## Water Mist System Plan Review

### Date of Review ___/___/______

### 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 ______

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**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: 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.

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.

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.

Detection System Riser,

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:

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,

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. 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.

27. _____ Two sources of electrical power are provided (24-hr minimum standby power).

28. _____ Emergency release device is provided and detailed, unless each nozzle is thermally activated.

29. _____ Normal manual control(s) for activation is detailed to be accessible, labeled, and mounted 4 ft. or less above the floor level.

30. _____ Pneumatic control lines are protected against damage and supervised.

31. _____ When automatic activation is provided, the method is designed in compliance with

**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.

34. _____ Components subject to corrosion are protected.
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.

**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 and equivalent pipe lengths are in accordance with .
39. Nozzle pressures are within limitations specified by the manufacturer.
40. The results of the hydraulic and pneumatic calculations at the supply point and at the nozzle are provided, .
41. The water supply is designed for the largest single hazard or group of hazards,
42. A volume and pressure of the propellant gas is in accordance with Section 9.

**Atomizing Media:**
43. For twin fluid systems the atomizing media source shall be in accordance with Code
44. Pump capacity is in accordance with .
45. A test connection is detailed for testing the pump in accordance with
46. When used, an air compressor is listed for fire service use,. 
47. When used as the dedicated air supply, the compressor is connected to a backup power supply..

**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, .
49. Gas and water containers are sized for required quantities, , and are not located where environmental or mechanical damage will occur, .
50. When required in a seismic design category, documentation explaining seismic bracing for atomizing media containers shall be provided, .
51. Containers that are pressurized shall be equipped with a pressure relief device.

52. Manifold containers shall be interchangeable and have the same volume and discharge pressure.

53. Low pressure storage cylinder detail shows the liquid level and pressure gauges, and high/low pressure supervisory alarm.

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.

55. Pipe or tube: type of material, sizes, pressure rating, if used in low, intermediate, or high PSI system, and pipe specifications are provided.

56. Bending criteria for Type K and L copper pipe is noted on plans.

57. Fittings are either listed or meet the referenced ANSI or ASTM standard for the given application. Specifications or equipment data sheets are provided.

58. Screwed unions are limited to pipe diameters of 2 inches or less.

59. One-piece reducers are used and noted on plans.

60. When required, an FDC is detailed and interfaces on the pressure side of the system.

**Hangers:**
61. Hangers are listed for their intended use.

62. Types of hangers and hanger locations on structural elements are detailed on plans. 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 NFPA 13.

**Seismic Bracing (Based on the requirements in NFPA 13):**
64. Seismic bracing is designed, detailed, and seismic calculations are provided, NFPA.

65. Lateral sway brace spacing

66. A seismic separation assembly for piping is provided at building seismic joints.

67. Longitudinal sway brace spacing complies with.
68.____ A 4-way sway brace is provided at the top of the riser.

69.____ Longitudinal and lateral bracing is provided for each run of pipe between the change of direction

70.____ Branch lines and end sprinklers are restrained against vertical and lateral movement,

71.____ Calculations for seismic bracing are provided.

**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.,

73.____ Thermal nozzles: nozzle temperature rating and the maximum ambient temperatures are provided.

74.____ Number, type, and the placement of spare nozzles are noted on plans.

75.____ Nozzles with waterway dimensions less than 51 microns use the type of water

**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.

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.

79.____ Water pressure relief valve size and location is detailed and in compliance with

80.____ Indicating valve location is detailed and in compliance with.

81.____ A water flow test valve is detailed and designed to meet the equivalent flow of PRV.

82.____ Compressed gas PRV is detailed when the supply pressure is higher than the operating pressure.

83.____ Check valve is detailed between the system and the potable water connection.
84. Pressure gauges are detailed on the pressurized side of control valves and supply connections.

**Strainers:**
85. Strainers and filters are listed for their use and the listing data sheets are provided.

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

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

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

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

**Pumps and Controllers:**
90. An automatic pump is provided and detailed.

91. Pump capacity is in accordance with NFPA.

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

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

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

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

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

97. Pump controller is a listed fire pump controller.

**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.

**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. \times 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.
  - 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. \times \_ 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 milliams

- (I) = Alarm Appliance Amperage
  - A. No. of Alarm Appliances = \_
  - B. Current amperage each = \_ A \times \_ B = \_ (I)

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

- Voltage (E) = (I) \times (R) from totals in Steps 2 and 3 above
  - (E) = (I) \times \_ (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)