SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
       2. SUMMARY
          1. Section Includes:

Pipes, fittings, and specialties.

Specialty valves.

Sprinklers.

Alarm devices.

Pressure gauges.

* + - 1. DEFINITIONS

Retain terms that remain after this Section has been edited for a project.

Some fire-protection products for high-pressure sprinkler piping are only rated for 250 psig. If 300-psig piping is required, verify product pressure ratings.

* + - * 1. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than [**250 psig**] [**300 psig**].
        2. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.
      1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Fire Protection Engineer Qualification:

Where required by this specification or the project drawings to provide the services of a professional Director’s Representative, the professional Director’s Representative shall be a licensed Fire Protection Engineer, who is actively licensed in the State of New York.

A licensed Fire Protection Engineer shall be defined as a register professional Director’s Representative (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES) or who has obtained a B.S. or M.S. Degree in “Fire Protection Engineering” from an accredited engineering program at a recognized University or Institute.

* + - * 1. Product Data: For each type of product: catalog sheets, specifications and installation instructions indicating UL listing or FM approval for each product.

Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for steel pipe within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services*.

* + - * 1. Sustainable Design Submittals:

"Product Data" Subparagraph below applies to LEED 2009 NC, CI, and CS; LEED v4; IgCC; ASHRAE 189.1; and Green Globes. Coordinate with requirements for adhesives.

Product Data: For adhesives, indicating VOC content.

"Laboratory Test Reports" Subparagraph below applies to LEED 2009 for Schools, LEED v4, IgCC, ASHRAE 189.1, and Green Globes. Coordinate with requirements for adhesives.

Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

* + - * 1. Shop Drawings: For wet-pipe sprinkler systems per NFPA 13 “Standard for the Installation of Sprinkler Systems” Plans and Calculations.

Include plans, elevations, sections, and attachment details.

Include diagrams for power, signal, and control wiring.

Include Hydraulic Calculations, computer generated and referenced to remote areas on plans.

The shop drawings shall be developed by and the hydraulic calculations shall be performed by person(s) meeting one of the following minimum qualification levels (without substitution):

National Institute for Certification in Engineering Technologies (NICET) Level IV for Water-Based Fire Protection Systems certified technicians, OR

A licensed Professional Fire Protection Engineer, licensed in the State of New York, and as defined by this specification.

Where a NICET Level III or IV Technician in “Water-Based Fire Protection System Layout” performs the shop drawings and hydraulic calculations, the drawings and hydraulic calculations shall bear the seal and signature of the NICET Technician.

Where a licensed Professional Fire Protection Engineer performs the shop drawings and hydraulic calculations, the drawings and hydraulic calculations shall bear the seal and signature of the licensed Professional Fire Protection Engineer.

* + - * 1. Seismic Submittals: Provide sway bracing Seismic Shop drawings per NFPA 13 Section 9.3 and the requirements of the Contract Documents.

Include plans, elevations, section, and location of attachments with details incorporating sway bracing, flexibility, clearances, and anchoring.

Seismic Bracing Calculations

* + - * 1. Quality Control Submittals:

Design Data: All portions of the sprinkler system shall be sized in accordance with NFPA requirements for Hydraulically Designed Systems. Submit Drawings and hydraulic calculations for approval.

Certificates: As required under Quality Assurance Article.

Company Field Advisor Data: Include:

Name, business address and telephone number of Company Field Advisor secured for the required services.

Certified statement from the Company listing the qualifications of the Company Field Advisor.

Services and each product for which authorization is given by the Company, listed specifically for the project.

Copy of:

NICET Letter of Approval of advisor indicating Level III for Water-Based Fire Protection Systems certification or

NICET Letter of Approval of advisor indicating Level IV for Water-Based Fire Protection Systems certification OR

Licensure certificate for Professional Engineering in the State of New York, AND National Council of Examiners for Engineering and Surveying (NCEES) record/certificate for verification of completion of the Principles of Practice of Fire Protection Engineering Exam of copy of certified B.S. or M.S. degree from an accredited Fire Protection Engineering program.

Contractor’s Qualifications Data:

Contractor’s name, business address and telephone number

Names and addresses of 3 similar projects that each person has worked on during the past 5 years.

Name of Project Manager for the project that is National Institute for Certification in Engineering Technologies (NICET) certified as Level III or IV for Water-Based Fire Protection Systems, or is a registered Professional Fire Protection Engineering in the State of New York. Provide a copy of Project Manager’s:

NICET Letter of Approval indicating Level III for Water-Based Fire Protection Systems certification, OR

NICET Letter of Approval indicating Level IV for Water-Based Fire Protection Systems certification, OR

Licensure certificate for Professional Engineering in the State of New York, AND National Council of Examiners for Engineering and Surveying (NCEES) record/certificate for verification of completion of the Principles of Practice of Fire Protection Engineering Exam or copy of certified B.S. or M.S. degree from an accredited Fire Protection Engineering program.

Installer’s Qualifications Data:

Name of each person will be performing the Work and their employer’s name, business address and telephone number.

Names and addresses of 3 similar projects that each person has worked on during the past 5 years.

Working Drawing/Hydraulic Calculation Preparer Qualification Data. Working drawings and hydraulic calculations shall be prepared by either a:

National Institute for Certification in Engineering Technologies (NICET) certified as Level III for Water-Based Fire Protection Systems technician.

National Institute for Certification in Engineering Technologies (NICET) certified as Level IV for Water-Based Fire Protection Systems technician.

A licensed Professional Fire Protection Engineer, licensed in the State of New York, and as defined by this specification.

Name of each person who will be preparing working drawings/hydraulic calculations, required for the Work.

Upon request, furnish names and addresses of the required number of similar projects that each person has worked on which meet the experience criteria.

For the Working Drawing/Hydraulic Calculation Preparer qualification data, provide a copy of:

NICET Letter of Approval of supervisor indicating Level III for Water-Based Fire Protection Systems certification OR

NICET Letter of Approval of supervisor indicating Level IV for Water-Based Fire Protection Systems certification OR

Licensure certificate for Professional Engineering in the State of New York, AND National Council of Examiners for Engineering and Surveying (NCEES) record/certificate for verification of completion of the Principles of Practice of Fire Protection Engineering Exam or copy of certified B.S. or M.S. degree from an accredited Fire Protection Engineering program.

* + - * 1. Certifications: [**Retain or delete what is applicable]**

Welding Certificates.

Certified NICET Level III or IV Technician for “Water-Based Fire Protection Layout”.

NYS registered Professional Fire Protection Engineer. (minimum 3 years of experience having the ability to assess and design water-based fire suppression systems).

Certification that Contractor’s installers are approved for the installation by the CPVC Pipe Manufacture.

* + - * 1. Fire-hydrant flow test report. As per NFPA 13 “Standard for the Installation of Sprinkler Systems”, test shall be conducted no more than 12 months prior to the working plan submittal.
        2. Field Test Reports: Test Certificates and Test Forms to be used for projects. Each report chosen to which is applicable for each project specific. [Retain or delete if applicable] [NFPA 13-Contractor’s Material and Test Certificate for Aboveground Piping] [NFPA 24 Contractor’s Material and Test Certificate for Underground Piping] [NYSDOH Form 1013 Report on Test and Maintenance of Backflow Prevention Device]
        3. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved: Comply with requirements in Section 013350 “Computer Aided Design Coordination Drawings” **[(D & C Master Spec)**].

