



SAN JUAN COUNTY DEPARTMENT OF COMMUNITY DEVELOPMENT

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POLICIES/PROCEDURES/INTERPRETATIONS

Fire Sprinkler Requirements in S-1 Occupancies

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Issued 08/13/2018
Building Code Interpretation -2018-01
Fire Sprinklers in S-1 Occupancies

Code interpretation pursuant to SJCC 18.10.030(A)

ISSUE: Are fire sprinklers required pursuant to 2015 International Building Code (IBC) section IBC 311 (Storage Group S) (Attachment A) and IFC section 903.2.9 (Attachment B) for a contractor self storage facility classified as S-1/B with an S-1 occupancy size of greater than 2,500 square feet where the list of allowable contents to be stored in the S-1 occupancy area is unspecified?

ANALYSIS:

The subject of fire sprinkler requirements for S-1 occupancies, specifically self storage (either household self storage or contractor self storage), is addressed by Washington State Building Code Council State Building Code Interpretation No. 15-03 (Attachment C) and International Fire Code Interpretation 20-14 (Attachment D). While these were interpretations of the 2012 IBC, the applicable sections did not change upon adoption of the 2015 IBC, so these interpretations remain valid and applicable. Both of these interpretations related to "self storage warehouse" and "mini-storage".

State Building Code Interpretation 15-03 concludes that the "the answer depends on what is being stored in the mini-storage units. The answer is No if the building does not allow storage of upholstered furniture or mattresses per IFC 903.2.9(5). If the storage of upholstered furniture or mattresses is allowed, then the answer is yes as IFC 903.2.9 applies."

IFC Interpretation 20-14 concludes that fire sprinklers are required in any Group S-1 self storage warehouse over 2,500 square feet that is rented to individuals for the storage of personal household items (which could include incidental pieces of upholstered furniture and mattresses). It further concludes that this requirement is regardless of how much furniture and/or mattresses are actually stored. Storage of one mattress or one piece of furniture triggers the requirement.

Mini-storage, self storage and contractor storage are not listed occupancies in IBC Chapter 3, and they are not defined in the IBC. Since they are not specifically listed, the Building Official has the authority to interpret the occupancy based on the proposal.

There is a significant possibility that contractor storage could include furniture or mattresses as part of a remodel job, or that woodworking activities could occur within the contractor storage space. In spaces over 2,500 square feet, both of these activities/uses could trigger the requirement for fire sprinklers. An F-1 space for a woodworking operation would trigger fire sprinklers if the space used for woodworking exceeds 2,500 square feet. An S-1 space triggers a sprinkler requirement if any furniture or mattresses are stored in it.

Interpretation: A Group S-1 Occupancy to be used for contractor storage is a "self storage facility". Self storage facilities are classified as either an S-1 or an S-2 occupancy based on the list of contents to be stored and the activities proposed that are submitted with the application materials and shown on the plans for each occupancy area. Based on these materials, the Building Official will determine whether fire sprinklers are required based on IBC/IFC 903.2.9.

If the list of contents includes mattresses or furniture and the occupancy exceeds 2,500 square feet, then fire sprinklers are required. Specified contents are those listed under S-1 and S-2 in IBC Chapter 3 sections 311.2 and 311.3.

If the list of contents is not specific, and the occupancy exceeds 2,500 square feet, then fire sprinklers are required because self storage facilities are often used for storage of household items including furniture and mattresses. An example of a non-specific list is "lumber and **other similar items...**" or "**household items**". "Household items" are always presumed to include furniture and/or mattresses.

For contents that are not specifically listed in 311.2 or 311.3, the Building Official will determine, in conjunction with the Fire Marshal, whether the items are sufficiently similar as other items on the list as to be considered the same or not.

In the instance of the proposed contractor storage, fire sprinklers are required because the list of contents is unspecified and includes the storage of "...other similar items" and the plans do not list the contents allowed to be stored in each occupancy area.

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receiving care are capable of self-preservation. This group shall include, but not be limited to, the following:

- Alcohol and drug centers
- Assisted living facilities
- Congregate care facilities
- Group homes
- Halfway houses
- Residential board and care facilities
- Social rehabilitation facilities

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code.

