SECTION 211316 - DRY-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.

Sprinkler specialty pipe fittings.

Sprinklers.

Alarm devices.

Manual control stations.

Control panels.

Pressure gages.

* + - 1. DEFINITIONS

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

* + - * 1. Standard-Pressure Sprinkler Piping: Dry-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 4 of 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 engineer, the professional engineer 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 engineer (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.

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. Shop Drawings: For dry-pipe sprinkler systems.

Include plans, elevations, sections, and attachment details.

Include diagrams for power, signal, and control wiring.

* + - * 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 to what is applicable]**

Welding certificates.

Certified NICET Level III or IV Technician for "Dry-Pipe Sprinkler System Layout".

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

* + - * 1. Fire-hydrant flow test report: As per NFPA 13, 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]**

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. 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:

Domestic water piping.

Compressed air piping.

HVAC hydronic piping.

Items penetrating finished ceiling including the following:

Lighting fixtures.

Air outlets and inlets.

<**Insert item**>.

<**Insert item**>.

* + - 1. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: For dry-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.
				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 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 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. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

One sprinkler wrench as specified by the sprinkler manufacturer shall be provided in the cabinet for each type of sprinkler installed to be used for the removal and installation of the sprinklers in the system.

* + - * 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 & NFPA 13 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. Approval 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 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 instruction for precautions that should be taken during shutdown period.

Do not proceed with interruption of sprinkler service until schedule is approved by the Director’s Representative with written permission.

Return the existing system to pre-shutdown operations 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 ARCOM. and suitable for the intended applications.

* + - 1. SYSTEM DESCRIPTIONS
				1. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from opened sprinklers.
				2. Combined Dry-Pipe and Preaction Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Fire-detection system, located in same area as sprinklers, actuates tripping devices that open dry-pipe valve without loss of air pressure and actuates fire alarm. Water discharges from opened sprinklers.
				3. Single-Interlock Preaction Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air. Actuation of fire-detection system, located in same area as sprinklers, opens deluge valve, permitting water to flow into sprinkler piping and to discharge from opened sprinklers.
				4. Double-Interlock Preaction Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air. Actuation of a fire-detection system, located in same area as sprinklers, opens deluge valve, permitting water to flow into sprinkler piping. A closed solenoid valve in the sprinkler piping is opened by another fire-detection device; water will then discharge from opened sprinklers.
			2. PERFORMANCE REQUIREMENTS
				1. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

NFPA 13.

* + - * 1. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

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**>.

* + - * 1. 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" 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 19 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 six subparagraphs below to suit requirements of authorities having jurisdiction. Values indicated should provide minimum required total flow for each hazard and group.

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 two "Maximum Protection Area per Sprinkler" subparagraphs below.

Maximum Protection Area per Sprinkler: According to UL listing.

Maximum Protection Area per Sprinkler:

Revise first five subparagraphs below to suit requirements of authorities having jurisdiction.

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.

Revise "Total Combined Hose-Stream Demand Requirement" Subparagraph below to suit requirements of authorities having jurisdiction.

Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

Light-Hazard Occupancies: [**100 gpm for 30 minutes**] <**Insert requirement**>.

Ordinary-Hazard Occupancies: [**250 gpm for 60 to 90 minutes**] <**Insert requirement**>.

Extra-Hazard Occupancies: [**500 gpm for 90 to 120 minutes**] <**Insert requirement**>.

<**Insert requirement**>.

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

All steel piping in this article is suitable for 175-psig minimum working pressure.

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

* + - * 1. Standard-Weight, Galvanized-Steel Pipe: ASTM A 53, [**Type E**] <**Insert type**>, [**Grade B**] <**Insert grade**>. Pipe ends may be factory or field formed to match joining method.

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

* + - * 1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, standard-weight, seamless steel pipe with threaded ends.

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

* + - * 1. Galvanized-Steel Couplings: ASTM A 865, threaded.

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

* + - * 1. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, 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.

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

* + - * 1. Cast-Iron Flanges: ASME B16.1, Class 125.
				2. Grooved-Joint, Steel-Pipe Appurtenances:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1489) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Anvil International/Smith-Cooper International; Tailwind Capital, LLC](http://www.specagent.com/Lookup?uid=123457084667).