Domestic water piping and mechanical.

HVAC Ductwork and units.

Electrical conduit and Breaker panels.

Structural elements.

Items penetrating finished ceiling include the following:

Lighting fixtures.

Air outlets and inlets.

Smoke Detectors.

Exit signs.

Retain "Coordination Drawings" Paragraph below for situations where limited space necessitates maximum utilization for efficient installation of different components or if coordination is required for installation of products and materials by separate installers. Coordinate paragraph with other Sections specifying products listed below. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - 1. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, maintenance manuals, parts list for mechanical and electric devices, and Publication NFPA 25 “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems” Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems. Submit one (1) set of copies to the Director’s Representative and a second set of copies to be inserted into the AS Built Drawing Cabinet located in the Fire Sprinkler Riser Room.
         2. Warranty Information: Providing one-year parts and labor warranty certificate. Submit one copy to the Director’s Representative and provide a second copy to be inserted into the AS Built Drawing Cabinet located in the Fire Sprinkler Riser Room.
         3. As-Built Drawings and Hydraulic Calculations: After final acceptance of the system all drawings and calculations shall have the NICET level III or IV Technician stamp and a NYS Registered Professional Fire Protection Engineer seal and signature. Or a seal and signature by a NYS Registered Professional Fire Protection Engineer. Submit one (1) set of copies to the Director’s Representative as a hard copy electronically and as a .pdf and .dwg. files. Then provide a second set of hard copies to be inserted into the AS Built Drawing Cabinet located in the Fire Sprinkler Riser Room.
         4. As per IFC follow requirements in 901.2.1 Statement of compliance. Before requesting final approval of the installation, the installing contractor shall furnish a written statement to the fire code official that the subject fire protection system has been installed in accordance with approved plans and has been tested in accordance with the manufacture’s specifications and the appropriate installation standard. Any deviation from the design standards shall be noted and copies of the approvals for such deviations shall be attached to the written statement. Submit pdf copy to the Director’s Representative and provide a second hard copy and pdf to be inserted into the AS Built Drawing Cabinet located in the Fire Sprinkler Riser Room.
         5. Field Test Reports: Completed NFPA Test Certificates and Test Forms signed by Installing Contractor and witnessed by Director’s Representative including their signature. Submit all related test reports in pdf to the Director’s Representative and provide the same related test reports in hard copy and pdf to be inserted into the AS Built Drawing Cabinet located in the Fire Sprinkler Riser Room.

Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping”, NFPA 24 “Contractor’s Material and Test Certificate for Underground Piping”, and NYSDOH Form 1013-Report on Test and Maintenance of Backflow Prevention Device.

* + - 1. MAINTENANCE MATERIAL SUBMITTALS
         1. Spare Parts: Furnish the following items and deliver to the Director’s Representative for storage in spare sprinkler head cabinets:

Fill in blanks in subparagraph below; obtain quantities and types from designer. Delete underlining before entering information.

Spare sprinkler heads of required temperature range as follows:

Quantity type: <\_\_\_\_\_\_\_>.

Standard upright: <**\_\_\_\_\_\_**>.

Standard pendent: <**\_\_\_\_\_\_**>.

Sidewall upright: <**\_\_\_\_\_\_**>.

Sidewall pendent: <**\_\_\_\_\_\_**>.

Sidewall horizontal: <**\_\_\_\_\_\_**>.

Flushing ceiling: <**\_\_\_\_\_\_**>.

Flush wall: <**\_\_\_\_\_\_**>.

Institutional pendent: <**\_\_\_\_\_\_**>.

One sprinkler head wrench to fit each type sprinkler head listed above.

* + - * 1. An AS Built Drawing Cabinet shall be installed at each project that has a new Fire Sprinkler System, alteration and fit-up which shall be located in the Fire Sprinkler Riser Room. All close out submittals for the project record documents shall be stored in the AS Built Drawing Cabinet.

AS Built Drawing Cabinet:

Rigid 16 gage steel construction/ Red powder coat finish.

Dimensions: 26.35”H x 14.25” W x 4” H.

Full-length, stainless steel piano hinge w/Boston lock

Surface mount w/ wall mount holes.

* + - * 1. Laminated 11x17 paper: Emergency and Working Procedures and System Riser Diagram: Fasten to wall located in the Fire Sprinkler Riser Room.

Start-up procedures.

Shut-down procedures.

Riser diagram showing valve locations and equipment with brass identification tags.

Alarm Co. & Monitoring Co. contact information.

Installing Contractors information.

* + - * 1. Laminated 11x17 Building Map: Fasten to wall located in Fire Sprinkler Room.

Showing Riser Detail Location: Include Main Control Valves, Main Drains, Low Point Drains, Inspectors Test Stations, Fire Alarm Control Panel, and Annunciator Panel.

Each System numbered and color coded in what areas they cover of the building.

* + - 1. QUALITY ASSURANCE
         1. Company Field Advisor with qualifications identified above. Secure the services of a Company Field Advisor for the following:

Rend advice regarding installation and final adjustment of the system.

Witness final system test and then certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.

Train facility personnel in operation, and routine maintenance of the system.

The Company Field Advisor shall be certified per:

National Institute for Certification in Engineering Technologies (NICET) Level III for Water-Based Fire Protection Systems certified technicians, OR

National Institute for Certification in Engineering Technologies (NICET) Level IV for Water-Based Fire Protection Systems certified technicians, OR

A licensed Professional Fire Protection Engineer, licensed in the State of New York, and as defined by this specification.

* + - * 1. Contractor Qualifications: The Contractor performing the Work of this Section shall be experienced in sprinkler work and shall have been regularly engaged in the installation of sprinkler systems for a minimum of 10 years and shall, upon request, furnish to the Director’s Representative the names and addresses of 5 similar projects which the Contractor worked on during the last 5 years.

The Project Manager employed to supervise the Work shall be National Institute for Certification in Engineering Technologies (NICET) certified as Level III or IV for Water-Based Fire Protection Systems, OR shall be a professional Fire Protection Engineer (as defined by this specification) licensed in the State of New York. The services of a Project Manager shall include, but are not limited to, the following:

Attendance at meetings during construction.

Render advice regarding installation and final adjustment of the system.

Witness final system test and then certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.

Performance of hydraulic calculations and development of Working Drawings.

* + - * 1. Installer Qualifications: The workers and supervisors performing the Work of this Section shall be personally experienced in sprinkler systems Work and shall have been regularly employed by a company engaging in the installation of sprinkler systems for a minimum of 5 years and shall, upon request, furnish to the Director’s Representative the names and addresses of 5 similar projects which they have worked on during the last 5 years.
        2. Working Drawing/Hydraulic Calculation Preparer Qualifications:

The persons employed to prepare these documents for the Work shall be personally experienced in sprinkler work and shall have been regularly performing such work for a minimum of 5 years while in the employ of a company or companies engaged in the installation of fire protection systems.

Upon request, furnish to the Director’s Representative the names and addresses of five similar projects which the foregoing people have prepared working drawings/hydraulic calculations on during the past 3 years.