❖ Where five to 16 residents live in a supervised environment and receive custodial care, such a facility is classified as Group R-4. Ninety-eight percent of households in the U.S. that identified themselves as a single-family household have less than 16 occupants. The 16-occupant limit is also consistent with the limits of an NFPA 13D sprinkler system. Thus the limit of 16 residents was established as an appropriate limit considering that this facility will operate similarly to a single-family home. Under federal housing laws regarding nondiscrimination, families cannot be determined by blood or marriage. If a Group R-4 occupancy is expanded or allowed to have more than 16 care recipients, the facility needs to be reclassified as a Group I-1 occupancy. The number of persons used in the determination includes those who receive care but does not include staff.

Similar to Group I-1, a Group R-4 occupancy is also one of two "conditions." In a Condition 1 facility, care recipients may be slower during evacuation but are capable of self-preservation. In a Condition 2 facility, care recipients may require limited assistance with evacuation during emergency situations. See the commentary in Section 308.3 for Group I-1,

for a further detailed explanation of both Group I-1 and R-4 custodial care occupancies. Also see Section 202, Definitions, Custodial care.

Group R-4 facilities must satisfy the construction requirements of Group R-3. Facilities with five or fewer persons receiving care will be either a Group R-3 occupancy (see Section 310.5), or can be built under the IRC (see Section 310.5.1).

See Commentary Figure 308.1.

310.6.1 Condition 1. This occupancy condition shall include buildings in which all persons receiving custodial care, without any assistance, are capable of responding to an emergency situation to complete building evacuation.

❖ See the commentary to Section 310.6.

310.6.2 Condition 2. This occupancy condition shall include buildings in which there are any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation.

❖ See the commentary to Section 310.6.

SECTION 311 STORAGE GROUP S

311.1 Storage Group S. Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy.

❖ This section requires that all structures (or parts thereof) designed or occupied for the storage of moderate- and low-hazard materials are to be classified in either Group S-1 (moderate hazard) or S-2 (low hazard).

Life safety problems in structures used for storage of moderate- and low-hazard materials are minimal

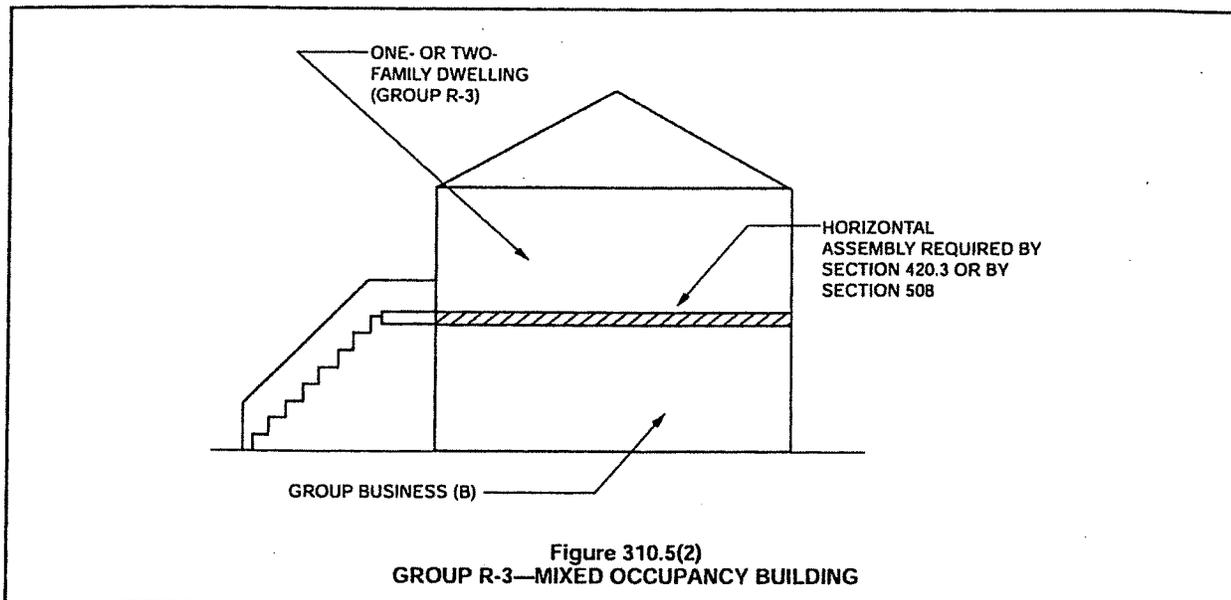


Figure 310.5(2)
GROUP R-3—MIXED OCCUPANCY BUILDING

USE AND OCCUPANCY CLASSIFICATION

because the number of people involved in a storage operation is usually small and normal work patterns require occupants to be dispersed throughout the facility.

