

# Introduction to DSPS Fire Suppression Plan Review

(Rev. 10/3/2023)



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# Outline

- Overview of Safety & Buildings Fire Protection Review
- Requirements for Fire Sprinkler Plan Review
- Key components to look for during plan review
- Field Inspections
- Testing of sprinkler systems



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# Overview of Safety & Buildings Fire Protection Review



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# Why is the Department of Safety and Professional Services now performing fire protection plan review?

- ❑ Develop uniform procedures and practices throughout the State of Wisconsin
  - All commercial buildings as of January 2012
  - Transferred CBRF review to DHS January 2016 by memorandum of agreement.



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# Why is the Department of Safety and Professional Services now performing fire protection plan review?

- ❑ Establish consistency in interpretation and enforcement of the Wis. Admin. Code
  - Wisconsin Act 270 (April 2014)
    - Established a uniform commercial building code in Wisconsin, while allowing municipalities to grandfather fire detection, prevention, and suppression ordinances that relate to the construction, alteration, or addition to a public building or a building that is a place of employment



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# Why is the Department of Safety and Professional Services now performing fire protection plan review?

## ☐ Mandated by Law

- WI Statute 101.12 Approval and inspection of public buildings and places of employment and components.

**101.12(1)** Except for plans that are reviewed by the department of health and family services under ss. 50.02 (2) (b), 50.025, 50.36 (2), or 50.92 (3m), the department shall require the submission of essential drawings, calculations and specifications for public buildings, public structures and places of employment including the following components:

**101.12(1)(a)** Heating, ventilation, air conditioning and fire detection, prevention or suppression systems.



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# Why is the Department of Safety and Professional Services now performing fire protection plan review?

- ❑ SPS 361.05 – specifies the current adopted code
  - IBC 2015 is the current code enforced by DSPS
    - IBC chapter 35 contains a comprehensive list of all standards that are referenced in the code
  - Fire Protection standards referenced by 2015 IBC:
    - NFPA 13, 13R, 14, 20, 72 (2013 Editions) NFPA 30 (2012 Edition)
    - A complete list can be found at:  
<https://dsps.wi.gov/Documents/Programs/FireSuppressAlarm/FireSuppressionSubmittalGuidelines.pdf>



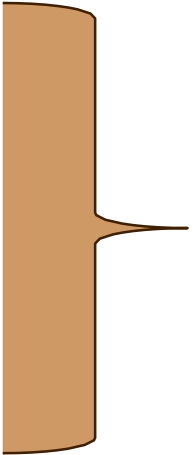
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# Occupancies currently requiring State of Wisconsin plan review

## ☐ All occupancies **except** the following:

- CBRF's serving 5-8 unrelated adults (UDC)
- Assembly A-2, A-3
- Business B
- Factory F-1, F-2
- Mercantile M
- Storage S
- Utility and Misc. U



(containing less than 25,000 cubic feet)

(Table SPS 361.30-1)



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# Types of Fire Protection Systems that are reviewed

- ☐ Alternative Fire Suppression Systems
- ☐ Atrium Fire Protection Systems
- ☐ New Automatic Fire Sprinkler Systems  
And additions or alterations of more than 20 sprinklers
- ☐ New Fire Alarm Systems  
Add additions or alterations of more than 20 devices
- ☐ Standpipe and Hose Systems
- ☐ Underground piping dedicated solely to  
the fire suppression system



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# Where Plans are Reviewed

❑ Plan reviews to DSPS must be submitted electronically through the Electronic Safety and Licensing Application (eSLA).

- For step-by-step instructions and videos on electronic submittals, see the eSLA User Guides and Videos page  
<https://dsps.wi.gov/Pages/eSLAResources.aspx>.
- See the applicable DIS program page for plan review information specific to the program.  
<https://dsps.wi.gov/Pages/Programs/Default.aspx>

❑ DIS no longer accepts hard copy plan review submittals.



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# Where Plans are Reviewed

## ❑ Requirements for eSLA submittal:

- The applicant must create an eSLA login profile. This login profile is specific to the individual submitting the application. It should not be a generic profile for the company.
- If a Supervising Professional is required, the Supervising Professional must also have an active eSLA login profile.
- You must include the property owner's name, address, phone number, and email address.
- eSLA works best with Google Chrome, Mozilla Firefox, or Safari as the internet browser. If using another internet browser, you may experience technical issues with the submittal.
- Be able to combine plan sheets into one file for upload.
- Be able to combine supporting documents into one file for upload.