The persons employed to prepare these documents for the Work shall be performed by person(s) meeting one of the following minimum qualification levels (without substitution):

National Institute for Certification in Engineering Technologies (NICET) Level III for Water-Based Fire Protection Systems certified technicians, OR

National Institute for Certification in Engineering Technologies (NICET) Level IV for Water-Based Fire Protection Systems certified technicians, OR

A licensed Professional Fire Protection Engineer, licensed in the State of New York, and as defined by this specification.

* + - * 1. System Acceptance:

Comply with NFPA 13 requirements.

Complete and sign the Contractor’s Material and Test Certifications and provide copies to Director’s Representative.

Tests shall be witnessed by the Director’s Representative.

* + - * 1. Regulatory Requirements:

Materials for the Work of this Section shall be Underwriter’s Laboratories listed, and/or Factory Mutual approved.

* + - * 1. Certification: NFPA Contractor’s Material and Test Certificate.
        2. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.
      1. FIELD CONDITIONS

Retain this article if interruption of existing sprinkler service is required.

* + - * 1. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Personnel or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

Follow the Impairment Procedures as per NFPA 25 “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems” & NFPA 13 “Standard for the Installation of Sprinkler Systems” standards.

Notify Director’s Representative no fewer than two (2) days in advance of proposed interruption of sprinkler service as per IFC follow requirements in 901.7 Systems out of service. Approved fire watch shall be provided for all occupants left unprotected by the shutdown until the fire protection system has been returned to service.

Before shutting down the sprinkler system to perform the work, notify the Director’s Representative in writing, and the local fire department that the system is to be shut down temporarily. Give schedule which states date and time of proposed shut down and approximate length of time that the system will be out of service. Request instructions for precautions that should be taken during the shutdown period.

Do not shut down system until schedule is approved by the Director’s Representative.

Return the existing system to pre-shutdown operation immediately after Work has been completed. Give written notice to the Director’s Representative that the system has been returned to pre-shutdown operation.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. PERFORMANCE REQUIREMENTS
         1. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with [**NFPA 13**] [**NFPA 13R**].
         2. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
         3. High-Pressure Piping System Component: Listed for [**250-psig minimum**] [**300-psig**] working pressure.

Retain "Delegated Design" Paragraph below if Contractor is required to assume responsibility for design.

* + - * 1. NICET Level III or IV Technician: Provide Water-Based Fire Protection Layout with seal and signature of a NYS Registered Professional Fire Protection Engineer using performance requirements, design criteria, IFC, and NFPA standards that are indicated in this specification and design documentation.
        2. NYS Registered Professional Fire Protection Engineer. Provide Water-Based Fire Protection Layout using performance requirements, design criteria, IFC, and NFPA standards that are indicated in this specification and design documentation.

Retain data in first subparagraph below if known and if Owner wants to furnish test data to Contractor.

Available fire-hydrant flow test records indicate the following conditions:

Date: <**Insert test date**>.

Time: <**Insert time**> [**a.m.**] [**p.m.**]

Performed by: <**Insert operator's name**> of <**Insert firm**>.

Location of Residual Fire Hydrant R: <**Insert location**>.

Location of Flow Fire Hydrant F: <**Insert location**>.

Static Pressure at Residual Fire Hydrant R: <**Insert psig**>.

Measured Flow at Flow Fire Hydrant F: <**Insert gpm**>.

Residual Pressure at Residual Fire Hydrant R: <**Insert psig**>.

Sprinkler system design shall be approved by authorities having jurisdiction.

The margin-of-safety requirement may not be required by authorities having jurisdiction. Retain "Margin of Safety for Available Water Flow and Pressure" Subparagraph below to require the application of a margin of safety in the Contractor's design.

Margin of Safety for Available Water Flow and Pressure: [**10**] [**20**] <**Insert number**> percent, including losses through water-service piping, valves, and backflow preventers.

Sprinkler Occupancy Hazard Classifications:

Revise first 20 subparagraphs below to suit requirements of authorities having jurisdiction. See Appendix A in NFPA 13 for recommended hazard classifications.

Automobile Parking Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

Building Service Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

Electrical Equipment Rooms: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

Elevator Machine Room and Hoistway: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

General Storage Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

Laundries: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

Libraries except Stack Areas: [**Light Hazard**] <**Insert classification**>.

Library Stack Areas: [**Ordinary Hazard, Group 2**] <**Insert classification**>.

Machine Shops: [**Ordinary Hazard, Group 2**] <**Insert classification**>.

Mechanical Equipment Rooms: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

Office and Public Areas: [**Light Hazard**] <**Insert classification**>.

Repair Garages: [**Ordinary Hazard, Group 2**] <**Insert classification**>.

Residential Living Areas: [**Light Hazard**] <**Insert classification**>.

Restaurant Service Areas: [**Ordinary Hazard, Group 1**] <**Insert classification**>.

<**Insert classification**>.

Minimum Density for Automatic-Sprinkler Piping Design:

Revise first seven subparagraphs below to suit requirements of authorities having jurisdiction. Values indicated should provide minimum required total flow for each hazard and group.

Residential (Dwelling) Occupancy: [**0.05 gpm over 400-sq. ft.**] <**Insert value**> area.

Light-Hazard Occupancy: [**0.10 gpm over 1500-sq. ft.**] <**Insert value**> area.

Ordinary-Hazard, Group 1 Occupancy: [**0.15 gpm over 1500-sq. ft.**] <**Insert value**> area.

Ordinary-Hazard, Group 2 Occupancy: [**0.20 gpm over 1500-sq. ft.**] <**Insert value**> area.

Extra-Hazard, Group 1 Occupancy: [**0.30 gpm over 2500-sq. ft.**] <**Insert value**> area.

Extra-Hazard, Group 2 Occupancy: [**0.40 gpm over 2500-sq. ft.**] <**Insert value**> area.

Special Occupancy Hazard: As determined by authorities having jurisdiction.

Retain one of first two subparagraphs below.

Maximum protection area per sprinkler according to UL listing.

Maximum Protection Area per Sprinkler:

Revise six subparagraphs below to suit requirements of authorities having jurisdiction.

Residential Areas: [**400 sq. ft.**] <**Insert dimension**>.

Office Spaces: [**120 sq. ft.**] [**225 sq. ft.**] <**Insert dimension**>.

Storage Areas: [**130 sq. ft.**] <**Insert dimension**>.

Mechanical Equipment Rooms: [**130 sq. ft.**] <**Insert dimension**>.

Electrical Equipment Rooms: [**130 sq. ft.**] <**Insert dimension**>.

Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

Coordinate "Seismic Performance" Paragraph below with Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."

* + - * 1. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 “Standard for the Installation of Sprinkler Systems” and [**ASCE/SEI 7**] <**Insert requirement**>.
      1. STEEL PIPE AND FITTINGS
         1. Schedule 40: ASTM A 53 “Standard Specification for Pipe, Steel, Black and Hot-Dipper, Zinc-Coated, Welded and Seamless”, Type E, Grade B; with factory- or field-formed ends to accommodate joining method. As per Part 3-Pipe Schedule.
         2. Schedule 40: ASTM A 135 “Standard Specification for Electric-Resistance-Welded Steel Pipe”, Grade A; with factory- or field-formed ends to accommodate joining method. As per Part 3-Pipe Schedule.
         3. Schedule 40: ASTM A 795 “Standard Specification for Black and Hot-Dipper Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use”, Type E, Grade A; with factory- or field-formed ends to accommodate joining method. As per Part 3-Pipe Schedule.

