Never pass up an opportunity to learn

Techniques

- Tag-a-long with other trades or vice versa.
- Use plan review checklist for on-site checklist
- Use “Reviewed for Code Compliance” shop drawings on site.
- Use architectural and MEP plans on site.
- Address changes to RCC or approved shop drawings or plans:
  - Minor
  - Major

More on Techniques

- Walk the pipe, floor by floor
  - Be redundant
  - Inspect the same each visit
- "Be the water."
- Consistency throughout project
  - Handle missed items on previous inspections with tact.
  - Don't play "GOTCHA!"

Why Sprinklers?

- Remember why this building is fire sprinklered:
  - Trade ups
  - Owner's request
  - Engineer's specification
  - Reduction in fire flow
  - Fire department access

NFPA 13D

Scope

66% of US consumers spend money on multiple products that only partially resolves their fire issues.

Chapters

"Few products, if any, in fire protection help customers like we do!"

Costs

- National average
- NY average
- Bids and the economy

Challenges

- Costs
- Rumors
- Licensing and Insurance

NFPA 13D Design

The number of design sprinklers shall include all sprinklers *within a compartment* to a maximum of 2 sprinklers

Hydraulic Calculations Options

1) Simplified calculation method
2) Prescriptive pipe sizing method
3) NFPA 13
4) Manufacturer's listing

Simplified Calculation Method

- Permitted on straight run connections
- Min. 4 in. city water main
- Determine friction loss from single design sprinkler to the connection

Inspections

- Municipal annual inspection not required.
  - Constitutional issues
    - US Constitution- Bill of Rights, Amendment IV
    - "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized."
- How many homes in your town?
  - Some day all homes will have fire sprinklers- Can you realistically inspect every home in your community?

Inspections

Requirements in NFPA 13D

NFPA 25* does not address 13D systems

* See Chapter 16 for Group Homes

System Components (Listing)

- NFPA 13D
  - All materials and devices EXCEPT:
    - Water supply pipe and fittings, tanks, expansion tanks, connections up to 5 ft between a tank and pump, pumps, valves, gauges, waterflow detection devices, hangers.

Water Supply

- Waterworks system
- Elevated tank
- Pressure tank per ASME
- (~~Fire~~) Pump
  - Stored supply
  - Well w/ sufficient capacity

