



MOBILE FIRE - RESCUE DEPARTMENT FIRE CODE ADMINISTRATION

Sprinkler System Plan Review 2018 International Fire Code and NFPA 13

Date of Review ___/___/___

BLD20___-___

Project Address: _____ Project Name: _____

Professional Engineer's Name: _____ Phone: _____

Sprinkler Contractor's Business Name: _____ Phone: _____

Sprinkler Contractors Name: _____ Phone: _____

Sprinkler Contractor's Email Address: _____

Occupancy Classification: _____

Reference numbers following checklist statements represent an NFPA code section unless otherwise specified.

1. A minimum of two sets of drawings is provided.
2. _____ Equipment is listed for intended use and compatible with the system; specification data sheets are provided.

Drawings shall detail the following :

General

3. _____ Type of system is noted; hydraulic calc, wet, dry, pre-action. The plans declare the design year of NFPA 13.
4. _____ Scale: a common scale shall be used and plan information shall be legible.
5. _____ Plot plan details illustrate the water supply pipe diameters, lengths, and fittings to the building.

6. ____ The location of partitions and fire walls, and building elevation views.
7. ____ Occupancy class and/or use of each room or area. Classify a room if the hazard is different than adjacent areas or rooms,
8. ____ Full-height cross-sectionals and include ceiling construction as needed for clarification.
9. ____ Total area protected by each system for each floor is provided.
10. ____ Dimensions for system piping, sprinkler spacing and branch line space and elevation changes.
11. ____ Equipment symbol legend and the compass point are provided.
12. ____ Area limitations for hazard classification.
13. ____ Hydrant flow test determining water supply capacity at 20 psi residual pressure is provided.
14. ____ Hydraulic calculations are provided with summary, detail worksheets, and graph sheet, except for permissible pipe schedule systems,
15. ____ Dry pipe system capacity in gallons is provided ____ gal., not to be greater than 750 gal.
16. ____ All water supply valves and flow switches are supervised, IFC 903 refers to exceptions.
17. ____ Exterior flow alarm location is detailed and provided for systems exceeding 20 sprinklers,

Note: if an electric bell is utilized, it shall be connected to the Fire Alarm Control Panel and listed for outdoor use, IFC 903.

18. ____ Backflow prevention device pressure loss data is provided in the hydraulic calculations.

Sprinklers

19. ____ Total number of each type of sprinkler is noted, ordinary temperature sprinklers are to be used,
20. ____ Sprinkler temperature ratings when near heat sources are in accordance with Table 8.3.).

21. ____ Light hazard occupancies shall have quick-response sprinklers unless residential sprinklers are required or if sprinklers are replacing existing standard sprinklers,
22. ____ Sprinkler locations are correct, ceiling and roof cross-sectional views are provided for clarification,
23. ____ For each type of sprinkler the K factor, temperature rating, and orifice size are provided,
24. ____ Each sprinkler coverage area is within its square footage limitations or its listing,
25. ____ Specialty sprinklers, EC, ESFR, QRES, large drop, sidewall, etc., comply with the standard and listing limitations,
26. ____ Maximum perpendicular distance to the walls is not greater than 1/2 of allowable distance between sprinklers, For irregular shaped or angled areas the sprinkler is horizontally within 75 percent of the permitted spacing between sprinklers,
27. ____ Standard sprinkler spacing from vertical obstructions complies with Table 8.6.and for floor-mounted obstructions,
28. ____ Sidewall sprinkler spacing for a front obstruction refer to Table 8.7. for a side obstruction refer to Table 8.7.and for a floor-mounted obstruction refer to Table 8.7.
29. ____ Extended coverage uprights and pendent spacing for ceiling or wall obstructions refer to Table 8.8. and for floor mounted obstructions refer to Table 8.8.
30. ____ Extended coverage sidewall spacing for front obstructions refer to Table 8.9. and for floor mounted obstructions, Table 8.9.
31. ____ Residential upright and pendent sprinkler spacing from vertical obstructions complies with Table 8.10.6.1.2 and for floor-mounted obstructions, Table 8.10..
32. ____ Residential sidewall sprinkler spacing from ceiling or hanging obstructions complies with Table 8.10.and for floor-mounted obstructions, Table 8.10.