Nipples in "(Galvanized-) (and) (Black-)Steel Pipe Nipples" Paragraph below are available in NPS 1/8 to NPS 12.

* + - * 1. Galvanized and Black Steel Pipe Nipples: ASTM A 733 “Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples” made of ASTM A 53 “Standard Specification for Pipe, Steel, Black and Hot-Dipper, Zinc-Coated, Welded and Seamless”, standard-weight, seamless steel pipe with threaded ends.

Couplings in "(Galvanized-) (and) (Uncoated-)Steel Couplings" Paragraph below are available in NPS 1/8 to NPS 20.

* + - * 1. Galvanized and Black Steel Couplings: ASTM A 865 “Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints”, threaded.

Fittings in "(Galvanized) (and) (Uncoated), Gray-Iron Threaded Fittings" Paragraph below are available in NPS 1/4 to NPS 12.

* + - * 1. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B 16.4 “Gray Iron Threaded Fittings Classes 125 and 250”, Class 125, standard pattern.

Unions in "Malleable- or Ductile-Iron Unions" Paragraph below are available in NPS 1/4 to NPS 3, but NFPA limits them to NPS 2 and smaller.

* + - * 1. Malleable- or Ductile-Iron Unions: UL 860 “Pipe Unions for Flammable and Combustible Fluids and Fire-Protection Service”.

Flanges in "Cast-Iron Flanges" Paragraph below are available in NPS 1 to NPS 96.

* + - * 1. Cast-Iron Flanges: ASME B16.1 “Gray Iron Pipe Flanges and Flanges Fittings Classes 25, 125 and 250”, Class 125.

Flanges and fittings in "Steel Flanges and Flanged Fittings" Paragraph below are available in NPS 1/2 to NPS 24.

* + - * 1. Steel Flanges and Flanged Fittings: ASME B16.5 “Pipe Flanges & Flanged Fittings”, Class 150.

Pipe-Flange Gasket Materials: AWWA C110 “Standard for Ductile-Iron and Gray-Iron Fittings”, rubber, flat face, 1/8 inch thick.

Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.

Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.

Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.

Fittings in "Steel Welding Fittings" Paragraph below are available in NPS 1/2 to NPS 48.

* + - * 1. Steel Welding Fittings: ASTM A 234 “Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service” and ASME B16.9 “Factory-Made Wrought Buttwelding Fittings”.

Welding Filler Metals: Comply with AWS D10.12 “Guide for Welding Mild Steel Pipe” for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

* + - * 1. Grooved-Joint, Steel-Pipe Appurtenances:

Pressure Rating: [**175-psig**] [**250-psig**] [**300-psig**] minimum.

[**Galvanized**] [**Painted**] Grooved-End Fittings for Steel Piping: ASTM A 47 “Standard Specification for Ferritic Malleable Iron Castings”, malleable-iron casting or ASTM A 536 “Standard Specification for Ductile Iron Castings”, ductile-iron casting, with dimensions matching steel pipe.

AWWA C606 “Standard for Grooved and Shouldered Joints” and UL 213 “Standard for Rubber Gasketed Fittings for Fire-Protection Service” cover couplings in "Grooved-End-Pipe Couplings for Steel Piping" Subparagraph below in NPS 3/4 to at least NPS 12.

Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 “Standard for Grooved and Shouldered Joints” and UL 213 “Standard for Rubber Gasketed Fittings for Fire-Protection Service” rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 “Standard for Grooved and Shouldered Joints” and UL 213 “Standard for Rubber Gasketed Fittings for Fire-Protection Service” flexible pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, bolts and nuts.

Fittings in "Steel Pressure-Seal Fittings" Paragraph below are available in NPS 3/4 to NPS 2.

* + - * 1. Mechanical-T Bolted Branch Outlets: ASTM A-536 “Standard Specification for Ductile Iron Castings”, ASTM A-449 and ASTM A-183

Pressure Rated up to 500psi maximum working pressure.

Painted or galvanized

Sizes from 2”x1/2” through 8”x4”

Grooved outlet or Female threaded outlet.

Pipe in "Standard-Weight, (Galvanized-) (and) (Black-)Steel Pipe" Paragraph below is intended for use with flanged, cut- or roll-grooved, plain-end-pipe, threaded, and welded joints. Pipe is generally available in NPS 1/8 to NPS 26. Use only black-steel pipe for roll-grooved and welded joints. Match options for fitting and pipe finish.

* + - 1. CPVC PIPE AND FITTINGS

Pipe in this article is generally available in NPS 3/4 to NPS 3 and must be installed in a fire-rated enclosure. CPVC piping and fittings not permitted by DOCCS, OHM, etc. where potential of ligature risks occur in patient areas. CPVC piping and fittings not permitted to supply institutional type sprinkler heads.

* + - * 1. CPVC Pipe: ASTM F442 and UL 1821, SDR 13.5, for 175-psig rated pressure at 150 deg F, with plain ends. Include "LISTED" and "CPVC SPRINKLER PIPE" markings.
        2. CPVC Fittings: [**UL listed**] [**or**] [**FM Global approved**], for 175-psig rated pressure at 150 deg F, socket type. Include "LISTED" and "CPVC SPRINKLER FITTING" markings.

NPS 3/4 to NPS 1-1/2: ASTM F438 and UL 1821, Schedule 40, socket type.

NPS 2 to NPS 3: ASTM F439 and UL 1821, Schedule 80, socket type.

Fittings in "CPVC-to-Metal Transition Fittings" Subparagraph below are generally available in NPS 3/4 to NPS 3.

CPVC-to-Metal Transition Fittings: CPVC, one piece, with dimensions equivalent to pipe; one end with threaded brass insert, and one socket end.

Unions in "CPVC-to-Metal Transition Unions" Subparagraph below are generally available in NPS 1 to NPS 2.

CPVC-to-Metal Transition Unions: CPVC, with dimensions equivalent to pipe; one end with threaded brass insert, and one socket end.

Flanges in "Flanges" Subparagraph below are generally available in NPS 3/4 to NPS 3.

Flanges: CPVC, one or two pieces.

* + - * 1. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F493 solvent cement recommended by pipe and fitting manufacturer, and made for joining CPVC sprinkler pipe and fittings. Include cleaner or primer recommended by pipe and fitting manufacturer.

Subparagraph below applies to LEED 2009 NC, CI, and CS; LEED v4; IgCC; and Green Globes. VOC content limit is that for adhesive primers for plastic.

Adhesive primer shall have a VOC content of 550 g/L or less.

Subparagraph below applies to LEED 2009 for Schools Credit IEQ 4.1.

Adhesive primer shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

Subparagraph below applies to LEED v4.

Adhesive primer shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

Subparagraph below applies to IgCC.

Adhesive primer shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

Subparagraph below applies to Green Globes.

Adhesive primer shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit or 33 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.

Subparagraph below applies to LEED 2009 NC, CI, and CS; LEED v4; IgCC; and Green Globes. VOC content limit is that for CPVC welding compounds.

Solvent cement shall have a VOC content of 490 g/L or less.

Subparagraph below applies to LEED 2009 for Schools Credit IEQ 4.1.