NFPA 13D

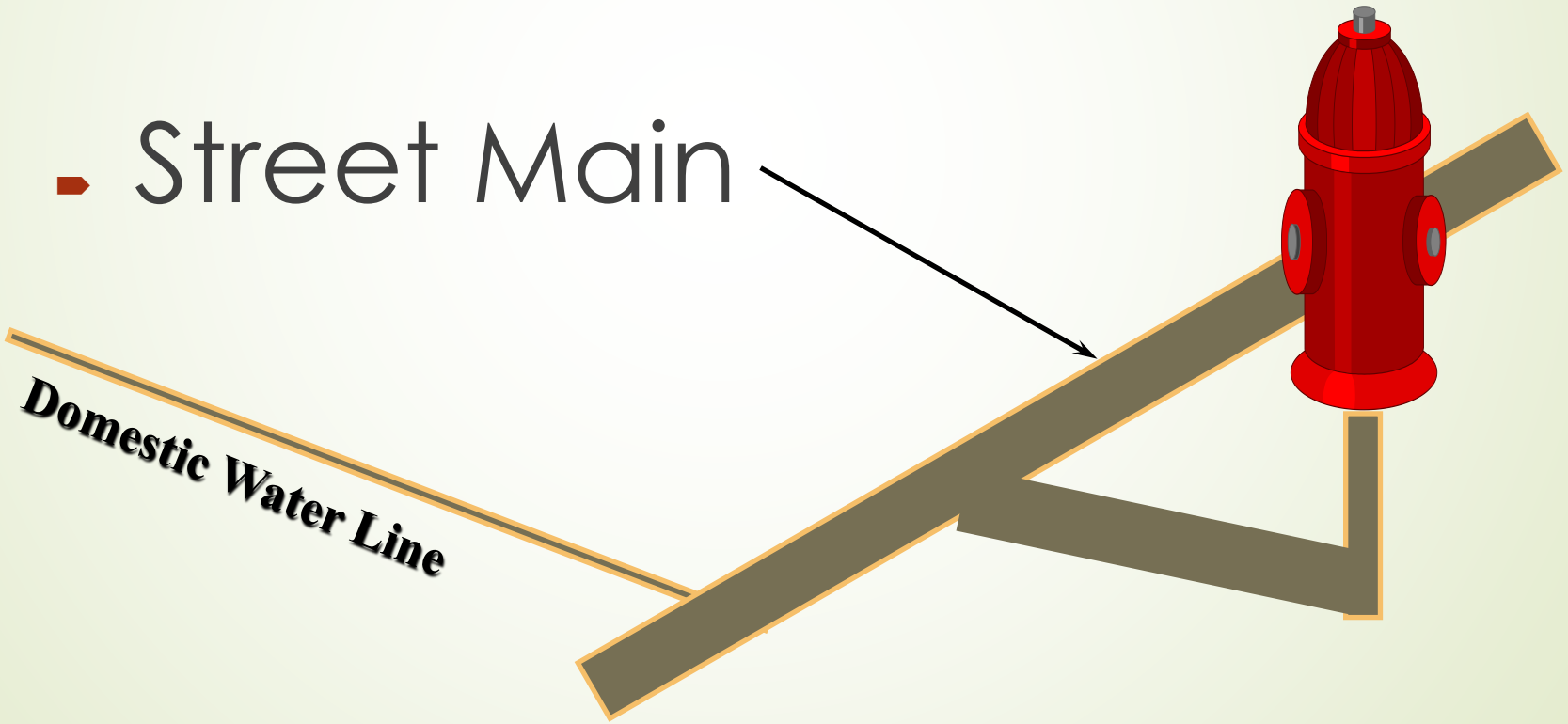
Water Supply Duration

10 Minutes

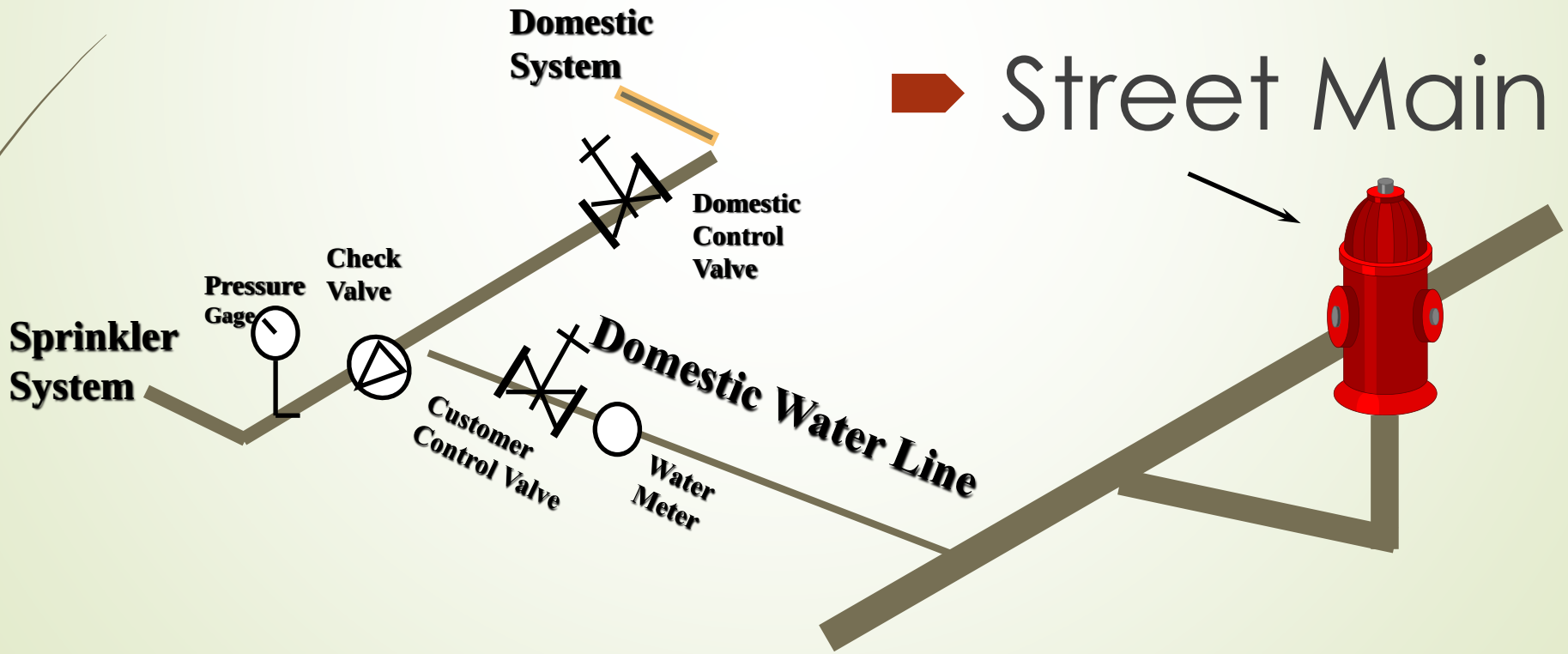
Exception : Single Story 1 Family Dwelling not Exceeding 2000 Sq. ft.
7 Minute Water Supply Allowed

