



Chapter 9 of the 2003 MN State Fire Code is amended by adding the following:

Application Submittal

1. Submit a minimum of four (4) sets of complete plans, specifications, and hydraulic calculations for review to Fire Inspections.
 - For ten (10) sprinkler heads or less and other small projects see Daywork Policy FPB-3a.
 - For emergency repair work see Emergency Repair Work Policy FPB-3b.
 - For installing recalled or voluntary replacement heads see Sprinkler System *Recall Work* Submittal, Policy FPB-3c
2. Plans submitted for review shall be drawn in a scale size large enough so that details on pipe size, pipe lengths, riser nipple pipe size/lengths, sprinkler head symbols, hanger details, building construction features, and fire sprinkler obstructions are clearly legible. The minimum drawing size scale is 1/8th inch = one foot. Details shall be a minimum 1/4th inch = one foot or large enough to be legible if not to scale.

All submittals shall be in compliance with the requirements of the adopted edition of NFPA 13 for working plans. Each item in the list shall be shown on the plans.

3. Adequate, concise, and sufficient information shall be clearly indicated on the plans to review the system design and occupancy information. This may include submitting details on racking systems, hazardous materials, soffits, equipment schedules, etc. The specific edition of NFPA 13 shall be documented on the plans. System design criteria and classification may be reviewed with the Fire Department - Inspections prior to system design.
4. The newest edition of NFPA 13 may be used when the following conditions are met:
 - A. The edition that is being used must be clearly designated on the plans and calculations. i.e., NFPA 13, 1999 Edition.
 - B. The edition used must be utilized in its entirety.
5. Any material/installation deviation from approved plans will require permission from the Fire Inspections staff. All changes shall be followed up in writing on company letterhead. As-built plans (revisions to be clouded) shall be submitted before Certificate of Occupancy can be signed off by the Fire Inspections staff.

Issuance of Permit

1. After plans are reviewed, the Fire Inspections staff will issue the permit. You will receive one (1) copy of the reviewed plans to be placed **on the job site**.

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2. **NO WORK SHALL BE STARTED WITHOUT A PERMIT AND A REVIEWED SET OF PLANS ON THE JOB SITE.** Inspection card shall be posted in a conspicuous place on job site.
- A limited permit may be issued. Each job will be considered independently for the issuance of a limited permit. At a minimum, plans, specifications, and calculations shall be submitted. The contractor or responsible person of the company must pick up the permit in person and sign a liability waiver before work can be started.
 - The Maple Grove Fire Inspections staff shall be notified any time a sprinkler system is taken out of service. Any person who shall violate any of the provisions of this Code shall for each and every such violation and non-compliance respectively be guilty of an offense punishable as a misdemeanor.

Inspections

Call the Fire Inspections staff at (763) 494.6091, or (763) 494.6092 or if no answer, call Hennepin County Dispatch at (763) 525.6220, to contact the fire marshal or a fire inspector:

1. When the system is taken out of service start the job.
2. For rough-in inspections of the installation while the pipe remains accessible.
3. For final inspection and testing of the system (24-hour notification is preferred so your date and time can best be accommodated). All sprinkler heads and all signage must be in place for final inspections.
4. When the system is back in service.
5. When fire sprinkler systems are taken out of service and the monitoring company is contacted to put a monitored system on test, only the fire sprinkler system shall be put on test. If the building has a fire alarm system, that system shall remain on line and shall not be put into test (ignore) mode.
6. When a limited permit is issued, no rough-ins, inspections, or tests will be conducted until a plan is approved and a permit is issued for the project.

Construction or work for which fire department approval is required shall be subject to inspection by the Fire Department - Inspections and such construction or work shall remain accessible and exposed for inspection purposes until approved by the Fire Department - Inspections.

Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of the Code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of the Code or of other ordinances of the jurisdiction shall not be valid.

It shall be the duty of the permit applicant or contractor or both to cause the work to remain accessible and exposed for inspection purposes. Neither the fire inspector nor the jurisdiction shall be liable for expenses entailed in the removal or replacement of any material required to allow inspection.

It shall be the duty of the person doing the work authorized by permit to notify Fire Department - Inspections that such work is ready for inspection. The Fire Department - Inspections is authorized to require that every request for inspection be filed not less than one working day before such inspection is desired. Such requests may be made by telephone.