Solvent cement shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

Subparagraph below applies to LEED v4.

Solvent cement shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

Subparagraph below applies to IgCC.

Solvent cement shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

Subparagraph below applies to Green Globes.

Solvent cement shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit or 33 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.

* + - * 1. Plastic Pipe-Flange Gasket and Bolts and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.
      1. SPECIALTY VALVES
         1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
         2. Pressure Rating:

Standard-Pressure Piping Specialty Valves: 175-psig minimum.

High-Pressure Piping Specialty Valves: [**250-psig minimum**] [**300-psig**].

* + - * 1. Body Material: Cast or ductile iron.
        2. Size: Same as connected piping.
        3. End Connections: Flanged or grooved.

Valves in "Alarm Valves" Paragraph below are generally available in NPS 1-1/2 to NPS 8.

* + - * 1. Alarm Valves:

Manufacturers:

[Reliable Automatic Sprinkler Co., Inc.](https://products-specpoint.mydeltek.com/products/company/d9dd9775-56b9-47b8-afdb-86ff82953e9c?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27211000+-+WATER-BASED+FIRE-SUPPRESSION+SYSTEMS%27%25%7C%25%27Alarm+Valves%27)

Tyco

Viking Group Inc.

Approved equivalent.

Standard: UL 193.

Design: For horizontal or vertical installation.

Delete option in first subparagraph below if water-supply pressure is constant.

Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gauges, [**retarding chamber,**] and fill-line attachment with strainer.

Retain one of two options in first subparagraph below. Retain first if retarding chamber is required. Retain second if retarding chamber is not required.

Drip cup assembly pipe drain [**without valves and separate from main drain piping**] [**with check valve to main drain piping.**]

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

Valves in "Deluge Valves" Paragraph below are generally available in NPS 1-1/2 to NPS 8.

* + - * 1. Deluge Valves:

Manufacturers:

Reliable Automatic Sprinkler Co., Inc.

Tyco

Viking Group Inc.

Approved equivalent.

Standard: UL 260.

Design: Hydraulically operated, differential-pressure type.

Include trim sets for alarm-test bypass, drain, electrical water-flow alarm switch, pressure gauges, drip cup assembly piped without valves and separate from main drain line, and fill-line attachment with strainer.

Retain "Wet, Pilot-Line Trim Set" Subparagraph below for hydraulic manual control or solenoid-valve actuation.

Wet, Pilot-Line Trim Set: Include gauge to read diaphragm-chamber pressure and manual control station for manual operation of deluge valve, and connection for actuation device.

* + - * 1. Riser Check Valve:

UL & FM listed

Design: For horizontal or vertical installation

Trim kit with main drain, two (2) 3-way globe valves w/ plugs, two (2) 300psi water gauges.

* + - * 1. Automatic (Ball Drip) Drain Valves:

Manufacturers:

Reliable Automatic Sprinkler Co., Inc.

Viking Group Inc.

American Fire Supply

Dixon Valve & Coupling Company, LLC

Approved equivalent.

Standard: UL 1726.

Pressure Rating: 175-psig minimum.

Type: Automatic draining, ball check.

Size: NPS 3/4.

End Connections: Threaded.

* + - 1. AIR VENT

One manual air vent valve of 1/2-inch-minimum size, one automatic air vent, or other approved means is required for wet sprinkler systems using metallic pipe in accordance with NFPA 13.

* + - * 1. Manual Air Vent/Valve:

Manufacturers:

[Apollo Valves; a part of Aalberts Integrated Piping Systems](https://products-specpoint.mydeltek.com/products/company/c5065d92-c118-4c46-98d7-3813db66bdd2?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221116+-+DOMESTIC+WATER+PIPING%27%25%7C%25%27Appurtenances+for+Grooved-End%5Cu002c+Ductile-Iron+Pipe%27).

[WATTS; A Watts Water Technologies Company.](https://products-specpoint.mydeltek.com/products/company/2e5d5377-6aec-43d6-b62e-507c395e75fa?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27221119+-+DOMESTIC+WATER+PIPING+SPECIALTIES%27%25%7C%25%27Reduced-Pressure-Principle+Backflow+Preventers%27)

Approved equivalent.

Description: Ball valve that requires human intervention to vent air.

Body: Forged brass.

Ends: Threaded.

Minimize Size: 1/2 inch.

Minimum Water Working Pressure Rating: 300 psig.

* + - * 1. Automatic Air Vent:

Manufacturers:

AGF Manufacturing, Inc.

[Reliable Automatic Sprinkler Co., Inc.](https://products-specpoint.mydeltek.com/products/company/d9dd9775-56b9-47b8-afdb-86ff82953e9c?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27211000+-+WATER-BASED+FIRE-SUPPRESSION+SYSTEMS%27%25%7C%25%27Alarm+Valves%27)

Approved equivalent.

Description: Automatic air vent that automatically vents trapped air without human intervention.

Standard: UL listed or FM Global approved for use in wet-pipe fire sprinkler systems.

Vents oxygen continuously from system.

Float valve to prevent water discharge.

Minimum Water Working Pressure Rating: 175 psig.

* + - * 1. Automatic Air Vent Assembly:

The "dual" option in "Description" Subparagraph below is not available from all manufacturers. Consult manufacturers.

Description: Automatic [**dual**] air vent assembly that automatically vents trapped air without human intervention, including Y-strainer and ball valve in a pre-piped assembly.

Standard: UL listed or FM Global approved for use in wet-pipe fire sprinkler system.

Vents oxygen continuously from system.

Float valve to prevent water discharge.

Minimum Water Working Pressure Rating: 175 psig.

<**Insert additional requirements specific to manufacturers**>.

* + - 1. SPRINKLER PIPING SPECIALTIES

Fittings in "Branch Outlet Fittings" Paragraph below are generally available in at least NPS 2 to NPS 8 main sizes, with NPS 1/2 to NPS 4 outlets or branches.

* + - * 1. Branch Outlet Fittings:

Manufacturers:

AGF Manufacturing, Inc.

Viking

Anvil International

Approved equivalent.

Standard: UL 213.

Pressure Rating: [**175-psig minimum**] [**300 psig**].

Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.

Type: Mechanical-tee and -cross fittings.

Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.

Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.

Branch Outlets: Grooved, plain-end pipe, or threaded.

Assemblies in "Flow Detection and Test Assemblies" Paragraph below are generally available in NPS 3/4 to NPS 2.

* + - * 1. Floor Control Assembly used for multi-story buildings to separate each floor by its own control floor control assembly:

UL & FM listed.

Design: For horizontal or vertical installation

Trim kit with test and drain valve with [**relief valve]**, one (1) 3-way globe valve w/ plug, one (1) 300 psi water gauge.

Water flow indicator- (Flow Switch)

Testers in "Branch Line Testers" Paragraph below are generally available in NPS sizes required for a single sprinkler.

* + - * 1. Branch Line Testers:

Manufacturers:

AGF Manufacturing, Inc.

American Fire Supply

Potter Roemer, Member of Morris Group International

Approved equivalent.

Standard: UL 199.

Pressure Rating: 175 psig.

Body Material: Brass.

Size: Same as connected piping.

Inlet: Threaded.

Drain Outlet: Threaded and capped.

Branch Outlet: Threaded, for sprinkler.

