



MOBILE FIRE - RESCUE DEPARTMENT FIRE CODE ADMINISTRATION

Water Mist System Plan Review 2009 International Fire Code and NFPA 750

Date of Review ___/___/_____ BLD201__ - _____

Project Address: _____ Project Name: _____

Professional Engineer's Name: _____ Phone: _____

Contractor's Business Name: _____ Phone: _____

Contractors Name: _____ Phone: _____

Contractor's Email Address: _____

System Application: Local ___ Total Compartment: ___ Zoned: ___

Design: Pre-Engineered ___ Engineered: ___

System Type: Low Pressure ___ Intermediate Pressure ___ High Pressure: _____

Nozzle Type: Auto ___ Non-Auto ___ Hybrid _____

Numbers following worksheet comments represent an NFPA code section unless otherwise specified.

Worksheet Legend: ✓ or OK = acceptable N = need to provide NA = not applicable

1. ___ Two sets of drawings are provided.

2. ___ Equipment is listed for intended use and compatible with the system and equipment data sheets are provided.

Plan Set Shall Provide and Detail the Following (11.1.3-5):

General:

3. _____ Scale: a common scale shall be used and plan information is legible.
4. _____ Description of the water and gas storage containers including internal volume, design pressure at standard temperature and pressure, 11.1.5 (9).
5. _____ Building dimensions, location of fire partitions and fire walls.
6. _____ Description of the hazards or occupancies being protected and if these areas are occupied, 11.1.5(7)
7. _____ Full-height cross sections, which include ceiling construction.
8. _____ System application, nozzle type, operation method, and media type.
9. _____ Device and nozzle location, provide sectional view detailing detectors position.
10. _____ Type of devices and detail proper device wiring for detectors, horns, etc.
11. _____ Equipment symbol legend and compass point.
12. _____ Water mist control panel location is detailed and connected to the building fire alarm system, if the building is equipped with such a system.
13. _____ Sequence of operation for operation of the water mist system, 11.1.5(22).

Detection System Riser, 5.10.1.1 and 11.1.5:

14. _____ Riser diagram shows the number and type of devices, audible, visual, release, shutdown, and discharge controls, per circuit, zone ID, a dedicated 120 AC power supply, batteries, panel, etc.

Point to Point System Wiring Diagram, 11.1.5(23):

15. _____ Interconnection and wire routing to identified devices and controls per circuit.
16. _____ Indicate the number of conductors and wire gauge for each circuit.
17. _____ Identify separate zones, circuits, and end of line resistor locations.

Circuit Loads, Voltage Drop Calculations, and Battery Calculations, 11.1.5(26), 5.10.2.2:

18. _____ Quantity of signaling devices, current consumption, and end-of-line voltage for each circuit.
19. _____ Based on the approximate length of each circuit and the conductor amperage, determine the resistance for each 1,000 feet of wire using *National Electrical Code* ampacity values or those specified by the manufacturer of the conductors.

20. ____ Show the formula and acceptable circuit limits on the drawing or on an attached sheet including:
21. ____ A. Standby power consumption of all current drawing devices multiplied by the hours required by NFPA (24 hours) including power consumption of the control panel modules.
22. ____ B. Power consumption of all devices on standby power; including door holders, relays, smoke detectors, etc.
23. ____ C. Alarm power consumption of all current drawing devices multiplied by the minutes required by NFPA (5 minutes).
24. ____ D. Formula format for battery calculations and size of batteries.

System Devices:

25. ____ Pre-engineered water mist automatic detection system layout meets the manufacturer's listing requirements and a specification/design manual is provided, 5.10.2.1. Alarm initiating and signaling devices are installed in accordance with NFPA 72.
26. ____ Equipment and detectors are listed for use and the listing data sheets are provided, 5.1.1.
27. ____ Two sources of electrical power are provided (24-hr minimum standby power), 5.10.2.2.
28. ____ Emergency release device is provided and detailed, unless each nozzle is thermally activated, 5.10.3.5.
29. ____ Normal manual control(s) for activation is detailed to be accessible, labeled, and mounted 4 ft. or less above the floor level, 5.10.3.6.
30. ____ Pneumatic control lines are protected against damage and supervised, refer to the exceptions, 5.10.4.3.
31. ____ When automatic activation is provided, the method is designed in compliance with 5.10.1.2.

Water Mist Information:

32. ____ Type of system, system application, type of nozzles, operation method, and media type are provided.
33. ____ Design objective and hazard classifications are provided, 8.3.1 and 8.4.2.
34. ____ Components subject to corrosion are protected, 5.1.3.

35. If required a FDC is detailed on the discharge side of pressure source and prior to the filter/strainer or on the suction side of the pressure source, depending on the operating pressure, 10.5.5.

Calculations:

36. _____ System hydraulic and atomizing medium calculations are provided in accordance with Chapter 9.

