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**Welcome!**

# Understanding the Sprinkler System Design Alternatives in the 2015 International Codes<sup>®</sup>

Presented By

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# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

Why inspect, test and maintain ?

- Insure proper system operation
- Insure hazard has not changed
- Maintain ability to occupy the building

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

Why is proper system operation important ?

- Consider the myriad of design alternatives “tradeoffs” that the model building and fire codes allow when fire sprinkler systems are installed.....

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

## Building Code

- Indicates where sprinklers are required

or

- Provides design alternatives which utilize sprinklers

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- Sprinklers systems are required to be indicated on the Certificate of Occupancy
- This makes the sprinkler systems a mandatory requirement for occupancy
- Sprinklers can be required by a code section or be a design choice by the owner and/or design team
- In either case they are required for occupancy
- Remember - Chapters 8, 9 and 10 of the IBC and the IFB are almost identical

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

## Fire Code

- Section 901.6.1
- Indicates sprinklers shall be maintained in an operative condition at all times sprinklers

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

## Existing Building Code

- When existing building with sprinklers are changed, altered, modified
- Maintenance per the International Fire Code is required



# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

Lets clarify  
in the IBC and IFC

- 903.3.1.1 – NFPA 13 – qualifies for all design alternatives
- 903.3.1.2 – NFPA 13R – qualifies for many design alternatives
- 903.3.1.3 – NFPA 13D – qualifies for a few design alternatives

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Assembly Occupancy Specific Sprinkler Advantages**
- Sprinklers permit unlimited areas in one-story A-4 buildings. 507.4
- Sprinklers permit unlimited areas in one-story A-3 buildings. 507.6
- Sprinklers permit unlimited areas for Motion Picture theaters of 1 story and type II construction. 507.12
- Multiple manual pull stations not required when sprinklers are present in A occupancies. 907.2.1
- Sprinklers permit an increase from 200 ft to 250 ft in assembly buildings. 1029.7

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Business Occupancy Specific Sprinkler Advantages**
- Sprinklers permit unlimited areas in one story group B, F, M, or S buildings 507.4
- Sprinklers permit unlimited areas in two-story group B, F, M, or S buildings. 507.5
- Sprinklers eliminate smoke dampers at shafts in groups B and R buildings, when meeting criteria. 717.5.3#2
- Multiple manual pull stations not required when sprinklers are present in B occupancies. 907.2.2 exception
- Sprinklers allow 100 ft of common path of egress travel in occupancies B, F, S. 1006.2.1

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Educational Occupancy Specific Sprinkler Advantages**
- Sprinklers permit unlimited areas in one story E building of type II, IIIA, or IV. 507.11
- Multiple manual pull stations not required when sprinklers are present in E occupancies. 907.2.3

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Factory Occupancy Specific Sprinkler Advantages**
- Sprinklers permit unlimited areas in one story group B,F,M, or S buildings 507.4
- Sprinklers permit unlimited areas in two-story group B, F, M, or S buildings. 507.5
- Multiple manual pull stations not required when sprinklers are present in F occupancies. 907.2.4 exception
- Sprinklers allow 100 ft of common path of egress travel in occupancies B,F,S. 1006.2.1
- Sprinklers allow up to 400 ft of travel distance in groups F-1 and S-1. 1017.2.2

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Institutional Occupancy Specific Sprinkler Advantages**
- In group I-2, quick response sprinklers allow waiting rooms constructed as corridors open to the corridors. 407.2.1
- Sprinklers eliminate the need for smoke detectors in habitable areas in group's I-1 and I-3. 907.2.6.1 and 907.2.6.3.3

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Mercantile Occupancy Specific Sprinkler Advantages**
  - Sprinklers permit unlimited areas in one-story M buildings. 507.4
  - Sprinklers permit unlimited areas in two-story M buildings. 507.5
  - Sprinklers permit unlimited or increase of 100% in groups M and S control areas (non-flammable liquids, non-combustible solids). Table 414.2.5(1) sub (b)
  - Sprinklers permit increase in control areas of group M per Table 414.2.5(2) (flammable & combustible liquids)
  - Multiple manual pull stations not required when sprinklers are present in M occupancies. 907.2.7

