

Automatic Fire Sprinkler Systems Information Packet



Colorado Springs Fire Department Division of the Fire Marshal

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PURPOSE

This information packet has been developed in an effort to provide the highest level of service to the customers of the CSFD. The major goal of automatic fire sprinkler plan reviews conducted by the CSFD Construction Services is to ensure the design of automatic fire sprinkler systems meet the minimum requirements of the adopted codes and ordinances. To meet this goal, the submitted plans and supporting documentation must contain the information needed to conduct a thorough review.

SCOPE

This packet outlines the minimum requirements set forth in the International Fire Code, local amendments, and departmental policies and procedures as they relate to the installation of Automatic Fire Sprinkler Systems. This packet is not intended to provide an all-inclusive listing of submittal and inspections requirements, as it would be virtually impossible to cover all situations. This packet only covers requirement set forth in the latest edition of NFPA 13 and may be used as guidance for submitting NFPA 13D and 13R systems as well. Also included in this packet is information covering items required to be included on the working drawings and supporting documents.

DEFINITIONS

CSFD	Colorado Springs Fire Department
CSU	Colorado Springs Utilities
Ft ²	Square feet
FDC	Fire Department Connection
GPM	Gallons per Minute
IFC	International Fire Code
K-factor	Sprinkler head discharge coefficient
NFPA	National Fire Protection Association
NICET	National Institute for Certification in Engineering Technologies
PSI	Pounds force per square inch
RBD	Regional Building Department
SIN	Sprinkler Identification Number
RME	Responsible Managing Employee

GUIDELINES

I. INTRODUCTION.

A. APPLICABLE CODES AND STANDARDS.

1. Adopted International Fire Code and its local Amendments.
2. 2016 Edition of NFPA 13 Installation of Sprinkler Systems and associated standards.
3. 2016 Edition of NFPA 72 National Fire Alarm Code.

4. 2016 Edition of NFPA 14 Standard for the Installation of Standpipe and Hose Systems
5. Colorado Springs City Ordinances.
6. CSFD Administrative Rulings/Interpretations.

B. ADMINISTRATIVE REQUIREMENTS.

1. **Approved Contractors.** All suppression contractors must obtain a Colorado Springs Fire Suppression Contractor's A License in order to design, install, add to, alter, service, repair, and inspect automatic fire sprinkler and standpipes systems of all types as well as retrofit existing systems with backflow preventers, in accordance with Pikes Peak Regional Building Code, Section 207. Please contact Regional Building Department, Contractor Licensing at 719-327-2887 for additional information.
2. **Approved Installers.** A Colorado Springs licensed Installer shall be on-site for all installations, additions, alterations, repair and inspections of fire sprinkler systems. Installers are required to pass a test administered by Compliance Services and Assessments and obtain approval from the CSFD prior to overseeing any work on any water-based system.
3. **Code/Standard Editions.** Automatic fire sprinkler systems shall meet the criteria of the adopted IFC as amended and all applicable requirements of the most recent edition of the NFPA standards. NFPA standards are effective on the January 1st of the year following the effective date printed in the standard. Sprinkler systems shall also meet the requirements set forth in adopted ordinances and CSFD Administrative Rulings.
4. **Permits/Inspections.** Required plan submittal with approvals, permits and associated inspections must be secured through CSFD Construction Services. Plan approval and permits shall be secured prior to the start of any work.
5. **Special Circumstances.** Depending on the scope of work, different types of submittals may be required; therefore you may want to contact the CSFD Construction Services for any additional information. For example, small tenant finish projects – hydraulic calculations need not be submitted as long as it is indicated that there is no adverse effect on the system's remote area or demand.
6. **Alternative Methods.** If special building conditions and/or restrictions exist that may prohibit any of the requirements set forth in adopted codes, rules, regulations, etc. from being met, approval by CSFD Construction Services for an alternate installation will be required. This alternate method must be approved before any installation of the system begins. In some cases, the alternative method may be referred to the Fire Board of Appeals for consideration.
7. **Non-Required Systems.** All non-required fire alarm systems shall meet the requirements of adopted codes and standards... Additionally, they shall be submitted for review and approval to CSFD Construction Services.
8. **Revisions.** All revisions shall be clouded and identified with a sequential numbering or lettering system, such as Revision A, B, etc. or Revision 1, 2, etc. Revisions are date sensitive, thus each revised sheet must bear the date of the revision.
9. **As-Builts.** All deviations from approved plans shall be documented and submitted to CSFD for archival. Reviews will not be conducted on As-built, unless specifically required by the fire inspector, as these field changes are often verified as compliant by the fire inspectors. All as-built plans shall be conspicuously marked as such.

II. SUBMITTAL INFORMATION.

Submittals shall be of sufficient clarity and quality to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of the IFC, and other relevant laws, ordinances, rules and regulations adopted by Colorado Springs, and as determined by the Fire Marshal. You may refer to the attachments section of this packet for a more complete checklist of items required to be provided on the submitted plans. This documentation is required to assure the plan submittal package contains the necessary information for a complete plan review.

A. MINIMUM REQUIREMENTS OF THE CSFD FOR SUBMITTAL.

1. **Drawing Size.** Drawings shall be submitted on sheets no less than 24x36 inches and shall be drawn to 1/8" or 1/4" scale. Other scales may be accepted on an as-needed basis, please contact the CSFD Construction Services if you have questions regarding the use of different scales.
2. **Plan Review Number.** Drawings shall be provided with a **CSFD Plan Review Number**. This number is an eight digit numeric code located on the back of the architectural/building permit set of plans. Some plans are fire sprinkler work only, please indicate such.
3. **Number of Drawing Sets.** A minimum of 2 sets of drawings are required to be submitted to Construction Services and shall include the items found in the checklist provided within this packet. Please roll plans, as this method is more appropriate for our plan bins and easier to transport within the office. A maximum of three original sets may be stamped with our approval. Refer to the Attachments for the checklist of information required on all plans submitted. All plan sheets shall be signed/sealed by an RME of the licensed submitting contractor.
4. **Cut Sheets/Specifications.** One set of manufacturer's product information (cut sheets) shall be provided. This is to include information on all devices that are part of or being connected to, the fire sprinkler system. When cut sheets show multiple models/types of devices, the specific item(s) being installed shall be highlighted. For example, in using extended coverage heads, the spacing utilized in the design and calculations shall be highlighted on the cut sheets as well as indicated on the drawings.

