EL DORADO COUNTY REGIONAL FIRE PROTECTION STANDARD

INSTALLATION OF COMMERCIAL FIRE SPRINKLER SYSTEMS
STANDARD #C-001 EFFECTIVE 03-25-2009

PURPOSE:

To ensure that sprinkler plans submitted for review contain items necessary for approval prior to installation of systems in accordance with the latest approved edition of NFPA 13, *Standard for the Installation of Sprinkler Systems* (NFPA 13).

SCOPE:

This standard applies to all new or modified sprinkler systems in accordance with the latest approved edition of NFPA 13. All individuals and companies who are installing or altering a fire sprinkler system are subject to the requirements of this standard and all other requirements of NFPA 13.

This standard outlines the procedure to be followed when submitting sprinkler plans and defines the District's requirements for sprinkler system installations that may be more restrictive or not included in existing codes and standards.

AUTHORITY:

The latest approved edition of NFPA 13

California Fire Code, 2007 Edition, as adopted and amended by the Local Fire District

REQUIREMENTS:

Procedures are numbered in accordance with the referenced NFPA chapters. Chapter numbers missing from this document indicate direct application of that entire chapter from the latest approved edition of NFPA.

Part One – Commercial Occupancies

Chapter 6.3 – Aboveground Pipe and Tube

1. Sprinkler piping shall meet the minimum requirements of NFPA 13, Table 3-3.1 and shall be UL listed and FM approved. All pipe shall have a Corrosion Resistance Ratio (CRR) of 1.00 or greater per the UL listing and FM approval. Other types of pipe material may be approved for use provided they meet appropriate UL listing, FM approval and NFPA 13. The Authority Having Jurisdiction (AHJ, Fire Department) shall approve the use of alternate pipe prior to installation.

2. Flexible type fire sprinkler connections shall be approved by the AHJ prior to installation.

Chapter 6.7- Valves

1. The inspector's test valve shall be installed in any location downstream of the water flow alarm with the AHJ's approval.

Chapter 6.8 and 8.16 - Fire Department Connections (FDC)

1. FDC's shall be visible, accessible, and installed on the address side of buildings in an approved location, and provided with approved frangible metal caps and fasteners.

2. FDC's shall be located within 50 feet of an accessible fire hydrant. The FDC and fire hydrant shall be located on the same side of the access roadway. Final location shall be approved by AHJ.

3. The 2-½ inch inlets for the FDC shall be located at 36 inches above finish grade.

4. The inlets of the FDC shall be a minimum of 2 feet and not greater than 15 feet from the back of curb or back of walkways adjacent to a public street or approved fire access lane. When a back-flow device is used, the FDC shall be located on the system side of the back-flow device facing and within 15 feet of the public street or fire access lane.

5. FDC's shall be located free of interference from nearby objects including buildings, fences, posts and landscaping. Consideration shall be given to the effects of maturing vegetation that may interfere with operations at a later date.

6. Vehicle protection shall be provided and approved for FDC's subject to vehicular damage by the installation of approved bollards (see EDCR Fire Prevention Standard E003) or a minimum of a six-inch curb.

7. The FDC may serve up to four buildings on the same parcel. The final number of buildings shall be approved by the AHJ.

8. Address numbers are required on the fire department connection (see separate EDCR Fire Protection Standard #B-001 for addressing details).

9. Existing buildings with automatic sprinkler systems that are upgraded with the addition of 20% or more fire sprinklers in which the FDC does not conform to #1 and #2 above shall require the installation of a new FDC in accordance with this standard.

10. Sprinkler systems designed for a total combined water demand over 1,000 gallons per minute, determined by the sprinkler system and inside hose demand, shall be equipped

with one 2-½ inch inlet per each 500 gallons per minute on a FDC manifold with a minimum of a 6 inch pipe and check valve.