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Residential Occupancy Specific Sprinkler Advantages**
- Sprinklers reduce the fire resistance rating of fire partitions between dwelling/sleeping units to ½ hour. 708.3
- Sprinklers reduce the fire resistance rating of horizontal assemblies between dwelling/sleeping units to ½ hour. 711.2.4.3
- Sprinklers eliminate smoke dampers at shafts in group R buildings. 717.5.3 (2)
- Sprinklers eliminate draftstopping in floors of all R groups. 718.3.2
- Sprinklers eliminate draftstopping in attics of groups R-1 and R-2. 718.4.2
- Multiple manual pull stations not required when sprinklers are present in R-1 and R-2 occupancies. 907.2.8.1 and 907.2.9
- Sprinklers increase common path of travel in R-2 to 125 ft. 1006.3.2(1)
- Sprinklers allow R-2 occupancies up to 3 stories with one exit. Table 1006.3.2(1)



# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Storage Occupancy Specific Sprinkler Advantages**
  - Indoor and Outdoor Control Areas Sprinklers permit unlimited or increase of 100% in groups M and S control areas. Table 414.2.5 (1) sub (b) and (i) (Non-flammable liquids, Non-combustible Solids)
  - Sprinklers permit unlimited areas in one-story S buildings. 507.4
  - Sprinklers permit unlimited areas in two story S buildings. 507.5
  - Sprinklers allow additional building height of open parking garages with mechanical access. Table 406.5.4
  - Where ESFR (early suppression fast response) sprinklers are provided, smoke and heat vents are not required. 910.1
  - Sprinklers allow 100 ft of common path of egress travel in occupancies B, F, S. 1006.3.2.1
  - Sprinklers allow up to 400 ft of travel distance in groups F-1 and S-1. 1017.2.2
  - Quantities can be increased in a control area 100% when sprinkled (physical hazard). Table 307.1(1) note d
  - Quantities can be increased in a control area 100% when sprinkled (health hazard). Table 307.1(2) note d
  - Sprinklers eliminate control area floor fire rating in type II-A, III-A, and V-A. 414.2.4

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **High-Rise Buildings**
- Sprinklers permit the fire resistance rating reductions for high-rise buildings that have sprinkler control valves equipped with supervisory initiating devices and water flow initiating devices for each floor. 403.2.1
- Sprinklers permit the required fire resistance rating of the fire barrier walls enclosing vertical shafts, other than exit enclosures and elevator hoistway enclosures, to be reduced to 1-hour where automatic sprinklers are installed within the shafts at the top and at alternate floor levels. 403.2.1.2
- **Atrium Floor Areas**
- Sprinklers permit the atrium floor area to be used for any approved use where the individual space is provided with an automatic sprinkler system. 404.2
- **Atriums**
- Sprinklers permit a glass wall forming a smoke partition where automatic sprinklers are provided along both sides of the separation wall. 404.6

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Stages**

- Sprinklers installed in the space below the stage eliminate the requirement for a fire resistance rated floor type IIA, IIA, VA. 410.3.1 (2)
- Proscenium wall water curtains may be used in lieu of fire curtains for proscenium openings. 410.3.5
- Sprinklers allow 1 ½" hose connections instead of 2 ½" hose connections installed near stages. 905.3.4

- **Attics and Crawl Spaces**

- Sprinklers delete the 1-hour fire resistance rating for attics and under-floor concealed spaces used for storage of combustible materials. 413.2

- **Mezzanines**

- Sprinklers increase mezzanine area up to one half of the floor area in construction types I and II. 505.2
- Sprinkled mezzanines in 2 story buildings, other than H and I uses, having two or more means of egress are not required to be open into the area of the mezzanine 505.4 (5)