Problems of fire safety, particularly as they relate to the protection of stored contents, are directly associated with the amount and combustibility of the materials (including packaging) that are housed on the premises.

Storage facilities typically contain significant amounts of combustible or noncombustible materials that are kept in a common area. Because of the combustion, flammability or explosive characteristics of certain materials (see Section 307), a structure or portion thereof that is used to store high-hazard materials exceeding the maximum allowable quantities (MAQ), or that does not meet one of the identified uses in Section 307.1.1, cannot be classified as Group S. Such a structure is to be classified as Group H, high-hazard use, and is to comply with Section 307.

Hazardous materials may be located in Group S occupancy buildings, provided the amount of materials in each control area does not exceed the MAQ specified in Tables 307.1(1) and 307.1(2). Control areas must comply with Section 414. Storage occupancies consist of two basic types: Groups S-1 and S-2, which are based on the properties of the materials being stored. The distinction between Groups S-1 and S-2 is similar to that between Groups F-1 and F-2, as outlined in Section 306.

311.1.1 Accessory storage spaces. A room or space used for storage purposes that is less than 100 square feet (9.3 m²) in area and accessory to another occupancy shall be classified as part of that occupancy. The aggregate area of such rooms or spaces shall not exceed the allowable area limits of Section 508.2.

❖ This provision allows small storage rooms to be classified in the same occupancy group as the primary occupancy of a space. There are two limits: each space is limited to 100 square feet (9.3 m²); and the aggregate of such spaces on any story is limited to 10 percent of the floor area. These small storage spaces could occur in any other occupancy, such as a Group B office building, a Group E classroom or a Group M retail store. Individual spaces in excess of 100 square feet (9.3 m²) would be classified as a Group S occupancy and the provisions of mixed occupancies (Section 508) would apply. Section 508.2 limits accessory occupancies on any story to 10 percent of the area of that story. The area of storage spaces would need to be aggregated to determine if the spaces can be classified as part of the main occupancy or if they need to be classified as a Group S occupancy. As a separated mixed use building, Table 508.4 does not require a separation between Group S-1 and Group F-1, B or M. Table 509 for incidental uses would require storage rooms in Group I-2 and ambulatory care facilities with an area over 100 square feet (9.3 m²) to be separated by fire barrier or horizontal

assemblies with a fire-resistance rating of at least 1 hour.

311.2 Moderate-hazard storage, Group S-1. Storage Group S-1 occupancies are buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

- Aerosols, Levels 2 and 3
- Aircraft hangar (storage and repair)
- Bags: cloth, burlap and paper
- Bamboos and rattan
- Baskets
- Belting: canvas and leather
- Books and paper in rolls or packs
- Boots and shoes
- Buttons, including cloth covered, pearl or bone
- Cardboard and cardboard boxes
- Clothing, woolen wearing apparel
- Cordage
- Dry boat storage (indoor)
- Furniture
- Furs
- Glues, mucilage, pastes and size
- Grains
- Horns and combs, other than celluloid
- Leather
- Linoleum
- Lumber
- Motor vehicle repair garages complying with the maximum allowable quantities of hazardous materials listed in Table 307.1(1) (see Section 406.8)
- Photo engravings
- Resilient flooring
- Silks
- Soaps
- Sugar
- Tires, bulk storage of
- Tobacco, cigars, cigarettes and snuff
- Upholstery and mattresses
- Wax candles

❖ Buildings in which combustible materials are stored and that burn with ease are classified in Group S-1, moderate-hazard storage occupancies. Examples of the kinds of materials that, when stored, are representative of occupancies classified in Group S-1 are also listed in this section.

As defined by the IFC, a repair garage is any structure used for servicing or repairing motor vehicles. Therefore, regardless of the extent of work done (e.g., quick lube, tune-up, muffler and tire shops, painting, body work, engine overhaul), repair garages are classified as Group S-1 (see Commentary Figure 311.2) and must be in compliance with Section 406.8. In addition, to avoid a Group H classification, the amounts of hazardous materials in the garage must be less than the maximum allowable quantity per control area permitted in Tables 307.1(1) and 307.1(2).