Water Supply Options

- Street Main

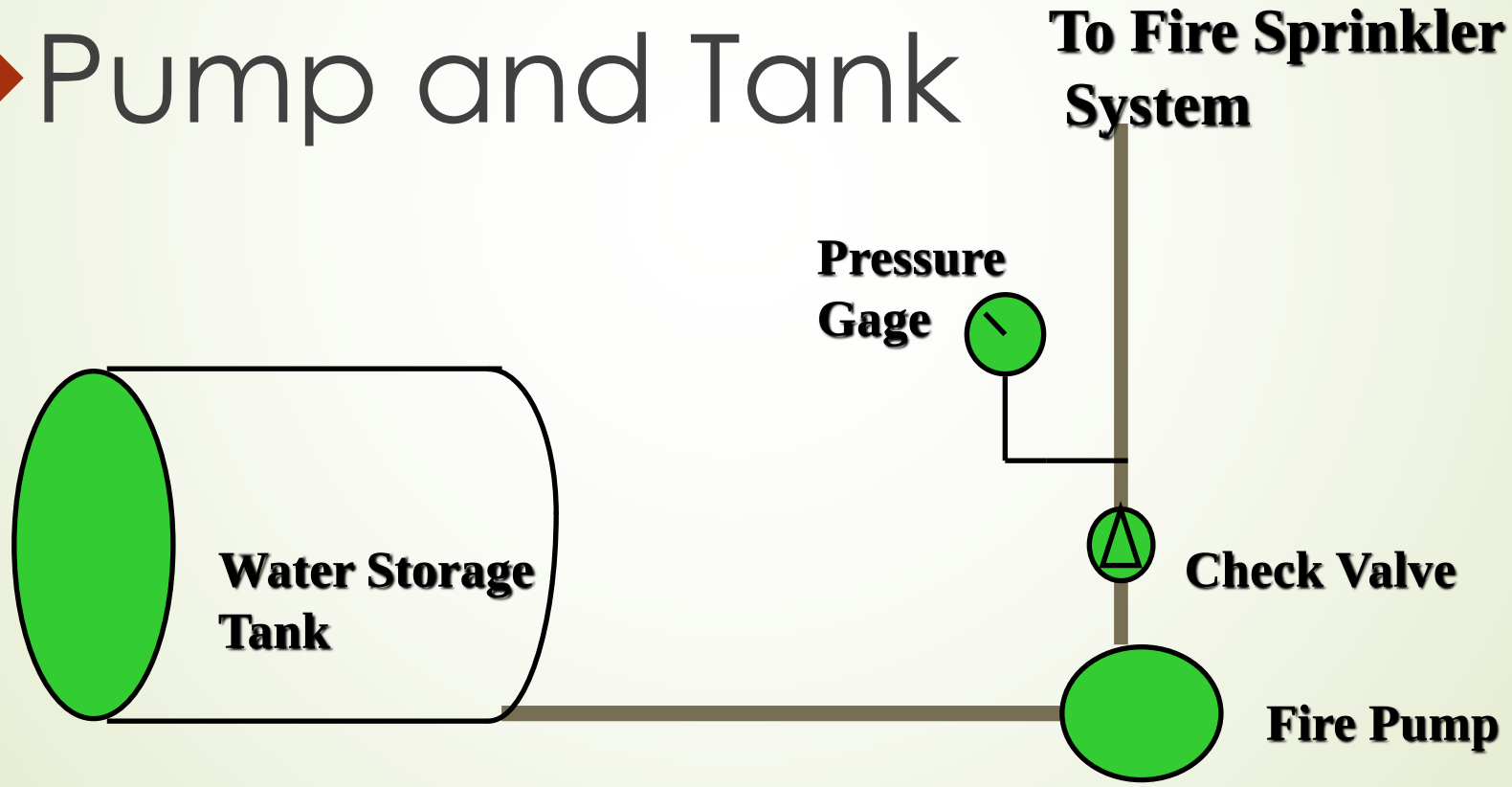


Domestic Water Line Serves Both Domestic System and Fire Sprinkler System

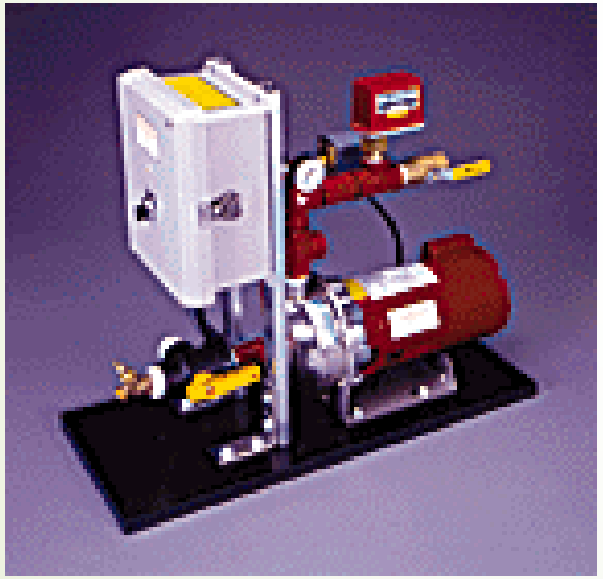


Water Supply Options

- Street Main
- Pump and Tank



Tank and Pump

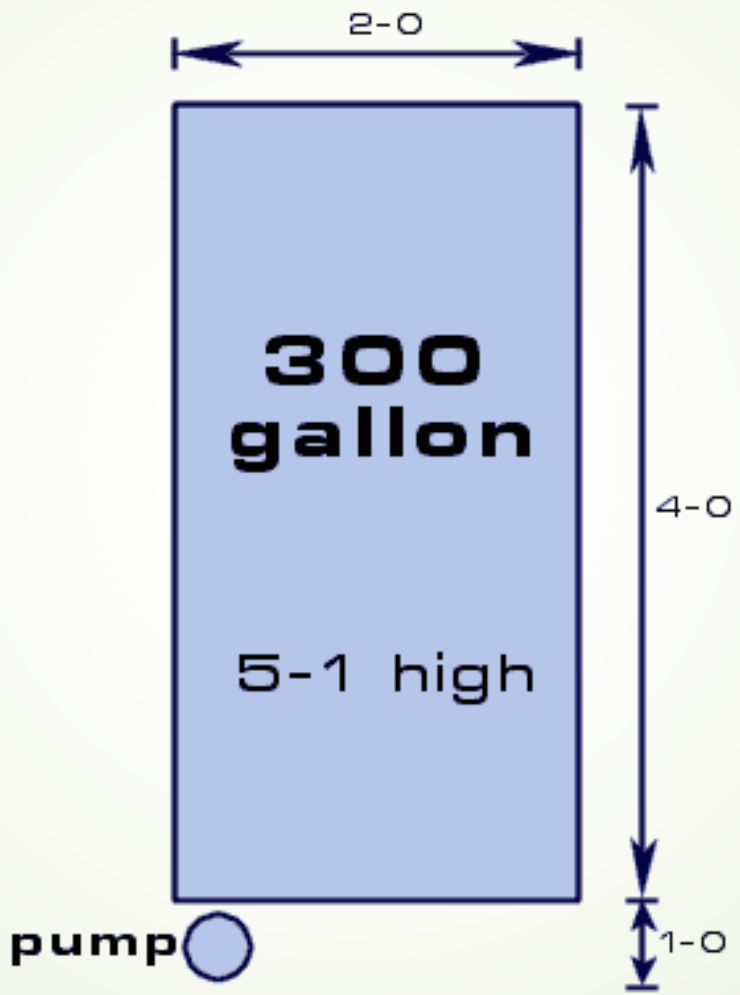


Compact Pump w/Alarm

Technology is growing for 13D (or shrinking)