- 33. ____ Sprinkler coverage is provided under obstructions greater than 4 ft. wide,
- 34. ____ Baffles are designed and provided for sprinklers less than 6 ft. apart in accordance with Section 8.6.
- 35. ____ Pilot line detector system design is in accordance with Section 8.
- 36. ____ Locations or conditions requiring special consideration,
- 37. ____ A. concealed spaces,
- 38. ____ B. vertical shafts,
- 39. ____ C. stairways,
- 40. ____ D. vertical openings,
- 41. ____ E. elevator hoistways and machine rooms,
- 42. ____ F. spaces under ground floors, exterior docks, and platforms,
- 43. ____ G. exterior roof, porches, decks, balconies, and canopy,
- 44. ____ H. dwelling unit,
- 45. ____ I. library stack or medical record storage room, .
- 46. ____ J. electrical equipment,
- 47. ____ K. duct protection,
- 48. ____ L. ceilings: open-grid, drop-out,
- 49. ____ M. stages,
- 50. ____ Sprinkler is provided at top of shaft, refer to exceptions, shafts with combustibile surfaces require coverage at alternate levels, accessible noncombustible shaft has sprinkler at bottom,
- 51. ____ Vertical shaft has sprinklers at top opening, above bottom opening and alternate levels when it has combustibile surfaces,

52. _____ Sprinklers are provided beneath combustible stairs,
53. _____ Sprinklers are provided at the top of the shaft, under the first landing above the shaft bottom when the shaft and stairs are noncombustible, . Refer to 8.15.for when there is storage use under the stair landing or when a noncombustible construction exterior stair tower is 50 percent open.
54. _____ Closely spaced sprinklers with draft stops are provided around unenclosed floor openings except large openings like found in malls or atriums, and openings between floors of a common dwelling unit,
55. _____ Elevator shaft has a sprinkler within 2 ft. of the bottom unless the shaft is noncombustible and there are no hydraulic fluids
56. _____ Ordinary or intermediate temperature sprinklers are in the elevator machine room or at the top of the elevator shaft, refer to exceptions,
57. _____ Sprinklers are provided under combustible ground floor, exterior dock, and platforms,
58. _____ Sprinklers are provided under roofs and canopies unless noncombustible, less than 4 ft. wide, and no storage, refer to exceptions,
59. _____ Sprinklers are not required in noncombustible dwelling unit bathrooms, less than 55 sq. ft. or limited combustible with a 15-minute thermal barrier, except in limited care and nursing homes,
60. _____ Sprinklers are not required in hotel or motel dwelling unit clothes closet, pantries, or linen closets less than 24 sq. ft. and the least dimension is not greater than 3 ft.,
61. _____ Sprinklers are provided in every aisle and at every tier stack, distance is not more than 12 ft. in library stack rooms,
62. _____ Sprinklers are provided in electrical equipment rooms, Exception: the room is dedicated use, has dry-type equipment, 2-hour equipment enclosures, and no combustible storage allowed,
63. _____ When required, ducts are protected with a sprinkler at the top of the riser and at the midpoint of each offset, and the sprinkler spacing is every 10 ft., which begins 5 ft. from the entry of the horizontal duct, Method of access for each sprinkler is detailed.

64. _____ Open grid ceilings shall not be installed under sprinklers, unless the grid opening and sprinkler placement criteria of Section 8.15. are met.
65. _____ Drop-out ceilings are installed under sprinklers in accordance with their listing, and sprinklers are not location below the ceilings, 8.15.
66. _____ Sprinklers are provided below the stage ceiling, under stages of combustile construction or if combustibles are stored under the stage, and if required for proscenium opening protection a deluge system is provided, 8.15
67. _____ 2½ in. hose connection is allowed with wet system of light or ordinary hazard and each sprinkler floor system has its own control valve, minimum riser size is at least 4 in., each combination sprinkler and standpipe riser has its own control valve that isolates it from other risers, 8.17.