Aircraft hangars for storage, repair or both would be classified as Group S-1. This classification corre-

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lates with the actual use of such hangars, which very frequently would include some level of repair work, and also works with the requirements of NFPA 409. Aircraft hangers accessory to one- and two-family structures are classified as Group U occupancies.

311.3 Low-hazard storage, Group S-2. Storage Group S-2 occupancies include, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic *trim*, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

- Asbestos
- Beverages up to and including 16-percent alcohol in metal, glass or ceramic containers
- Cement in bags
- Chalk and crayons
- Dairy products in nonwaxed coated paper containers
- Dry cell batteries
- Electrical coils
- Electrical motors
- Empty cans
- Food products
- Foods in noncombustible containers
- Fresh fruits and vegetables in nonplastic trays or containers
- Frozen foods
- Glass
- Glass bottles, empty or filled with noncombustible liquids
- Gypsum board
- Inert pigments
- Ivory
- Meats

- Metal cabinets
- Metal desks with plastic tops and *trim*
- Metal parts
- Metals
- Mirrors
- Oil-filled and other types of distribution transformers
- Parking garages, open or enclosed
- Porcelain and pottery
- Stoves
- Talc and soapstones
- Washers and dryers

❖ Buildings in which noncombustible materials are stored are classified as Group S-2, low-hazard storage occupancies (see Commentary Figure 311.3). It is acceptable for stored noncombustible products to be packaged in combustible materials as long as the quantity of packaging is kept to an insignificant level.

As seen in Group F-1 and F-2 classifications, it is important to be able to distinguish when the presence of combustible packaging constitutes a significant fuel load. As such, a fuel load might require the building to be classified in Group S-1, moderate-hazard storage. A simple guideline to follow is the "single thickness" rule, which is when a noncombustible product is put in one layer of packaging material.

Examples of materials qualified for storage in Group S-2 storage facilities are as follows:

- Vehicle engines placed on wood pallets for transportation after assembly;
- Washing machines in corrugated cardboard boxes; and
- Soft-drink glass bottles packaged in pressed paper boxes.

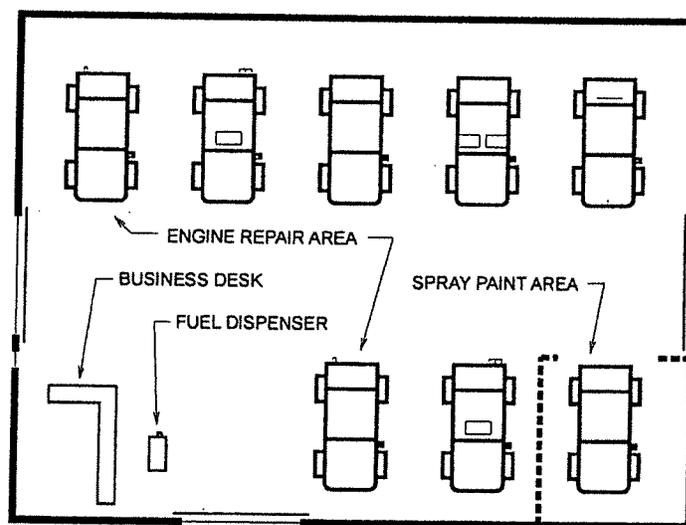


Figure 311.2
GROUP S-1—REPAIR GARAGES

FIRE PROTECTION SYSTEMS

[F] 903.2.9 Group S-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 *fire area* exceeds 12,000 square feet (1115 m²).
 2. A Group S-1 *fire area* is located more than three stories above *grade plane*.
 3. The combined area of all Group S-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
 4. A Group S-1 *fire area* used for the storage of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m²).
 5. A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).
- ❖ An automatic sprinkler system must be provided throughout all buildings containing a Group S-1 occupancy fire area where the fire area exceeds 12,000 square feet (1115 m²); is more than three stories above grade plane; combined, on all floors including mezzanines, exceeds 24,000 square feet (2230 m²); or is used for the storage of commercial motor vehicles and exceeds 5,000 square feet (464 m²). See the commentary to the definition of "Commercial motor vehicle" in Chapter 2.

