GOLDER RANCH FIRE DISTRICT

GRFD Fire Code Standard 903
Automatic Sprinkler System Design & Installation Requirements

Where Required

Approved automatic sprinkler systems shall be provided throughout all Groups A, B, E, F, H, I, M, R, and S occupancies for every facility, building or portion of a building hereafter constructed within or moved into the jurisdiction. Approved automatic sprinkler systems shall be provided throughout all one- and two-family dwellings and townhouses used as model homes with sales or construction offices, and one- and two-family dwellings and townhouses which exceed 3,600 square feet in fire-flow calculation area hereafter constructed within or moved into the jurisdiction.

Approved automatic sprinkler systems shall be provided throughout all isolated or rural one- and two-family dwellings, townhouses, and accessory structures requiring a permit, hereafter constructed within or moved into the jurisdiction where the development of full fire flow is impractical.

Existing Building Fire Area Increase

Approved automatic sprinkler systems shall be provided throughout the entire fire area of both existing and new square footage when the total square footage of the final construction is not provided with the required fire-flow in accordance with Appendix B Table B105.1.

Existing Building Change of Occupancy

Approved automatic sprinkler systems shall be provided throughout the entire fire area when there is a change of occupancy to an A, E, F, H, I, R-1, R-2, R-4, or S-1 occupancy.

Design and Installation Requirements

Where the provisions of the fire code require that a building or portion thereof be equipped throughout with an automatic sprinkler system, sprinkler systems shall be designed and installed throughout in accordance with appropriate standards of the National Fire Protection Association (NFPA). All commercial occupancies, wherever located throughout the District, shall be equipped with automatic fire sprinkler systems installed and designed in accordance with NFPA 13, "*Standard for the Installation of Sprinkler Systems*" the latest adopted edition and GRFD Standards 902 and 903.

When approved in buildings of Group R1 and R2 occupancies, up to and including four stories in height, automatic sprinkler systems may be installed throughout in accordance with NFPA 13R, "*Standard for the Installation of Sprinkler Systems In Low-Rise Residential Occupancies*" the latest adopted edition and GRFD Standard 905.

When approved in buildings of Group R3 and R4 occupancies, automatic sprinkler systems installed in one- and two-family dwellings may be installed throughout in accordance with NFPA 13D, "*Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*" the latest adopted edition and GRFD Standard 906.

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Design Plan Submittals

Automatic sprinkler systems and fire alarm systems shall be designed by a qualified professional Arizona registrant. A system's design shall be included with the building construction documents submitted for permit review and approval for construction. The following are considered to be professional registrant design activities:

1. Consider the range of hazards of the project.
2. Prepare a hazard analysis identifying the hazard classification of the intended occupancy, including any special hazards.
3. Determine the applicable codes, standards, and appropriate engineering practices.
4. Ascertain the availability and adequacy of the water supply for the project.
5. Determine the appropriate design density and area of operation for each hazard area.

Layout or Shop Plan Submittals

Automatic sprinkler system layouts or shop plans shall be submitted to the fire code official for review and approval prior to installation. A minimum of three copies shall be provided for review and approval. One of the copies will be retained by GRFD for the occupancy file. One set of fire code official approved plans shall be on the job site for each inspection. Automatic sprinkler system layout or shop plans submitted to the code official for review and approval shall be by certified persons with at least a Level III National Institute for the Certification of Engineering Technologies (NICET) in fire sprinklers. The submittal shall be reviewed for compliance by the registrant responsible for the system design. Contents of layouts or shop submittals shall comply with GRFD Standard 904.

Approved Plans

Plans and specifications shall be submitted to the code official for review and approval prior to construction. One set of code official approved plans shall be on the job site for each inspection. An inspection will be canceled and a fee assessed in accordance with the ***Golder Ranch Fire District Construction Permit and Fire Code Operational Services Fee Schedule,*** if plans are not on the job site for each inspection.

Work commencing before permit issuance

Any person who commences work, activity, or operation regulated by this code before obtaining the necessary permits shall be subject to 500 percent of the normal permit fee, which shall be in addition to the required permit fees. See the ***Golder Ranch Fire District Construction Permit and Fire Code Operational Services Fee Schedule.***

As-Built Plans

Installation of automatic fire sprinkler systems shall be in accordance with the approved plans. Changes shall have prior approval of the fire code official. When approved changes have been made during installation, "As-Built" plans shall be submitted prior to "Certificate of Occupancy" issuance. Minor changes can be hand drawn on a copy of the original approved plans and a minimum of three copies submitted for re-approval and re-stamping. Major changes shall be re-drafted and new plans submitted for approval. The fire code official shall have the discretion to establish the level of changes, minor or major.