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Area Increase**
- Sprinklers add 300% for one story and 200% for multiple stories in building area. Table 506.23
- **Height Increases**
- Sprinklers permit a height increase of 20 ft and one story. Table 504.3
- **Unlimited Areas**
- Sprinklers permit unlimited areas in one and two-story group B, F, M, or S buildings. 507.4 & 507.5
- **Furnace Rooms**
- Sprinklers eliminate the 1-hour wall requirement around furnace rooms having equipment with over 400,000 BTU per hour input. Table 509
- **Boiler Rooms**
- Sprinklers eliminate the 1-hour wall requirement around boiler rooms having boilers over 15 psi and 10 horsepower. Table 509

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Refrigerant Machinery**
  - Sprinklers eliminate the 1-hour wall requirement around refrigerant machinery rooms. Table 509.5
- **Occupancy Separations**
  - Sprinklers permit up to a 1-hour reduction in the fire resistance rating of fire separation walls. Table 508.4
- **Exterior Wall Opening**
  - Sprinkled maximum allowable area of unprotected opening to be the same as for protected opening. Table 705.8
  - Sprinklers eliminate the requirements for flame barriers protecting window separations, separated by five feet or less. 705.8.5
  - Sprinklers delete the protection requirements of openings in an exterior wall where buildings are equipped with sprinklers and water curtains are installed on the exterior. 705.8.2

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Fire Walls**
- Sprinklers permit openings in firewalls to exceed the 156 sq ft limit where both buildings are sprinklered. 706.8
- Sprinklers allow the firewall to terminate to the inside surface of the non-combustible exterior wall. 706.5 (3)
- **Fire Barriers**
- Sprinklers permit openings in fire barriers to exceed the 156 sq ft. where both fire areas are sprinkled. 707.6
- **Shaft Enclosure**
- The bottom of a shaft is not required to be closed off provided it terminates in room protected by sprinklers. 713.11

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Sprinkler Penetration**
- The annular space created by the membrane penetration fire sprinkler covered by a metal escutcheon plate requires no additional firestopping. 714.3.2
- **Draftstopping**
- Sprinklers eliminate the requirement for draftstopping at 1,000 sq ft in floor ceiling assembly. 718.3.2
- Sprinklers eliminate the requirement for draftstopping in attics and concealed spaces at 3,000 sq ft. 718.3.3
- **Exit Enclosure Doors**
- Sprinklers delete the maximum transmitted temperature end point for door assemblies in exit enclosures. 716.5.5
- **Fire Dampers**
- Sprinklers eliminate the required fire dampers in ducts for HVAC systems, fire barrier walls that have a required fire resistance rating of 1-hour or less. 717.5.2

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Set Out Construction**
  - Sprinklers permit a reduction in the class finish requirements for walls or ceilings that are set out or dropped. 803.13.2
- **Interior Wall and Ceiling Finishes**
  - Sprinklers reduce the wall and ceiling finishes to a lower category. Table 803.11
- **Textile Wall Covering**
  - Sprinklers eliminate the requirement of materials to pass ASTM E-84 requirements for class A materials. 803.1.4
- **Combustible Decorative Materials**
  - Sprinklers increase the amount of combustible decorations up to 75% (versus 10%) in assembly occupancies. 806.3
- **Interior Floor Finish**
  - Sprinklers reduce the requirements for floor finish materials in vertical exits and exit passageways and exit access corridors. 804.4.2



# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Standpipes**
- Sprinklers allow Class I standpipes where Class III standpipes are required. 905.3.1
- Sprinklers allow Class I standpipes to have 50' more travel. 905.4
- Sprinklers allow the risers and laterals of standpipes not to be covered by fire resistive material. 905.4.1
- **Fire Alarms**
- Heat detectors are not required when sprinklers are present. 907.4.3.1
- Sprinklers eliminate smoke detection in R-4 occupancies. 907.2.10.2
- Multiple manual pull stations not required when sprinklers are present in A, B, E, F, M, R-1, R-2 occupancies. 907.2.1 thru 907.2.4, 907.2.7, 907.2.8.1, 907.2.9