The first three sprinkler threshold requirements for Group S-1 occupancies are identical to those of Groups F-1 and M (see commentary, Sections 903.2.4 and 903.2.7). Group S-1 occupancies, such as warehouses and self-storage buildings, are assumed to be used for the storage of combustible materials. While high-piled storage does not change the Group S-1 occupancy classification, sprinkler protection, if required, may have to comply with the additional requirements of Chapter 32 of the IFC. High-piled stock or rack storage in any occupancy must comply with the code and the IFC. The fifth sprinkler threshold is the same as for Group F-1 except that, in this case, upholstered furniture and mattresses are being stored and not manufactured. Group M has a similar threshold, but is required for larger occupancies containing such items with an area of 5,000 square feet (464 m²) versus what is required for Groups S-1 and F-1 occupancies of 2,500 square feet (232 m²). See the commentary for Group M and Group F-1 definitions for more discussion on this issue. Again, it is important to note that the threshold is based upon the square footage of the occupancy and not upon the size of the fire area. A formal interpretation (IFC Interpretation 20-14) has been issued on this section. The formal interpretation addresses self storage warehouses specifically and whether such a facility between 2500 and 12000 square feet would require an automatic sprinkler system. This is based upon the fact that upholstered furniture may be stored in such units. The response provided noted that a sprinkler system would be required based on

the fact the requirements are focused on the square footage of the occupancy and are not based on fire area or the amount of upholstered furniture or mattresses present.

[F] 903.2.9.1 Repair garages. An *automatic sprinkler system* shall be provided throughout all buildings used as repair garages in accordance with Section 406, as shown:

1. Buildings having two or more *stories above grade plane*, including basements, with a *fire area* containing a repair garage exceeding 10,000 square feet (929 m²).
2. Buildings not more than one *story above grade plane*, with a *fire area* containing a repair garage exceeding 12,000 square feet (1115 m²).
3. Buildings with repair garages servicing vehicles parked in basements.
4. A Group S-1 *fire area* used for the repair of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m²).

❖ Automatic sprinklers may be required in repair garages, depending on the quantity of combustibles present, their location and floor area. In addition, any Group S-1 fire area intended for the repair of commercial motor vehicles that exceeds 5,000 square feet (464 m²) would require sprinklers. This is the same criteria as Group S-1 occupancies and Group S-2 enclosed parking garages storing commercial motor vehicles. Repair garages may contain significant quantities of flammable liquids and other combustible materials. These occupancies are typically considered Ordinary Hazard Group 2 occupancies as defined in NFPA 13. Portions of repair garages used for parts cleaning using flammable or combustible liquids may require automatic sprinkler protection. If quantities of hazardous materials exceed the limitations in Section 307 for maximum allowable quantities per control area, the repair garage would be reclassified as a Group H occupancy. Note that the term "commercial motor vehicles" is specially defined in Chapter 2.

[F] 903.2.9.2 Bulk storage of tires. Buildings and structures where the area for the storage of tires exceeds 20,000 cubic feet (566 m³) shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

❖ This section specifies when an automatic sprinkler system is required for the bulk storage of tires based on the volume of the storage area as opposed to a specific number of tires. Even in fully sprinklered buildings, tire fires pose significant problems to fire departments. Tire fires produce thick smoke and are difficult to extinguish by sprinklers alone. NFPA 13 contains specific fire protection requirements for the storage of rubber tires.

Whether the volume of tires is divided into different fire areas or not is irrelevant to the application of this section. If the total for all areas where tires are stored is great enough that the resultant storage volume exceeds 20,000 cubic feet (566 m³), the building must

