

DIVISION 21: FIRE SUPPRESSION

210500	COMMON REQUIREMENTS FOR FIRE SUPPRESSION
210548	VIBRATION & SEISMIC CONTROLS FOR FIRE SUPPRESSION PIPING & EQUIPMENT
210553	IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT
211300	WET PIPE FIRE SUPPRESSION SPRINKLERS

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SECTION 210500 - COMMON REQUIREMENTS FOR FIRE SUPPRESSION**PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A. Pipe, fittings, valves, and connections for sprinkler systems.

1.2 SUMMARY

- A. Furnish and install an automatic fire sprinkler protection system as described in Contract Documents.
 - 1. System shall be installed beginning with connection to the new building service main located as shown and work shall include but not necessarily be limited to the following areas:
 - a. New construction
 - 2. Provide double check valve on fire sprinkler service lines.
 - 3. Furnish and install post indicator valves on all fire line services, as required by AHJ.
- B. Section 09 9123 - Painting: Preparation and painting of fire protection piping systems.
- C. Section 21 1300 - Wet Pipe Fire Suppression Sprinklers: Sprinkler systems design.

1.3 REFERENCE STANDARDS

- A. ASTM A 795/A 795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2008.
- B. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2010.
- C. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2010.
- D. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.
- E. UL 262 - Gate Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- F. UL 312 - Check Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.4 APPLICABLE CODES AND ORDINANCES

- A. The following form a part of this specification:
 - 1. National Fire Protection Association Pamphlets: Standards of the National Fire Protection Association for the Installation of Sprinkler and Fire Protection Equipment.
 - a. Pamphlet No. 13, 13D, 13R, 14, and applicable standards.
 - b. Pamphlet No. 231, 231C and applicable standards.
 - c. And as approved over this geographical area
 - 2. International Building Code
 - 3. International Fire Code
 - 4. Underwriter's Laboratories, Inc. Publications: List of Inspected Fire Protection Equipment and Materials.

5. Applicable state and local codes and ordinances pertaining to fire protection systems and equipment.
 6. Requirements of State Fire Marshal.
 7. Requirements of Local Fire Marshal.
 8. Safety Code for Elevators and Escalators.
 9. Life Safety Code.
- B. Work in Colorado must be done by an Colorado licensed sprinkler contractor and plans submitted to and approved by the office of the Colorado State Fire Marshall.
- C. The contractor shall notify the Colorado State Fire Marshall and the Local Fire Department to witness the test of the fire sprinkler system.

1.5 VERIFICATIONS AND REQUIREMENTS

- A. Fire Sprinkler Contractor shall verify adequacy of the water service to the building.
- B. Fire Sprinkler Contractor shall also check with the Local City Fire Marshal, the State Fire Marshal and the Fire Rating Bureau to determine requirements for the following:
1. Fire department connections
 2. Test connections
 3. Exterior and interior piping
 4. Spacing of heads
 5. Rating of building

1.6 FEES AND PERMITS

- A. Fees or permits required to furnish and install the fire protection system shall be included as part of this Section of the Contract Documents.

1.7 PIPE SIZING

- A. Fire Sprinkler Contractor shall be required to size all piping for this project using the Hydraulic Calculation Method in accordance with requirements of National Fire Protection Association Pamphlet No. 13 for Hydraulically Designed Sprinkler Systems

1.8 SUBMITTALS

- A. See General Section – for submittal procedures.
- B. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
1. Fire Sprinkler Contractor shall submit complete layouts to underwriters having jurisdiction and the State Fire Marshal for approval prior to submission to Architect.
 - a. Particular attention shall be paid in layout to coordination of sprinkler piping and structural system of beams and mechanical ductwork. Notations shall be made on shop drawings where pipes are required to pass thru beams.
 - b. Wall sprinkler shall be used in ramp areas where headroom is at a minimum and shall be arranged so as not to conflict with egress and door swings.
 - c. Careful coordination shall be given to avoid changing ceiling lighting systems as shown on drawings.
 - d. Sprinklers must be spaced equally with lights and ceiling diffusers.