It shall be the duty of the person requesting any required inspection to provide access to and means for proper inspection of such work.

System Components and Hardware Required

- A. A control valve will be required on all flammable storage rooms, hazardous materials storage rooms, spray booths, hoods, atriums, and other locations involving special consideration.
- B. Control valves are required before and after the check valve on systems that are combination domestic and fire served by one underground line.
- C. All systems shall have tamper switches (supervisory) on all valves and for preaction and dry systems include low and high air pressure switches.
- D. Post indicator valves: There are three options: 1) A yard post indicator valve, 2) a wall post indicator valve, or, 3) a one-hour fire resistive construction protecting the fire sprinkler room with exterior access, drain, emergency light pack, and a sidewalk to the public way. Post indicator valve must be down stream from the domestic (at the point where the domestic and fire split, on the fire side) or provide a separate fire main. A gate valve shall be installed on the domestic side.
- E. When a fire alarm system is installed in a sprinklered building, the sprinkler system shall be connected to the fire alarm system to provide inside horn/strobe alarms as well as the outside horn/strobe alarms. The outside horn/strobe shall only sound when water is flowing.

For the intent of this section only, a fire alarm system shall include a system, which has a fire alarm panel, notification devices, and initiating devices.

- F. Outside horn/strobe alarm to be located above fire department connection.
- G. An inspector test valve shall be provided on each sprinkler system riser, kitchen hood, and special systems utilizing a water flow switch as close as possible to the high remote end of the system. By utilizing the inspectors test valve in this location, it can further demonstrate that there is no blockage in the system.
- H. A sight glass shall be installed on all sprinkler systems after the test valve. If you can see the water discharging from the inspector test valve location, a sight glass will not be required.
- I. Riser manifolds are not allowed in NFPA 13 installations unless used as a floor control valve in a multiple story occupancy.
- J. If an accelerator or exhauster is utilized, an automatic air maintenance device shall be installed.
- K. A permanently mounted test header for a fire pump shall be installed on the building exterior.

Design Criteria

- A. A MINIMUM of ten (10) P.S.I. safety margin shall be designed. This is required to account for the large fluctuations in the City's water system at different times of the day and year. The City water towers can fluctuate 20 feet, therefore causing a head pressure loss in the system.

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- B. The minimum design for residential sprinklers in a NFPA 13 system shall be 0.10 gpm/sq. ft.
- C. Storage/Racking Plan: A storage plan detailing shelf storage, the racking system, storage configuration and commodities being stored shall be submitted to the Fire Department - Inspections with sprinkler plans. Details that shall be included are:
1. Storage Configuration: State whether storage is on pallets, in solid piles on floor, shelving or racks, storage height, compactness of storage, and list whether encapsulated or not.
 2. Stocking Methods: State whether the stocking method will be manual or mechanical.
 3. Racking System: Storage rack height, rack size, aisle space between racks, size and location of flue space (longitudinal and transverse), type of decking/shelves, protection of vertical supports.
 4. Shelves: Shelf storage is storage of combustible materials on structures less than 30 inches deep, with shelves usually 2 feet apart vertically and separated by approximately 30 inch aisles. If shelf depth increases over 30 inches, this is rack storage.
 5. Commodity Classification: A listing of all commodities with their storage configuration shall be submitted. A person knowledgeable in classifying commodities in accordance with the 2003 MN State Fire Code must classify the products/materials that will be stored in the facility.
 6. Hazardous Materials Classification: Any chemicals shall be submitted on a Maple Grove Hazardous Materials Inventory Statement form. Any person or company who analyze and classify chemicals for preparation of a hazardous materials inventory must be pre-approved by the Fire Marshal.

The plans shall include the following:

- a. Floor plan of the building showing locations and dimensions of high-piled storage areas.
- b. Useable storage height for each storage area.
- c. Number of tiers within each rack, if applicable.
- d. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
- e. Aisle dimensions between each storage array.
- f. Maximum pile volume for each storage array.
- g. Location of commodities, which are banded or encapsulated.
- h. Dimension and location of transverse and longitudinal flue spaces.