[CPS Products, Inc](http://www.specagent.com/Lookup?uid=123457084662).

[National Fittings, Inc](http://www.specagent.com/Lookup?uid=123457084663).

[Shurjoint; a part of Aalberts Integrated piping Systems](http://www.specagent.com/Lookup?uid=123457084664).

Smith-Cooper International.

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084665).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084666).

Approved equivalent.

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

Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.

AWWA C606 and UL 213 cover couplings in subparagraph below in NPS 3/4 to at least NPS 12.

Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

* + - 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.

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

Valves in "Dry-Pipe Valves" Paragraph below are available in NPS 1-1/2 to NPS 8.

* + - * 1. Dry-Pipe Valves:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1518) 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=123457084669).

[Reliable Automatic Sprinkler Co., Inc. (The)](http://www.specagent.com/Lookup?uid=123457084670).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084675).

[Venus Fire Protection Ltd](http://www.specagent.com/Lookup?uid=123457084671).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084672).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084673).

Approved equivalent.

Standard: UL 260.

Design: Differential-pressure type.

Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

Retain "Air-Pressure Maintenance Device" Subparagraph below if system uses air-pressure maintenance devices. If retaining, delete "Air Compressor" Subparagraph below.

Air-Pressure Maintenance Device:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1520) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[General Air Products, Inc](http://www.specagent.com/Lookup?uid=123457125683).

[Globe Fire Sprinkler Corporation](http://www.specagent.com/Lookup?uid=123457084740).

[Reliable Automatic Sprinkler Co., Inc. (The)](http://www.specagent.com/Lookup?uid=123457084741).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084742).

[Venus Fire Protection Ltd](http://www.specagent.com/Lookup?uid=123457084743).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084744).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084745).

Approved equivalent.

Standard: UL 260.

Type: Automatic device to maintain minimum air pressure in piping.

Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and [**175-psig**] [**300-psig**] outlet pressure.

Retain "Air Compressor" Subparagraph below if system contains an air compressor. If retaining, delete "Air-Pressure Maintenance Device" Subparagraph above.

Air Compressor:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1521) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Gast Manufacturing Inc](http://www.specagent.com/Lookup?uid=123457084677).

[General Air Products, Inc](http://www.specagent.com/Lookup?uid=123457084678).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084679).

Approved equivalent.

Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide.”

Motor characteristics, such as NEMA designation, temperature rating, service factor, enclosure type, and efficiency, are specified in Section 210513 "Common Motor Requirements for Fire Suppression Equipment." If different characteristics are required, insert subparagraphs below to suit Project.

Motor Horsepower: Fractional.

Power: 120-V ac, 60 Hz, single phase.

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

* + - * 1. Deluge Valves:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1524) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[BERMAD Control Valves](http://www.specagent.com/Lookup?uid=123457084747).

[CLA-VAL](http://www.specagent.com/Lookup?uid=123457084748).

[Globe Fire Sprinkler Corporation](http://www.specagent.com/Lookup?uid=123457084751).

[OCV Control Valves](http://www.specagent.com/Lookup?uid=123457084752).

[Reliable Automatic Sprinkler Co., Inc. (The)](http://www.specagent.com/Lookup?uid=123457084749).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084750).

[Venus Fire Protection Ltd](http://www.specagent.com/Lookup?uid=123457084753).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084754).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084755).

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 gages, drip cup assembly piped without valves and separate from main drain line, and fill-line attachment with strainer.

Dry, Pilot-Line Trim Set: Include dry, pilot-line actuator; air- and water-pressure gages; low-air-pressure warning switch; air relief valve; and actuation device. Dry, pilot-line actuator includes cast-iron, operated, diaphragm-type valve with resilient facing plate, resilient diaphragm, and replaceable bronze seat. Valve includes threaded water and air inlets and water outlet. Loss of air pressure on dry, pilot-line side allows pilot-line actuator to open and causes deluge valve to open immediately.

Retain "Air-Pressure Maintenance Device" Subparagraph below if system uses air-pressure maintenance devices. If retaining, delete "Air Compressor" Subparagraph below.