37. _____ Hydraulic calculation nodes match plan nodes.

38. _____ Hydraulic junction points balance within the pressure specified in 9.3.5 and equivalent pipe lengths are in accordance with 9.3.6.

39. _____ Nozzle pressures are within limitations specified by the manufacturer, 9.4.1.2.

40. _____ The results of the hydraulic and pneumatic calculations at the supply point and at the nozzle are provided, 9.4.6.

41. _____ The water supply is designed for the largest single hazard or group of hazards, 10.2.

42. _____ A volume and pressure of the propellant gas is in accordance with Section 9.4.1.1.

Atomizing Media:

43. _____ For twin fluid systems the atomizing media source shall be in accordance with 10.6.1.

44. _____ Pump capacity is in accordance with 10.5.2.2.

45. _____ A test connection is detailed for testing the pump in accordance with 10.5.2.3.

46. _____ When used, an air compressor is listed for fire service use, 10.6.8.1.

47. When used as the dedicated air supply, the compressor is connected to a backup power supply, 10.6.8.2.

Containers and Piping:

48. _____ Pressurized water and atomizing media containers shall meet the construction requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section VIII, *Unfired Pressure Vessels* or in accordance with U.S. Department of Transportation requirements, 5.2.2.2.

49. _____ Gas and water containers are sized for required quantities, 5.2.1, and are not located where environmental or mechanical damage will occur, 7.5.4.

50. _____ When required in a seismic design category, documentation explaining seismic bracing for atomizing media containers shall be provided, 5.2.2.1.

51. _____ Containers that are pressurized shall be equipped with a pressure relief device, 5.2.2.5.
52. _____ Manifold containers shall be interchangeable and have the same volume and discharge pressure, 5.2.3.
53. _____ Low pressure storage cylinder detail shows the liquid level and pressure gauges, and high/low pressure supervisory alarm, 7.5.6.4.
54. _____ Pressure gauges are detailed on all pressurized cylinders, both sides of pressure regulator valve, pressurized side of the supply connections and system control valves, and air supplies for dry systems, 7.8.5.
55. _____ Pipe or tube: type of material, sizes, pressure rating, if used in low, intermediate, or high PSI system, and pipe specifications are provided, 5.3.2.1.
56. _____ Bending criteria for Type K and L copper pipe is noted on plans which is in accordance with 5.3.6.
57. _____ Fittings are either listed or meet the referenced ANSI or ASTM standard for the given application. Specifications or equipment data sheets are provided, 5.4.
58. _____ Screwed unions are limited to pipe diameters of 2 inches or less, 5.4.2.3.
59. _____ One-piece reducers are used and noted on plans, 5.4.2.4.
60. _____ When required, an FDC is detailed and interfaces on the pressure side of the system, refer to exceptions, 10.5.5.

Hangers:

61. _____ Hangers are listed for their intended use or in accordance with 5.5.
62. _____ Types of hangers and hanger locations on structural elements are detailed on plans, 7.3.7.1. Low pressure water pipe is hung in accordance with NFPA 13.
63. Armovers to nozzles are detailed and the supports shown for steel pipe and tube length greater than what is specified in 7.3.7.2.

Seismic Bracing (Based on the requirements in NFPA 13):

64. _____ Seismic bracing is designed, detailed, and seismic calculations are provided, NFPA 13.
65. _____ Lateral sway brace spacing complies with 9.3.5.3.
66. _____ A seismic separation assembly for piping is provided at building seismic joints, 9.3.3.
67. _____ Longitudinal sway brace spacing complies with 9.3.5.4.

68. _____ A 4-way sway brace is provided at the top of the riser, 9.3.5.5.
69. _____ Longitudinal and lateral bracing is provided for each run of pipe between the change of direction in accordance with 9.3.5.11.
70. _____ Branch lines and end sprinklers are restrained against vertical and lateral movement, 9.3.6.3.
71. _____ Calculations for seismic bracing are provided, 9.3.5.6 – 9.3.5.11.

Nozzles:

72. _____ Nozzles: All design and installation listing data for each nozzle is provided. The information shall include: specific hazard objectives, flow rate, space height; protection distance, spacing, coverage area, and pressures; delivery time, spacing from walls, compartment volume, and thermal classification, etc., 5.6.1 and 7.2.
73. _____ Thermal nozzles: nozzle temperature rating and the maximum ambient temperatures are provided and comply with Table 5.6.7.1.
74. _____ Number, type, and the placement of spare nozzles are noted on plans, 5.6.7.
75. _____ Nozzles with waterway dimensions less than 51 microns use the type of water specified in 10.5.1.7.