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- i. Location and classification of commodities in accordance with Section 2301.1 of the International Fire Code.
 - j. A Hazardous material inventory statement (HMIS).
- D. New water flow tests shall be conducted for all new systems. Two hydrants which are closest to the property shall be used. The static pressure should be measured on the hydrant in front of or nearest the property and the water allowed to flow from the next hydrant nearest the property, preferably the one farthest from the source of supply if the feed is only one way. The residual pressure will be that indicated at the hydrant where the water is not flowing. Accurate elevation information of the test hydrant (static/residual) shall be provided relative to the finish floor elevation of the project building.

A representative from the Utility Department shall be contacted prior to the test at (763) 494.6372 to witness the test. The Fire Inspections staff shall be notified with the date, time, and address of the flow test at least 24 hours in advance.

- E. In buildings where a high water usage is likely, or when the maximum size of domestic water on combination fire sprinkler/domestic water line in the building exceeds 1/4 size of the water supply line, an electric solenoid valve shall be installed on the domestic side of the service, and shall include the lawn irrigation system. The electric solenoid valve shall be installed immediately after the main valve (before the meter). This valve shall be normally powered open and close on loss of electric power or signal from the automatic fire sprinkler system water flow indicator.

i.e., 6" combination service – 1 ½ inch domestic maximum
8" combination service – 2 inch domestic maximum

Note: The building water usage may also be designed into the hydraulic calculations of the sprinkler system in lieu of a solenoid valve.

- F. Dry sprinkler systems shall only be utilized to protect areas of a building that cannot be maintained above 40 degrees Fahrenheit. All other areas of the building shall be protected by a wet sprinkler system.
- G. Air pressure for dry systems shall be in accordance with the manufacturer's instructions or 20 P.S.I. in excess of the calculated trip pressure based on the highest normal static water pressure.

Manufacturer's instructions or calculations shall be included on the submitted sprinkler plans.

- H. The fire department connection, PIV, and WPIV shall be a minimum of ten (10) feet from electric and gas meters and electric transformers.
- I. The fire department connection and wall post indicator valve shall be installed at 42 inches above finished grade.
- J. Inspector test piping and main drains shall be plumbed to the exterior of the building. When a floor drain must be used, calculations shall be submitted with plans that show that the drain can handle full flow under pressure.

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- K. In multiple story buildings, fire sprinkler systems are **to be zoned by floor. Birdcage (vertical riser) design is not acceptable.** On very small buildings, a birdcage design may be allowed on a case-by-case review. The occupancy or use of the building will be an important deciding factor.
- L. The fire department connection shall be located as designated by the Fire Marshal.
- M. The fire department connection shall be labeled as to the system it supplies, i.e., automatic sprinkler or standpipe, or automatic sprinkler and standpipe.
- N. In speculative buildings, the sprinkler system shall be designed for the maximum potential storage height for double row, rack storage with eight (8) foot aisles that is possible in the building at a minimum design density required to protect a Class IV Commodity. The design information shall be documented in full detail (design parameters) on the plan.
- O. When hose connections and hose racks and reels are required, the Maple Grove Fire Inspections staff will consider deletion of these with the substitution of Class I standpipes located at exits as equivalent protection. The owner must submit a letter requesting Alternate Materials and Methods in accordance with MFC, Section 104.9. The request shall include reasons; e.g. Insurance carrier requests substitution or company does not want employees to utilize hose to fight fires because of safety concerns and training requirements, etc. The location of the standpipes must be shown on the plans and calculations.
- P. Manual standpipe systems (Fire department pumper pumps into system to supply the system demand) may be allowed on a case by case basis in buildings not exceeding 6 stories or 70 feet in height. A letter must be submitted requesting Alternate Materials and Methods in accordance with the 2003 MSFC, Section 104.9 The request shall include calculations showing that 100 psi can be provided with a minimum flow rate of 500 gpm for the hydraulically most remote standpipe. The minimum flow rate for additional standpipes shall be 250 gpm per standpipe up to a maximum flow of 1250 gpm. The calculations shall be based on a fire department pumper supplying 1250 gpm at 150 psi at the fire department connection. Hydraulic calculations shall include friction loss including fire department hose, elevation, and sprinkler system demand.
 - 1. Each hose connection for manual standpipes shall be provided with a clear and legible permanent sign that reads, “MANUAL STANDPIPE FOR F.D. USE ONLY.”
 - 2. A clear and legible permanent sign shall be provided at the fire department connection that reads, “Manual Standpipe”.
 - 3. Combination sprinkler/manual standpipe systems shall have hydraulic calculations submitted for the sprinkler system based on the water supply and manual standpipe system calculations based on requirement found in Q above.
- Q. When performance-based design is utilized it shall be the responsibility of the designer to supply sufficient information to the Fire Department - Inspections to review all of the design criteria and parameters. All reference materials (i.e., SFPE Handbook, articles, procedures, etc.) shall be provided at no cost to the Fire Department - Inspections. The designer shall also provide a peer review of the design at no cost to the Fire Department - Inspections if required by the Fire Marshal.