A table of contents shall be provided and specifications package shall be tabbed with the following sections: Water supply, Sprinklers, Piping and Fittings, Valves, Hangers, Appurtenances and other system components, Fire Department Operating instructions for the entire system (including copy of instructions to be posted next to the panel), and Manufacturer approved testing instructions.

Cut sheets shall be rolled inside the plans to prevent them from becoming separated, if the cut sheets are too large to feasibly roll them, a binder identifying the project, is acceptable. Stamped cut sheets will be returned to the contractor and must remain on the job site with the approved plans. The cover of the cut sheets shall be signed/sealed by an RME of the licensed submitting contractor.

CSFD accepts cut sheets on CD. The CD must have the individual cut sheets for the materials specific to the job – we will not accept manufacturer's CD's! If this option is chosen, the CSFD will stamp, date and initial the CD – it is then the contractor's responsibility to provide the means of reviewing that disk upon the fire inspector's request.

5. **Hydraulic Calculations.** A minimum of 2 sets of hydraulic calculations are required to be submitted to Construction Services and shall include the items found in the checklist provided with this packet. Calculations shall be rolled inside the plans to prevent them

from becoming separated, if the hydraulics set is too large to feasibly roll them, a binder identifying the project, is acceptable. One set will be retained by Construction Services for our records. The cover page of all hydraulic calculations shall be signed/sealed by an RME of the licensed submitting contractor.

6. **Code Study.** In some cases, CSFD will require a code study of the design criteria for the system being submitted. Most commonly, this is required in storage occupancies utilizing rack storage and/or in-rack sprinkler systems. Each step is required to be detailed, reference each code or standard section used in arriving at the design criteria for the sprinkler system. Be sure to show your work when increasing or decreasing densities or design areas.

B. CONSTRUCTION DOCUMENTS.

Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of the IFC, relevant laws, ordinances, rules and regulations as determined by the CSFD.

Plans shall be legible, dark-lined and reproducible with conventional copying equipment. Please do not use colored highlighting as these are frequently not reproducible. Also, do not use colored or gray back ground shading as these interfere with archiving.

When a project is associated with a building permit, sprinkler plans shall reflect the scope of work as approved under the building permit. The scopes of work must match. This is especially crucial when you have multiple permits within the same building.

When working on an existing system, you must provide details on that system such as original installation date, original requirements of the system or its intent, requirements based on occupancy and occupant load, etc.

Refer to the attachments within this packet for a checklist of items to be included on your drawings.

III. GENERAL INFORMATION AND REQUIREMENTS.

A. FIRE DEPARTMENT CONNECTIONS.

Fire department connections shall be readily visible and accessible. FDC's shall not be obstructed by any landscaping, parking or storage, fences, etc. at anytime.

All FDC's shall be installed at locations approved by the CSFD on the front entrance and/or addressed side of the structure. There are some instances where this location is not possible, please contact Construction Services in these situations.

The FDC shall be located within 40 feet of an approved fire department access road. Additionally, a fire hydrant capable of meeting the required sprinkler supply demand shall be provided within 100 feet of the FDC.

All standpipe and automatic fire sprinkler system FDC's shall be properly identified so as to indicate clearly what each component or each piece of equipment serves. One inlet for every 250 gpm in system demand shall be provided.

When the sprinkler system exceeds a demand of 1500 gpm, a secondary FDC of same capacity in an approved secondary location will be required. Each FDC is required to be located within 100 feet of a hydrant and 40 feet of an approved fire department access road.

A CSFD approved weatherproof electric horn/strobe unit shall be installed proximate to and within 20 feet of the FDC. For Local Systems, signage as to the type of alarm ("Fire Sprinkler

System Activated”) and requested action (“Call 911”) shall be installed. The horn/strobe shall be at a height and location that is visible to responding emergency crews.

B. MONITORING.

New automatic sprinkler systems shall be electronically supervised by an approved monitoring agency when there are 20 or more sprinklers in all occupancies.

Existing automatic sprinkler systems (installed pre-November 2005) may be supervised in accordance with the Fire Code adopted at the time of original installation. NFPA 13:8.16.1.2.1 provides some guidance on acceptable methods of supervision as indicated below in order of descending preference.

- a. Electronically supervised by an approved monitoring company
- b. Local signaling service that will cause an audible signal at a constantly attended point
- c. Locked in the open position.
- d. Located within a locked or fenced enclosure under the control of the owner, sealed in the open position, and inspected weekly as part of an approved procedure.

C. WATER SUPPLY INFORMATION.

Theoretical water supply information shall be obtained from Colorado Springs Utilities. Construction Services will not accept actual flow tests for fire sprinkler plan submittal and hydraulic calculations! The information on this report shall be less than 1 year old. A copy of this report shall be provided with your submittal package.

The water supply graph shall indicate a second curve showing 10% reduction in the water supply. This curve shall be separate and distinguishable and have a slope equal to or greater than the 100% theoretical water supply curve. You must provide the 100% theoretical water supply information, with the reduced water supply information indicated on the graph sheet, or on the plans. Do not supply us with only the reduced information.

The required sprinkler system flow and pressure, including applicable hose demand, shall fall on or under a curve with a slope equal to or greater than the available water flow.

Fire Pumps shall be sized to supply the equipment that they serve. Where pumps serve sprinklers only, they can be sized to provide the flow for the sprinkler system, ignoring any hose stream demands. Demands of equipment not connected to the fire pump (such as outside hose demand) can be ignored except for evaluating their impact on the available water supply to the pump.

D. HIGH PILED STORAGE AND HIGH CHALLENGE COMMODITIES.

In buildings used for high-pile combustible storage, fire protection shall meet the criteria of the IFC and the applicable sections of NFPA 13. Also, please refer to the “High Piled Combustible Storage Document #1” provided by the Division of the Fire Marshal for additional requirements. Please be sure to provide a copy of the completed high piled combustible storage questionnaire along with the submitted plans.

To expedite reviews, provide a code study on how the design criterion was determined for the sprinkler system. Information on how the design density and area were determined must be provided – this is especially critical when there are multiple adjustments for various storage arrangements. Each code section must be referenced and all math work must be shown.