Fittings in "Sprinkler Inspector's Test Fittings" Paragraph below are generally available in NPS 3/4 to NPS 2.

* + - * 1. Test and Drain Valves:

Standard UL’s “Fire Protection Equipment Directory” or FM Global “Approval Guide.”

Pressure Rating: [**175-psig minimum] [300 psig].**

Body Material: bronze housing with orifice, sight glass, and integral test valve.

Include: [**pressure relief**]

Size: Same as connected piping.

Inlet and Outlet: Threaded or grooved.

Locking plate kit to prevent unintentional alarms.

Nipples in "Adjustable Drop Nipples" Paragraph below are generally available in NPS sizes required for a single sprinkler.

* + - * 1. Valve Locking Devices: Test and Drain Valves shall have padlocking feature in both the open and closed position.

Padlock: FPPI Break Shackle Locks-#764.40/keyed alike furnished with 2 keys for each lock.

Key Tags: 1-1/2 in. dia., brass, stamped with valve number and service specified in Section 210553.

Fasteners: Brass wire link chain with S-hooks.

Fittings in "Flexible Sprinkler Hose Fittings" Paragraph below are generally available in NPS sizes required for a single sprinkler.

* + - * 1. Flexible Sprinkler Hose Fittings:

Manufacturers:

AGF Manufacturing, Inc.

Victaulic

[Reliable Automatic Sprinkler Co., Inc.](https://products-specpoint.mydeltek.com/products/company/d9dd9775-56b9-47b8-afdb-86ff82953e9c?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27211000+-+WATER-BASED+FIRE-SUPPRESSION+SYSTEMS%27%25%7C%25%27Alarm+Valves%27)

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084707).

Approved equivalent.

Standard: UL 1474.

Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.

Pressure Rating: [**175-psig minimum] [300 psig].**

Size: Same as connected piping, for sprinkler.

Required identification label to be installed on all flexibly sprinkler hose assemblies, as follows: “CAUTION; Relocation of this device should only be performed by qualified and/or certified individuals that are aware of the original system design criteria, hydraulic criteria, sprinkler head listing parameters, and knowledge of the fire code and NFPA 13 installation standards. Relocation of device without the knowledge could adversely affect the performance of this fire protection and life safety system.”

Refer to Section 210553 “Identification for Fire Suppression Piping and Equipment” Section 2.2 “Warning Signs and Labels”.

* + - 1. SPRINKLERS

Coordinate this article with "Sprinkler Schedule" Article.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=1549) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Globe Fire Sprinkler Corporation](http://www.specagent.com/Lookup?uid=123457084709).

[Reliable Automatic Sprinkler Co., Inc. (The)](http://www.specagent.com/Lookup?uid=123457084710).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084707).

[Venus Fire Protection Ltd](http://www.specagent.com/Lookup?uid=123457084711).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084706).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084712).

Approved equivalent.

* + - * 1. Sprinkler Heads: Brass or bronze, with standard ½ inch orifice, and deflector:

Upright or Pendent Type: Deflector designed to distribute water downward in a uniform hemispherical spray pattern.

Dry Pendent Type: Designed to prevent water and condensation from being trapped below the drainable system piping.

Flush Pendent Type: All or part of sprinkler body including shank thread mounts above lower plane of finished ceiling.

Sidewall Type: Horizontal or vertical sprinklers with special deflectors designed to discharge most of the water away from nearby wall in a pattern resembling ¼ of a sphere with a small portion of discharge directed at wall behind sprinkler.

Institutional Pendent Type: Star Sprinkler Corporation’s (Grunau Co.) Model PH-2, Style A and Style B, 165 degree temperature rating.

Coordinate this article with "Sprinkler Schedule" Article.

Style A: Flat escutcheon (for rooms with recessed lighting).

Style B: Conical escutcheon (for rooms with surfaced mounted lighting).

Markings: Stamp sprinkler type on deflector in addition to NFPA’s color code requirements covering temperature classification.

Fill in subparagraph below when heads exposed and piping concealed; delete when piping exposed unless otherwise instructed.

Finish:

* + - * 1. Spare Sprinkler Head Cabinet: Steel, with hinged cover, constructed of minimum 20 gage material and fitted with 16 gage steel racks designed to hold quantities and types of spare sprinkler heads and sprinkler head wrenches.

Finish: Bright red, baked on enamel.

* + - 1. ALARM DEVICES
         1. Alarm-device types shall match piping and equipment connections.

Retain remaining paragraphs if devices are specified in this Section.

* + - * 1. Water-Motor-Operated Alarm:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1552) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Globe Fire Sprinkler Corporation](http://www.specagent.com/Lookup?uid=123457084719).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084720).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084721).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084722).

Approved equivalent.

Standard: UL 753.

Type: Mechanically operated, with Pelton wheel.

Alarm Gong: Cast aluminum with red-enamel factory finish.

Size: 8-1/2-inches diameter.

Components: Shaft length, bearings, and sleeve to suit wall construction.

Inlet: NPS 3/4.

Outlet: NPS 1 drain connection.

* + - * 1. Electrically Operated Notification Appliances:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1400&mf=&src=wd)

Potter Electric Signal Company, LLC.

Johnson Controls

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084707).

Approved equivalent.

Strobe/Horn:

Standard: UL 464.

Tone: Selectable, steady, Temporal-3 (T-3) in accordance with ISO 8201 and ANSI/ASA S3.41, 2400 Hz, electromechanical, broadband.

Voltage: 120 V ac, 60 Hz.

Effective Intensity: 110 cd.

Finish: Red, suitable for outdoor use with approved and listed weatherproof backbox. White letters on housing identifying device as for "Fire."

"Sign, Integrated" Subparagraph below is available from at least one manufacturer.

Sign, Integrated: Mount between backbox and strobe/horn with text visible on both sides, above and below strobe/horn. Housing to be shaped to cover surface-mounted weatherproof backbox. Sign is to consist of white lettering on red plastic identifying it as a "Sprinkler Fire Alarm" and instructing viewers to call 911, police, or fire department.

* + - * 1. Water-Flow Indicators:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1400&mf=&src=wd)

Viking Group.

[Potter Electric Signal Company, LLC.](https://products-specpoint.mydeltek.com/products/company/0af43550-934c-4239-9f8a-99d7f920d688?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&df=%27Potter+Electric+Signal+Company%5Cu002c+LLC%27%25%7C%25%27Potter+Electric+Signal+Company%5Cu002c+LLC%27)

Approved equivalent.

Standard: UL 346.

Water-Flow Detector: Electrically supervised.

Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.

Type: Paddle operated.

Pressure Rating: 250 psig.

Design Installation: Horizontal or vertical.

* + - * 1. Pressure Switches:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1400&mf=&src=wd)

Potter Electric Signal Company, LLC.

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084707).

[Reliable Automatic Sprinkler Co., Inc.](https://products-specpoint.mydeltek.com/products/company/d9dd9775-56b9-47b8-afdb-86ff82953e9c?groupby=sectionNumber%2520false%252CproductType%2520false&sortby=sectionNumber%252CproductType%252Ctype%252ClastUpdated%2520desc&ia=true&defaultFilter=true&sp=%27211000+-+WATER-BASED+FIRE-SUPPRESSION+SYSTEMS%27%25%7C%25%27Alarm+Valves%27)

Approved equivalent.

