SECTION 21 1300

FIRE-SUPPRESSION SPRINKLER SYSTEMS

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LANL MASTER SPECIFICATION SECTION

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| Rev. 0: New specification section adopting content aligned with commercial industry practice. |

Word file at <http://engstandards.lanl.gov>

This template must be edited for each project.  In doing so, specifier must add job-specific requirements.  Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.  Once the choice is made or text supplied, remove the brackets.  The specification section must also be edited to delete requirements for processes, items, or designs that are not included in the project -- and specifier’s notes such as these.  This template is tailored to meet requirements contained in the LANL Engineering Standards Manual (ESM). To seek a variance from requirements in this section that are applicable, contact the Engineering Standards Manual Fire [POC](http://engstandards.lanl.gov/POCs.shtml#fire). Please contact POC with suggestions for improvement as well.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Note that DOE-STD-1066 Appendices A and B are not applicable to the Work specified herein. Consider the scope and purpose of DOE documents as pertains to commercial construction before editing such requirements into this specification section.

This template is developed for ML-4 projects.  For ML-1, 2, and 3 applications, additional requirements and independent reviews should be added if increased confidence in procurement or execution is desired; see ESM Chapter 1 Section Z10 Specifications and Quality sections.
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PART 1 GENERAL

1. SCOPE OF WORK

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Select one of the following paragraphs. Last paragraph related to non-hydraulically designed modifications is for instances where it can be demonstrated without performing hydraulic calculations that the Work does not affect the hydraulically-remote areas.

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1. Provide hydraulically-designed complete fire sprinkler system(s) to achieve fully-sprinklered coverage. The Work shall be complete in all respects. Provide shop drawings, calculations, installation and testing compliant with NFPA 13.
2. Provide hydraulically-designed modification(s) to existing fire sprinkler system(s) to achieve fully-sprinklered coverage. The Work shall be complete in all respects. Provide shop drawings, calculations, installation and testing compliant with NFPA 13.
3. Provide non-hydraulically-designed modification(s) to existing fire sprinkler system(s) to achieve fully-sprinklered coverage. Justification for non-hydraulic designs shall be vetted through the AHJ prior to generating shop drawings. The Work shall be complete in all respects. Provide shop drawings, installation and testing compliant with NFPA 13.
4. SECTION INCLUDES
5. Wet-pipe Fire Sprinkler Systems.
6. Dry-pipe Fire Sprinkler Systems.
7. Preaction Fire Sprinkler Systems.
8. System Design, Installation, and Certification.
9. Fire Department Connections for Sprinkler Systems.
10. RELATED SECTIONS
11. Section 01 2500, *Substitution Procedures*
12. Section 01 3300, *Submittal Procedures*
13. Section 07 8400, *Firestopping*
14. Section 21 0500, *Common Work Results for Fire Suppression: Pipe and fittings*
15. Section 21 0523, *General-Duty Valves for Water-Based Fire-Suppression Piping*
16. Section 21 0533*, Heat Tracing for Fire Suppression Piping*
17. Section 21 1200*, Fire-Suppression Standpipes*
18. Section 21 3000*, Fire Pumps*
19. Section 22 0713, *Plumbing and HVAC Insulation: Pipe insulation*
20. Section 22 0813, Testing Piping Systems
21. Section 28 4600, *Fire Detection and Alarm*
22. REFERENCES
23. FM (AG) - FM Approval Guide
24. ITS (DIR) – Directory of Listed Products
25. NFPA 13 – Standard for the Installation of Sprinkler Systems
26. NFPA 25 – Standard for the inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
27. NFPA 70 – National Electric Code
28. NFPA 72 – National Fire Alarm and Signaling Code
29. NFPA 1963 – Standard for Fire Hose Connections
30. UL (DIR) – Online Certifications Directory
31. UL 405 – Standard for Safety Fire Department Connection Devices
32. DELEGATED DESIGN SUBMITTALS
33. Submit shop drawings, corresponding hydraulic calculations and product data to the LANL Fire Marshal’s office for approval.
	1. Product Data: Provide manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories.
	2. Shop Drawings: Indicate supports, components, accessories, and sizes.
	3. Hydraulic Calculations. Calculations shall be performed using current fire hydrant flow test data [obtained by the subcontractor; provided by LANL].
34. INFORMATIONAL SUBMITTALS
35. Completed “Contractor’s Materials and Test Certificate for Aboveground Piping”.
36. Project Record Documents. Record Documents reflecting final installed conditions. Include Drawings [and 3D model] and the corresponding Hydraulic Calculations.
37. Operation and Maintenance Data: Manufacturer’s data including parts diagrams, lists of spare parts, and service requirements.
38. QUALITY ASSURANCE
39. Perform Work in accordance with NFPA 13. One bound copy of the applicable edition of NFPA 13 shall remain onsite and accessible while Work is being performed and until [Certificate of Occupancy; acceptance].
40. Designer Qualifications: Design system under direct supervision of a [Professional Fire Protection Engineer experienced in fire suppression design and licensed in NM state; NICET Level III certified technician “Water-Based Systems Layout”]. Drawings and calculations shall be sealed by NICET Level III or Professional Engineer.
41. Installer Qualifications: Company specializing in performing the Work of this section [with minimum \_\_\_\_\_ years’ experience; with documented experience; \_\_\_\_\_; or None - N/A][ and approved by manufacturer; \_\_\_\_\_; or None - N/A].
42. DELIVERY, STORAGE, AND HANDLING
43. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.
44. WARRANTY
45. See Section 01 7700, Closeout Procedures for additional warranty requirements.
46. Correct defective Work within one year following the date of Substantial Completion.