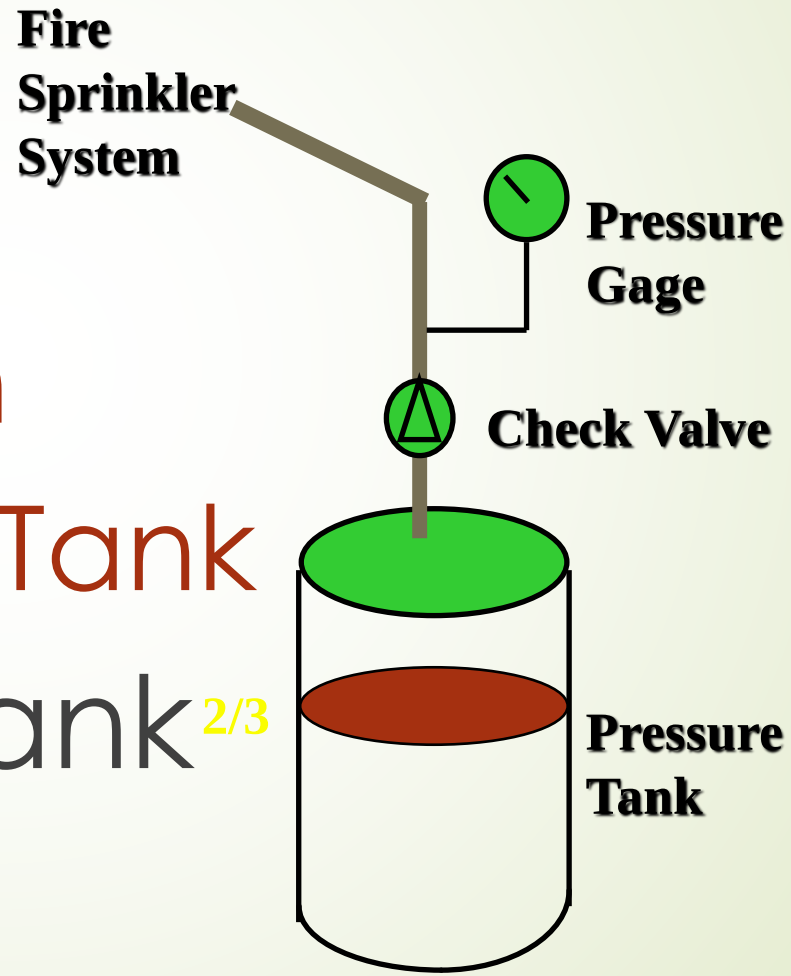
Pre-fab Systems meeting the need

13D Tank Size



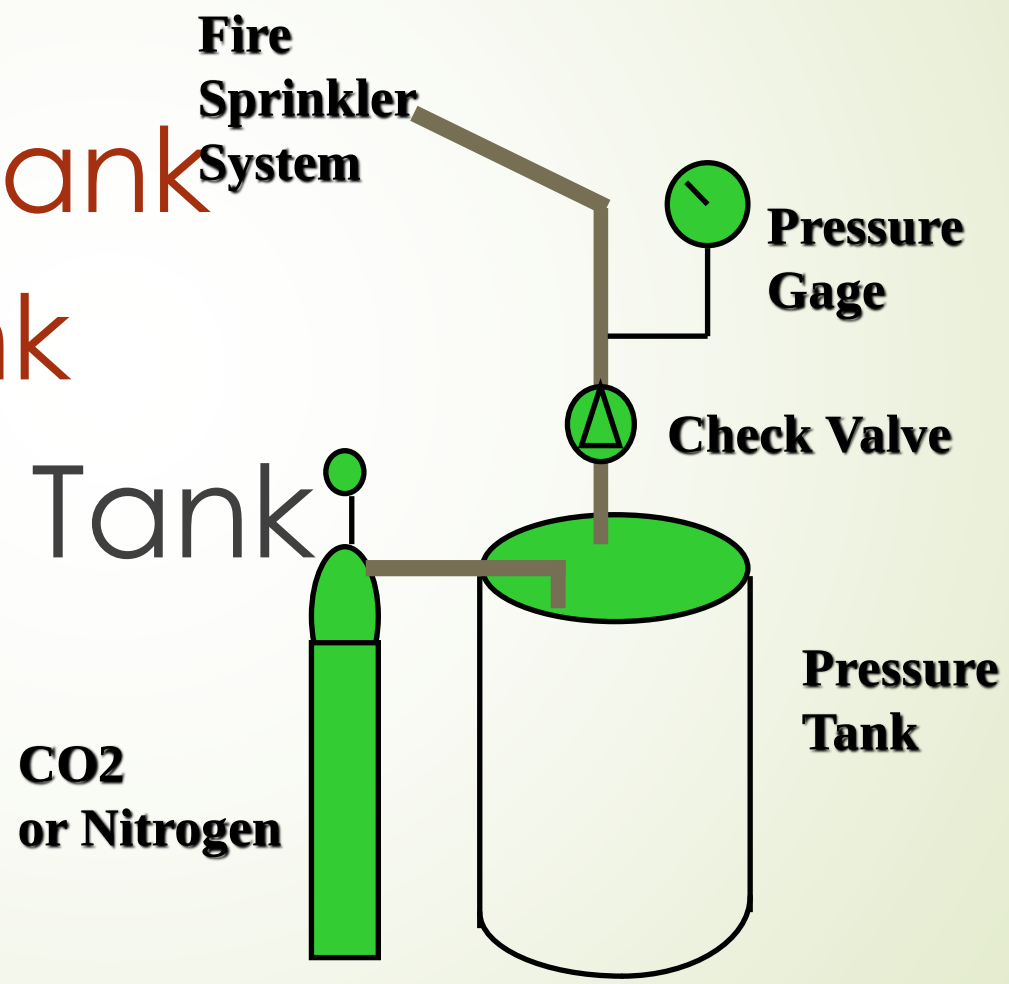
Water Supply Options

- Street Main
- Pump and Tank
- Pressure Tank 2/3



Water Supply Options

- Street Main
- Pump and Tank
- Pressure Tank
- Pressurized Tank



13D Riser

- Very basic
  - FDC not required
  - Alarm not required
  - Municipal annual inspection not required.
    - Homeowner visuals suffice
      - Water pressure
      - Valve “ON”