Air-Pressure Maintenance Device:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1527) 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=123457084759).

[Reliable Automatic Sprinkler Co., Inc. (The)](http://www.specagent.com/Lookup?uid=123457084760).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084756).

[Venus Fire Protection Ltd](http://www.specagent.com/Lookup?uid=123457084757).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084761).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084762).

Approved equivalent.

Standard: UL 260.

Type: Automatic device to maintain minimum air pressure in piping.

Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and [**175-psig**] [**300-psig**] outlet pressure.

Retain "Air Compressor" Subparagraph below if system contains an air compressor. If retaining, delete "Air-Pressure Maintenance Device" Subparagraph above.

Air Compressor:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1529) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Engineered Corrosion Solutions](http://www.specagent.com/Lookup?uid=123457150829).

[Gast Manufacturing Inc](http://www.specagent.com/Lookup?uid=123457084763).

[General Air Products, Inc](http://www.specagent.com/Lookup?uid=123457084764).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084765).

Approved equivalent.

Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide.”

Motor Horsepower: Fractional.

Power: 120-V ac, 60 Hz, single phase.

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. Automatic (Ball Drip) Drain Valves:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1460) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Reliable Automatic Sprinkler Co., Inc. (The)](http://www.specagent.com/Lookup?uid=123457087160).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457087161).

Approved equivalent.

Standard: UL 1726.

Pressure Rating: 175-psig minimum.

Type: Automatic draining, ball check.

Size: NPS 3/4.

End Connections: Threaded.

* + - 1. SPRINKLER PIPING SPECIALTIES
				1. General Requirements for Dry-Pipe System Fittings: [**UL listed**] <**Insert standard**> for dry-pipe service.

Fittings in "Branch Outlet Fittings" Paragraph below are 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:](http://www.specagent.com/Lookup?ulid=1466) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[AGF Manufacturing, Inc](http://www.specagent.com/Lookup?uid=123457110952).

[Anvil International/Smith-Cooper International; Tailwind Capital, LLC](http://www.specagent.com/Lookup?uid=123457087162).

[National Fittings, Inc](http://www.specagent.com/Lookup?uid=123457087163).

[Shurjoint; a part of Aalberts Integrated piping Systems](http://www.specagent.com/Lookup?uid=123457087164).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457087165).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457087166).

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.

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

* + - * 1. Sprinkler Inspector's Test Fittings:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1543) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[AGF Manufacturing, Inc](http://www.specagent.com/Lookup?uid=123457084699).

[Triple R Specialty](http://www.specagent.com/Lookup?uid=123457084700).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084696).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084697).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084698).

Approved equivalent.

Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide.”

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

Body Material: Cast- or ductile-iron housing with sight glass.

Size: Same as connected piping.

Inlet and Outlet: Threaded.

* + - 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. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
				2. Pressure Rating for Residential Sprinklers: 175-psig maximum.
				3. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
				4. Pressure Rating for High-Pressure Automatic Sprinklers: [**250-psig minimum**] [**300 psig**].
				5. Automatic Sprinklers with Heat-Responsive Element:

Nonresidential Applications: [**UL 199**] <**Insert standard**>.

Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

If more than one sprinkler finish is required in "Sprinkler Finishes" Paragraph below, indicate where each finish is required in "Sprinkler Schedule" Article.

* + - * 1. Sprinkler Finishes: [**Chrome plated**] [**bronze**] [**and**] [**painted**].

If more than one special sprinkler coating is required in "Special Coatings" Paragraph below, indicate where each coating is required in "Sprinkler Schedule" Article.

* + - * 1. Special Coatings: [**Wax**] [**lead**] [**and**] [**corrosion-resistant paint**].
				2. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

Ceiling Mounting: [**Chrome-plated steel, one piece, flat**] [**Chrome-plated steel, two piece, with 1-inch vertical adjustment**] [**Plastic, white finish, one piece, flat**].

Sidewall Mounting: [**Chrome-plated steel**] [**Plastic, white finish**], one piece, flat.

* + - * 1. Sprinkler Guards:

[Manufacturers:](http://www.specagent.com/Lookup?ulid=1550) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Reliable Automatic Sprinkler Co., Inc. (The)](http://www.specagent.com/Lookup?uid=123457084716).