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Occupancy	Threshold	Exception
All occupancies	Buildings with floor level \geq 55 feet above fire department vehicle access and occupant load \geq 30.	Open parking structures. F-2
Assembly (A-1, A-3, A-4)	Fire area > 12,000 sq. ft. or fire area occupant load > 300 or fire area above/below level of exit discharge. Multitheater complex (A-1 only)	None
Assembly (A-2)	Fire area > 5,000 sq. ft. or fire area occupant load > 100 or fire area above/below level of exit discharge.	None
Assembly (A-5)	Accessory areas > 1,000 sq. ft.	None
Ambulatory care facility (B)	\geq 4 care recipients incapable of self-preservation or any care recipients incapable of self-preservation above or below level of exit discharge.	None
Educational (E)	Fire area > 12,000 sq. ft. or below level of exit discharge.	Each classroom has exterior door at grade.
Factory (F-1)	Fire area > 12,000 sq. ft. or building > three stories or combined fire area > 24,000 sq. ft.	None
Mercantile (M)	Woodworking > 2,500 sq. ft. (F-1 only). Manufacture > 2,500 sq. ft. (F-1), display and sale > 5,000 sq. ft. (M), storage > 2,500 sq. ft. (S-1) of upholstered furniture or mattresses.	
Storage (S-1)	Bulk storage of tires > 20,000 cu. ft. (S-1 only).	
High hazard (H-1, H-2, H-3, H-4, H-5)	Sprinklers required.	None
Institutional (I-1, I-2, I-3, I-4)	Sprinklers required.	Day Care at level of exit discharge and each classroom has exterior exit door.
Residential (R)	Sprinklers required.	None
Repair garage (S-1)	Fire area > 12,000 sq. ft. or \geq two stories (including basement) with fire area > 10,000 sq. ft. or repair garage servicing vehicles in basement or servicing commercial motor vehicles in fire area > 5,000 sq. ft.	None
Parking garage (S-1)	Commercial motor vehicles parking area > 5,000 sq. ft.	None
Parking garage (S-2)	Fire area > 12,000 sq. ft. or fire area > 5,000 sq. ft. for storage of commercial motor vehicles; or beneath other groups. (enclosed parking)	Not if beneath Group R-3
Covered and open malls (402.5)	Sprinklers required.	Attached open parking structures.
High-rises (403.3)	Sprinklers required.	Open garages; certain telecommunications buildings
Unlimited area buildings (507)	A-3, A-4, B, F, M, S: one story. B, F, M, S: two story.	One story F-2 or S-2.

Note: Thresholds located in Section 903.2 unless noted. See also Table 903.2.11.6 for additional required suppression systems.
For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

Figure 903.2
SUMMARY OF OCCUPANCY-RELATED AUTOMATIC SPRINKLER THRESHOLDS



Washington State Building Code Council

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STATE BUILDING CODE INTERPRETATION NO. 15-03

CODE: 2012 International Building Code

SECTION: IBC 311.2 moderate-hazard storage, Group S-1
IFC 903.2.9 Automatic Sprinkler Systems Group S-1

A large mini storage development has been presented to Benton County Building Department. During the preconstruction meeting, the developers were advised that based on IBC 311.2 all the mini-storage units would be classified as S-1.

QUESTION: What is the occupancy classification for mini storages?

ANSWER: Occupancy classification is at the discretion of the local official. Classification of units as S-1 is reasonable based on the list of possible contents in IBC section 311.2. Classifying mini storage as Group S-1 is appropriate based on the history of these types of buildings.

IFC 903.2.9 Group S-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m²).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230m²).
4. A Group S-1 fire area used for storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464m²).
5. A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet.

QUESTION: At a 2012 IBC update class, the instructor stated, paraphrasing, "Due to mini storages being subject to the storing of upholstered furniture and mattresses, 903.2.9 (5) is applicable". While not every unit will be used to store upholstered furniture or mattresses, the plan check dilemma is determining which units will store what.

Is IFC/IBC 903.2.9 (5) always applicable to S-1 mini storages built under the current code?

ANSWER: The answer depends on what is allowed to be stored in the mini storage units. The answer is No if the building does not allow storage of upholstered furniture or mattresses per IFC 903.2.9(5). If the storage of upholstered furniture or mattresses is allowed, then the answer is Yes as IFC 903.2.9 applies.

SUPERSEDES: None

REQUESTED BY: Benton County Building Department

INTERNATIONAL BUILDING CODE

CHAPTER 9
FIRE PROTECTION SYSTEMS

SECTION [F] 903.2.9
2012 Edition
IFC Interpretation 20-14
Issued 10-6-2014
BU_12_20_14

[F] 903.2.9 Group S-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

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4. A Group S-1 *fire area* used for the storage of commercial trucks or buses where the *fire area* exceeds 5,000 square feet (464 m²).
5. A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).

• • • • •

Q: The area of a self-storage warehouse is between 2,500 square feet and 12,000 square feet. Spaces are rented to individuals for the storage of personal household items (which could include incidental pieces of upholstered furniture and mattresses).

Does item #5 require an automatic sprinkler system throughout the Group S-1 self-storage warehouse?

A: Yes.

This criteria is written such that any Group S-1 occupancy, not the fire area, over 2,500 square feet used for the storage of upholstered furniture and/or mattresses shall be sprinklered throughout the building. This is regardless of how much upholstered furniture and/or mattresses are actually stored.