- e. No fabrication of piping shall be done until piping drawings are accepted by the Architect, the Mechanical Engineer and State Fire Marshal.
 - 2. The Fire Protection Sprinkler Contractor shall submit drawings that have been prepared and overseen by a NICET Certified Engineering Technician in fire protection with a minimum, Level 3 rating, or by a Professional Engineer in fire protection. This person shall be employed and be a staff member of the Fire Protection Contractor and shall be required to certify that the drawings are in accordance with the specifications and all regulatory requirements. All drawings shall be signed by the CET or stamped and signed by the Professional Engineer.
 - 3. All area with exposed structure, piping shall neatly follow and be held tight to the line of the deck. When approved by the Architect, piping may follow the line of the exposed structure.
- D. Project Record Documents: Record actual locations of components and tag numbering.
- E. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer: The sub-contractor for the fire protection system shall be duly licensed by the state, county and city in which the project is being constructed. The fire sprinkler contractor must be engaged in the installation of the types of automatic fire sprinkler system required for this project and be fully familiar with all local conditions, specified codes and requirements. Prior to installation, submit data for approval showing that the Fire Sprinkler Contractor has successfully installed Automatic Fire Sprinkler Systems of the type and design as specified herein.
- C. Designer: The designer for the fire sprinkler system shall be a staff employee of the "Installer" and shall be either a licensed Fire Protection Engineer in the State of Colorado, or a Certified Engineering Technician in Fire Protection, Level III (NICET Level III). Registration or certification shall be active during the entire contract period. The designer shall certify that the drawings and installation are in accordance with the intent of the plans and specifications. The designer shall make a complete and final inspection of the installation, including operating all alarms, control valves, checking all piping, seismic bracing, hangers, etc. After checking all components of the system, the designer shall provide a letter stating the installation is complete, operational and in accordance with approved plans and specifications. If changes have been made in the installation since the plans were approved, the designer shall correct the shop drawings and provide as-built drawings to the Owner with the letter.
- D. Valves: Bear UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- E. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
- F. Final Inspection: The Sprinkler Contractor CET or PE responsible for overseeing this project shall make a complete and final inspection of the installation, checking out all alarms, valves, piping, seismic bracing, hangers, etc., conduct a final main drain test on the system, and provide documentation of this final inspection

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.

- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 - PRODUCTS

2.1 FIRE PROTECTION SYSTEMS

- A. Sprinkler Systems: Conform work to NFPA 13.
- B. Welding Materials and Procedures: Conform to ASME Code.

2.2 BURIED PIPING

- A. Steel Pipe: ASTM A 53/A 53M Schedule 40 or ASTM A 795 Standard Weight, black , with AWWA C105 polyethylene jacket, or double layer, half-lapped polyethylene tape.
 - 1. Steel Fittings: ASME B16.9, wrought steel or butt welded; with double layer, half-lapped polyethylene tape.
 - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings.
 - 3. Joints: Welded in accordance with AWS D1.1.
 - 4. Casing: Closed glass cell insulation.

2.3 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A 795 Schedule 10 or ASTM A 53 Schedule 40, black.
 - 1. Steel Fittings: ASME B16.9, wrought steel or butt welded.
 - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings, ASME B16.4 and threaded fittings.
 - 3. Malleable Iron Fittings: ASME B16.3 and threaded fittings.
 - 4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.4 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm): Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches (50 mm) and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support for Pipe Sizes to 3 inches (80 mm): Cast iron hook.
- E. Wall Support for Pipe Sizes 4 inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
- F. Vertical Support: Steel riser clamp.
- G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- H. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.5 GATE VALVES

- A. A. Up to and including 2 inches (50 mm):
 - 1. Manufacturers:
 - a. Nibco ; Product Model F-637-31 Flanged Ends.
 - b. Mueller; Product Model A-2073-6 Flanged Ends.
 - 2. Bronze body, bronze trim, rising stem, handwheel, solid wedge or disc, threaded ends.
- B. Over 2 inches (50 mm):
 - 1. Manufacturers:
 - a. Nibco ; Product Model F-637-31 Flanged Ends.
 - b. Mueller; Product Model A-2073-6 Flanged Ends.
 - 2. Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid rubber covered bronze or cast iron wedge, flanged ends.
- C. Over 4 inches (100 mm):
 - 1. Manufacturers:
 - a. Nibco ; Product Model F-637-31 Flanged Ends.
 - b. Mueller; Product Model A-2073-6 Flanged Ends.
 - 2. Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