[Tyco Fire Products; brand of Johnson Controls International plc, Building Solutions North America](http://www.specagent.com/Lookup?uid=123457084717).

[Victaulic Company](http://www.specagent.com/Lookup?uid=123457084714).

[Viking Corporation](http://www.specagent.com/Lookup?uid=123457084715).

Approved equivalent.

Standard: UL 199.

Type: Wire cage with fastening device for attaching to sprinkler.

* + - 1. ALARM DEVICES
				1. Alarm-device types shall match piping and equipment connections.
				2. 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: 10-inch diameter.

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

Inlet: NPS 3/4.

Outlet: NPS 1 drain connection.

* + - * 1. Exterior Sprinkler Alarm Strobe Horn/ Sign Combination:

Standard: UL listed.

Type: Horn/Strobe weather proof.

Size: 9-1/4”h x 10” w x 4” d.

Finish: Red-with White lettering, suitable for outdoor use.

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.

As per IFC, NFPA 13, NFPA 72 and manufactures installation requirements.

* + - * 1. Pressure Switches:

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=1561) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[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. MANUAL CONTROL STATIONS
				1. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" for hydraulic operation, with union, NPS 1/2 pipe nipple, and bronze ball valve.
				2. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
			2. CONTROL PANELS
				1. Description: Single-area, two-area, or single-area cross-zoned type control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves.

Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" when used with thermal detectors and Class A detector circuit wiring.

Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.

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

Retain one of two "Manual Control Stations" paragraphs below.

* + - * 1. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION," with operating instructions and cover held closed by breakable strut to prevent accidental opening.
				2. Manual Control Stations: Hydraulic operation, with union, NPS 1/2 pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION," with operating instructions and cover held closed by breakable strut to prevent accidental opening.
				3. Panels Components:

Battery charger.

Standby batteries.

Electrically supervised solenoid valves and polarized fire-alarm bell.

Lamp test facility.

Single-pole, double-throw auxiliary alarm contacts.

Rectifier.

* + - 1. PRESSURE GAGES

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=1485) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[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 Gage Range: [**0- to 250-psig minimum**] [**0 to 300 psig**].
				4. Label: Include "WATER" or "AIR/WATER" label on dial face.
				5. Air System Piping Gage: Include [**retard feature and**] "AIR" or "AIR/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 Director’s Representative 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 13/9.3 requirements for seismic-restraint device materials and installation requirements for seismic design. Such as couplings-flexible, seismic separations, clearances, and sway braces.
				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 shutoff 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 valves to drain piping between fire department connections and check valves. Drain to floor drain or to outside building.

Retain one of two paragraphs below.

* + - * 1. Connect compressed-air supply to dry-pipe sprinkler piping.
				2. Connect air compressor to the following piping:

Pressure gages and controls.

Electrical power system.

Fire-alarm devices, including low-pressure alarm.

* + - * 1. 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 in NFPA 13. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."
				2. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.
				3. Drain dry-pipe sprinkler piping.
				4. Pressurize and check dry-pipe sprinkler system piping and [**air-pressure maintenance devices**] [**air compressors**].
				5. 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. 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. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
			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 [**dry-pipe**] [**and**] [**deluge**] valves with trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

Retain first subparagraph below or retain second and third subparagraphs.

Install air compressor and compressed-air-supply piping.

Install air-pressure maintenance device with shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with [**14- to 60-psig**] <**Insert value**> adjustable range; and [**175-psig**] <**Insert value**> maximum inlet pressure.

Install compressed-air-supply piping from building's compressed-air piping system.

* + - 1. SPRINKLER INSTALLATION

Coordinate this article with Drawings.