11. FDC's located on a back-flow device shall be installed in a manner approved by the AHJ and the local water purveyor.

12. The FDC shall be painted with Safety White or Red enamel paint. Contact the AHJ for the details.

Chapter 7.3 - Pre-Action Systems and Deluge Systems

1. Pre-action systems are not approved for office or similar occupancies.

2. Pre-action systems shall default to a wet pipe system in the event of alarm system failure.

   Exception: Normally unoccupied computer rooms constructed in accordance with NFPA Standard 75 (Standard for the Protection of Information Technology Equipment).

Chapter 8.4 - Residential Systems

1. Hotels, Motels, Condominium, Town Houses and Apartment buildings shall be protected with sprinkler systems designed and installed in accordance with NFPA 13.

2. Residential type sprinkler heads are required within dwelling units.

Chapter 8.5 - Position, Location, Spacing and Use of Sprinklers

1. Sprinklers shall not be placed in or below smoke vents or ridge vents.

Chapter 8.14 - Special Situations

1. Attic spaces and areas above ceilings shall have automatic fire sprinkler protection regardless of construction type.

2. Areas under computer room floors and in similar occupancies shall have automatic fire protection systems installed if wire or cable is to be installed within that space. Systems may be: fire sprinklers, clean agent systems, carbon dioxide systems, or similar automatic extinguishment systems.

3. Sprinklers shall not be installed at the top of noncombustible hoist ways of passenger elevators with car enclosure materials that meet the requirements of ASME A17.1, *Safety Code for Elevators and Escalators.* One head shall be installed at the bottom of the elevator shaft.

4. Where system piping or pumps are located in areas subject to freezing, steps shall be taken to protect system integrity; this may include, but is not limited to, heating, installation of insulation, providing a dry pipe system, or using anti-freeze.

5. Any system prone to freezing (3000 feet and greater) may require an anti-freeze system per the AHJ.

Chapter 8.15 - Piping Installation

1. System riser shall be inside the fire control room and constructed as follows:

   A. Fire control room shall contain all fire sprinkler system risers, fire alarm control panels, spare sprinklers and wrench, and other fire equipment as required by the AHJ.

   B. Fire control rooms shall be located within the building on an outside wall at a location approved by the AHJ, and shall be provided with a means to access the room directly from the exterior with an approved door of minimum dimensions of 36"X80".

   C. Durable signage shall be provided on the exterior side of the access door to identify the fire control room. The sign shall indicate "FIRE CONTROL ROOM" with 3” x ½” stroke letters that contrast with their background.

   D. There shall be a key for access to the Fire Control Room in the Knox key vault. The key vault location to be determined by the AHJ.

   E. Fire control rooms shall have a minimum dimension of 5' and not be less than 35 square feet in usable area.

   F. The fire sprinkler riser shall be located between 12" and 18" from that outside wall and at least 12" from any other wall.

   G. The fire control room may contain other building service equipment. This other equipment shall not be within 3' in front of any fire equipment in the room.

   H. There shall be a minimum of a 2 inch clearance between the fire riser pipe and the concrete/pipe sleeve floor structure. The 2 inch space shall be filled with a compressible material that allows movement.

2. In all new MULTI-FAMILY buildings (apartments, condominiums and town homes) the system riser shall be inside the fire control room constructed as follows:

   A. Fire control room shall contain all fire sprinkler system risers, fire alarm control panel, spare sprinklers and wrench, and other fire equipment required by the AHJ.

B. Fire control rooms shall be located within the building on an outside wall at a location approved by the Fire Department, and shall be provided with a means to access the room directly from the exterior with an approved door of minimum dimensions of 36"X80".

C. Durable signage shall be provided on the exterior side of the access door to identify the fire control room. The sign shall indicate "FIRE CONTROL ROOM" with 3" x ½" stroke letters that contrast with their background.

D. There shall be a key for access to the Fire Control Room in the Knox key vault. The key vault location to be determined by the Fire Department.

E. Fire control rooms shall have a minimum dimension of 2' and not be less than 8 square feet in usable area.

F. The fire sprinkler riser shall be located between 12" and 18" from that outside wall and at least 12" from any other wall.