Standard: UL 346.

Type: Electrically supervised water-flow switch with retard feature.

Components: Single-pole, double-throw switch with normally closed contacts.

Design Operation: Rising pressure signals water flow.

* + - * 1. Valve Supervisory Switches:

[Manufacturers:](http://www.specagent.com/LookUp/?ulid=1400&mf=&src=wd)

[Fire-Lite Alarms; Honeywell International, Inc](http://www.specagent.com/Lookup?uid=123457084726).

[Kennedy Valve Company; a division of McWane, Inc](http://www.specagent.com/Lookup?uid=123457084727).

[Potter Electric Signal Company, LLC](http://www.specagent.com/Lookup?uid=123457084724).

[System Sensor](http://www.specagent.com/Lookup?uid=123457084725).

Approved equivalent.

Standard: UL 346.

Type: Electrically supervised.

Components: Single-pole, double-throw switch with normally closed contacts.

Design: Signals that controlled valve is in other than fully open position.

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

* + - 1. PRESSURE GAUGES
         1. [Manufacturers:](http://www.specagent.com/LookUp/?ulid=1400&mf=&src=wd)

[AGF Manufacturing, Inc](http://www.specagent.com/Lookup?uid=123457087174).

[AMETEK, Inc](http://www.specagent.com/Lookup?uid=123457087175).

[Ashcroft Inc](http://www.specagent.com/Lookup?uid=123457087176).

[Brecco Corporation](http://www.specagent.com/Lookup?uid=123457087177).

[WIKA Instrument Corporation](http://www.specagent.com/Lookup?uid=123457087178).

Approved equivalent.

* + - * 1. Standard: UL 393.
        2. Dial Size: 3-1/2- to 4-1/2-inch diameter.
        3. Pressure Gauge Range: [**0- to 250-psig minimum**] [**0 to 300 psig**].
        4. Label: Include "WATER" label on dial face.

1. EXECUTION
   * + 1. PREPARATION

Retain this article if fire-hydrant flow test is required or if Owner has not provided flow information.

* + - * 1. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
        2. Report test results promptly and in writing.
      1. FIRE PROTECTION WATER SERVICE PIPING

Retain this article and delete "Water-Supply Connections" Article if connection to building's water-service piping is required.

* + - * 1. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Section 211100 "Facility Fire-Suppression Water-Service Piping" for exterior piping. Comply with Local Water Supply Company regulations, Plumbing Code, and NYS DOH.

Retain one of two paragraphs below. Backflow preventers are recommended and are usually required by authorities having jurisdiction.

* + - * 1. Install shutoff valve,backflow preventer, pressure gauge, drain, and other accessories indicated within the building or heated structure or pit. [See Article 3.3] Comply with requirements for backflow preventers in Section 210524 “Backflow Preventers”. Comply with Local Water Supply Company regulations, Plumbing Code, and NYS DOH.
        2. Install shutoff valve, check valve, pressure gauge, and drain with in.
      1. FIRE PROTECTION WATER SUPPLY INSIDE AN EXISTING BUILDING

Retain this article and delete "Service-Entrance Piping" Article if connection to building's water-distribution piping is required.

* + - * 1. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping." Comply with Local Water Supply Company regulations, Plumbing Code, and NYS DOH.

Retain one of two paragraphs below. Backflow preventers are recommended and are usually required by authorities having jurisdiction.

* + - * 1. Install shutoff valve,backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements for backflow preventers in Section 210524 “Backflow Preventers”. Comply with Local Water Supply Company regulations, Plumbing Code and NYS DOH.
        2. Install shutoff valve, check valve, pressure gauge, and drain with in.
      1. PIPING INSTALLATION
         1. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

* + - * 1. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

Retain first paragraph below if piping is required to withstand seismic design loads.

* + - * 1. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.
        2. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
        3. Install unions adjacent to each valve in pipes NPS 2 and smaller.
        4. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
        5. Install "Inspector's Test Connections" in sprinkler system piping, complete with test and drain valve, and sized and located according to NFPA 13.
        6. Install sprinkler piping with drains for complete system drainage.
        7. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
        8. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
        9. Install alarm devices in piping systems.

Pipe hangers specified in NFPA 13 meet minimum pipe hanger requirements and may be inadequate in areas where seismic events are likely or for special conditions.

* + - * 1. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."
        2. Install pressure gauges on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gauges with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal and install where they are not subject to freezing.
        3. Pressurize and check preaction sprinkler system piping and [**air-pressure maintenance devices**] [**air compressors**].
        4. Fill sprinkler system piping with water.
        5. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Section 210533 "Heat Tracing for Fire-Suppression Piping" and for piping insulation in Section 210700 "Fire-Protection Systems Insulation."
        6. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

Retain first paragraph below for piping that penetrates an exterior concrete wall or concrete slab.

* + - * 1. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
        2. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."
      1. JOINT CONSTRUCTION
         1. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
         2. Install unions adjacent to each valve in pipes NPS 2 and smaller.
         3. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
         4. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
         5. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
         6. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
         7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

Apply appropriate tape or thread compound to external pipe threads.

Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

* + - * 1. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
        2. Steel-Piping, Pressure-Sealed Joints: Join [**lightwall**] [**and**] [**Schedule 5**] steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
        3. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

* + - * 1. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
        2. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
        3. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
        4. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
        5. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.
        6. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
        7. Plastic-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.

CPVC Piping: Join according to ASTM D2846 Appendix.

* + - 1. INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

UL listing requires that DecoShield Systems' system (the only system listed) be installed according to its "Installation Manual" and NFPA 13, NFPA 13D, or NFPA 13R, for supporting system.

* + - * 1. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and NFPA 13 or NFPA 13R for supports.
      1. VALVE AND SPECIALTIES INSTALLATION
         1. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
         2. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
         3. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
         4. Specialty Valves:

Install valves in vertical position for proper direction of flow, in main supply to system.

Install alarm valves with bypass check valve and retarding chamber drain-line connection.

Install deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.

* + - * 1. Air Vent:

Provide at least one air vent at high point in each wet-pipe sprinkler system in accordance with NFPA 13 requirements. Connect vent into top of fire sprinkler piping.

Provide dielectric union for dissimilar metals, ball valve, and strainer upstream of automatic air vent.

Do not retain subparagraph below if dual air vents are specified in "Automatic Air Vent Assembly" Paragraph in "Air Vent" Article, or if air vent assembly configuration is such that manufacturer does not require piping of air vent to drain.

[**Pipe from outlet of air vent to drain.**]

* + - * 1. Spare Sprinkler Head Cabinet: Secure to building wall or other permanent structure in vicinity of main valve controlling sprinkler system, unless otherwise directed.
      1. SPRINKLER INSTALLATION

Coordinate this article with Drawings.

* + - * 1. Install sprinklers in suspended ceilings in center of **[narrow dimension of]** acoustical ceiling panels.

Caution: Dry-type sprinklers in first paragraph below can be used with wet-pipe sprinkler systems. Typical applications would be in freezer boxes and at loading docks where dry-type sprinkler supply pipe extends into a heated place and connects to wet-pipe system.

