**Chapter 29 Existing System Modifications**

29.1 General

29.1.1

In addition to the applicable requirements of this standard, the requirements of Chapter 29 shall apply where modifications or additions are made to existing systems.

29.1.2

Where additions or modifications are made to an existing system, enough of the existing system shall be indicated on the plans to make all conditions clear.

29.1.3

When backflow prevention devices are to be retroactively installed on existing systems, a thorough hydraulic analysis, including revised hydraulic calculations, new fire flow data, and all necessary modifications to accommodate the additional friction loss, shall be completed as a part of the installation.

29.1.4

A hydraulically calculated system for a building, or a hydraulically calculated addition to a system in an existing sprinklered building using the pipe schedule method, shall supersede the requirements in this standard governing pipe schedules, except that all systems shall continue to be limited by area.

29.1.5

Unless permitted by 29.1.5.1, when modifying existing systems protecting general storage, rack storage, rubber tire storage, roll paper storage, and baled cotton storage, using sprinklers with K-factors K-8.0 (115) or less, the requirements of 21.1.3 and 21.1.4 shall not apply.

29.1.5.1

Where applying the requirements of Table 21.5.1.1 utilizing the design criteria of 0.6 gpm/ft2 per 2000 ft2 (25.5 mm/min over 185 m2) to existing storage applications, standard-response spray sprinklers with a K-factor of K-11.2 (160) or larger that are listed for storage applications shall be used.

29.1.6

For modifications or additions to existing systems equipped with residential sprinklers, the listed discharge criteria less than 0.1 gpm/ft2 (4.1 mm/min) shall be permitted to be used.

29.1.7

Torch cutting and welding shall not be permitted as a means of modifying or repairing sprinkler systems.

29.1.8

Additives to existing systems intended for control of microbiological or other corrosion shall be listed for use within fire sprinkler systems.

29.2 Components

29.2.1

The use of reconditioned valves and devices as replacement equipment in existing systems shall be permitted.

29.2.2

Where all or part of an inactive sprinkler system is abandoned in place, components including sprinklers, hose valves and hoses, and alarm devices shall be removed.

29.2.3

Control valves abandoned in place shall have the operating mechanisms removed.

29.2.4

Sprinkler system piping and/or valves abandoned in place shall be uniquely identified to differentiate them from active system piping and valves.

29.3 Sprinklers

29.3.1

Reconditioned sprinklers shall not be permitted on any existing system.

29.3.2

When a sprinkler is removed from a fitting or welded outlet, it shall not be reinstalled except as permitted by 29.3.2.1.

29.3.2.1

Dry sprinklers shall be permitted to be reinstalled when removed in accordance with the manufacturer's installation and maintenance instructions.

29.3.3

Where modifications or additions are made to existing light hazard systems equipped with standard response sprinklers, new standard response sprinklers shall be permitted to be used.

29.3.4

Where individual standard response sprinklers are replaced in existing light hazard systems, new standard response sprinklers shall be permitted to be used.

29.3.5

Where existing light hazard systems are converted to use quick-response or residential sprinklers, all sprinklers in a compartment shall be changed.

29.3.6

When replacing residential sprinklers manufactured prior to 2003 that are no longer available from the manufacturer and that are installed using a design density less than 0.05 gpm/ft2 (2.04 mm/min), a residential sprinkler with an equivalent K-factor (±5 percent) shall be permitted to be used, provided the currently listed coverage area for the replacement sprinkler is not exceeded.

29.3.7

Where cover plates on concealed sprinklers have been painted by other than the sprinkler manufacturer, the cover plates shall be replaced.

29.4 Revamping of Pipe Schedule Systems

29.4.1

The pipe schedule method shall be permitted as follows:

Additions or modifications to existing pipe schedule systems sized according to the pipe schedules of Section 27.5

Additions or modifications to existing extra hazard pipe schedule systems

29.4.2

When pipe schedule systems are revamped to accommodate added ceilings, sprinkler outlets utilized for new armover or drop nipples shall have hexagonal bushings removed when present.

29.4.3

When pipe schedule systems are revamped, a nipple not exceeding 4 in. (100 mm) in length shall be permitted to be installed in the branch line fitting.

29.4.4

All piping other than the nipple permitted in 29.4.3 and 29.4.5 shall be a minimum of 1 in. (25 mm) in diameter in accordance with Figure 29.4.4.

FIGURE 29.4.4 Nipple and Reducing Elbow Supplying Sprinkler Below Ceiling.