13D Riser

13D Riser

13D Riser in Exterior Closet

Insulated Closet

Must maintain any wet system at minimum 40 degrees F.

Heater

13D Riser

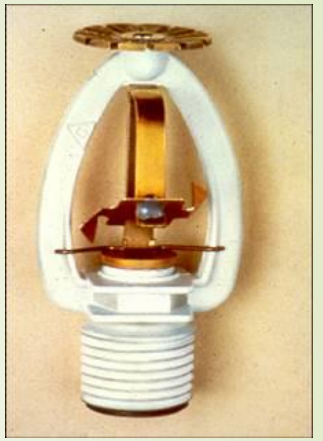
Multi-purpose Systems

- A type of “network system”.
- Not all “network systems” are multi-purpose systems.

Pipe & Fittings

- NFPA 13D
  - Pipe per Table 5.2.2
    - Listed pipe per Table 5.2.3.2
    - Includes PEX tubing
  - Fittings per 5.2.5
    - Listed fittings per Table 5.2.9.2

Fire Sprinkler Operation



- Activated by heat
  - Metal link
  - Glass bulb

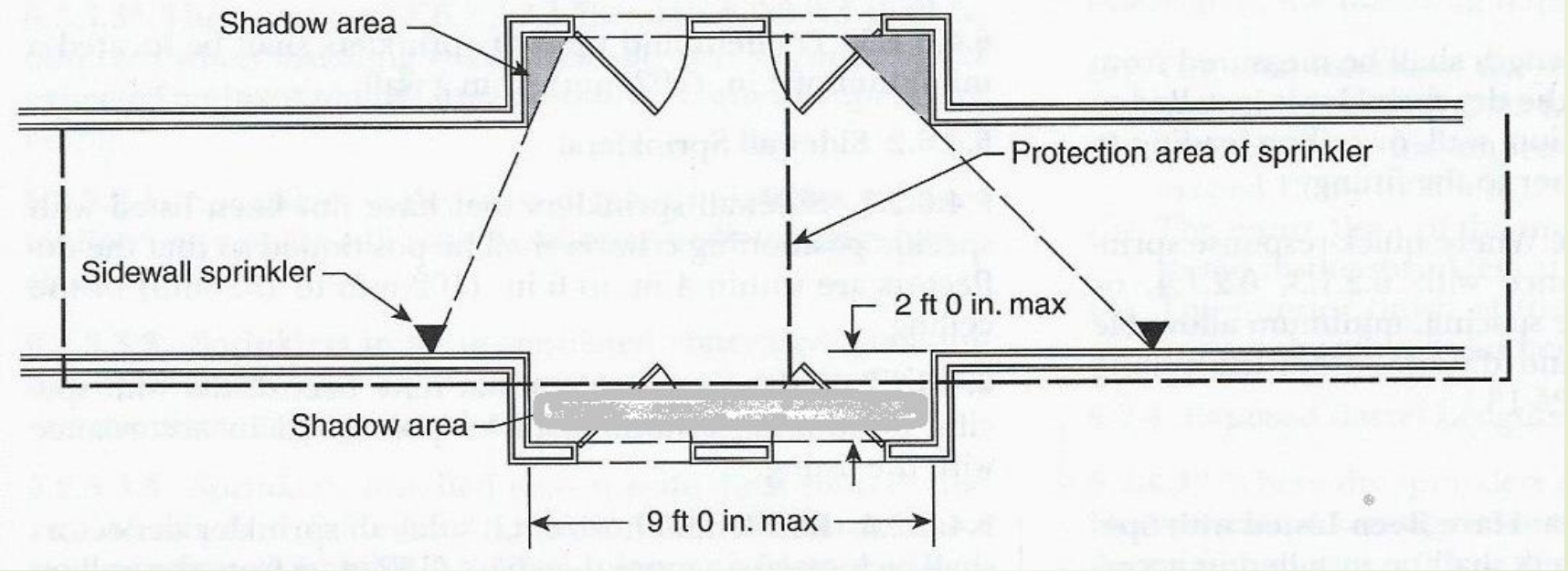
- Fire sprinklers do not activate by smoke
- Smoke detectors do not activate fire sprinklers
- Manual pull stations, *nope, not them either*

