

Alternates to Fire Sprinkler Systems

With the passage of Senate Bill 582 in the 2013 session, the legislature noted: *“It is in the best interests of this state that state building code regulations encourage economic development, experimentation, innovation and cost effectiveness in construction, especially construction in rural or remote parts of this state.”*

Accordingly, the Division has been tasked with identifying provisions in the code which are barriers and developing strategies to simplify processes and reduce obstacles. One such barrier is the requirement to install a fire sprinkler system in buildings where water supply is either unavailable or inadequate to service a code-compliant sprinkler system.

While the state building code provides a process for local building officials to amend or make exceptions to the code as needed where strict compliance is impractical, there is no guideline for a uniform or consistent approach for demonstrating that the intent of the code is met where alternate approaches for the elimination of a sprinkler system is proposed.

Scope:

This white paper is meant to assist in determining the acceptance of equivalent protection to a fire sprinkler system. The intent is to provide flexibility that allows the use of alternative approaches to achieve compliance with minimum requirements, provide safeguards for public health, safety, and welfare. The white paper serves as a supplement to the provisions of OSSC Section 104.10

Modification:

104.10 Modifications. *Wherever there are practical difficulties involved in carrying out the provisions of this code, the building official shall have the authority to grant modifications for individual cases, upon application of the owner or owner’s representative, provided the building official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.*

The white paper is not intended to inhibit innovative ideas or technological advances not addressed here, and the provisions of this white paper do not preclude further application of OSSC Section 104.11
Alternative materials, design and methods of construction and equipment:

104.11 Alternative materials, design and methods of construction and equipment. *The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at*

least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

Applicability:

The intent of this “White Paper” is to establish guidelines for building official to address structures built on a parcel that is not served by a municipal water system, where the municipal water system is not reliable, or where the building official determines that there are practical difficulties involved in carrying out the code. This white paper shall apply to new construction, alteration, change of occupancy, and addition to buildings. Solutions may combine prescriptive compliance with performance compliance methods, evaluation and design procedures.

Discussion:

The building shall be designed with safeguards for the safe evacuation of its occupants and against the spread of fire during an event.

The purpose of all fire protection systems as required by Chapter 9 of the OSSC is: to detect a fire; to alert the occupants or fire department of a fire emergency; to control smoke and to control or extinguish a fire. So the intent of any alternate to a fire sprinkler system shall always consider this purpose and reasonable safeguards for the occupants of the building.

Conclusion:

The following building code elements, when required, enhance the safety of the occupants. When not required by the code, the building official may consider the addition of one or more of these elements as an approved equivalent to fire sprinkler installation. The following guidelines correlate with OSSC Chapter references:

CHAPTER 5 – GENERAL BUILDING HEIGHTS AND AREAS

Many other code requirements depend on the establishment of the minimum required type of construction for a building. The keystone in setting thresholds for a building’s size is based on the building’s use and the materials with which it is constructed. It is aimed at providing an acceptable level of hazard for building occupants by limiting fire load and fire hazards relating to height, area and occupancy. Buildings of higher construction types that incorporate noncombustible materials and a higher degree of fire-resistant elements can be larger and higher than buildings of lower construction types that utilize combustible and unprotected elements.

Reductions to the allowable area and height can be considered as an element for mitigation of a fire sprinkler system.

CHAPTER 6 - TYPES OF CONSTRUCTION:

The purpose of classifying buildings or structures by their type of construction is to account for the response or participation that a building’s structure will have in a fire condition originating within the building as a result of its occupancy or fuel load.

In some cases, the code allows for a 1-hour fire-resistance-rated construction as a substitute for sprinklers. The building official can consider this and/or the introduction of non-combustible or fire-resistive materials when normally not required.

CHAPTER 7 - FIRE AND SMOKE PROTECTION FEATURES:

Fire-resistance-rated construction is one form of fire protection in a design. It's often referred to as a passive protection. Passive protection was common in the Uniform Building Code, the previous base code used in Oregon up to 2002. Components include fire and smoke dampers, rated doors, fireproofing, firestop systems, fire-rated glazing, fire-rated walls, and fire-rated ceiling assemblies. Fire-rated components and materials help control the spread of fire while limiting the damage to a burning building and surrounding structures. More importantly, materials that contain or control fires give building occupants sufficient time to escape and allow firefighters to act before the structure collapses.

Fire walls, fire barriers, fire partitions, along with smoke barriers and smoke partitions help to slow down the spread of fire and smoke giving occupants more time to evacuate. These features may be considered as an appropriate element to mitigate a sprinkler system.

CHAPTER 8 - INTERIOR FINISHES:

Interior finishes and decorative materials are key elements in the development and spread of fire. In some cases, interior decorations are the first materials ignited. In other instances, the interior finish materials become involved in the early stages of fire and contribute to its early growth and spread. Performance requirements of interior finish materials may be evaluated based on test standards, and certain restrictions used to mitigate fire growth within buildings by restricting interior finish materials and decorative materials.

How a building is being used, its contents, and the flammability of its finishes may be considered appropriate element to mitigate a sprinkler system.

CHAPTER 9 - FIRE PROTECTION SYSTEMS:

Smoke detection and alarm systems provide early warning to occupants. These systems include manual fire alarm and automatic fire detection.