PART 2 PRODUCTS

1. PERFORMANCE REQUIREMENTS
2. All materials and components shall meet applicable NFPA requirements. Products shall be UL listed and/or FM approved.
3. Fire sprinkler system design, components and installation shall comply with NFPA13.

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Retain one of the following two paragraphs.

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1. Fire hydrant flow test data:
2. Date: \_\_\_\_\_\_\_\_\_\_
3. Gage Hydrant Number: \_\_\_\_\_\_\_\_\_\_
4. Flow Hydrant Number: \_\_\_\_\_\_\_\_\_\_
5. Static Pressure: \_\_\_\_\_\_\_\_\_\_
6. Residual Pressure: \_\_\_\_\_\_\_\_\_\_
7. Flow: \_\_\_\_\_\_\_\_\_\_
8. Distance from test gage to base of riser: \_\_\_\_\_\_\_\_\_
9. Elevation of test gage: \_\_\_\_\_\_\_\_\_\_
10. Elevation of base of riser: \_\_\_\_\_\_\_\_.
11. Obtain a current fire hydrant flow test [from LANL].
12. Hydraulic calculations shall achieve a margin of 10 psig or 10 percent – whichever is greater.
13. FIRE SPRINKLERS
14. Manufacturers: Provide fire sprinklers from the following manufacturers. Each type of fire sprinkler listed on the shop drawings shall be from a single manufacturer.
	* 1. Reliable Sprinkler
		2. Tyco Fire Protection Products
		3. Victaulic
		4. Viking
		5. \_\_\_\_\_\_\_\_\_\_\_
		6. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
15. Suspended Ceiling Application: [Semi-recessed; Recessed; Concealed] [pendant; upright; or \_\_\_\_\_] type with matching [push on; clamp on; screw on] [escutcheon; cover] plate.
16. Response Type: [Quick; Standard; or \_\_\_\_\_].
17. Coverage Type: [Standard; Extended; or \_\_\_\_\_].
18. Finish: [Brass; Chrome plated; Enamel, color \_\_\_\_\_\_; Teflon; Wax; \_\_\_\_\_].
19. [Escutcheon; Cover] Plate Finish: [Chrome; Enamel, color \_\_\_\_\_\_].
20. Heat-Responsive Element: [Fusible solder link type; Glass bulb type] temperature rated for specific area hazard.
21. Exposed Area Application: [Pendant; Upright] type [with guard].
22. Response Type: [Quick; Standard; or \_\_\_\_\_].
23. Coverage Type: [Standard; Extended; or \_\_\_\_\_].
24. Finish: [Brass; Chrome plated; Enamel, color \_\_\_\_\_\_; Teflon; Wax; \_\_\_\_\_].
25. Heat-Responsive Element: [Fusible solder link type; Glass bulb type] temperature rated for specific area hazard.
26. Sidewall Application: [Semi-recessed; Recessed; or \_\_\_\_\_] horizontal sidewall type with matching [push on; clamp on; screw on] escutcheon plate.
27. Response Type: [Quick; Standard; or \_\_\_\_\_].
28. Coverage Type: [Standard; Extended; or \_\_\_\_\_].
29. Finish: [Brass; Chrome plated; Enamel, color \_\_\_\_\_\_; Teflon; Wax; or \_\_\_\_\_].
30. Heat-Responsive Element: [Fusible solder link type; Glass bulb type] temperature rated for specific area hazard.
31. Dry Sprinklers: [Concealed; Exposed; Plain barrel; Recessed; or \_\_\_\_\_] pendant type with matching push on [escutcheon plate; cover plate].
32. Response Type: [Quick; Standard; or \_\_\_\_\_].
33. Coverage Type: [Standard; Extended; or \_\_\_\_\_].
34. Finish: [Brass; Chrome plated; Enamel, color \_\_\_\_\_\_].
35. [Cover; Escutcheon] Plate Finish: [Chrome plated.; Enamel, color \_\_\_\_\_\_].
36. Heat-Responsive Element: [Fusible solder link type; Glass bulb type] temperature rated for specific area hazard.
37. Storage Sprinklers: [Pendant; Standard; Upright; or \_\_\_\_\_] type [with guard].
38. Type: [In-Rack; CMDA; CMSA; ESFR].
39. Finish: [Chrome-plated; Enamel, color \_\_\_\_\_\_].
40. Heat-Responsive Element: [Fusible solder link type; Glass bulb type; or \_\_\_\_\_\_\_\_\_\_\_] temperature rated for specific area hazard.
41. Guards: [Red; Chrome] finish.
42. Flexible Drop System: Stainless steel, multiple use, open gate type.
43. Application: Use to properly locate sprinkler heads.
44. Include all supports and bracing.
45. Type: [braided; unbraided; or \_\_\_\_\_\_\_] tube as required for the application.
46. Manufacturers:
	1. Victaulic.
47. PIPING SPECIALTIES
48. Manufacturers for Wet Pipe Sprinkler Alarm, Dry Pipe Sprinkler Alarm and Preaction Valves:
	1. Reliable Automatic Sprinkler
	2. Tyco Fire Products
	3. Victaulic
	4. Viking
	5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_
	6. Substitutions: [Alternate products may be accepted, follow Section 01 2500, Substitution Procedures; or Not permitted – No substitutions].
49. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber-faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
50. Electric alarm interface.
51. Test and drain valve.
52. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, accelerator, and with the following additional capabilities and features:
53. Electric alarm interface.
54. Test and drain valve.
55. Externally resettable.
56. Preaction Valve:
57. Operated by detection system listed for releasing service and independent of building fire alarm system with provisions for local, manual[, and indicated remote;, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; or None - N/A] releases.
58. Incorporate [mechanical; or \_\_\_\_\_\_\_\_\_\_] latching mechanism incorporating valve clappers independent of system water pressure fluctuations.
59. Provide test detection device for each actuation circuit adjacent to each controlled valve in accordance with [NFPA 13](https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=13).