The design professional shall perform a survey of the stored commodities to determine the highest challenging commodities stored inside the building. The design shall be based on the most challenging commodity stored or to be stored in the building and if used, the method of separating or isolating these commodities. The sprinkler shop drawings or technical report shall explain the basis for determining the basis for commodity selection, if and how the

commodities will be isolated or separated, and any design documents used such as Factory Mutual Data Sheets or fire test reports.

Please reference the Plan Submittal Requirements Checklist at the end of this document for additional plan requirements for these systems.

E. LIMITED AREA SYSTEMS.

Limited area systems involve 20 or fewer sprinklers. These are permitted to be supplied from the domestic water system. Typically these systems are used in medical gas rooms or other isolated hazard areas in an otherwise non-sprinklered building. References from NFPA 101, 99 and 13R are used in the review of these systems.

For protection of medical gas installations, remember the rooms are required to be ventilated, often to the exterior. Additionally, radiant heat sources are not recommended for heating of these rooms due to the fire hazard they create with the medical gases. This makes installation of wet pipe sprinklers a challenge in the least. CSFD recommends the use of dry sprinklers for these areas.

F. ELEVATOR MACHINE ROOMS.

Automatic sprinklers are NOT to be installed in elevator machine rooms/spaces, control rooms/space or hoist ways of traction elevators. The following requirements must be met in lieu sprinkler protection:

1. The elevator equipment is to be installed to meet the more restrictive of the two options noted below:
 - a) Within an enclosure meeting the fire resistive rating of the elevator hoist way OR
 - b) One-hour occupancy separation
2. No combustible storage is permitted to be stored in the room (room must be dedicated to elevator equipment only)
3. System smoke detection is to be provided and connected to a monitored fire alarm system
4. A portable fire extinguisher rated not less than 2A:20B:C is provided at the door giving access into the room.

G. ELECTRICAL ROOMS.

Automatic sprinklers are not required to be installed in MAIN electrical equipment room as long as the following conditions apply:

1. The room is dedicated to electrical equipment only
2. Only dry type electrical equipment is used
3. Equipment is installed in a two-hour enclosure
4. No combustible storage is permitted to be stored in the room
5. System smoke detection is provided and connected to a monitored fire alarm system
6. A portable fire extinguisher rated not less than 2A:20B:C is provided at the door giving access into the room.

The Main electrical room is the room where the electrical service enters the building and is distributed to the sub-panels. All other electrical rooms, closets, telephone switch and similar rooms are required to be sprinklered.

H. HEALTHCARE AND STATE PROJECTS.

When dealing with healthcare or State facilities, check with the appropriate State of Colorado agency for additional requirements that may over-ride our local amendments. Application of NFPA 101 is permitted and in some instances required. These additional requirements must be coordinated with CSFD Construction Services.

I. **TENANT FINISH/REMODELS.**

Submittals shall include the entire project area including adjacent spaces and devices as necessary to show proper sprinkler coverage. New and existing equipment shall be designated with "N" and "E" subscripts.

Deficiencies caused by tenant finish or remodel work shall be corrected prior to final inspection. This means if the scope of work causes a deficiency in the system, that deficiency becomes your responsibility to correct. For example, a demising wall is erected for a new tenant and that demising wall creates a spacing issue of sprinklers outside the new tenant space, you must correct that spacing issue prior to final inspection. CSFD will consider that as part of your scope of work.

Additionally, you must provide the design criteria (density and operating area), the code edition the system was originally designed and installed to as well as the system demand and a current static pressure reading from the riser.

Sprinklers removed for any reason shall NOT be reinstalled per NFPA 13, 6.2.1.1, unless the requirements of A6.2.1.1 are met.

1. **20-Head Letters.** If the work consists of 20 heads or fewer, the work may be submitted to CSFD as a 20-head letter. Only ONE 20-head letter per project is permitted! Refer to 2009 IFC 901.3.1.1 for additional information and restrictions. Such submissions shall include the following information:

- a. Letter shall be submitted on a licensed contractor's letterhead.
- b. All work performed will be completed by the licensed contractor indicated on the letterhead or as declared in the letter if other than the submitting contractor.
- c. The water supply is of sufficient capacity and no hydraulic overloading exists.
- d. The system shall be installed in accord with all applicable local and national standards.
- e. Scope of work being conducted including the building name and address as well as interior area location. A sketch may be the easiest way to depict the scope of work, but is not required.
- f. The number of heads being affected.
- g. Time schedule for the work being performed, including start and completion dates.
- h. CSFD plan review number OR statement "System Work Only" shall be provided. If a building permit was issued, it is helpful to provide that information as well.

At the time the work is completed, a certificate of compliance shall be filed with the Division of the Fire Marshal.

Revisions to the scope of work conducted under a 20-head letter now require a revised letter to be submitted. If the revisions cause the scope of work to exceed 20-heads, you must submit plans and obtain a physical permit.

2. **Turning heads upright to accommodate a demolished ceiling.** This work may be accepted on a letter. These are considered on a case-by-case basis, please contact Construction Services for guidance.

J. **VESTIBULES.**

Vestibules have proven to be a frustrating feature during the freezing temperatures we experience in Colorado. Vestibules that are outside the building envelope, unheated vestibules and glass vestibules with no storage of saleable or combustible goods are good candidates for the omission of fire sprinklers. Each vestibule will be reviewed on a case-by-case basis for the omission of fire sprinklers to prevent potential property damage due to frozen pipes.

K. **EMERGENCY REPAIR WORK**

Emergency repair work is defined as that minimum work necessary to return a damaged or impaired system to satisfactory and fully functional status.

Emergency repair work may proceed without a permit provided the system is repaired to its original configuration, and a permit application (with submittals) is submitted by the next business day after the work is completed.

- L. **Decommissioning Systems.** When systems are to be removed from service, a letter shall be submitted to CSFD Construction Services detailing the reason(s) for the system being removed. Information on the building, occupancy classification and occupant load shall be included.

M. **ADDITIONAL REQUIREMENTS.**

1. **Floor Control Valve Assemblies.** Buildings exceeding 2 stories shall be provided with the following for isolation, control and annunciation of water flow for each floor level:
 - a. Floor control valve
 - b. Check valve
 - c. Main drain valve
 - d. Flow switch.

Exceptions: Where the top level of sprinklers is supplied by the level below. Where the aggregate floor area does not exceed the system protection area limitations.

2. **Buildings under construction** shall have fire protection equipment installed and maintained in accordance with the IFC.