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Sufficient information shall be provided to the Fire Department - Inspections to review and approve the company or individual conducting the peer review. Adequate and permanent records shall be kept of the system designs, all meetings and all correspondence and any modifications.

R. Design criteria for kitchen hood and duct systems:

1. Head placement shall be based on NFPA 13.
2. Protection for the hood shall be one of the following:
 - a. General automatic fire sprinkler floor protection under the kitchen hood. The design density shall be provided over the entire area below the hood; or,
 - b. Water spray nozzles matched one for one (nozzle to appliance) and installed per manufacturer's installation requirements for axial and radial distance criteria.
3. Hydraulic calculation shall include all sprinkler heads within a single kitchen hood and duct system. This would include the sprinkler heads protecting below the hood, behind the filters, collar, and all heads in the ductwork. Hoods that are mounted side by side and less than one foot apart shall be treated as one hood system.
4. The minimum hydraulic design for a single kitchen exhaust system shall be Extra Hazard, Group 1 and a 500 gpm hose allowance figured in to the hydraulic calculations.
5. Upon activation of the flow switch or a gate valve tamper (water shut off at the hood) the fuel sources under the kitchen hood shall be shut down. The kitchen exhaust shall continue to run.
6. When a pre-piped sprinkler system is used on a project, the kitchen hood supplier shall submit sprinkler plans and hydraulic calculations demonstrating the required gpm and pressure at the connection point to the fire sprinkler system for the kitchen hood and duct system for approval. A pre-piped fire sprinkler system for a kitchen hood and duct system that is being installed by a Minnesota licensed sprinkler contractor shall not be connected to the wet sprinkler system until the hydraulic calculations have been submitted and approved by the Fire Inspections staff. A pre-piped fire sprinkler system for a kitchen hood system shall be designed in accordance with items S-1 to S-5 above.

S. Ansul PIRANHA fire suppression systems shall be connected to the automatic sprinkler system water supply or to a dedicated domestic water supply with a U.L. Central Station monitored shut off valve. The U.L. listing and installation manual for Ansul PIRANHA require the connection to be made immediately after the main water shut off valve (before the meter).

Before an Ansul PIRANHA fire suppression system is connected to the water supply as outlined above, water pressure information shall be submitted for review by the Fire Department - Inspections. Required water pressure shall be 30 to 100 psi.

General Requirements

- A. The maximum height of indicating control valves shall not exceed 6 feet. All gauges shall be easily readable from the floor.
- B. All indicating control valves and sprinkler risers shall have *permanent signs* identifying the area and the design criteria of the building that is controlled by that particular valve or sprinkler riser.
- C. Underground test certificates should be reviewed by the sprinkler contractor prior to connection of the overhead piping, and shall be responsible for ascertaining that the water main has been flushed before connecting to the riser. A copy of the Underground Test Certificate shall be forwarded to the Fire Inspections staff.
- D. All systems that are required to be monitored, shall be monitored by a U.L. Central Station. All indicating control valves, including the P.I.V., must be tampered and monitored.

An Underwriters Laboratories Fire Alarm System Certificate installed and operable in accordance with NFPA 72 is required on all monitored systems. Generally, the company that is monitoring the system will apply for the U.L. Fire Alarm System Certificate. The sprinkler contractor must be sure that all components of the sprinkler system meet the requirements of U.L.