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Fire suppression systems supplied from a dedicated fire loop or tank (non-potable water) do not require backflow prevention.
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1. Backflow Preventer: Reduced pressure principle valve assembly backflow preventer with drain and OS&Y (Open Stem & Yoke) gate valve on each end.
2. Manufacturers:
3. Febco, Model LF880V
4. Wilkins, Model 475V
5. \_\_\_\_\_\_\_\_\_\_
6. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
7. Test Connections:
8. Inspector's Test Connection:
9. Provide test connections approximately [6 ft; \_\_\_\_ ft] above floor for [each; portion of each; or \_\_\_\_\_\_\_\_\_\_] sprinkler system equipped with an alarm device, located at the most remote part of each system.
10. Route test connection to an exterior location or floor drain location, excluding janitor sinks, accepting full flow that will not result in negative consequences.
11. Supply discharge orifice with same size as corresponding sprinkler orifice.
12. Limit vertical height of exterior wall penetration to [2 ft; \_\_\_\_ ft] above finished grade.
13. Backflow Preventer Test Connection:
14. Provide downstream of the backflow prevention assembly, listed hose valves with 2.5 inch National Standard male hose threads with cap and chain.
15. Furnish one valve for each 250 gpm of system demand or fraction thereof.
16. Provide permanent sign reading "Test Valve"***.***
17. Manufacturers:
18. Guardian Fire Equipment
19. Potter Roemer
20. \_\_\_\_\_\_\_\_\_\_
21. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
22. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy [chrome plated; red enameled; or \_\_\_\_\_\_\_\_\_\_\_\_\_] gong and motor housing, nylon bearings, and inlet strainer.
23. Manufacturers:
24. Reliable Automatic Sprinkler
25. Tyco Fire Products
26. Victaulic
27. Viking
28. \_\_\_\_\_\_\_\_\_\_\_
29. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
30. Electric Alarm Bell: Electrically operated [chrome plated; red enameled; or \_\_\_\_\_\_\_\_] gong with pressure alarm switch.
31. Manufacturers:
32. Edwards Signaling.
33. Potter Electric Signal Company, LLC
34. \_\_\_\_\_\_\_\_\_\_
35. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
36. Fire Department Connections:
37. Type: [Free standing; Flush, wall mount; Exposed, projected wall mount] made of corrosion resistant metal complying with UL 405***.***
38. Inlets: [Two; Three; Four; or \_\_\_\_\_] way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to [NFPA 1963](https://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=NFPA%201963). Brass caps with gaskets, chains, and lugs.
39. Configuration: [Square; Linear].
40. Outlet: Threaded [4 NPS; 5 NPS; 6 NPS; \_\_\_\_\_ NPS].
41. Location: [Back; Bottom].
42. Rated Working Pressure: 175 psi.
43. Finish: [Chrome; Brass or bronze; Polished brass; or \_\_\_\_\_].
44. Sleeve: [ Brass,; \_\_\_\_\_,; or None - N/A] 18 inches height.
45. Signage: Raised or engraved lettering 1 inch minimum indicating system type.
46. Manufacturers:
47. Elkhart Brass Manufacturing Company, Inc.
48. Fire End & Croker Corporation
49. Potter Roemer
50. \_\_\_\_\_\_\_\_\_\_
51. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
52. Supervisory Switches:
53. Manufacturers:
54. Potter Electric Signal Company, LLC
55. CoilKeeper Solenoid Supervisory Switch
56. SignaLink Bridge Wireless Supervisory System
57. \_\_\_\_\_\_\_\_\_\_
58. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
59. Water Level Supervisory Switches:
60. Manufacturers:
61. Potter Electric Signal Company, LLC
62. \_\_\_\_\_\_\_\_\_\_
63. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
64. [PREACTION; OR \_\_\_\_\_\_\_\_\_\_\_] VALVE CONTROL PANEL
65. Manufacturers:
66. Reliable Automatic Sprinkler
67. Tyco Fire Products
68. Viking
69. \_\_\_\_\_\_\_\_\_\_\_
70. Substitutions: [Alternate products may be accepted, follow Section 01 2500, *Substitution Procedures*; or Not permitted – No substitutions].
71. Provide a [modular; or \_\_\_\_\_\_\_\_\_] type control panel for electrically operated detection and extinguishing systems for each [preaction; or \_\_\_\_\_\_\_\_\_] valve.
72. Factory mount in surface mounted, steel cabinet with hinged doors[, and cylinder lock].
73. Provide factory wired assembly containing components and equipment as required to perform specified system operating and supervisory functions.
74. Include isolation switch to allow system testing without activation of the [preaction; or \_\_\_\_\_\_\_\_\_]valve.
75. House batteries in separate and lockable, steel cabinet.
76. Finish interior and exterior of cabinet with [enamel paint; or \_\_\_\_\_\_\_\_\_\_\_] and provide identification***.***
77. Include trouble lights and trouble alarm.
78. Provide 120 volt AC service transformed through a two-winding, isolation type transformer and rectified to low voltage DC for operation of all system actuating, signal sounding, trouble signal, and fire alarm tripping circuits.
79. Provide [UL (DIR); FM (AG); or \_\_\_\_\_] listed as an extinguishing system releasing panel and separate from the building's fire alarm control panel.
80. Secondary Power Supply:
81. Provide [nickel cadmium; lead calcium; sealed lead acid; or \_\_\_\_\_\_\_\_\_\_\_\_\_] rechargeable storage batteries and battery charger.
82. Storage Batteries:
83. Provide with sufficient ampere-hour rating to operate under [supervisory; trouble; and \_\_\_\_\_\_\_\_\_] conditions[, including audible trouble signal devices;, \_\_\_\_\_\_\_\_\_\_\_\_; or None - N/A] under alarm conditions for an additional [10; or \_\_\_] minutes and as required in accordance with the equipment listing.
84. Prevent contact between terminals of adjacent cells, battery terminals, and other metal parts with separate cell construction.
85. Battery Charger:
86. Provide solid-state automatic two rate type, capable of recharging completely discharged batteries to fully charged condition in [24; or \_\_] hours or less.
87. Locate charger within control panel or battery cabinet.
88. Supervision: Refer to Section 28 4600, *Fire Detection and Alarm*.