Prior approval from CSFD shall be obtained before combustible materials are stored or moved into buildings until such time fire protection systems are operational and on-line. Factory Mutual Data Sheet 1-0 *Safeguards During Construction* and NFPA Standard 241 *Safeguarding Construction and Alteration Operations* both speak to this issue as a safe operating practice. Having fire sprinkler and alarm systems operational prior to storage of, or moving in of, combustible materials (including but not limited to building furnishings) reduces the amount of fire, smoke and water damage should a fire occur.

3. **Approved signage** must be provided on the door of the enclosure in which any sprinkler system valves/controls are located stating "Fire Control Valves" in 2 inch high block letters with a stroke of not less than ¼ inch and a color contrasting with its background (NFPA 13:6.6.4 and IFC).

Valves or switches which are located within building elements must also be identified in an approved, suitable and easily identifiable method or manner at the point/location giving access to said valve or component.

Signs shall be permanent, weatherproof and appropriately secured in accordance with NFPA 13:6.6.4.

A general information sign used to determine system design basis and information relative to the requirements of NFPA 25, shall be provided with a permanently marked weather-proof metal or rigid plastic sign, secured at each system control riser, antifreeze loop and auxiliary control valve, This sign shall include the following:

1. Name and location of the facility
2. Occupancy classification
3. Commodity Classification
4. Presence of high-pile or rack storage, and solid shelving
5. Max height of storage and aisle widths
6. Encapsulation of pallet loads
7. Presence of other special storage
8. Presence of hazardous materials including any flammable or combustible liquids
9. Location of auxiliary drains, low point drains.
10. Original main drain flow test results
11. Installing contractor/designer
12. Indicate of presence and location of antifreeze/other auxiliary systems (NFPA 13:25.6)

High Pile/High Challenge systems shall have their capabilities and limitations identified. A permanent sign shall be provided at or adjacent to each sprinkler riser. This sign shall include the following information:

1. Design base or basis, including the edition used
 2. A statement indicating if the sprinkler design is control mode density area method, control mode specific application, suppression mode or any combination thereof
 3. When used, all of the storage conditions stipulated for special designs
 4. The maximum storage height
 5. The minimum required aisle width
 6. If storage is in racks, the maximum rack width and minimum transverse and longitudinal flue widths
 7. Commodities that can be protected by the automatic sprinkler system
 8. Commodities that cannot be protected by the automatic sprinkler system
 9. Limits on storage heights of idle wood and plastic storage
 10. Limits on storage heights of miscellaneous Group A plastics, tire and rolled paper storage
 11. Locations where in-rack sprinklers are used
 12. Locations where horizontal and/or vertical barriers are used
 13. Information explaining the manufacturer, SIN, K-factor and operating temperature of the overhead sprinklers protecting the high pile/high challenge storage.
- An example sign can be found at the end of this document.

4. **Spare Sprinklers Cabinet.** A minimum of 6 spare sprinklers shall be provided and shall include all types and ratings installed and shall be as required in section 6.2.9. One sprinkler wrench as specified by the sprinkler manufacturer shall be provided in the cabinet for each type of sprinkler installed. A list of the sprinklers installed in the property shall be posted in the sprinkler cabinet. This list shall include the following:

1. SIN or manufacturer, model, orifice, deflector type, thermal sensitivity and pressure rating.
 2. General description
 3. Quantity of each type to be contained in the cabinet
 4. Issue or revision date of the list.
(NFPA 13:6.2.9)
5. **Shell buildings** that are required to be sprinkled shall be required to be designed and installed according to the requirements set forth for "Ordinary Hazard Group II" occupancies. Upon tenant finish, these buildings may be converted to lower hazard design density and coverage if applicable to the occupancy or use. Because there is no way of telling who a prospective tenant will be, or what kind of hazards that tenant will be bringing into the building, this requirement is intended to mitigate against those hazards which this department may be unaware of. In addition, this ensures the density is provided for most occupancies without system upgrades.
 6. **Grounding.** In no case shall sprinkler piping be used for grounding of electrical services per NFPA 13: 8.18.
 7. **Non-System Components.** Sprinkler piping or hangers shall not be used to support any non-system components! This includes any fire alarm wiring. (NFPA 13: 4.6 and 9.1.1.8)
 8. **Flex Connections.** Systems utilizing flexible sprinkler connections shall be approved for such use. Hydraulic calculations shall be provided proving their use will not adversely affect the system design. This is applicable for both newly installed systems and existing system being modified.
 9. **Plastic Pipe and Spray Foam Insulation.** Compatibility shall be verified and proof of application in accordance with manufacturer requirements shall be provided. In general, it is best to avoid using spray foam insulation with plastic piping due to the exothermic reaction of the spray foam during the curing process.
 10. **Freezing Conditions.** Here in Colorado, we experience sub-zero temperatures and unfortunate sprinkler system freeze-ups. Antifreeze sprinkler systems, where permitted, shall be designed to protect at least -15° F.

It is the designer's responsibility to provide the building owner with a system design that will continue to function reliably even under such adverse temperature conditions. The sprinkler contractor must be conscious of field conditions that may affect the performance of their system, such as drafts, disturbed insulation, installation along exterior walls, etc. and incorporate such conditions into a reliable design.

It is the owner's responsibility to ensure adequate heat is provided to the building, however the installer should be watchful of situations that may pose a freezing condition such as a lack of heat within a riser room or insulation that has been either improperly tented or disturbed, and take appropriate actions to remedy the situation.

A permanent source of heat shall be provided at the floor level of the riser room in situations where the riser room is provided with exterior access. Unheated building spaces that are to be sprinklered must be clearly identified on the submittal documents. Some areas that are difficult to maintain heat include: above ceiling spaces, stairwells, pump and valve rooms and exterior vestibules.

Use of heat trace is permissible on a case-by-case basis. The installation of heat trace shall be approved by CSFD prior to installation. Heat trace is required to be listed for fire protection service and is required to be supervised by an approved supervising station, generally accomplished through the fire alarm system. Heat trace is not permitted in lieu of a heated valve enclosure to protect valves and supply piping.