* + - * 1. Install sprinklers in standard 2 by 4 ceiling tiles, locate in the center or tiles and in standard 2 by 4 ceilings tiles which simulate 2 by 2 ceiling tiles, locate sprinklers in the center of the 2 by 2 area.
				2. Install sprinklers with water supply from heated space. Do not install pendent or sidewall sprinklers in areas subject to freezing.
				3. 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. Comply with requirements for labeling and identifying equipment, piping, control valves, and drains specified in Section 210553 “Identification for Fire-Suppression Piping and Equipment”.
				2. Identify system components with requirements.
				3. Hydraulic Design Information Sign as per NFPA 13: Identifying a hydraulically designed sprinkler system with a permanently marked weatherproof metal or rigid plastic sign secured with corrosion resistant wire, chain, or other approved means. Such signs shall be placed at the dry pipe valve, preaction valve, or deluge and standpipe system supplying the corresponding hydraulically designed area.
				4. General Information Sign as per NFPA 13: Such signs shall be placed at each system control riser, antifreeze loop, and auxiliary system control valve. The sign shall include the following information:

Name and location of the facility protected

Occupancy classification

Commodity classification

Presence of high-piled and/or rack storage

Maximum height of storage planned

Aisle width planned

Encapsulation of pallet loads

Presence of solid shelving

Flow test data

Presence of flammable/combustible liquids

Presence of hazardous materials

Presence of other special storage

Location of auxiliary drains and low point drains on dry pipe and preaction systems

Original results of main drain flow test

Name of installing contractor or designer

Indication of presence and location of antifreeze or auxiliary systems

Where injection systems are installed to treat MIC or corrosion, the type of chemical, concentration of the chemical, and where information can be found as to the proper disposal of the chemical.

* + - * 1. Caution signs shall be attached to all valves controlling sprinklers as per NFPA 13: The caution sign shall be worded as follows: “This valve controls fire protection equipment. Do not close until after fire has been extinguished. Use auxiliary valves when necessary to shut off supply to auxiliary equipment. **Caution:** Automatic alarm can be sounded if this valve is closed.”
			1. 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 on Dry Pipe Sprinkler Systems as per NFPA 13 with the Director’s Representative.

Air pressure leakage test: In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi shall be conducted for 24 hours. Any leakage that results in a loss of pressure in excess of 1-1/2 psi for 24 shall be corrected.

Flush test and Hydrostatic test as per NFPA 13. Cleaning and pressure testing of system to 200 psi for 2 hours. Repair leaks and retest until no leaks exist.

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

System Operational Tests: Trip Test on Dry Pipe Valve for delivery time, and Main Drain Test.

Energize circuits to electrical equipment and devices.

Start and run air compressors.

Coordinate with fire-alarm tests: Waterflow Devices, Tamper Switches, and Low Air Switches that operate as required.

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

Tests performed on Backflow Preventer. As per Cross Connection Control, NYS DOH, and Forward Flow Test as per NFPA 13.

* + - * 1. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
				2. Prepare test and inspection reports. Results shall be recorded using the NFPA Contractor’s Material and Test Certificate for Aboveground Piping and Report on Test and Maintenance of Backflow Prevention Device – Form 1013. Witnessed by Director’s Representative.
			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 the Company Field Advisor that is the certified NICET III or IV Technician representative from the installing Contractor to train facilities personnel on the normal operation, function, and maintenance of equipment and components including response to alarm conditions, status reports, system operation and emergency operation.
			3. PIPING SCHEDULE
				1. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with roll-grooved end to threaded joints.
				2. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
				3. Standard-pressure, dry-pipe sprinkler system, NPS 1” inch to 2” inch shall be one of the following:

Standard-weight Schedule 40, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

* + - * 1. Standard-pressure, dry-pipe sprinkler system, NPS 2-1/2” inch to 4” inch shall be one of the following:

Standard-weight Schedule 40, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

Standard-weight Schedule 40, galvanized-steel pipe with Cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

* + - * 1. Standard-pressure, dry-pipe sprinkler system, NPS 5” inch to 6” inch shall be one of the following:

Standard-weight Schedule 40, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

Standard-weight Schedule 40, galvanized-steel pipe with Cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved 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: [**Dry pendent sprinklers**] [**Dry recessed sprinklers**] [**Dry flush sprinklers**] [**Dry concealed sprinklers**] [**Dry pendent, recessed, flush, and concealed sprinklers as indicated**].

Wall Mounting: Dry sidewall sprinklers.

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

Special Applications: [**Extended-coverage and quick-response sprinklers where indicated**] <**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.

[**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 211316