3. System Control Valves

A. Control valves shall be an indicating type valve assembly. To comply with water quality requirements, back flow protection shall be provided in accordance with local Water Purveyor standards. All sprinkler systems shall have an OS&Y valve incorporated into the above ground double detector check valve as approved by the local water purveyor. These valves may be approved for use as the exterior sprinkler control valve. Underground accessed gate valves are not acceptable for sprinkler system control valves. Where multiple buildings are allowed on one fire line, a sectional control valve and check valve shall be installed on each fire riser.

B. All sprinkler system control valves shall be supervised with tamper switches that report to a central station alarm company and shall be locked in the fully open position with a non-hardened lock and chain assembly.

C. Vehicle protection shall be provided for above ground control valves subject to vehicular damage by approved bollards (see EDCR Fire Prevention Standard E-003) or a minimum of a six-inch curb.

D. Multi-floor buildings with three or more stories: Individual floor control valves shall be required for each floor, located within a rated stairway or in the fire control room. Floor control valves shall have a permanent sign identifying areas or systems controlled in ½" letters that contrast with their background and shall be permanently banded to the valve or permanently affixed to a wall adjacent to the valve. Exception: Three story multi-family buildings.

E. Sprinkler systems located in special hazard areas (i.e. spray booths, trash chutes, flammable liquid storage, etc.) shall have a separate locked and monitored indicating control valve.

Chapter 8.16 - System Attachments

1. An alarm bell shall be located on the building in an approved, readily visible location. Approved signs shall be legible and indicate, "SPRINKLER FIRE ALARM - CALL 911 IF RINGING" in accordance with NFPA 13.

2. Alarm bells shall provide a sound pressure level of a minimum 15db above ambient noise.

3. Fire sprinkler systems shall be monitored in accordance with EDCR Fire Prevention Standard C-002, *Fire Alarm Systems*.

Chapter 11 - Design Approaches

1. Office buildings or portions of buildings used for office or similar use without a specified use shall be designed in accordance with the following:

   A. The system shall be designed as an Ordinary Hazard Group 1 density.

   B. Upright sprinkler protection in attic areas shall have a maximum protection area of 130 square feet per sprinkler unless a smaller protection area is required by Table 8.6.2.2.1(a).

   C. No design area reduction for quick-response sprinklers shall be permitted for the shell building installation.

   D. All sprinklers on branch lines shall be provided with a tee and one inch plugged outlets for future tenant improvements.

2. Retail buildings or portions of buildings used for retail or similar use without a specified occupant shall be designed in accordance with the following:

   A. Buildings with a ceiling height not exceeding 16 feet, the system shall be designed as an Ordinary Hazard Group 2 density with a minimum design area of 3,000 square feet.

   B. All sprinklers on branch lines shall be provided with a tee and one inch plugged outlets for future tenant improvements.

3. Retail buildings or portions of buildings used for retail or similar use with a specified occupant shall be designed in accordance with the following:

A. Regardless of the ceiling height, the system shall be designed based on the specific use and storage array for that space.

B. A detailed plan showing the storage array and commodity classification shall be provided at the time of plan submittal.

4. Warehouse buildings shall be designed in accordance with the following:

A. Buildings without a specified occupant or tenant shall have a system designed to meet a minimum of .495 GPM over 2,000 square feet. Documentation shall be provided from the building owner; stating acknowledgement that this is a minimum design standard and that future occupant may require upgrades to the system.

B. Buildings with a specified occupant known to require a system that will exceed the minimum design criteria of .495 GPM over 2,000 square feet shall have a system designed to meet the storage array and commodity classification for that space. A detailed plan showing the storage array and commodity classification shall be provided at the time of plan submittal.

Chapter 13.4 - Spray Application Using Flammable and Combustible Materials

1. Spray booths shall have a separate monitored control valve and drain.

2. Hydraulic calculations shall be based upon all sprinklers flowing simultaneously with density for an Extra Hazard Group 2 occupancy.

3. Sprinkler location:

A. In the spray area and plenum areas.

B. In exhaust stack 6" above building roofline.

C. At the midpoint of offset ducts.

D. In horizontal ducts or plenums a maximum of 10 feet on center and 5 feet maximum from duct bends.

4. Sprinklers outside the spray booth at the ceiling level that have a spray pattern protecting the booth, shall be high-temperature rated (286ºF).