Antifreeze systems shall be provided with a placard at the main control valve indicating:

- a) Manufacturer type and brand of antifreeze solution used

- b) Concentrations of antifreeze solution by volume note that only premix solutions are permitted.
 - c) Volume of antifreeze solution.
11. **NEW! Reduced Pressure Backflows.** Any sprinkler system utilizing a chemical suppressant (i.e. foam) or a stored water supply in conjunction with the CSU water supply must be equipped with a reduce pressure backflow assembly. The reduce pressure backflow assembly must be listed by USC (University of Southern California - http://www.usc.edu/dept/fccchr/_downloads/List/list.pdf), and installed in the listed orientation, the reduce pressure backflow must be installed in accordance with Colorado Springs Utilities, and Colorado State Plumbing regulations.
 12. **Dry Systems Protecting Dwelling Units.** Initial water discharge shall be achieved in 15 seconds. These systems are not permitted to utilize options such as 60 second delivery times, QOD's, etc. Please reference 13:7.2.3 for additional details.
 13. **High Volume Low Speed (HVLS) Fans.** All HVLS fans shall be interlocked to shut down immediately upon receipt of a waterflow signal at the fire alarm control panel.
 14. **NEW! Pipe Replacement.** Like for like pipe replacements will require submittals drawings showing the scope of the pipe replacement, existing hydraulic calculations for the system, the edition of the NFPA 13 that the system was originally approved under, and a current CSU fire flow report (to ensure that the water supply has not deteriorated since the system was installed). If the pipe being replaced is going from a smaller internal pipe diameter to a larger internal pipe diameter (i.e. black schedule 40 to black schedule 10), then the above requirements would also apply. However, if the pipe replacement involves changing the type of pipe (i.e. black to galvanized) or is going from a larger internal pipe diameter to a smaller pipe diameter, then full submittal drawings and hydraulic calculations will be required.

A CSFD inspection is required for these retrofits, and a plan review fee will be assessed. The plan review fee for a pipe replacement will be based on the number of sprinkler heads involved in the scope of work along with the number of stories and systems involved.
 15. **NEW! Retroactive Backflow Installation.** The retroactive installation of a backflow assembly is to be in accordance with NFPA 13:8.17.4.5.2. Submittal must include a minimum of an 8 ½" x 11" riser detail, current CSU water flow report, and demand hydraulic calculation (if demand of the existing system is known). Backflow retrofit on a pipe schedule system must use the water supply requirements in NFPA 13:11.2.2 in preparing the demand hydraulic calculation. Also provide the edition of the NFPA 13 that the system was originally approved under.

This submittal would also apply for the replacement of an existing dry, pre-action, deluge, or alarm valve where the valve replacement is not like for like.

A CSFD inspection is required for these retrofits, and a plan review fee will be accessed.

IV. INSTALLATION.

A. ADMINISTRATIVE PERMITS.

1. **Work at Risk.** Approval shall be obtained from CSFD to begin work prior to issuance of a permit. A letter is to be submitted to CSFD requesting the work at risk, and defining the justification for the request. The work at risk approval shall be posted on the job site until such time your installation permit is issued.

2. **Demolition Permit.** Approval shall be obtained from CSFD to permanently remove a fire protection system from a building. The approval shall be posted on the job site until such time the final inspection is completed (See decommissioning systems section).
3. **20-head Letters.** Any additions or remodels to an existing commercial fire sprinkler system involving 20 heads or less will not require plans submittal or a construction permit when approved by the CSFD. Upon approval, the letter is considered an administrative permit and must be posted on the job site in lieu of the formal construction permit.

B. CONSTRUCTION PERMITS

1. A construction permit is required for installation of or modification to a fire sprinkler system. Any modification requires a permit (also see 20 head letter section). Maintenance is defined as the work necessary to keep equipment operable or to make repairs. An example of maintenance work would be exercising valves, lubing stems or cleaning strainers. Replacing existing sprinklers due to age, paint, or damage would be considered repair work and not subject to permit requirements.
2. The installation of the fire sprinkler system is not to commence, including any pre-piping, until the working plans have been reviewed and approved by CSFD Construction Services and a construction permit is secured on site. To begin work prior to plan approval, refer to the Work At Risk sections.
3. Permits for fire sprinkler systems expire one year after date of issue. A 30-day grace period is allowed to renew the permit. After the grace period expires, if inspections have been conducted in the past 13 months, new plans and permit are not required to be submitted. If the grace period has expired and no inspections have occurred in the past 13 months, new plans shall be submitted. Refer to IFC 105.3.1 for further information.
4. Permits will be issued to match the scope of work of the building permit they are associated with. For example: if there are 3 separate building permits issued for interior remodels in different areas of the same building, the fire sprinkler submittals will receive 3 separate permits, regardless if they were submitted on one plan set or separate plan sets. This prevents failures of one scope of work holding up the final of another scope of work.

C. APPROVED CONTRACTORS/INSTALLERS.

1. A Colorado Springs Licensed Installer shall be on-site for all installations, additions, alterations, repairs and inspections of automatic fire sprinkler and standpipe systems. The Installer shall be employed by a Fire Suppression Contractor A licensed company in accordance with Pikes Peak Regional Building Code, Section 207.

V. INSPECTIONS AND TESTING.

It shall be the duty of the person doing the work authorized by a permit to notify the CSFD that the work is ready for inspection. It shall also be the responsibility of the person requesting the inspections to provide access to and means for proper inspection of the work.

Don't put the inspectors on the spot. Call before they walk on the site with any questions and get them resolved up front with all parties involved. Additionally, if you want them to be consistent, compliance with the minimum codes is a must.

Systems shall undergo an acceptance test witnessed by CSFD. It shall be unlawful to occupy any portion of a building or structure until the required systems have been tested and approved by the CSFD.

A. ABOVEGROUND PIPING.

1. **Visual Inspection.** Sprinkler piping and hangers shall not be covered and/or concealed by any means prior to a visual inspection being conducted and accepted by CSFD. THIS INCLUDES DROP GRID STYLE CEILINGS! Ceilings, including finished sheet rock, will be required to be removed if necessary for inspection.
2. **Hydrostatic Test.** All piping and joints, including the FDC piping, in standpipe and/or sprinkler systems require a 200 psi hydrostatic test per NFPA 13:10.10.2 and 25.2.1.1. All pipe joints shall be exposed to expedite the verification of leak-free joints. The test shall be witnessed and accepted by a member of the CSFD Construction Services.

Where system working pressure exceeds 150 psi, the hydrostatic test shall be performed at 50 psi in excess of the system working pressure per NFPA 13:25.2.1.2.

Additions/Modifications to existing systems involving more than 20 sprinklers, the area shall be isolated and tested at not less than 200 psi for a minimum of 2 hours. If the area cannot be isolated, it shall be tested at the system's normal static pressure.