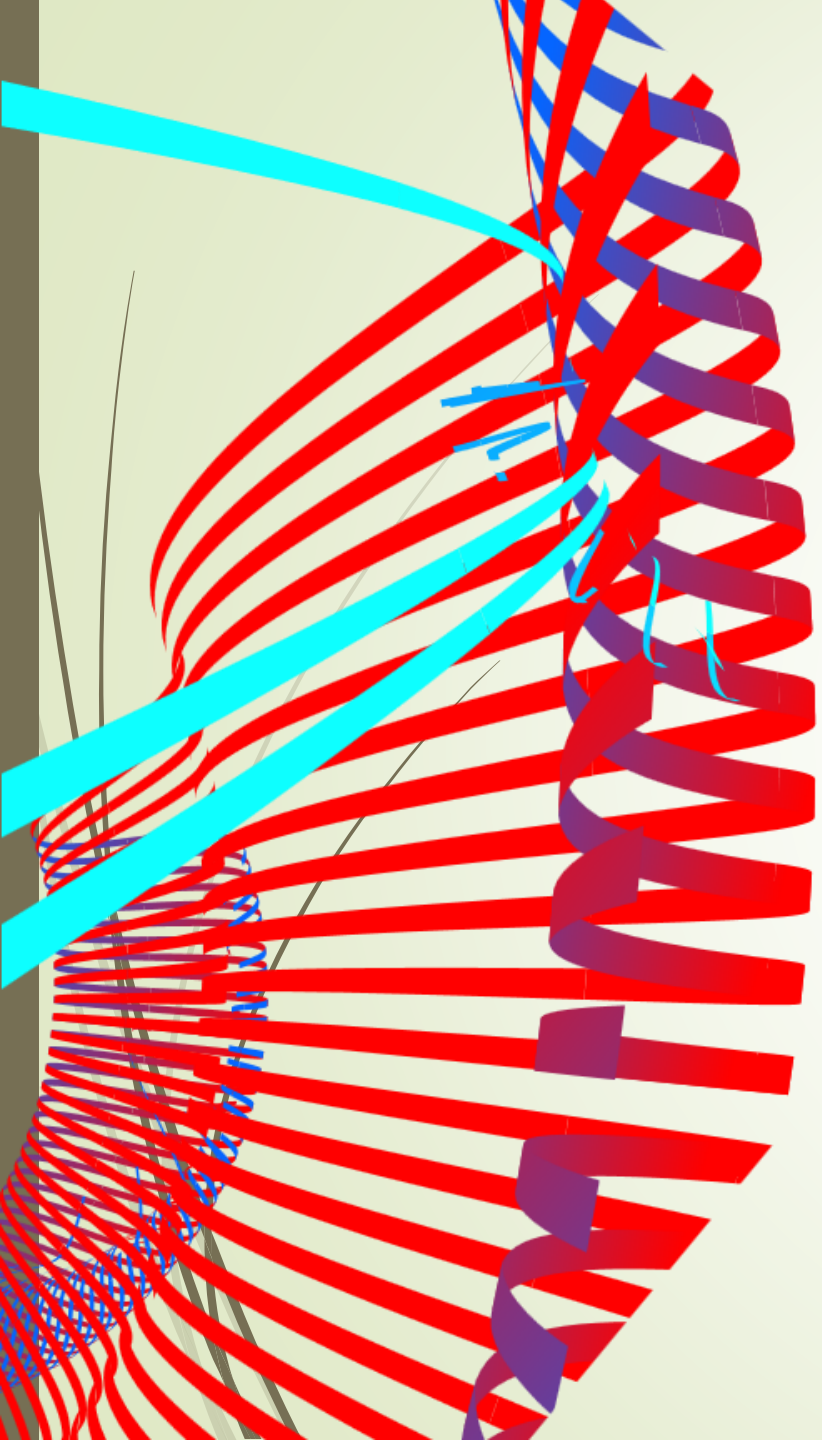
“Residential” Sprinkler

- Designed and tested to react approx 9 times faster than commercial fire sprinklers.

Just a note: NFPA 13D Shadows

- A single sprinkler can have up to 15 sq. ft. of dry area.
- Corridors are permitted up to 2 ft in depth and 9 ft in length





2020 NY STATE RESIDENTIAL CODE

FIRE PROTECTION IN THE NYSRC

Chapter 3

Section 313

Section 314

Chapter 29

Design and installation of residential fire sprinklers.

Fire Sprinkler Sections Deleted?

Need to look at areas Sections that received fire sprinkler trade-ups and return to older code requirements.

NYSRC P2904

NYSRC P2904

Section: P2904.1 General

- Complies with NFPA 13D or P2904
- Partial systems- limited allowance
- Stand alone or Multipurpose systems
- Stand alone- Separate from domestic
- Backflow is NOT required
    - Stipulations

NYSRC P2904

Section: P2904.1.1 Required Locations

- All areas except;
  - Attics, crawl spaces
    - Except fuel-fired equipment
  - Certain closets
  - Certain bathrooms
  - Garages, porches

- Basically, its where there is human activity

NYSRC P2904

Section: P2904.2

- Key words…
- “New”, “Listed”, “Residential”
- Installed per Manufacturer’s Requirements

NYSRC P2904

Section: P2904.2.1 Temp Ratings, Heat Sources

- Rated not less than 135F, not more than 175F.
- Separated from heat sources per Manufacturer's Instructions

NYSRC P2904

Section: P2904.2.2

Intermediate Temp

- 175F to 225F
  - Attics
  - Skylights, with direct sunlight
  - Concealed spaces under roof.
  - Distances from heat sources in Table 2904.2

NYSRC P2904

Section: P2904.3

Freezing

- Prevent freezing!
  - Pipe per P2603.5
  - Dry Pipe System (Residential)
  - Dry fire sprinklers
- Another answer, not in the code:
  - Homebuilders may stipulate in a contract:
    - To paraphrase; All fire sprinkler piping in walls to be in conditioned interior walls only.

NYSRC P2904

Section: P2904.2.4 Fire Sprinkler Coverage

- P2904.2.4.1 Limit 400 sqft.
- P2904.2.4.2 Obstructions
  - Formulas per Figure…2.4.2
  - Sidewall
  - Pendant

NYSRC P2904

Section: P2904.2.6 Modification prohibited

- P2904.2.6 No paint or caulk
  - Includes escutcheon
  - No requirement in Energy Code to caulk concealed fire sprinklers!