Chapter 14 - Plans and Calculations

1. Sprinkler plans for new installations, system upgrades, tenant improvements, etc. shall be submitted to the local AHJ.

2. A minimum of two sets of plans shall be submitted. One set will be retained by the Fire Department and the other set will be returned to the contractor with comments or corrections required. The approved set marked "Job Set" shall be maintained at the site where the work is being performed.

3. A C-16 license holder shall install all sprinkler systems. The licensed company or a registered engineer that is licensed and authorized for fire protection shall prepare plans. License numbers shall be shown on all copies of plans.

4. Installation shall not begin until plans have been approved.

5. All buildings requiring sprinkler protection shall have sprinklers throughout and no building may be partially protected with sprinklers without approval of the Fire Department.

6. Fees shall be paid at the time the approved plans are picked up. Additional fees will be assessed for sprinkler system installation work performed prior to the AHJ's approval.

Chapter 14.4 - Hydraulic Calculation Procedures

1. All fire sprinkler plans shall be engineered to the results of a flow test data provided by the Fire Department. 20% shall be deducted from the static and residual pressures for design purposes.

Chapter 15 - Water Supplies

1. Underground piping shall be installed in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances* and the approved plans prepared by a civil engineer or piping installation contractor. The underground fire service installation contractor shall submit for review and approval a schematic drawing of the underground piping and appurtenances for approval. A trench cross sectional detail shall be included on the plans.

2. Plastic piping approved for underground installations shall be PVC, C900, Class 150 or greater, and be listed for such use.

3. All runs of non-metallic water pipe shall have a No. 10 gauge solid soft drawn copper locator wire taped on top of the pipe to facilitate locating the pipe at a later date. The wire shall be stubbed up inside each valve box. Continuity test shall be conducted on each splice at all locations.

4. Galvanized pipe is not approved for underground supply piping.

5. Non-metallic pipe shall not be used within five feet of a building.

6. Above grade valves for controlling the water supply for any fire protection system shall be electrically supervised.

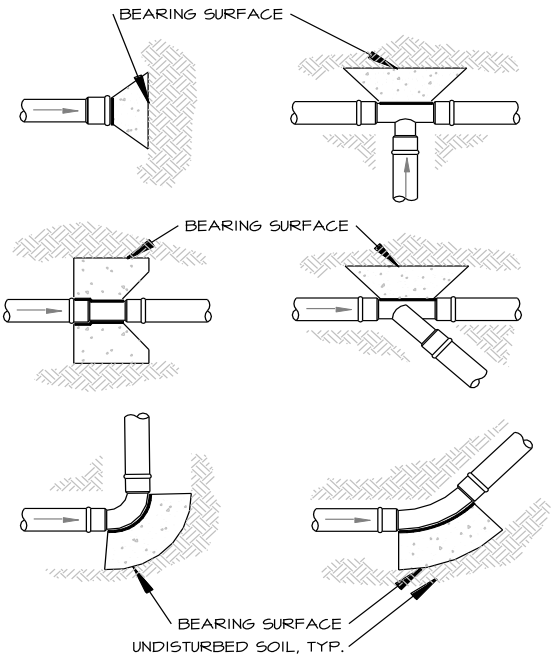
7. All piping shall be laid in a six inch bed of sand or natural gravel not over one inch in diameter and have a twelve inch fill of sand or natural gravel not over one inch in diameter.

8. A strand of 3" wide plastic blue tape marked "Water" shall be placed 12 inches above all piping.

9. All sections of ductile iron pipe or ductile iron fittings shall be encased in either 8-mil linear low density (LLD) or 4-mil high-density, cross laminated (HDCL) polyethylene sheets or tubes in accordance with American Water Works Association Standard C105/A21.5-05, *Polyethylene Encasement for Ductile-Iron Pipe Systems.* Any fasteners shall be made of low-alloy steel.