3. System Operational Tests.

Main Drain. Sprinkler and/or standpipe systems shall undergo a main drain test to establish a base line residual pressure for future reference in accordance with NFPA 13:25.2.3.4.

Trip Test. Dry Pipe/Preaction/Deluge valves shall undergo a working trip test or automatic operation in accordance with NFPA 13:25.2.3.2.

PRV's/BFP's shall undergo testing to ensure proper operation per NFPA 13:25.2.4 and 25.2.5.

B. UNDERGROUND PIPING.

1. **Visual Inspection.** CSFD does not perform a visual inspection of the underground fire lines; CSU Water Inspections will inspect the fire line and approve the burial.
Remote FDC pipe that is not tied directly into the water supply is not inspected by CSU. This piping must be visually inspected by CSFD prior to burial.
2. **Hydrostatic Test.** Standpipe and/or sprinkler systems require a 200 psi hydrostatic test procedure for the underground piping per NFPA 13:10.10.2. The test shall be witnessed and accepted by CSFD. Underground piping is allowed minimum leakage in accordance with NFPA 13.

Where system working pressure exceeds 150 psi, the hydrostatic test shall be performed at 50 psi in excess of the system working pressure per NFPA 13:10.10.2.

3. **Underground Flush.** Underground piping from the water supply to the system riser and lead-in connection to system riser shall be completely flushed before any connection is made to fire protection system piping (NFPA 13:10.10.2). The test shall be witnessed and accepted by CSFD

Flushing shall continue for sufficient time to ensure thorough cleaning, usually until the water runs clear, this is usually accomplished in a 5-minute flush. Be advised the CSU chlorination flush does NOT replace the Fire Department's required flush.

Minimum flow rate shall be not less than one of the following:

1. Hydraulically calculated demand rate of the system, including any hose requirements.
2. Flow necessary to achieve a velocity of 10 ft/sec in accordance with NFPA 13 Table 10.10.2.1.3. Minimum Flow Rates (Preferred method)

<i>Underground Pipe Size (in)</i>	<i>Required Flow Rate (gpm)</i>	<i>Hose/Pipe Sizes</i>					
		2 ½"	3"	4"	5"	6"	8"
4	390	1	1	1	-	-	-
6	880	2	2	1	1	1	-
8	1560	4	3	2	1	1	1
10	2440	6	4	3	2	1	1
12	3520	8	6	4	2	2	1

3. Maximum flow rate available to the system under fire conditions.

C. COMPLETION DOCUMENTS.

1. The completed *Contractor’s Material and Test Certificate for Aboveground Piping* form is to be provided to the fire inspector at the time of final inspection. Be sure to use the updated form in the 2016 edition of NFPA 13. Previous editions will NOT be accepted.
2. The completed *Contractor’s Material and Test Certificate for Underground Piping* form is to be provided to the fire inspector at the time of the underground and hydrostatic inspection. Be sure to use the updated form in the 2016 edition of NFPA 13. Previous editions will NOT be accepted.
3. An owner’s manual and installation instructions covering the fire sprinkler systems equipment.
4. A copy of the completed *Fire Sprinkler System Installer’s Certification*.
5. Permanent records such as hydraulic nameplate and general information in accordance with NFPA 13, as well as copy of NFPA 25 *Inspection Testing and Maintenance of Water-Based Fire Protection Systems* shall be provided to the building owner.

REFERENCES AND LINKS

- a. Colorado Division of Fire Prevention and Control Web site.
<http://dfpc.state.co.us/>
- b. CSU Water & Wastewater specifications.
<http://www.csu.org/>
- c. Administrative Rulings and IFC Amendments can be found on the CSFD web site at
<https://csfd.coloradosprings.gov/public-safety/fire/fire-code-and-permits/fire-code-amendments-and-administrative-rulings>

ATTACHMENTS

- Working Drawing Submittal Checklist
- Hydraulic Calculations Checklist

Sample Signage for High-Pile/High Challenge Fires
Permit Application

Plan Requirements per NFPA 13 and CSFD.

Working Drawings

Title Block shall contain the following:

- Name of owner and occupant.
- Location including full street address as assigned by RBD Enumerations.
- Name, address, phone, FAX number and email address of installing contractor and designer.
- Signature/seal that these drawings were reviewed by a person holding a NICET level III or IV certification in Sprinkler Systems or State of Colorado Professional Engineering license.
- CSFD Plan Review number
- Point of Compass on every page.
- A scale including graphic representation.
- Detailed scope of work.

Information required on Drawings:

Building Information:

- Construction type and occupant load.
- Full height scaled elevations and cross sections of the building. Be sure to include structural information and ceiling construction for clarity. Section cut lines shall be indicated.
- Location of partitions, fire walls and /or area separation walls and rating classifications.
- Location of full-height walls.
- Occupancy class of each room/area as well as the Hazard/Commodity Classification.
- Location of concealed spaces, closets, attics and bathroom including dimensions.
- Location areas where sprinklers have been intentionally omitted. Must also note with a code reference why sprinklers were omitted from these areas.
- Building key plan for interior remodels.

Site Plan Information:

- Size of city main(s), circulating or dead end and if dead end, the distance to the nearest circulating main.
- City main theoretical flow test results from CSU.
- Underground pipe size, length, location, material and point of connection to city main.

System Information:

- Sprinkler Legend to include: Make, type, temperature rating, K-factor, SIN and nominal orifice size of sprinklers. Sprinkler head spacing dimensions and the listed spacing used for special sprinklers.
- Piping Legend to include: Pipe type and schedule of wall thickness, actual internal diameter.
- Temperature rating and location of high temperature heads.
- Area protected by each system on each floor and total area being protected.
- Number of sprinklers on each riser per floor and total number of sprinklers per building. Also, total number of sprinklers on each Dry, Pre-action, Antifreeze or Deluge System.
- Approximate capacity in gallons of each dry pipe and/or pre-action system.
- Information about antifreeze solution used (type and amount).
- Complete riser detail.
- Location, size and piping arrangement of FDC including kind and location of alarm bells (exterior horn/strobe).
- FDC is provided with an automatic drain
- Information about backflow preventers (manufacturer, size, type).
- Location and type (wet/dry, automatic/manual) of standpipe risers, outlets/valves and related equipment.
- Location and details of all control valves, check valves, drain pipes and test connections.
- Make, type, model and size of all alarm, dry, pre-action or deluge valves.
- Size, type and setting for Pressure-reducing valves.
- Fire Pump type (including manufacturer and model), capacity, speed, rated net pressure, diameter of impeller, inlet and outlet diameters, fuel or electrical requirements and location.
- Fire Pump Test Header is provided with an automatic drain
- Nominal pipe size and cutting lengths of pipe (center-to-center dimensions).
- Type of fittings, location and size of riser nipples, size of welds and bends. Including any flex connections
- Type and location of hangers, inserts and sleeves.
- Location of inspector's test connection and location of discharge. If discharge is to a storm drain, size of drain.
- Wet system drains extend at least 4-feet into heated space, before entering an unheated space
- Dry system low point drains are provided and the inspector test connection provides an arrangement minimizing condensation collection.
- Piping provisions for flushing
- When a new system is an addition to an existing system, enough of the old system shall be indicated and included on the plans to show the total number of sprinklers to be supplied and to make all conditions clear.
- Hydraulic reference corresponding with comparable reference points on the hydraulic calculation sheets.

- ❑ System design criteria showing **minimum** density, the design area and the required water flow for hose streams, both inside and outside. Also indicate the **total** water and pressure required.
- ❑ For hydraulically designed systems, the information on the hydraulic data nameplate attached to the riser.
- ❑ Any adjustments to the design area(s) or density(ies) based upon code provisions.
- ❑ Relative elevation of sprinklers, junction points and supply or reference points.
- ❑ If room design method is used, all unprotected wall openings throughout the floor protected.
- ❑ System elevation relative to grade and other sprinkler heads, junction points and supply or reference points.
- ❑ Hazard or commodity classification.
- ❑ Completed High-piled Packet #1 when applicable
- ❑ Edition year of NFPA 13 that the system was designed to.
- ❑ Code Study.

Additional information for High-Pile/High Challenge Systems

- ❑ An owner's certificate in accordance with Chapter 4 of NFPA 13.
- ❑ The design criteria (NFPA 13, Factory Mutual Data Sheets, or a specific fire test report).
- ❑ The type of design (Control Mode Density/Design Area, Specific Application, Suppression Mode, etc.), including the appropriate code references.
- ❑ Description of the stored commodities and how the commodity classification was determined (High Pile Storage Questionnaire).
- ❑ A layout of the proposed storage arrangement. If the storage is in racks, a plan and elevation detail illustrating rack heights, flue dimensions and arrangement (not required for spec warehouses).
- ❑ The aisle dimensions between each storage array.
- ❑ If a high challenge commodity is separated using fire-resistive construction, the boundary of the fire resistive construction shall be illustrated.
- ❑ A cross-section view illustrating obstruction to the ceiling sprinklers (lights, structural members, cable trays, electrical bus ducts, HVAC, etc.).
- ❑ Hazardous materials inventory statement, if applicable.
- ❑ For flammable and combustible liquids, an analysis of the miscibility of Class I liquids, the size and type of packaging, the packaging materials of construction, and if the containers have a pressure relieving mechanism.
- ❑ For Level 2 or 3 aerosols, a statement indicating that the aerosols are cartoned or uncartoned.

Information Required on Hydraulic Calculations.

Summary Sheet

- Date, location, name of occupant, owner and building number or other pertinent identification (i.e. suite number).
- Name, address and phone number of installing contractor and designer.
- Description of hazard/commodity classification.
- Specific NFPA reference material for design density used in calculations.
- Total water requirements for the system as calculated, including the allowance for inside hose and outside hydrant.
- Total water requirements for the system as calculated, at the base of the riser, defined by CSFD as being the Supply Side Pressure Gauge.
- Allowance for in-rack sprinklers, GPM where applicable

System design requirements

- Design area in ft².
- Minimum density in GPM/ ft².
- Area of coverage per sprinkler in ft².
- Spacing of sprinkler heads. When using special sprinklers, be sure to also indicate the manufacturer's minimum flow and pressure requirements, or any other unusual requirements.

Detailed Worksheets – actual calculations

- Sprinkler description and K-factor.
- Hydraulic coefficient used in calculations.
- For gridded or looped systems, a sketch representing the flow quantities and direction for lines with sprinklers operating in the hydraulically most remote area.
- Page numbers on every page.
- Pipe size (actual internal).
- Pipe lengths (center-to-center of fittings).
- Equivalent pipe lengths for all fittings and devices used in calculations.
- Friction loss in psi per foot of pipe.
- Total friction loss between reference points.
- Elevation head in psi at each reference point.
- Velocity pressure and normal pressure if included in calculations.
- Nodes to indicate hydraulic reference points, reference to other sheets, or to clarify data shown.
- Flow in GPM.
- In-rack sprinkler demand balanced to ceiling demand.
- Required pressure in psi at each reference point.
- Combined K-factor calculations for sprinklers on drops, arm-overs, or sprigs where calculations do not begin at the sprinkler

Water Supply Summary

- ❑ Location and elevation of static and residual test hydrants with relation to the riser reference point.
- ❑ Static pressure in psi.
- ❑ Residual pressure in psi.
- ❑ Pitot pressure in psi (if known).
- ❑ Resulting flow in GPM. A theoretical flow model must be obtained from Colorado Springs Utilities.
- ❑ Diameter of flowing orifice in inches.
- ❑ Graphic representation showing the water supply curve and system requirements, including hose demand when applicable, plotted on semi-exponential graph paper (also known as N1.85 or hydraulic paper) so as to present a graphic summary of the complete hydraulic calculation. This graph shall include the following:
 - ❑ Water Supply curve.
 - ❑ Sprinkler system demand.
 - ❑ Hose demand.
 - ❑ In-rack demand, if applicable.
 - ❑ Fire pump points (churn, rated, 150%).
 - ❑ Flow orifice diameter in inches.