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When considering Articles *Air Compressor* and/or *Nitrogen Generator* below - Consider application of bottled nitrogen where system size may not justify an air compressor or nitrogen generator.

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1. AIR COMPRESSOR
2. Compressor: Single-unit, electric motor driven, motor, motor starter, safety valves, check valves, air maintenance device incorporating electric pressure switch and unloader valve.
3. Electrical Characteristics:
4. [1/3; 3/4; 1-1/2; or \_\_\_\_] hp.
5. \_\_\_\_\_\_\_\_\_\_ volts, [single; or three] phase, 60 Hz.
6. NITROGEN GENERATOR
7. Nitrogen Generator: Provide FM (AG) approved system and accessories.
8. Minimum Nitrogen Purity: [95 percent; 98 percent; 99 percent; or \_\_\_\_\_].
9. Provide piping and accessories to connect to dry and preaction fire suppression systems.
10. Electrical Characteristics:
11. \_\_\_\_\_\_\_\_\_\_volts*,* [single; or three] phase, 60 Hz.
12. Accessories:
13. Provide [control panel; remote annunciator panel; or \_\_\_\_\_\_\_\_\_\_].
14. Provide air maintenance device.
15. Provide nitrogen storage tank sized to comply with NFPA 13.
16. Provide purge valves to remove oxygen from the system.
17. Provide nitrogen analyzer to determine the nitrogen purity.
18. Provide system with replaceable filters.

PART 3 EXECUTION

1. INSTALLATION
2. Install in accordance with referenced NFPA design and installation standards.
3. Provide pipe supports in accordance with NFPA 13.
4. Provide signage required by NFPA 13 and NFPA 25.
5. Provide power and signal wiring in accordance with NFPA 70.
6. Install equipment in accordance with manufacturer's instructions.
7. Install direct-buried valves with a valve box. Provide post indicator.
8. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
9. Locate outside alarm gong on building wall [as indicated; or \_\_\_\_\_\_\_\_\_\_].
10. Place piping in concealed spaces above finished ceilings.
11. Center sprinklers in [two directions in ceiling tile and provide piping offsets as required; one direction only in ceiling tile with location in other direction variable, dependent upon spacing and coordination with ceiling elements; or \_\_\_\_\_\_\_\_].
12. Mask fire sprinklers to ensure that they do not receive field paint finish. Remove after painting. Replace painted sprinklers.
13. Install air compressor on vibration isolators.
14. Below ground piping shall be flushed and documented prior to tie-in to above ground piping. Ensure that all piping is free of foreign material at time of installation.
15. Install guards on sprinklers [where indicated; located 7 feet or less above finished floor; or \_\_\_\_\_\_\_\_].
16. Hydrostatically test entire system in accordance with NFPA 13 and/or NFPA 24 and Section 22 0813, *Testing Piping Systems*.
17. Required inspections and testing shall be scheduled with, and witnessed by the Fire Marshal’s office.
18. INTERFACE WITH FIRE ALARM
19. Ensure required devices are installed and connected as required to fire alarm system in accordance with NFPA 72.

END OF SECTION

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Do not delete the following reference information:

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THE FOLLOWING STATEMENT IS FOR LANL USE ONLY

This project specification section is based on LANL Master Specification Section 21 1300 Rev. 0, dated December 5, 2024.