Pipe Support and Hangers

68. _____ Type and locations of hangers, sleeves, and braces are shown, 22.1. Non-listed hangers shall meet 5 performance criteria and be engineer certified,
69. _____ If trapeze hangers are used, the locations are shown, a legend provided to specify span, size of pipe supported, angle and pipe used, and section modulus are provided and comply with section, 9.1.
70. _____ Steel pipe hanger spacing is not greater than 12 ft. for 1 in. to 1¼ in., not greater than 15 ft. for 1½ in. to 8 in., Table 9.2., for copper and plastic pipe refer to Table 9.2. and the pipe data sheet.
71. _____ Light wall steel pipe hanger spacing is not greater than 12 ft. for 1 in. to 3 in. pipe, Table 9.2.
71. _____ Branch lines show one hanger for each section of pipe, exceptions are listed, 9.2.f branch line is 6 in 12 or greater then the number of hangers will be in accordance with 9.1.
73. _____ Cross mains show one hanger between each branch line or in compliance with Table 9.2., and for additional spacing variations refer to Section 9.2
74. _____ Supports can be on the horizontal pipe section if within 24 in. of the vertical pipe centerline, 9.2.
75. _____ Risers in multistory buildings show supports at the lowest level, each alternate level, below offsets, and at the top, 9.2.

76. _____ Risers have a distance between supports of not greater than 25 ft., 9.2.

Pipe and Valves

77. _____ Main drain pipe is $\frac{3}{4}$ in. or greater for riser up to 2 in., $1\frac{1}{4}$ in. or greater for riser $2\frac{1}{2}$ in. to $3\frac{1}{2}$ in., 2 in. only for riser 4 in. or greater, size is shown or determined by specified valve type,

78. _____ Main drain routing is to the exterior or to an interior drain but ensure that the drain capacity is adequate,

79. _____ Auxiliary drain location is detailed and its size is in accordance with Section

80. _____ The location of the listed backflow prevention device (can serve as a check valve) is detailed,

81. _____ A listed control valve is provided on each side of the check valve,
Only one control valve on the system side of the check valve is necessary when the water supply is provided from the city connection,

82. _____ The control valve locations are easily accessible,

83. _____ If a pressure reducing valve is used, its location and installation criteria are detailed in accordance with Section 8.

84. _____ If used, outside post-indicator control valve (PIV) locations and installation criteria are detailed in accordance with Section 8.

85. _____ If PIVs are approved to be located in a pit, the pit construction, location, and marking are designed and detailed in accordance with Section 8.16.1.4.2.

Seismic Protection

86. _____ Flexible couplings may be used for pipe $2\frac{1}{2}$ in. or larger at structural separations or within 2 ft. of expansion joints, within 2 ft. of the top and bottom of all risers, within 1 ft. above and below a floor penetration in multistory buildings, and on both sides of and within 1 ft. of concrete or masonry wall penetrations unless pipe clearance is provided,

87. _____ Flexible couplings are specified for drops to hose lines, rack sprinklers, and mezzanines,

88. _____ A 6 ell seismic separation assembly or listed flexible piping with four-way bracing within 6 ft. for any pipe, is provided and detailed at building seismic joints,

89. _____ Proper pipe clearance is noted on the plans for pipe penetrations, 9.3.4. Minimum clearance around pipes: 2 in. for 1 in. to 3½ in., 4 in. for 4 in. and larger, refer to the 3 spacing variations,
90. _____ Lateral sway bracing is required at a maximum spacing of 40 ft. for all mains, cross mains, and branch lines 2½ in. and larger,
91. _____ Lateral sway bracing is designed not to exceed the maximum zone of influence loading provided in Tables 9.3.5.
92. _____ Bracing is provided for the last length of pipe of the end of a feed or cross main,
93. _____ Bracing is required unless all the pipe is supported by rods less than 6 in. or by 30° wrap-around U-hooks for any size pipe,
94. _____ Longitudinal sway bracing is a maximum of 80 ft. for mains and cross mains and within 40 ft. of the end of the line,
95. _____ A four-way sway brace is provided at least every 25 ft. and at the top of the riser if the top of the riser exceeds 3 ft. in length,
96. _____ Seismic bracing calculations and the zones of influence are detailed and provided for each brace to be used as shown The design should be in compliance with IBC 16 and ASCI 7,
97. _____ Longitudinal and lateral bracing is provided for each run of pipe between the changes of direction unless the run is less than 12 ft. and supported by adjacent pipe run bracing,
98. _____ Branch lines are restrained at the end sprinkler of each line and restrained against vertical and lateral movement,
99. _____ Branch line method of restraint is in accordance with Section
100. _____ Restraints for branch lines shall be at intervals not greater than specified in Table 9.3. and justification for selection of the seismic coefficient is provided,

101. ____ Detailed are restraints for sprig 4 ft. long or greater against lateral movement,

Fire Department Connection (FDC)

102. ____ Local water flow alarm location is above the FDC.