10. All exposed flange bolts shall be coated in a bituminous material to protect the bolts from corrosion.

11. Concrete thrust blocks or other approved retaining, shall be installed at all locations where piping changes direction. See Attached thrust block diagrams.



MINIMUM BEARING SURFACE AREA

PIPE SIZE	TEE AND PLUG	90 DEGREE BEND	45 DEGREE BEND
1-1/2"	0.45 SQ. FT.	0.63 SQ. FT.	0.34 SQ. FT.
2"	0.69 SQ. FT.	0.97 SQ. FT.	0.53 SQ. FT.
2-1/2"	1.0 SQ. FT.	1.41 SQ. FT.	0.77 SQ. FT.
3"	1.48 SQ. FT.	2.10 SQ. FT.	1.14 SQ. FT.
4"	2.43 SQ. FT.	3.45 SQ. FT.	1.87 SQ. FT.
6"	5.25 SQ. FT.	7.41 SQ. FT.	4.02 SQ. FT.
8"	9.08 SQ. FT.	12.83 SQ. FT.	6.96 SQ. FT.
10"	14.93 SQ. FT.	21.07 SQ. FT.	11.44 SQ. FT.

NOTES
1. SIZE THRUST BLOCKS AS SPECIFIED ABOVE.
2. DO NOT ENCASE CONTROL WIRES IN THE CONCRETE.
3. ALL FITTINGS MUST BE WRAPPED WITH POLYETHYLENE TO PREVENT CONCRETE FROM ADHERING TO BOLTS OR PIPES.
4. JOINTS AND BOLTS SHALL BE ACCESSIBLE FOR REPAIRS.

THRUST BLOCK

NOT TO SCALE

12. A 200-PSI hydrostatic pressure test shall be performed on all installed piping and appurtenances for a period of two hours. The piping shall be center-loaded during pressure testing with all joints, fittings and appurtenances uncovered. Failure to comply with this section will result in a test failure and the uncovering of the piping for a visual inspection and retesting.

13. A fire sprinkler underground supply piping flush, using a full pipe diameter discharge shall be conducted and witnessed by the AHJ prior to connection to the above ground fire sprinkler system. The fire department connection piping shall also be flushed if connected to the fire sprinkler supply piping below grade. Piping shall be flushed until all foreign objects have been discharged and the water is clear.

Chapter 15.2 - Fire Pumps

1. Fire pumps shall be installed in accordance with NFPA 20, *Standard for the Installation of Stationary Fire Pumps for Fire Protection.*

2. A fire pump shall serve only one building unless approved for multiple buildings by the AHJ.

3. A fire pump shall have a by-pass line installed.

4. If a test loop is provided, listed control valves with normally closed tamper switches or other approved tamper switches shall be installed. In addition to the test loop, a method of flowing water every three years in accordance with the latest edition of NFPA 25, *Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems* shall be provided.

5. Fire pumps shall be maintained in accordance with the applicable provisions of NFPA 25.

6. A licensed C-16 contractor shall perform all weekly testing of fire pumps.

   Exception: A qualified representative of the owner, approved by the Fire Department.

7. Annual flow testing shall be performed by a California State licensed C-16 contractor, California State licensed Fire Protection Engineer, authorized fire pump manufacturer representative or a qualified representative of an approved insurance company providing fire loss coverage on the protected premises.

8. Written maintenance records shall be maintained by the building owner in accordance with the provisions found within NFPA 25. The reports shall be provided to the AHJ upon request.

Chapter 16 - System Acceptance

1. Inspections: A new fire sprinkler system requires the following inspections;

   A. Weld inspection. Required for all pipe with welded outlets prior to the pipe being installed.

   B. Installation inspection of all piping, sprinklers, hangers, seismic bracing, etc. and hydrostatic testing.

   C. Final inspection including any previously noted corrections.

2. Completed copies of the contractor's material and test certificates for the underground and aboveground piping shall be provided.

3. The request for an inspection shall be made 48 hours prior to the inspection. Contact your AHJ for any other possible accommodations.

Part Two - One- and Two- Family Dwellings and Manufactured Homes

See Standard C002