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Elevators**
- Elevators are not required to serve as the means of egress as required by ADA in sprinkled buildings 1009.2.1
- **Accessibility Stairs**
- Sprinklers delete the accessibility requirement for 48" egress stairs and for areas of refuge(except Illinois). 1009.3
- **Revolving Doors**
- Sprinklers permit the use of revolving doors for other than a means of egress. 1008.1.4.1.2
- **Automatic Locking**
- Sprinklers permit the use of access controls egress doors. 1010.1.9.7
- **Travel Distance**
- Sprinklers increase the travel distances for all occupancies. Table 1017.2
- **Egress Separations**
- Sprinklers reduced the required egress separation distance to 1/3 the diagonal of the building or space. 1007.1.1 exception

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Corridor Rating**
- Sprinklers delete the corridor fire resistance rating A,B,E,F, M, S, U. Table 1018.1
- **Dead End Corridors**
- Sprinklers allow dead end corridors up to 50 ft. in the following occupancies: B, E, F, I-1, M, R-1, R-2, R-4, S and U. 1018.4
- Sprinklers allow the space between the corridor ceiling and the floor or roof structure above corridors to serve as return air. 1018.5.1
- **Exit Discharge**
- Sprinklers eliminate the fire separation requirement for exterior exit ramps and stairs. 1027.6(3)
- Sprinklers permit of maximum of 50 percent of the occupants to exit through exit enclosures. 1028.1
- **Balcony Fire Ratings**
- Sprinklers permit balconies and similar appendages on buildings of types III, IV and V to be of type V construction without a fire resistance rating. 1406.3 (3)
- Sprinklers eliminate the aggregate width requirement of balconies. 1406.3 (4)

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Foam Plastic Insulation**
- Sprinklers allow foam plastic insulation to increase from 4” to 10” in thickness. 2603.3 exception
- **Light Diffusing Systems**
- Sprinklers permit the use of light-diffusing systems with an occupant load of 1,000 or more, theaters with the stage and proscenium opening and an occupant load of 700 or more, group I-2, group I-3 exit stairways and exit passageways. 2606.7
- Areas of light diffusing systems that are protected with fire sprinkler systems shall not be limited. 2606.7.4
- Sprinklers permit a 100 percent increase in the maximum percentage area for light transmitting plastic wall panels. 2607.5
- **Plastic Glazing**
- Sprinklers permit the allowable area of glazing to 50 percent of the wall face. 2608.2 (1) exception

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Light Transmitting Roof Panels**
- Sprinklers permit unlimited height for light transmitting plastics. 2608.2 (3)
- Sprinklers eliminate flame barriers for adjacent stories. 2608.2 (2)
- Sprinklers permit light transmitting plastic roof panels in buildings required to be of fire rated construction without complying with the roof covering requirements. 2609.1
- Sprinklers permit a 100 percent increase in an aggregate area of plastic roof panels. 2609.4 (1)
- Sprinklers eliminate the 4 ft minimum separation requirement between individual plastic roof panels. 2609.2 (1)
- **Skylight Separations**
- Sprinklers eliminate the minimum separation distance of 4 ft between skylights. 2610.6
- **Plastic Skylights**
- Sprinklers eliminate the 100 sq ft maximum area for skylights. 2610.4

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

- **Pedestrian Walkways**
- Sprinklers eliminate the requirement for fire barriers between pedestrian walkways and buildings. 3104.5
- Sprinklers permit increased height and stories for pedestrian walkways and buildings. 3104.5
- Sprinklers permit an increase from 200 ft to 250 ft for exit access travel distance in pedestrian walkways. 3104.9
- Sprinklers allow any increase from 200 ft to 400 ft of exit access travel systems in a pedestrian walkway constructed with both sides at least 50 percent open. 3104.9

# Examples of Design Alternatives for Fire Sprinklers in the 2015 Codes

So.....

- Obviously the benefits of fire sprinklers are widely recognized & adopted by the code makers.....
- WHAT IF THE SYSTEM FAILS? - NOW WHAT ARE YOU UP AGAINST???
- And, if the system is not being maintained, should the building still have a certificate of occupancy? Can you count on the system performing properly?
- What if the occupancy changes is the system design still code compliant?
- IF THERE'S A LOSS WILL INSURANCE PAY??

# Thank You For Your Time

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