29.4.5

When it is necessary to pipe two new ceiling sprinklers from an existing outlet in an overhead system, the use of a nipple not exceeding 4 in. (100 mm) in length and of the same pipe thread size as the existing outlet shall be permitted in accordance with Figure 29.4.5, provided that a hydraulic calculation verifies that the design flow rate will be achieved.

FIGURE 29.4.5 Sprinklers in Concealed Space and Below Ceiling.

29.4.6

Where an armover is attached to connect to a sprinkler, the use of pipe nipples less than 1 in. (25 mm) in diameter shall not be permitted where seismic design is required on the system.

29.5 Revamping of Hydraulic Design Systems

29.5.1

When hydraulically designed systems are revamped, any existing bushing shall be removed and a nipple not exceeding 4 in. (100 mm) in length shall be permitted to be installed in the branch line fitting.

29.5.2

Calculations shall be provided to verify that the system design flow rate will be achieved.

29.5.3

When it is necessary to pipe two new ceiling sprinklers from an existing outlet in an overhead system, any bushings shall be removed and the use of a nipple not exceeding 4 in. (100 mm) in length and of the same pipe thread size as the existing outlet shall be permitted, provided that a hydraulic calculation verifies that the design flow rate will be achieved.

29.5.4

Where an armover is attached to connect to a sprinkler, the use of pipe nipples less than 1 in. (25 mm) in diameter shall not be permitted where seismic design is required on the system.

29.6 System Design

29.6.1

Where an addition or modifications are made to an existing system, enough of the existing system shall be indicated on the plans to make all conditions clear.

29.6.2

The pipe schedule method shall be permitted as follows:

For modifications or additions to existing systems equipped with residential sprinklers, the listed discharge criteria less than 0.1 gpm/ft2 (4.1 mm/min) shall be permitted to be used.

A hydraulically calculated system for a building, or a hydraulically calculated addition to a system in an existing sprinklered building using the pipe schedule method, shall supersede the rules in this standard governing pipe schedules, except that all systems shall continue to be limited by area.

Unless permitted by 29.6.3, when modifying existing systems protecting general storage, rack storage, rubber tire storage, roll paper storage, and baled cotton storage, using sprinklers with K-factors K-8.0 (115) or less, the requirements of 29.6.2 and 29.6.3 shall not apply.

29.6.3

Where applying the requirements of Figure 25.9.3.1(a) and Figure 25.9.3.1(e) utilizing the design criteria of 0.6 gpm/ft2 per 2000 ft2 (25.5 mm/min over 185 m2) to existing storage applications, standard-response spray sprinklers with a K-factor of K-11.2 (161) or larger that are listed for storage applications shall be used.

29.6.4

For modifications or additions to existing systems equipped with residential sprinklers, the listed discharge criteria less than 0.1 gpm/ft2 (4.1 mm/min) shall be permitted to be used.

29.6.5 Retroactive Installation

When backflow prevention devices are to be retroactively installed on existing systems, a thorough hydraulic analysis, including revised hydraulic calculations, new fire flow data, and all necessary system modifications to accommodate the additional friction loss, shall be completed as a part of the installation.

29.6.6

A hydraulically calculated system for a building, or a hydraulically calculated addition to a system in an existing sprinklered building using the pipe schedule method, shall supersede the rules in this standard governing pipe schedules, except that all systems shall continue to be limited by area.

29.6.7

Unless permitted by 29.6.3, when modifying existing systems protecting general storage, rack storage, rubber tire storage, roll paper storage, and baled cotton storage, using sprinklers with K-factors K-8.0 (115) or less, the requirements of 21.1.3 and 21.1.4 shall not apply.

29.7 Testing

29.7.1

Modifications to existing piping systems shall require testing at system working pressure.

29.7.1.1

Where modification is made to an existing system affecting more than 20 sprinklers, the new portion shall be isolated and tested at not less than 200 psi (14 bar) for 2 hours.

29.7.1.2

Modifications that cannot be isolated, such as relocated drops, shall require testing at system working pressure.

29.7.2

Modifications to existing dry pipe or double interlock preaction systems shall be tested for air leakage using one of the following test methods:

An air pressure test at 40 psi (2.7 bar) shall be performed for 2 hours as follows:

The system shall be permitted to lose up to 3 psi (0.2 bar) during the duration of the test.

Air leaks shall be addressed if the system loses more than 3 psi (0.2 bar) during this test.

With the system at normal system air pressure, the air source shall be shut off for 4 hours. If the low pressure alarm goes off within this period, the leaks shall be addressed.