# Where Plans are Reviewed

☐ DSPS through eSLA

☐ Authorized Municipalities

- Certified Municipalities and Counties (SPS 361.60)
- A complete list of delegated municipalities can be found online at:

<https://dsps.wi.gov/Documents/Programs/DelegatedAgent/FSFADelegatedMuni.pdf>



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# Requirements for Fire Sprinkler Plan Review



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# Who can prepare fire sprinkler drawings?

- ☐ Architects, Engineers or Fire Protection Designers licensed by the Department of Safety and Professional Services (Business credential)
- ☐ Automatic Fire Sprinkler Contractor who is licensed by the Department of Safety and Professional Services (Trades credential)



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# General Information

## Required on all Fire Sprinkler Plans

- ☐ Plans and calculations shall be signed, sealed, and dated
- ☐ All plans shall include the name of the owner and the address of the building
- ☐ All plans shall include a plot plan showing the location of the building with respect to the property lines and lot lines, adjoining streets and alleys, as well as other buildings on the same property



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# General Requirements

## Required on all Fire Sprinkler Plans

- ☐ Floor plans shall be included showing the location and size of all rooms, doors, windows, walls, partitions, fire walls, and other pertinent information.
- ☐ All plans shall include all sections and details necessary to clarify the fire protection system design.





# General Requirements

## Required on all Fire Sprinkler Plans

- ☐ Include all pertinent information required
  - NFPA 23.1 (Working Plans) - 46 individual items
  - NFPA 23.2 (Water Supplies) - 12 individual items
- ☐ Hydraulic calculations
  - NFPA 23.3 (Hydraulic Calculation Forms) - 84 items
  - NFPA 23.4 (Hydraulic Calculation Procedures)



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# General Requirements

## Required on all Fire Sprinkler Plans

### ❑ Equipment Submittals Fire Sprinkler Systems

- It is only necessary to include data sheets for those materials which include specific criteria relative to its listing
  - Sprinklers
  - Cross connection control devices
  - Alarm Check, Dry pipe, Preaction, & Deluge Valves (detection for preaction and deluge required)
  - Fire & Jockey Pumps and Controllers
  - Tanks
  - Pressure Reducing Valves
  - Pipe, Fittings and Hangers



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# Key Components to Look for During Plan Review



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# NFPA 13 Systems

- ❑ Sprinklers are required to be installed in all areas throughout a building (NFPA 13:4.1)



# NFPA 13 Exceptions

- ❑ Combustible concealed spaces per exceptions listed in (NFPA 13: 8.15.1.2)
  - Need to coordinate with NFPA 13: 11.2.3.1.4 (Hydraulic Calculation Methods for 3,000 ft<sup>2</sup> remote area.)
- ❑ Exterior stairways (NFPA 13: 8.15.3.2.4)
- ❑ Spaces under ground floors, exterior docks, and platforms (NFPA 13: 8.15.6)
  - Need to coordinate with NFPA 13: 11.2.3.1.4 (Hydraulic Calculation Methods for 3,000 ft<sup>2</sup> remote area.)



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# NFPA 13 Exceptions

- ❑ At the bottom of the elevator hoist way for enclosed, non-combustible elevator shafts that do not contain combustible hydraulic fluids. (NFPA 13: 8.15.5.3)
- ❑ Elevator machine rooms, machinery spaces, control spaces, or hoist ways of traction elevators (NFPA 13: 8.15.5.3)
  - Dedicated to elevator equipment only.
  - Protected by smoke detectors, or other automatic fire detection
  - Separated from the remainder of the building by fire resistance rating specified by the applicable building code.
  - No materials unrelated to elevator equipment are permitted to be stored
  - The elevator machinery is not of the hydraulic type



# NFPA 13 Exceptions

- ❑ Top of elevator noncombustible passenger hoist ways, ASME A17.1 (NFPA 13: 8.15.5.6)
- ❑ Exterior projections. (NFPA 13: 8.15.7)
  - Noncombustible/limited combustible
  - Exclude from below if exposed surface is noncombustible/limited combustible fire retardant-treated wood and contains only sprinklered concealed space or
  - Unsprinklered concealed space filled with noncombustible insulation
  - Non or limited combustible ceilings attached to the bottom of solid joists to create an enclosed space 160ft<sup>3</sup> or less
  - Concealed spaces over isolated small exterior projections not exceeding 55ft<sup>2</sup>
  - Exterior exit corridors 50% open and noncombustible