103. ____ The FDC is in an approved location and 36 inch minimum clearance to the sides and to the front of wall mounted and free-standing FDCs is required and to a height of 78 inches, FDCs subject to vehicle damage require protection in accordance with IFC 312, and the design is in accordance with NFPA 12 and/or 14 and consult the appropriate worksheet in this book,

104. ____ FDC for fire engine use is a minimum 4 in. pipe unless hydraulic calculations show a smaller pipe can be used, on the system side of the water supply check valve, supported and 18 in. to 48 in. above grade,

105. ____ FDC is on system side of water supply check valve and before other control valves for multi-risers, also refer to (1) – (4) for single systems,

Hydraulic Calculations, 22.3

106. ____ Specify the calculation method used, density/area or room design,

107. ____ The summary sheet, water supply graph sheet, supply analysis, node analysis, and worksheets are provided for computer-generated calculations, The summary sheet, water supply graph sheet, and worksheets are provided for hand calculations.

108. ____ Reference points in the calculation worksheet match with points on the plans, and the occupancy hazard classifications are correct for the occupancy or use,

109. ____ If design area adjustments are made, the adjustment methodology is provided,

110. ____ The use of QR sprinklers in a design area meets design specifics,

111. ____ Pipe size and length references in the calculation worksheet match the plans.

112. ____ Sloped ceiling may require a 30 percent increase of design area,

113. ____ Sprinkler head information matches information on the plans.

114. ____ Water flow information is provided with static psi, residual psi, and available gpm at 20 psi residual with graphed results.
115. ____ Density and design areas information are provided and complies with the restrictions listed
116. ____ Calculations are correct: static psi, pipe length, gpm, K for drops or branch lines, elevation data, hose allowance, friction loss, and equivalent pipe and fitting lengths,
117. ____ For the room design method the design area includes the most demanding room and, if any, adjacent communication compartments,
118. ____ A minimum of 2 summary calculations are provided for a grid system, refer to the one exception,
119. ____ Multiple calculations may be required by the AHJ if the building design and room uses do not make the most demanding area obvious.
120. ____ Legend for calculation abbreviations is provided.
121. ____ Calculations are also provided for extra hazard EH occupancies, deluge, and exposure systems.
122. ____ Dry pipe and double interlock preaction design areas are increased 30 percent but the density remains the same, use of high-temp sprinklers in EH occupancy may reduce design area by 25 percent but not less than 2,000 sq. ft.,

Residential Sprinklers in a 13 System

123. ____ If a combustible concealed space does not meet the requirements in Section automatic sprinkler protection shall be provided,
124. ____ The calculation design is based on the 4 most demanding sprinklers at the minimum listed flow rate or 0.10 gpm/ft.,
125. ____ Hose streams and water duration requirements are for LH in accordance with Table 11.2.

Special Design

126. ____ Special design considerations for exposure protection, water curtain, and under roof or ceiling in combustible space are in accordance with 11.3.

Pipe Schedule

Note: For systems less than 5,000 sq. ft. the minimum water flow is proven to be available in accordance with Table 11.2.2.1. Systems less than 5,000 sq. ft. shall have 50 psi residual pressure and meet the requirements of Table 11.2.

- 127. ____ Only 5.6 K-factor sprinklers, use of higher K-factor sprinklers are for hydraulically calculated systems,
- 128. ____ Light Hazard: 8 sprinklers maximum for each branch line,
- 129. ____ A. pipe size and number of heads area in accordance with Table 22.5.
- 130. ____ B. sprinklers above and below the ceiling are in accordance with Table 22.5.
- 131. ____ Ordinary Hazard: 8 sprinkler maximum for each branch line, 22.5.
- 132. ____ A. pipe size and number of sprinklers are in accordance with Table 22.5.
- 133. ____ B. sprinklers greater than 12 ft. separations are in accordance with Table 22.5.
- 134. ____ C. sprinklers above and below the ceiling are in accordance with Table 22.5.
- 135. ____ Extra Hazard: not allowed,