Manual fire alarm systems are installed in buildings to limit fire casualties and property losses. They do this by promptly notifying the occupants of the building of an emergency, which increases the time available for evacuation. When fire alarm systems are supervised, the fire department will be promptly notified and its response time relative to the onset of the fire will be reduced.

Automatic fire detection systems increase the likelihood of a fire being discovered and give occupants an early warning. The automatic detecting devices may be smoke detectors or other approved detectors.

These systems vary in complexity and benefit, so discretion should be used to determine what system would be appropriate mitigation to a sprinkler system. Partial "multi-purpose sprinkler system coverage" may be considered, such as protection of storage areas, gas-fired equipment locations, egress paths, or other targeted areas.

CHAPTER 10 - MEANS OF EGRESS:

Number of exits, travel distances, and the arrangement of exits can help to shorten the time it takes to depart the building. The means of egress is the primary method for protection of people in buildings. It addresses all portions of the egress system including size, arrangement, number, and protection

requirements for the means of egress components. The principles on which the means of egress are based and that form the fundamental criteria for requirements are to provide a system:

1. That will provide occupants alternative paths of travel to a place of safety to avoid fire;
2. That will shelter occupants from fire and the products of combustion
3. That will accommodate all occupants of a structure; and
4. That it's clear, unobstructed, well-marked, illuminated, and in which all components are under control of the user without requiring any tools, key or special knowledge or effort.

Note: Performance based approach can be helpful where exit travel is reduced 50% or more than the allowable and the number of exits is increased.

These are just a few areas to consider when looking for a sprinkler system substitution. These guidelines are intended to help the building official in their decision making process when faced with a proposed alternate to a sprinkler system.

EXAMPLE 1:

A single story 5,775 sq. ft. A-3 occupancy of Type V-B Construction. The intended use is a place of religious worship. The building will include classrooms, an office and a sanctuary with fixed seating. The local Building Official has determined the occupant load to be 340. The proposed building will have 30 foot clear yards on all sides.

Applicable Code:

Section 903.2.1 Group A. An automatic sprinkler system shall be provided throughout buildings and portions thereof used as a Group A occupancies as provided in this section. For Group A-1, A-2, A-3, and A-4 occupancies, the automatic sprinklers system shall be provided throughout the floor area where the Group A-1, A-2, A-3, and A-4 occupancy is located, and in all floors from the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy.

Section 903.2.1.3 Group A-3. An automatic sprinkler system shall be provided for Group A-3 where one of the following conditions exists.

1. *The fire area exceeds 12,000 square feet;*
2. *The fire area has an occupant load of 300 or more; or*
3. *The fire area is located on a floor other than a level of exit discharge serving such occupancies.*

Discussion:

With the occupant load exceeding 299, the building is required to be provided with an automatic sprinkler system throughout. The intent of this code requirement is to allow the occupants a reasonable amount of time to exit the building safely. The proposed location of the A-3 doesn't have the required water supply on site to support the automatic sprinkler system. The applicant is offering two additional safety items as an alternate to the required sprinkler system.

The building as proposed will have three accessible exits, which also helps reduce the travel distance. There will be a fire alarm system that will include manual pull stations as required by code but will be upgraded to include smoke detection. The interior wall and ceiling finishes will be of Class B materials.

Each of the proposed safety upgrades go beyond the requirements of the code and provide an example of how the local Building Official could accept this as an alternate plan that would satisfy the intent of the code requirement for fire sprinklers.

EXAMPLE 2:

A single story 8,000 sq. ft. F-1 occupancy constructed of Type V-B Construction. The intended use will be a factory direct woodworking shop that produces cabinets and wood furniture. It will include an 800 sq. ft. mercantile showroom for sale of the products produced. The local Building Official has determined the occupant load to be 49. The front of the structure will have a 30 foot clear yard. The remaining three sides will have a 15 foot clear yard.

Applicable Code:

Code Section 903.2.4.1 Woodworking operations. *An automatic sprinkler system shall be provided throughout all Group F-1 occupancy fire areas that contain woodworking operations in excess of 2,500 square feet in area which generates finely divided combustible waste or use finely divided combustible materials.*

Discussion:

With the woodworking shop covering 7,200 square feet of the structure, this building is required to be provided with an automatic sprinkler system throughout. The intent of the code is to require fire sprinklers so as to aid the occupants in safely exiting the building. The water supply required to support the automatic sprinkler system is unavailable. The cost of providing the automatic sprinklers and a water supply that meets the requirements of NFPA 13 would prohibit the project from moving forward. The applicant is offering to provide additional safety items as an alternate to the fire sprinklers.

The building as proposed will have three accessible exits, which also helps reduce the travel distance. The walls separating the factory showroom from the woodworking shop will be designed and constructed as a smoke partition. All sides of the building with 15 foot yards will have exterior walls of 1- hour fire resistive construction. They propose to install a Class A roof covering. The building will be provided with smoke detectors that activate a fire alarm system.

Each of the proposed safety upgrades go beyond the minimum requirements of the code and provide an example of how the local Building Official could accept this as an alternate plan that would satisfy the intent of the code requirement for fire sprinkler.