* + - * 1. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
        2. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.
      1. IDENTIFICATION
         1. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
         2. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
      2. FIELD QUALITY CONTROL

Retain "Perform the following tests and inspections" Paragraph below to require Contractor to perform tests and inspections.

* + - * 1. Perform the following tests and inspections [**with the assistance of a Company Service Advisor**]:

Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.

Energize circuits to electrical equipment and devices.

Coordinate with fire-alarm tests. Operate as required.

Coordinate with fire-pump tests. Operate as required.

Verify that equipment hose threads are same as local fire department equipment.

* + - * 1. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
        2. Prepare test and inspection reports.
      1. CLEANING
         1. Clean dirt and debris from sprinklers.
         2. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.
      2. DEMONSTRATION
         1. [**Engage a Company Field Advisor per OGS Spec Section 014216 to train**] [**Train**] Facility’s maintenance personnel to adjust, operate, and maintain [**specialty valves**] [**and**] [**pressure-maintenance pumps**].
      3. PIPING SCHEDULE

Many pipe materials are available for wet-pipe sprinkler system piping applications. Review NFPA sprinkler standards, UL's "Fire Protection Equipment Directory," and FM Global's "Approval Guide" for materials suitable for different applications, pipe sizes, and joining methods. Applications in this Section are those generally used; other combinations may be required. Use of the "Steel Pipe Schedule" in the "Approval Guide" is recommended.

Retain piping applications in this article. Coordinate with materials specified in Part 2.

* + - * 1. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with [**threaded ends, cast-iron threaded fittings, and threaded**] [**grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved**] joints.
        2. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
        3. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.

Retain first paragraph below for CPVC pipe and fittings.

* + - * 1. CPVC pipe, [**Schedule 40**] [**Schedule 80**] CPVC fittings, and solvent-cemented joints may be used for light-hazard and residential occupancies.

Retain second option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Standard-pressure, wet-pipe sprinkler system, [**NPS 2 and smaller**] <**Insert pipe size range**>, shall be [**one of**] the following:

Retain one or more of 14 subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with plain ends; galvanized, plain-end-pipe fittings; and twist-locked joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with [**cut-**] [**or**] [**roll-**]grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with plain ends; steel welding fittings; and welded joints.

[**Thinwall**] [**Schedule 10**] [**nonstandard OD, thinwall**] [**or**] [**hybrid**] black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Thinwall**] [**Schedule 10**] [**or**] [**hybrid**] black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.

[**Thinwall**] [**Schedule 10**] [**nonstandard OD, thinwall**] [**or**] [**hybrid**] black-steel pipe with plain ends; welding fittings; and welded joints.

Schedule 5 steel pipe; steel pressure-seal fittings; and pressure-sealed joints.

[**Type L**] [**Type M**], hard copper tube with plain ends; [**cast-**] [**or**] [**wrought-**]copper, solder-joint fittings; and brazed joints.

[**Type L**] [**Type M**], hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.

NPS 2, [**Type L**] [**Type M**], hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

Retain second option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Standard-pressure, wet-pipe sprinkler system, [**NPS 2-1/2 to NPS 4**] <**Insert pipe size range**>, shall be [**one of**] the following:

Retain one or more of 10 subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with [**cut-**] [**or**] [**roll-**]grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with plain ends; steel welding fittings; and welded joints.

[**Thinwall**] [**Schedule 10**] [**nonstandard OD, thinwall**] [**or**] [**hybrid**] black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Thinwall**] [**Schedule 10**] [**nonstandard OD, thinwall**] [**or**] [**hybrid**] black-steel pipe with plain ends; welding fittings; and welded joints.

[**Type L**] [**Type M**], hard copper tube with plain ends; [**cast-**] [**or**] [**wrought-**]copper, solder-joint fittings; and brazed joints.

[**Type L**] [**Type M**], hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.

[**Type L**] [**Type M**], hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

Retain second option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. Standard-pressure, wet-pipe sprinkler system, [**NPS 5 and larger**] <**Insert pipe size range**>, shall be[**one of**] the following:

Retain one or more of nine subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with [**cut-**] [**or**] [**roll-**]grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with plain ends; steel welding fittings; and welded joints.

[**Thinwall**] [**Schedule 10**] [**or**] [**hybrid**] black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Thinwall**] [**Schedule 10**] [**or**] [**hybrid**] black-steel pipe with plain ends; welding fittings; and welded joints.

[**Type L**] [**Type M**], hard copper tube with plain ends; [**cast-**] [**or**] [**wrought-**]copper, solder-joint fittings; and brazed joints.

[**Type L**] [**Type M**], hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

Retain second option in first paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. High-pressure, wet-pipe sprinkler system, [**NPS 4 and smaller**] <**Insert pipe size range**>, shall be [**one of**] the following:

Retain one or more of four subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with plain ends; steel welding fittings; and welded joints.

[**Thinwall**] [**Schedule 10**] [**or**] [**hybrid**] black-steel pipe with plain ends; welding fittings; and welded joints.

Retain second option in paragraph below to allow Contractor to select piping materials from those retained.

* + - * 1. High-pressure, wet-pipe sprinkler system, [**NPS 5 and larger**] <**Insert pipe size range**>, shall be [**one of**] the following:

Retain one or more of four subparagraphs below. If using more than one type of material and joining method, identify various materials on Drawings and show points of transition from one material to another.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

[**Standard-weight**] [**or**] [**Schedule 30**], galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

[**Standard-weight**] [**or**] [**Schedule 30**], black-steel pipe with plain ends; steel welding fittings; and welded joints.

[**Thinwall**] [**Schedule 10**] [**or**] [**hybrid**] black-steel pipe with plain ends; welding fittings; and welded joints.

* + - 1. SPRINKLER SCHEDULE

Retain this article to require selected products to be used in indicated applications; delete to allow Contractor to choose among various products acceptable to authorities having jurisdiction, or if delegating sprinkler system design to Contractor. According to NFPA 13, Drawings shall indicate sprinkler make, type, model, and nominal k-factor, including sprinkler identification number.

* + - * 1. Use sprinkler types in subparagraphs below for the following applications:

Rooms without Ceilings: [**Upright sprinklers**] <**Insert type**>.

Rooms with Suspended Ceilings: [**Pendent sprinklers**] [**Recessed sprinklers**] [**Flush sprinklers**] [**Concealed sprinklers**] [**Pendent, recessed, flush, and concealed sprinklers as indicated**].

Wall Mounting: Sidewall sprinklers.

Spaces Subject to Freezing: [**Upright sprinklers**] [**Pendent, dry sprinklers**] [**Sidewall, dry sprinklers**] [**Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated**] <**Insert type**>.

Deluge-Sprinkler Systems: [**Upright**] [**and**] [**pendent**], open sprinklers.

Special Applications: [**Extended-coverage, flow-control, and quick-response sprinklers where indicated**] [**Attic sprinklers**] [**Combustible concealed space sprinklers**] [**Institutional space sprinklers**] <**Insert type**>.

* + - * 1. Provide sprinkler types in subparagraphs below with finishes indicated.

Concealed Sprinklers: Rough brass, with factory-painted white cover plate.

Flush Sprinklers: Bright chrome, with painted white escutcheon.

Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.

Residential Sprinklers: Dull chrome.

[**Upright**] [**Pendent**] [**and**] [**Sidewall**] Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313