- E. Fire pump monitoring shall include:

Electric Fire Pump Controller:

- 1. Pump Running (Supervisory)
- 2. Pump Not Automatic (Supervisory)
- 3. Loss of Phase (Supervisory)
- 4. Phase Reversal (Supervisory)

Diesel or Steam Turbine Fire Pump Controller:

- 1. Pump Running (Supervisory)
- 2. Pump Not Automatic (Supervisory)
- 3. General Trouble OR Specific Trouble signals as follows:
 - a. Critically Low Oil Pressure
 - b. High Engine Pressure
 - c. Failure to Start Automatically
 - d. Shut down from Overspeed Condition
 - e. Battery Failure
 - f. Battery Charger Failure

- F. Monitoring of the system shall be in service prior to testing the sprinkler system.
- G. The installing contractor shall provide the owner with:

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1. Instructions describing operation and proper maintenance of the sprinkler devices and the system or the publication titled NFPA 25, Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 2002 Edition.
 2. A sprinkler cabinet with the appropriate supply of spare sprinklers representative of the heads used, sprinkler wrench and device for removing the cover of water flow device. Sprinklers shall not be put on top of the sprinkler cabinet. If all representative heads and wrenches cannot be put in the cabinet, additional cabinets shall be installed as necessary.
- H. Zone maps shall be posted next to the sprinkler riser and fire alarm panel for all systems. A copy shall be submitted to the Fire Department - Inspections for approval. A permanent sign shall identify each system riser, correlating with the zone map. An acceptable zone map shall include the following:
1. A size large enough to be clear and legible but no smaller than 8 ½" X 11".
 2. The zone map shall be placed on a straightforward floor plan with NO other markings other than wall and door locations. (Sprinkler plans are not acceptable as a zone map.)
 3. Zone map shall be in a frame and mounted, or may be laminated with rings attached and hung on the wall, or by other approved means.
 4. The zone map shall show the general location of each zone, *special* sprinkler heads that are used, FD connection, PIV, WPIV, riser controls, inspector test, other system control valves and auxiliary drains. A North symbol shall be included on the plan.
 5. When systems are remodeled, extended, altered, or modified, the existing zone maps shall be updated.
- I. Mixing of sprinkler heads with different orifice sizes, K-factors, spacing requirements etc. shall not be installed within the same room, hallway, etc. Under certain conditions, such as different ceiling levels, soffits, and other special conditions, the Maple Grove Fire Inspections staff will make the final determination on a case-by-case basis.

Tests Required

- A. Wet system tests:
1. Two-hour hydrostatic of the entire system including the siamese connection. Piping between the exterior fire department connection and the check valve in the fire department inlet pipe shall be hydrostatic tested in the same manner as the balance of the system. All Sprinklers shall be in place and all signage installed, including zone maps.
 2. Test retard setting with inspector's test, 40 to 50 seconds are required.
 3. Main drain test. Main drain test papers shall be completed and provided to the Fire Department - Inspections

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4. Fire Department - Inspections shall witness all tests. A 24-hour notification is recommended.
5. At the completion of testing, the Contractor's Material & Test Certificate for Aboveground Piping shall be provided to the Fire Inspections staff.

B. Dry system tests:

1. Two-hour hydrostatic of entire system including siamese.
2. 24-hour air test at 40 psi.
3. Dry valve trip test –
Systems containing more than 750 gallons - water to flow from inspectors test in not more than 60 seconds, starting at the normal air pressure on the system and at the time of fully opened inspection test connection. Accelerators and/or exhausters will be required if the 60-second requirement is not met. Systems with 500-750 gallons - water to flow from the inspectors test within 60 seconds without an accelerator or exhauster. No limit is required if an accelerator or exhauster is provided.
 - a. Record the time it takes for the valve to trip after opening the system test valve.
 - b. Record the air and water pressures before the test.
 - c. Record the air pressure at trip point.
 - d. Record the delivery time for water to reach the test outlet.
 - e. Record whether the alarms operated properly.
4. Main drain test. Main drain valve shall remain fully open until the system pressure stabilizes. Record static and residual pressures.
5. Sprinklers shall be in place and all signage installed, including zone maps..
6. Fire Department - Inspections shall witness all tests, a 24-hour notification is recommended.
7. Low and high air pressure must be monitored by the central station.
8. Compressors must be hard wired without shut-off switches.
9. At the completion of testing, the Contractor's Material & Test Certificate for Aboveground Piping shall be provided to the Fire Inspections staff.

C. Antifreeze systems

1. When an antifreeze system is installed, testing of the antifreeze shall be done with a refractrometer in the presence of a fire inspector. Calibration of refractrometers shall be available on request.

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