2.6 GLOBE OR ANGLE VALVES

- A. Up to and including 2 inches (50 mm):
 - 1. Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable rubber disc, threaded ends, with backseating capacity repackable under pressure.
- B. Over 2 inches (50 mm):
 - 1. Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.7 BALL VALVES

- A. Up to and including 2 inches (50 mm):
 - 1. Manufacturers:
 - a. Milwaukee Model BBSC with threaded ends
 - b. Nibco Model T-505 with threaded ends
 - c. Nibco Model G-505 with grooved ends
 - 2. Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.
- B. Over 2 inches (50 mm):
 - 1. Manufacturers:
 - a. Milwaukee Model BBSC with threaded ends
 - b. Nibco Model T-505 with threaded ends
 - c. Nibco Model G-505 with grooved ends
 - 2. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive handwheel for sizes 10 inches (250 mm) and over, flanged.

2.8 BUTTERFLY VALVES

- A. Bronze Body:
 - 1. Manufacturers:
 - a. Mueller:

- 1) Model B-3250-00 Wafer type with valve tamper switch
 - 2) Model B-3250-52 Grooved ends type with valve tamper switch
 - b. Nibco:
 - 1) Model WD3510-4 Wafer type with valve tamper switch
 - 2) Model GD1765-4 Grooved type with valve tamper switch
 - c. Norris Model NW285AC-2K Wafer type with optional tamper switch
 - d. Pratt Model IBV
 - 2. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device , and built-in tamper proof switch rated 10 amp at 115 volt AC.
- B. Cast or Ductile Iron Body
- 1. Manufacturers:
 - a. Mueller:
 - 1) Model B-3250-00 Wafer type with valve tamper switch
 - 2) Model B-3250-52 Grooved ends type with valve tamper switch
 - b. Nibco:
 - 1) Model WD3510-4 Wafer type with valve tamper switch
 - 2) Model GD1765-4 Grooved type with valve tamper switch
 - c. Norris Model NW285AC-2K Wafer type with optional tamper switch
 - d. Pratt Model IBV
 - 2. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device , and internal tamper switch rated 10 amp at 115 volt AC.

2.9 CHECK VALVES

- A. Up to and including 2 inches (50 mm):
- 1. Manufacturers:
 - a. Nibco Model KT-403-W
 - b. Walworth Figure 412
 - 2. Bronze body and swing disc, rubber seat, threaded ends.
- B. Over 2 inches (50 mm):
- 1. Manufacturers:
 - a. Nibco Model F-938-31
 - b. Walworth Fig. 883F
 - c. Mueller Model A-2120-6
 - 2. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.
- C. 4 inches (100 mm) and Over:
- 1. Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.10 DRAIN VALVES

- A. Compression Stop:
- 1. Bronze with hose thread nipple and cap.
- B. Ball Valve:
- 1. Manufacturers:
 - a. Milwaukee Model BBSC with threaded ends
 - b. Nibco Model T-505 with threaded ends
 - c. Nibco Model G-505 with grooved ends

2. Brass with cap and chain, 3/4 inch (20 mm) hose thread.

2.11 POST INDICATOR VALVES

- A. Furnish and install at each fire service entrance a "Post Indicator Valve" with alarm switch equal to Kennedy, as required by AHJ.