NYSRC P2904

Section: P2904.3 Pipe

- P2904.3- Supported same as cold water domestic
- P2904.3.1.1- nonmetallic allowed
- P2904.3.1.1- 15-minute fire protection
  - 3/8" gypsum, 1/2" plywood
- P2904.3.2 Shutoffs
  - Valve for entire house systems
  - Locked "open" valve allowed on fs system
- P2904.3.3- One housing unit per system
- P2904.3.4- Drain on system side

NYSRC P2904

Section: P2904.4 Design Flow

- P2904.4.1- Determine
  - Area of coverage
  - Ceiling configuration (new)
  - Temp rating
  - Additional by manufacturer, if any

NYSRC P2904

Section: P2904.4 Design Flow

- P2904.4.1.1- Ceilings
  - 8:12 w/o beams
  - 8:12 w/beams
  - 2:12 to 8:12 w/ or w/o beams
  - Pendant fire sprinklers

NYSRC P2904

Section: P2904.4 Design Flow

- P2904.4.2- Design Flow
  - One fire sprinkler
  - Two (x2 most hyd. Demanding)
  - Unsmooth ceilings
  - Room with largest flow rate
    - Dictates system design flow rate
  - Dividing room

NYSRC P2904

Section: P2904.5 Water Supply

- P2904.5.1- If pump, pressure control setting
- P2904.5.2- 10 minute supply minimum
    - or 7 minute supply minimum if 2,000 sqft or less, one-story.

NYSRC P2904

Section: P2904.6 Pipe Sizing

- P2904.6.1- to determine pipe sizing
  - Prescriptive method or 13D hydraulically calculated
  - ¾" minimum and ½" at fire sprinkler attachment.
  - Tables
    - Size, type elevation changes

NYSRC P2904

Section: P2904.6 Pipe Sizing

- P2904.6.2- Prescriptive method
  - Tables (1) through (9)
    - Size, type, elevation changes

NYSRC P2904

Section: P2904.6 Pipe Sizing

- P2904.6.2.1- the fun begins! Equation 29-1
- $P_t = P_{sup} - PL_{scv} - PL_m - PL_d - PL_e - PL_{sup}$

NYSRC P2904

Section: P2904.6 Pipe Sizing

- P2904.6.2.1- Equation 29-1
- $P_t=P_{sup}-PL_{scv}-PL_m-PL_d-PL_e-Pl_{sup}$
- Step 1- Determine P_{sup}
  - Static supply pressure
- Step 2- Determine PL_{svc}
  - Pressure loss in the water service pipe

NYSRC P2904

Section: P2904.6 Pipe Sizing

- P2904.6.2.1- Equation 29-1
- $P_t=P_{sup}-PL_{scv}-PL_m-PL_d-PL_e-Pl_{sup}$
- Step 3- Determine PL_m-
  - Loss of meter pressure, if one
- Step 4- Determine PL_d-
  - Loss of pressure from other devices
    - Softeners, bfp, other

NYSRC P2904

Section: P2904.6 Pipe Sizing

- P2904.6.2.1- Equation 29-1
- $P_t=P_{sup}-PL_{scv}-PL_m-PL_d-PL_e-Pl_{sup}$
- Step 5- Determine PL_e-
  - Loss by elevation
    - Point of water source (where measured) to highest fs in system
- Step 6- Determine PL_{sup}-
  - Required pressure per manufacturer

NYSRC P2904

Section: P2904.6 Pipe Sizing

- P2904.6.2.1- Equation 29-1
- $P_t=P_{sup}-PL_{scv}-PL_m-PL_d-PL_e-Pl_{sup}$
- Step 7- Determine PL_t
  - Do the math
- Step 8- Tables (4) through (9)
  - Select material and size
  - Adding loss for fittings not required (already figured in Tables)

NYSRC P2904

Section: P2904.7 Instructions, Signs

- P2904.7-
  - Owners Manual to the Owner
  - Valve tag verbiage
    - Main shutoff

NYSRC P2904

Section: P2904.8 Inspections

- P2904.8.1- Preconcealment Inspection
  - See 1 through 8

NYSRC P2904

Section: P2904.8 Inspections

- P2904.8.2- Final Inspection
  - See 1 through 4

INSPECTION AFTER C OF O

- Inspection of system
  - More “not to do” than “to do”
  - 13D has a good list
- Homeowner’s responsibility
  - Rental?
    - Lease agreement should stipulate
      - Tenant?
      - Owner?

Rumor Control

“Just the Facts ma’am”

- The “Hollywood” image of fire sprinklers.
  - Movies
  - TV
  - Commercials
- “They all go off at once”
- “*I read it in the newspaper!*”
  - Therefore it must be true?

Public Perception

- *Fire Sprinklers Cost Too Much*
- *All Sprinkler Systems Are Deluge*
- *Fire Sprinklers Frequently Leak*
- *Fire Sprinklers Are Ugly*
- *Insurance Rates Will Increase Because of Water Damage*

Question #1

True or False: The pump supplying the fire sprinkler system shall be listed for fire protection use.