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# NFPA 13 Exceptions

- ❑ Not required in dwelling unit bathrooms not exceeding 55 ft<sup>2</sup>/15 minute thermal barrier (IBC 903.3.1.1.2)
- ❑ Not required in hotel and motel dwelling unit closets and pantries that do not exceed 24 ft<sup>2</sup> and the least dimension does not exceed 3ft (NFPA 13: 8.15.8.2)
- ❑ Generator, transformer and electrical equipment rooms
  - Approved fire detection system/ 2 hour (IBC 903.3.1.1.1)
  - Dry equipment only, 2-hour, no storage (NFPA 13: 8.15.11.3)



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# NFPA 13R Systems

NFPA 13R: 6.4.1

- ❑ Sprinklers are required to be installed in all areas throughout a building



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# NFPA 13R Exceptions

NFPA 13R: 6.6

- ❑ Bathrooms not exceeding 55 ft<sup>2</sup>
- ❑ Dwelling unit clothes/linen/pantry closets
  - area of the space not exceeding 24 ft<sup>2</sup> and
  - least dimension does not exceed 3 ft and
  - noncombustible or limited combustible construction
- ❑ Porches, balconies, corridors & stairs that are open and attached
  - SPS 362.0903(9) - Exterior balconies, decks and ground-floor patios of dwelling units where the building is of Type V construction, provided there is a roof or deck above shall require sprinkler protection



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# NFPA 13R Exceptions

NFPA 13R: 6.6

- ☐ Attics, penthouse equipment rooms, elevator machine rooms, concealed spaces exclusively for ventilation equipment, crawl spaces, floor/ceiling spaces, noncombustible elevator shafts, other concealed spaces not used for living or storage with no fuel fired equipment
- ☐ Closets on exterior balconies



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# Fire Sprinkler Plan Review Process

- ☐ Owner & Address of Building
- ☐ Plans & calculations properly signed
- ☐ Site plan, floor plans, cross section plan.
- ☐ Equipment submittals provided & listed
- ☐ Current waterflow test
- ☐ Design criteria & adjustments
- ☐ Sprinklers (K-factor, temperature, RTI)
- ☐ Control valves & system components



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# Hydraulic Calculation Review Process

- ☐ Remote Area identified
- ☐ Design area
- ☐ Area per sprinkler
- ☐ Minimum rate of water application
- ☐ Minimum pressure required
- ☐ Hose, rack, water curtain allowances
- ☐ Friction loss (pipe, fittings, elev., devices)
- ☐ Water source



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# Field Inspections



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# Information on Job Site

- ☐ Automatic fire sprinkler plans
  - Signed & sealed (SPS 361.31(1)(b))
- ☐ Automatic fire sprinkler specifications
  - Material and devices used
  - Settings of pressure reducing valves
  - Type and amount of antifreeze solution used, if any



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# System is Installed per the Plans

- ☐ Correct pipe sizes
- ☐ Sprinklers are spaced properly
- ☐ Appropriate sprinklers installed
- ☐ Correct type of pipe installed
- ☐ Underground correct size



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# Sprinklers

- ☐ Sprinklers free of all paint
- ☐ Tape, foil, or other protective covers are removed
- ☐ Deflectors have not been bent
- ☐ Sprinklers closer than 6 ft to each other
- ☐ Sprinklers obstructed



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# Testing of Sprinklers

- ☐ Standard response sprinklers in service over 50 years replaced or tested  
(NFPA 25: 5.3.1.1.1; 2011 Edition)
- ☐ 10 years for dry sprinklers  
(NFPA 25: 5.3.1.1.1.6; 2011 Edition)
- ☐ 20 years for quick response sprinklers  
(NFPA 25: 5.3.1.1.1.3; 2011 Edition)
- ☐ Sprinklers 325° F or greater shall be tested at 5 year intervals (NFPA 25: 5.3.1.1.1.4; 2011 Edition)
- ☐ Sprinklers manufactured prior to 1920 shall be replaced (NFPA 25: 5.3.1.1.1.2; 2011 Edition)



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# Obstruction to Sprinklers

- ❑ Obstructions that prevent sprinkler discharge from reaching the hazard
- ❑ Obstructions that prevent sprinkler discharge from reaching the hazard (NFPA13: 8.5.3)
  - Ducts over 4 ft wide (NFPA 13: 8.5.5.3.1)
  - Storage closer than 18” to sprinkler deflector (NFPA 13: 8.5.6.1 exceptions)
  - Open grate flooring over 4 ft wide
  - Overhead doors over 4 ft wide