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Hydraulic Calculations

Automatic sprinkler system water supply data for hydraulic calculations shall be based on a curve that is 90 percent of the available water supply curve as determined by flow test information. All flow tests shall be performed by or witnessed by a fire code official.

Contractor Installation

The layout, calculation, and installation of systems installed in accordance with this standard shall only be performed by people knowledgeable and trained in such systems. Contractors are required to possess a current L-16 or K-16 State of Arizona Contractor license to install sprinkler systems. The installer shall follow all manufacturer guidelines for installation.

Fire Sprinkler Risers

Risers shall be installed within a building. An exterior door leading directly into the area containing the fire sprinkler riser and shut off controls shall be provided. The door shall be conspicuously labeled with a permanent sign; letters minimum 1 inch with contrasting background. Where a separate riser room is provided it shall not be used for storage but may be used for electrical, telephone, or mechanical equipment. Lighting with an emergency circuit or battery backup shall be provided. Underground riser supply lines shall be visually inspected, pressure tested, and flushed prior to connection to the riser and overhead piping. Inspections shall be witnessed by the fire code official.

Backflow Prevention

The potable water supply shall be protected against backflow. Backflow prevention assemblies are allowed to be installed exterior of the building or to be installed as a portion of the automatic sprinkler system riser inside the building. Backflow prevention assemblies shall be U.L. 1469 Listed. Backflow prevention assemblies shall be installed in an orientation in accordance with its listing. A listed backflow prevention device shall be considered a check valve and an additional check valve shall not be required.

Exterior backflow prevention assembly shutoff valves shall be locked in the open position. Backflow prevention device valves shall be electrically supervised by a tamper switch installed in accordance with NFPA 72.

A means shall be provided to accommodate measured forward flow testing of the backflow prevention device at the sprinkler system demand. Forward flow test piping shall be sized the same as the backflow prevention assembly. Piping shall terminate to the building exterior and the terminal connection shall be a test header with a 2 ½ inch national standard thread outlet for each 250 gallons of system demand. A metal sign with raised letters at least 1 inch in size shall be mounted on all test headers. Such signs shall read, “TEST CONNECTION” or an approved alternative as applicable.

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Fire Department Connection (FDC)

FDC's shall be installed on the fire department access side of buildings, fully visible and recognizable from the fire department access or as otherwise approved by the fire code official. FDC's shall be located not less than 18 inches or more than 48 inches above the level of the adjoining ground, sidewalk, or grade surface. Immediate access to fire department connections shall be maintained at all times without obstructions by fences, bushes, trees, walls or any other object for a minimum of 3 feet.

A metal sign with raised letters at least 1 inch in size shall be mounted on all fire department connections serving fire sprinklers, standpipes or fire pump connections. Such signs shall read, "AUTOMATIC SPRINKLERS" or an approved alternative as applicable.

Fire department connections shall be sized such that a two-way 2½ inch Siamese connection is provided for all systems with a demand up to 500gpm. A single outlet fire department connection shall be acceptable where piped to a 3" or smaller riser. For systems with a demand of more than 500gpm, an additional 2-½ inch connection shall be provided for each 250gpm, or portions thereof, of design system flow up to a six-way FDC. If the sprinkler/standpipe system demand exceeds 1,500gpm, then an additional FDC may be required at a location approved by the fire code official. The diameter of the inlet pipe for the FDC shall be no less than the size of the system riser; a minimum of four (4) inches for two- or three-way FDC's; a minimum of six (6) inches for four-, five-, or six-way FDC's.

New FDC's shall have approved KNOX brand locking caps installed.

On existing buildings, wherever the fire department connection is not visible to approaching fire apparatus, the fire department connection shall be indicated by an approved sign mounted on the street front or on the side of the building. Such sign shall have the letters "FDC" at least 6 inches high and words in letters at least 2 inches high or an arrow to indicate the location. All such signs shall be subject to the approval of the fire code official. Existing FDC's shall have approved locking caps installed when replacing missing caps.

Obstructed Locations

Automatic sprinklers shall be installed with due regard to obstructions that will delay activation or obstruct the water distribution pattern. Automatic sprinklers shall be installed in or under covered kiosks, displays, booths, concession stands, or equipment that exceeds 4 feet in width.