FALSE

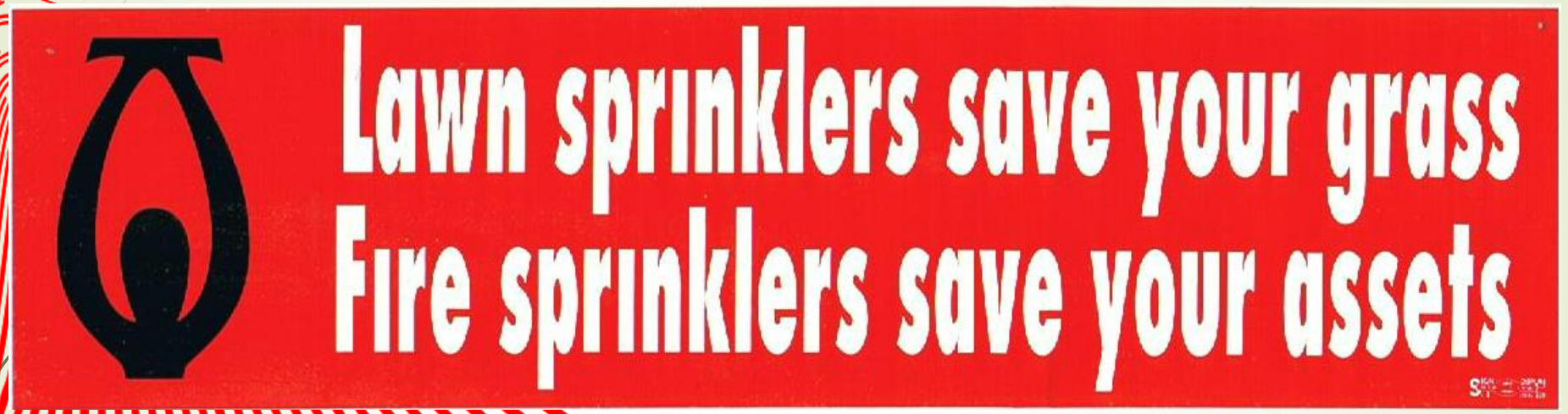
Question #2

True or False: PVC pipe is permitted to be used in aboveground pipe.

FALSE


Any Questions?

IN SUMMARY


Lawn sprinklers save your grass
Fire sprinklers save your assets

THANK YOU!

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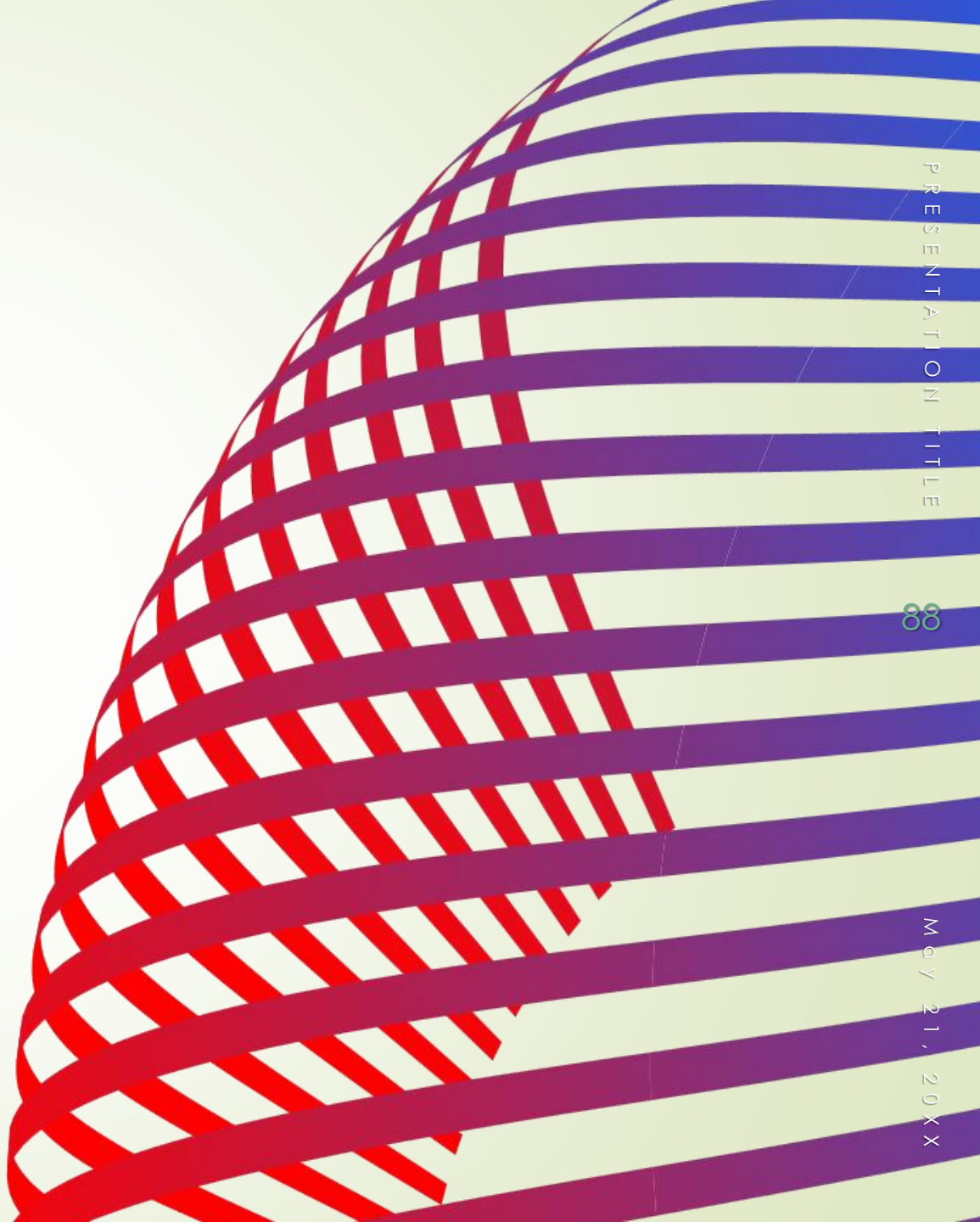

PRODUCT BENEFITS

Cool [illegible]

Areas for [illegible] sections

Online store [illegible] market swap

Company A

Product is more expensive

Companies B & C

Product is expensive and inconvenient to use

Companies D & E

Product is affordable, but inconvenient to use