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# Storage Height and Arrangement

- ☐ Storage array meets sprinkler design criteria
  - NFPA 13: 12.7 » Chapter 12 thru 21
- ☐ Storage height does not exceed system design
- ☐ Flue spaces clear and maintained
- ☐ Aisles free and proper width
- ☐ Correct size sprinkler orifice for design criteria (NFPA 13: 12.6 - Storage occupancies)
  - 0.2 or less →  $K=5.6$
  - > 0.2 to 0.34 →  $K=8.0$
  - > 0.34 →  $K=11.2$



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# Fire Suppression Alarms

- ❑ Inspectors test connection must have orifice equivalent to smallest sprinkler orifice on the system (NFPA 13: 8.17.4.2.1)
- ❑ Alarms sound within appropriate time frame of waterflow (NFPA 13: 6.9.1)
  - Audible Alarm on premises within 5 minutes (NFPA: 25.2.3.1)
  - Indicate a flow or water of 10 gpm or more (UL346)
  - Activation within 90 seconds of water flow (NFPA 72: 17.12.2)



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# Valves

- ☐ Control valve must be indicating type  
(NFPA 13: 8.16.1.1.1.2)
- ☐ Valves properly supervised (IBC 903.4)
- ☐ Valves in the correct position (NFPA 13: 8.16.1.1.2.4)
- ☐ Valves are accessible (NFPA 13: 8.16.1.1.7)
- ☐ Identification sign for each valve  
(NFPA 13: 6.7.4.1)



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# Fire Department Connection

- ☐ Location acceptable to Fire Chief (IBC 912.2.1)
- ☐ FDC is accessible (IBC 912.3)
- ☐ Mounting height should be 18” to 48”  
above grade (NFPA 13: A.8.17.2)
- ☐ Caps in place to protect inlets (NFPA 13: 6.8.2)
- ☐ No control valve in FDC piping  
(NFPA 13: 8.17.2.5.2)
- ☐ FDC piping arrangement (NFPA 13: 8.17.2.4)



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# Information Left on Site

- ☐ As-Built Drawings
- ☐ Hydraulic Design Information Sign
- ☐ NFPA 25 pamphlet
- ☐ Literature and instructions provided by the manufacturer
- ☐ Spare sprinklers (NFPA 13:6.2.9)
  - Dry sprinklers / stopper
  - Sprinkler list



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# Testing of Sprinkler Systems



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# Fire Service Mains

- ❑ Underground service flushed before connection to sprinkler system
  - Minimum flow rates for flushing (NFPA 13: 10.10.2.1.3)
    - Hydraulically calculated water demand rate including any hose requirement
    - Flow necessary to provide a velocity of 10 ft/sec (see Figure 10.10.2.1.3 for flow rates)
    - Maximum flow rate available to the system under fire conditions



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# Wet Sprinkler Systems

## □ Hydrostatic test

- 200 psi for 2 hours (NFPA 13: 25.2.1)
- If system has working pressure over 150 psi must test at 50 psi over working pressure
- If the weather is cold an interim air test shall be permitted
- Modifications of 20 or fewer sprinklers don't require testing in excess of system pressure
- Additions or modifications to existing systems shall be isolated and tested
- Modifications that cannot be isolated shall not require testing above system working pressure



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# Wet Sprinkler Systems

- ☐ No additives are allowed to be used for stopping leaks (NFPA 13: 25.2.1.9)
- ☐ Test blanks (NFPA 13: 25.2.1.14)
  - Painted
  - Numbered with recording method



# Dry Sprinkler Systems

- ❑ Must have a standard hydrostatic test (NFPA 13: 25.2.1.1)
- ❑ Air pressure leakage test (NFPA 13: 25.2.2.1)
  - Test at 40 psi for 24 hours
  - Any loss in excess of 1½ psi shall be corrected



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# Operational Tests

- ☐ Working test of dry pipe valve
  - Open ITC and measure time for water to be discharged (NFPA 13: 25.2.3.2.2)
- ☐ Testing of deluge or preaction valves
  - Per manufacturers instructions (NFPA 13: 25.2.3.3.1)
- ☐ Main drain test
  - Per manufacturers instructions (NFPA 13: 25.2.3.3.1)
- ☐ Water flow devices
  - Per (NFPA 13: 25.2.3.1)
- ☐ Backflow Prevention assemblies
  - Per (NFPA 13: 25.2.5.1)



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