Exterior Roof or Canopy

Sprinklers shall be installed under exterior roofs and canopies exceeding 4 feet in width. Sprinklers may be omitted, when approved by the fire code official, where the construction is entirely noncombustible. Sprinklers shall be installed under all roofs or canopies over areas where combustibles are stored and handled in accordance with NFPA 13-8.14.7.

Water-Flow Alarm

Approved audible water-flow alarm notification devices shall be connected to every automatic sprinkler system. Such sprinkler water-flow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. The alarm device shall be provided on the exterior of the building and located above the FDC. The water flow alarm is not a building evacuation alarm however building owners may choose to react to water flow alarms as evacuation alarms. The exception to this is where a fire alarm system is installed and actuation of the water-flow alarm actuates the building fire alarm system.

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Supervision / Monitoring

All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised by a listed fire alarm control unit. A lockable as-built construction document box, manual fire alarm box, and smoke detector shall be provided. Actuation of the manual fire alarm box or smoke detector shall cause an alarm signal. Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to an approved central station, remote supervising station or proprietary supervising station as defined in NFPA 72. The fire alarm control unit shall be installed adjacent to the riser, except where a fire alarm system is installed. Where automatic sprinkler system or fire alarm system construction documents did not include the information for the monitoring fire alarm control unit and equipment, a separate permit shall be applied for and approved prior to installation.

Construction Document Cabinet

A construction document cabinet shall be provided for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction. The construction document cabinet shall contain building plans indicating the typical floor plan and detailing the building core, means of egress, fire protection systems, firefighting equipment and fire department access. The construction document cabinet shall be a KNOX cabinet or other durable, lockable cabinet as approved by the code official. The cabinet shall be sized to hold the construction documents. Large buildings may require additional cabinets. The construction document cabinet shall be located adjacent to the automatic sprinkler system riser or in the fire command center where provided.

Fire Protection Systems – Remain In Service

Fire protection systems shall be maintained in accordance with the original installation standards for that system and NFPA 25 the latest edition. Systems shall be extended, altered, or augmented as necessary to maintain and continue protection whenever the building is altered, remodeled or incorporates additions. Alterations to fire protection systems shall be in accordance with applicable standards and obtain prior written approval of the fire code official.

Automatic sprinkler systems or fire alarm systems shall not be placed out of service for more than 8 hours in any one day without written authorization by the Code Official. The building shall be either evacuated or provided with an approved fire watch for all occupants during the outage until the fire protection system has been returned to service. Where utilized, fire-watches shall be provided with at least one approved means for notifying the fire department. The primary fire-watch duties shall be to perform constant patrols of the protected premises and to keep watch for and report all fires or emergencies.

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Automatic Sprinkler System Design Criteria Example

FIRE SPRINKLER SYSYEM DESIGN CRITERIA

WET PIPE AUTOMATIC SPRINKLER SYSTEM

1. HAZARD CLASSIFICATION FOR OCCUPANCY:
   LIGHT HAZARD IN DINNING AREA
   ORDINARY HAZARD GROUP 2 IN KITCHEN AND STORAGE AREA
   MAXIMUM STORAGE HEIGHT 10 FEET NO FLAMMABLE OR COMBUSTIBLE LIQUIDS
2. DESIGN STANDARD AND APPLICABLE CODE:
   NFPA 13 LATEST ADOPTED EDITION
   INTERNATIONAL FIRE CODE LATEST ADOPTED EDITION
3. DESIGN DENSITIES:
   LIGHT HAZARD: 0.10GPM / 1500 SQ. FT.
   ORDINARY HAZARD GROUP 2: 0.19GPM / 2000 SQ. FT.
   COVERAGE PER SPRINKLER: 130 SQ. FT.
4. WATER SUPPLY TEST RESULTS BASED ON 90% OF AVAILIBLE WATER:
   STATIC: 92 PSI
   RESIDUAL: 46 PSI
   FLOW: 1800 GPM
   TESTED BY: Golder Ranch Fire District
   DATE: March 17, 2016
   LOCATION: SEC Rancho Vistoso and Oracle Road
5. GENERAL NOTES:
   FIRE SPRINKLER CONTRACTOR SHALL VERIFY ALL DESIGN CRITERIA AND NOTIFY ARCHITECT OF ANY CONFLICT WHICH MAY AFFECT THE SCOPE OF WORK.
   AUTOMATIC FIRE SPRINKLER SYSTEM FLOW AND TAMPER SHALL BE MONITORED BY AN APPROVED CENTRAL STATION, PROPRIETARY SUPERVISING STATION, OR REMOTE SUPERVISING STATION.