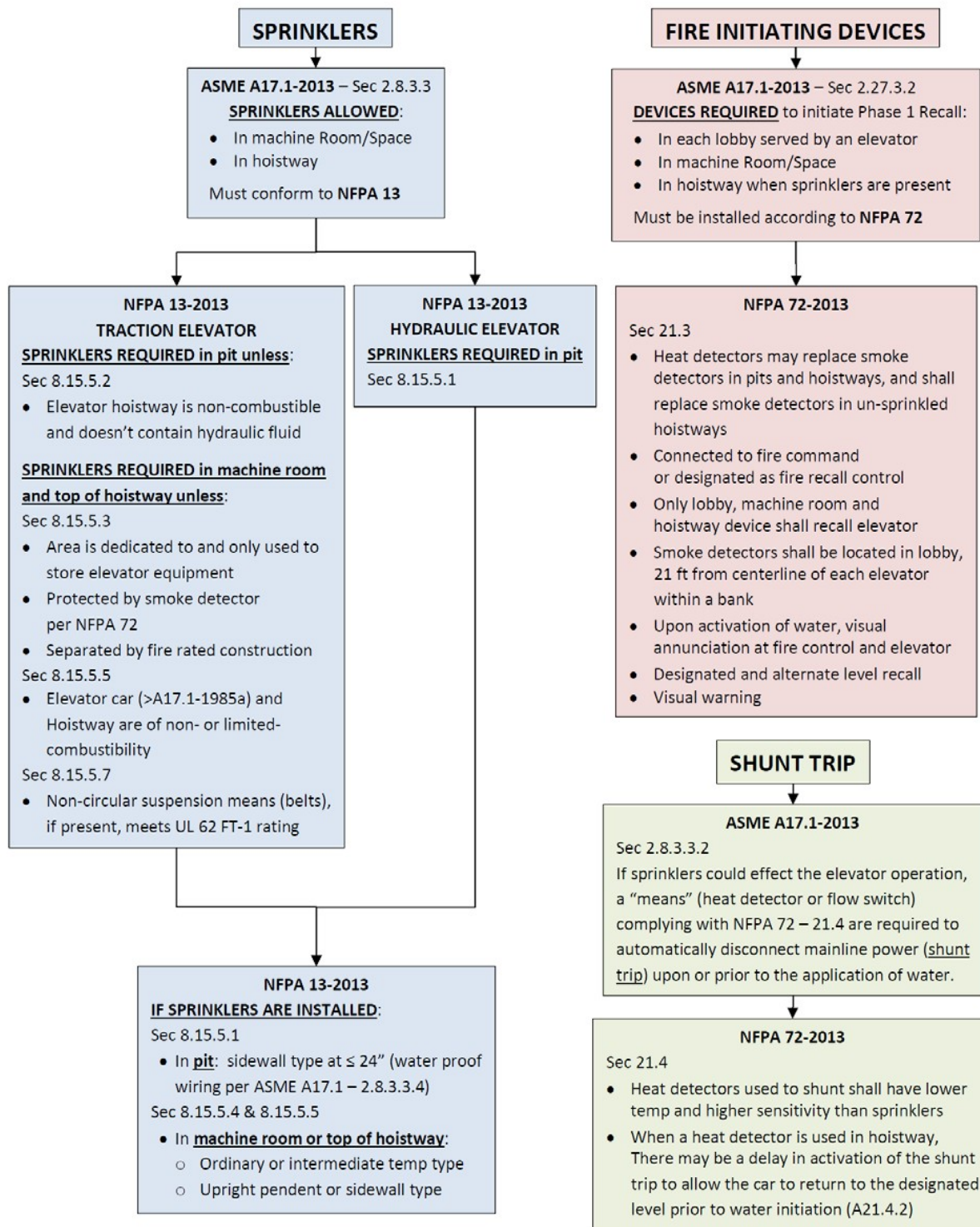
Sample Signage for High Pile/High Challenge Systems:

Automatic Sprinkler System Capabilities & Limitations

Stored Commodity	Class I water miscible flammable liquids in 1 & 5 gallon polyethylene containers in fiberboard cartons
Design Documents	NFPA 13, 2013 edition & NFPA 30-2000 edition, Table 4.8.2(g) and section 4.8.6.2 (Scheme B)
Design Type	Control Mode, Density/Area Method
Max Storage Height	25 feet
Min. Aisle Width	8 feet
Max. Rack Width	9 feet
Flue Dimensions	Longitudinal: Min 6-inches Transverse: Min 3-inches
System Capabilities	Class I-IV commodities, stored commodity, solid pile or palletized Group A plastics to 12 feet; rack storage of Group A plastics to 25 feet.
System Limitations	No level 2 or 3 aerosols, Class 2, 3 or 4 Oxidizers
Idle Pallets	6 feet max storage height
Tire Storage	5 feet max storage height
Roll Paper Storage	5 feet max storage height
In-Rack Sprinklers	In-rack sprinklers are Tyco/Central FS-B, 17/32" orifice, QR 155°F element, SIN TY0041
Horizontal Barriers	Required at each rack tier containing the stored commodity
Ceiling Sprinkler	Tyco ELO-231B, 3/4" orifice, SR 286°F element, upright, SIN TY0030

Requirements for Sprinklers and Fire Initiating Devices

The reason for any deviation from these requirements must be provided by the local fire authority to OPS in writing.





Fire Sprinkler Permit Application

This form must be completed and attached to the front of plans

Initial Review Re-Review Overtime Review Revision

Company Name: _____

Project Name: _____

Project Address: _____

Contact Person: _____

Company Phone: _____ Fax Number: _____

E-mail Address: _____

System Information:

Type of Work: New Addition Remodel
Type of System: Wet Dry Preaction Deluge Other _____
Auxiliary Equipment: Antifreeze Foam Standpipe Fire Pump Other _____
Occupancy Hazard Class: Light Ordinary Extra Other _____
Building Construction: Combustible Noncombustible Obstructed Unobstructed

Information to be provided on the plans :

CSFD Plan Review Number Equipment Data Sheets
 Project address Device Legend
 Designer Address Narrative Scope of Work
 Plans, Calculations, Cut Sheets signed sealed by RME
 Project is within the City of Colorado Springs Fire Jurisdiction

I attest the above information is provided and accurate; I understand my plans will not be reviewed if any of the items were not provided.

Signature: _____

THIS PLAN IS READY FOR PICK-UP

APPROVED/APPROVED AS CORRECTED
 DISAPPROVED/WITHDRAWN

FEES DUE: _____

• Reviewer: Withee Taylor Peterson Other _____

Comments:

Please do not call our office regarding plan review comments until after pickup and review by your office.

Plan Review Status/Comments available online at:
http://springsgov.com/units/fire/Prevent/PlansReview/FPS_WebFPS.asp

**** All plans remaining in our office more than 30 days will be discarded as abandoned**