Valves:

76. _____ Valves are listed for the intended use, equipment data sheets are provided and valve signage is provided.
77. _____ A monitored or locked indicating valve is provided for each source of water supply, 7.8.1.8.
78. _____ Water pressure regulating valve (PRV) is provided for any portion of the system with the potential to exceed the maximum system pressure rating and it opens at the percentage of system-rated pressure specified in 7.8.3.1.
79. _____ Water pressure relief valve size and location is detailed and in compliance with 7.8.3.1.3.
80. _____ Indicating valve location is detailed and in compliance with 7.8.3.1.4.
81. _____ A water flow test valve is detailed and designed to meet the equivalent flow of PRV, 7.8.3.1.6.
82. _____ Compressed gas PRV is detailed when the supply pressure is higher than the operating pressure, 7.8.3.2.2.
83. _____ Check valve is detailed between the system and the potable water connection, 7.8.4.2.

84. _____ Pressure gauges are detailed on the pressurized side of control valves and supply connections, 7.8.5

Strainers:

85. _____ Strainers and filters are listed for their use and the listing data sheets are provided, 5.8.1.

86. _____ Pipeline strainer and filter designs have a flush-out connection, 5.8.5.

87. _____ Number, type, and placement of spare strainers and filters are noted on the plans, 5.8.8

88. _____ Strainers and filters are detailed at each water supply connection or system riser, 7.7.

89. Strainer and filter ratings or mesh openings are of a percentage of the nozzle waterway dimension as specified in 10.5.1.6.

Pumps and Controllers:

90. _____ An automatic pump is provided and detailed, 10.5.2.1.

91. _____ Pump capacity is in accordance with 10.5.2.2.

92. _____ A test connection is detailed for testing the pump in accordance with 10.5.2.3.

93. _____ Pumps: design information and details include pump capacity, over pressure relief, method of automatic start and shutoff and water supply method, 5.9.

94. _____ Pumps are sized to provide the water flow rate and system demand, 10.5.2.2.

95. _____ Pump operation and functions are supervised at a constantly attended location, the method and what is supervised on the electrical and diesel pumps are noted on plans, 10.5.2.3.

96. _____ Power supply for pump driver complies with NFPA 20 except for being fed with an independent service feed, 5.9.2.

97. _____ Pump controller is a listed fire pump controller, 5.9.3.1.

Test Connector:

98. _____ It is detailed and it is sized not less than the largest nozzle, located at the most hydraulically remote point of the system, 7.10

Additional Comments:

Review Date: _____

Fire Code Administration Staff Reviewer: _____

Voltage Drop Calculations for Notification Appliance Circuit (NAC): _____

Each NAC shall have its voltage drop determined. This sheet shall be used for one NAC but every NAC should have a sheet completed and submitted with each permit application.

STEP 1: complete the following to provide data for determining the resistance of the conductor in Step 2

Wire length is from fire alarm control panel to the end of the fire alarm circuit = _____ ft. X 2 = _____ ft.
Wire Size = # _____ AWG (American Wire Gauge)
Resistance (R) = _____ OHMS for a given 1,000 ft. of the conductor specified

Step 2: complete the following to determine the total resistance (OHMS) for a NAC

(R) = Total Wire Resistance

From Step 1 divide the OHMS by 1,000, which will convert the conductor resistance to OHMS in each linear foot of wire

Determine OHMS per foot = _____ ft. = _____ OHMS/ft.
1,000

Take the total feet of wire from Step 1 and OHMS/ft. from the line above and put both in the equation below

Circuit resistance = _____ ft. X _____ OHMS/per ft. = (R) Total OHMS

Step 3: complete the following to determine the total alarm notification device amperage and devices may be rated in milliamps

(I) = Alarm Appliance Amperage

A. No. of Alarm Appliances = _____	B. Current amperage each _____	= A x B _____ (I)
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A. No. of Alarm Appliances = _____	B. Current amperage each _____	= A x B _____ (I)
		Total _____ (I)

Step 4: complete the following to determine the total voltage drop for the branch circuit

Voltage (E) = (I) X (R) from totals in Steps 2 and 3 above
(E) = (I) X _____ (R)
= _____ (E) (shall not exceed 4.4)

Step 5: complete the following to determine if enough voltage is available to operate fire alarm notification devices

Maximum allowable voltage drop: notification devices cannot drop below their Nameplate Operating Voltage (NOV) range. As of 5/1/2004 UL required indicating devices to operate within their NOV. The UL NOV standard is 16VDC to 33VDC, consult the 2002 NFPA 72 Handbook 7.3 for more information. Fire Alarm Control Units (FACU) are tested to UL 864 and are required to operate at the end of useful battery life, 20.4 V.

Allowable voltage drop is 20.4 V (FACU) - 16 VDC (NOV) = 4.4 V

If (E) from Step 4 exceeds 4.4 V then the NAC is not compliant with NFPA 72

Take (E) from Step 4 and put in the equation below

Voltage Drop = 20.4 V - _____ (E) = _____ V (shall not be less than 16V)