Wet System

- 136. ____ Relief valve not less than ½ in. is detailed for gridded system,
- 137. ____ An alarm connection not less than 1 in., discharging to the exterior, located anywhere downstream of the water flow alarm is provided to test the water flow alarm,

Dry System, Grid System not Permitted,

- 138. ____ Only upright, listed dry sprinklers are used, see exceptions for return bends and sidewall sprinklers,

- 139. ____ System capacity is provided and systems less than 500 gal. and systems between 500 and 750 gal. equipped with a quick opening device do not need to deliver water within 60 seconds,
- 140. ____ System is designed to meet the water delivery times for the hazard classification in accordance with Table 7.2.
- 141. ____ A trip test connection with a shut-off valve and at least a 1 in. plug is at the furthest sprinkler pipe,
- 142. ____ Compressor capacity specification sheet is provided, restores system within 30 minutes,
- 143. ____ Compressor piping system, air fill line not less than ½ in., and check-relief-shutoff valves are shown or noted,
- 144. ____ Shown is the location for the quick opening device (QOD) for systems greater than 500 gallons,
- 145. ____ Shown is the location of the check valve for QOD and the anti-flooding device between the riser and the QOD,

Preaction or Deluge

- 146. ____ Pressure gauge locations are above and below the preaction valve and on the air supply,
- 147. ____ Location and spacing of the detection devices are detailed,
- 148. ____ The single and non-interlock preaction system is limited to 1,000 sprinklers, 750 gal. limit for each valve.
- 149. ____ The double-interlock pre-action system is based on water delivery not exceeding 60 seconds but the water delivery time is also based on Table 7.2.
- 150. ____ Pre-action system is supervised when there are more than 20 sprinklers,
- 151. ____ Double interlock systems are not gridded, 7.3. and valve room is heated,

Combined Dry Pipe and Pre-action

- 152. ____ Dry pipe riser location is shown.
- 153. ____ Two 6 in. dry pipe valves are provided for systems greater than 600 sprinklers or greater than 275 sprinklers in a fire area,

154. ____ Multi-dry pipe valves are interconnected with 1 in. pipe with shut-off valve for simultaneous tripping,

155. ____ QOD is provided at the dry pipe valves,

156. ____ Fire areas requiring greater than 275 sprinklers shall divide the system into sections of 275 sprinklers or less by the use of check valves, and a building with multi-fire areas shall limit 600 sprinklers per check valve,

157. ____ The manual method of activating the detection system is within 200 ft. of travel,

158. ____ Water reaching the farthest point in not more than 1 minute for each 400 ft. of feed main, a maximum of 3 minutes for the system,

159. ____ Only upright, listed dry sprinklers are used, see exceptions for return bends and sidewall sprinklers,

Valves

160. ____ Check valve is at/near connection to water supply, single riser's alarm valve is considered a check valve,

161. ____ Control valves are provided in accordance with 8.16.

162. ____ Water supply exceeding 175 psi requires pressure reducing valves (PRVs), locations are detailed,

163. ____ Gauges are on the inlet and outlet sides of PRVs and an indicating valve on the inlet side,

164. ____ Post indicator valve is protected from vehicular damage and the top is 32 in. to 40 in. above grade,

General Storage Requirements, Chapter 12

165. ____ Refer to the NFPA references in Chapters 14 through 18.

Miscellaneous Storage (incidental to occupancy, not more than 10 percent of building area or 4,000 sq. ft., and pile area are limited to 1,000 sq. ft. with at least 25 ft. separation)

166. ____ Miscellaneous storage to 12 ft. of Classes I through IV, Group A plastic, rolled paper, and tires are designed in accordance with density curve Figure 13. and Table 13.

167. ____ Hazard classification for the design/area method complies with Figure 13. and commodity protection complies with Table 13.

168. ____ 5.6 K-factor or larger is used with a minimum starting pressure of 15 psi for in-rack sprinklers, 13.

169. ____ In-rack sprinkler water demand is based on the four most remote and adjacent sprinklers, 13.

Miscellaneous

170. ____ Flushing instructions and criteria are on the plans. Flushing requirements shall be 880 gpm for 6 in. pipe, 1,560 gpm for 8 in., 2,440 gpm for 10 in., 3,520 gpm for 12 in., and the flush should be pitoted and calculated to ensure the flow and the velocity is at least 10 ft/sec.

Review/Inspection Date ____/____/ 20____ Reviewer: _____