PART 3 - EXECUTION

3.1 FIRE SPRINKLER CONTRACTOR

- A. It is the responsibility of the Fire Sprinkler Contractor to inspect the job site prior to fabricating materials. The Fire Sprinkler Contractor shall coordinate the design with all plans and other contractors so that construction can be done without problems. The Fire Sprinkler Contractor shall call for a meeting with all trades to coordinate and sequence installation with the progress of other mechanical and structural systems, and work out spaces for all of the work. By doing so, the project will proceed at the General Contractor's completion schedule.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Areas Subject to Freezing Temperatures:
 1. Branches serving these areas may contain a cold weather valve and anti-freeze loop or dry heads.
- E. Group piping whenever practical at common elevations.
- F. Sleeve pipes passing through partitions, walls, and floors.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Pipe Hangers and Supports:
 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 6. Provide copper plated hangers and supports for copper piping.
 7. Prime coat exposed steel hangers and supports. Refer to Painting Section. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
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- I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain bottom of pipe level.
 - J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to General Painting Section.
 - K. Do not penetrate building structural members unless indicated and approved in writing by the Structural Engineer.
 - L. Provide sleeves when penetrating footings, floors, and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
 - N. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.
 - O. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
 - P. Provide gate valves for shut-off or isolating service.
 - Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.
 - R. Work shall be executed and inspected in accord with laws, ordinances, rules and regulations of local authorities having jurisdiction over such work. Should any change in the drawings or specifications be required to conform to these ordinances, Fire Sprinkler Contractor shall notify the Architect-Engineer at time of submitting his bid. After entering into the contract, Fire Sprinkler Contractor shall be held to complete all necessary work to meet local requirements without expense to Owner.
 - S. Sprinkler system shall be installed such that spacing of sprinkler heads in relation to ceiling shall not exceed that permitted for type of ceiling construction involved.
 - T. General Contractor is required under contract stipulations to leave chases and openings in walls, floors, ceilings, partitions and beams, etc., provided Fire Sprinkler Contractor shall furnish to General Contractor full information as to locations, dimensions, etc., of such chases and openings including the provision and proper setting of all sleeves and other equipment in advance of construction of work so as to cause no delay in work.
 - U. Should any cutting of walls, floors, ceilings, partitions, etc., be required for proper installation of the work or apparatus of Fire Sprinkler Contractor due to his failure in giving the General Contractor proper information at time required, such cutting shall be done at his own expense and in a manner acceptable to Architect-Engineer. All drilling and patching for anchor bolts, hangers, and other supports shall be subject to approval of Architect-Engineer.

- V. Siamese connections and watermains to sprinkler room shall be provided by Fire Sprinkler Contractor and connections to sprinkler system shall be by Fire Sprinkler Contractor.
- W. Conduits and wiring for alarm contacts, power wiring from starter to motor, and starter shall be provided and wired complete by Electrical Contractor for testing by Fire Sprinkler Contractor. Control wiring from starter to control and safety devices shall be provided and wired by Fire Sprinkler Contractor.

3.4 FIELD TESTING

- A. All portions of the system shall be hydrostatically tested.
- B. Flushing of underground piping shall be done in accord with National Fire Protection Association.
- C. On completion of the work, system shall be tested by full flow.
 - 1. Each control valve for each sprinkler system shall be tested by use of an inspector's test valve or the application of heat to sprinkler head most remote from the valve.
 - 2. All alarms and other devices shall be tested.
 - 3. All appliances and equipment for testing shall be furnished by Fire Sprinkler Contractor.
 - 4. Expenses, except for water and electricity used in connection with the tests, shall be defrayed by Fire Sprinkler Contractor.
 - 5. On completion of tests by Fire Sprinkler Contractor, any defects detected shall be corrected by Fire Sprinkler Contractor at his own expense and additional tests made until systems are proved satisfactory.
 - 6. Fire Sprinkler Contractor shall submit to Architect-Engineer a certificate covering materials and tests, similar to that specified by National Fire Protection Association, with a request for formal inspection at least five working days prior to date of inspection. The State and Local Fire Marshalls shall also be notified to witness this test. At such inspection any or all of required tests shall be repeated as directed by the Architect-Engineer.

END OF SECTION 210500

SECTION 210548 - VIBRATION AND SEISMIC CONTROLS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT**PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A. Vibration isolators.
- B. Seismic restraints.

1.2 SUBMITTALS

- A. See General Section – for submittal procedures.
- B. Product Data: Provide schedule of vibration isolator type with location and load on each.
- C. Shop Drawings: Indicate seismic control measures.
- D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Isolation Technology, Inc: www.isolationtech.com.
- B. Kinetics Noise Control, Inc: www.kineticsnoise.com.
- C. Mason Industries: www.mason-ind.com.

2.2 VIBRATION ISOLATORS

- A. Spring Hanger:
 - 1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
 - 2. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators.
 - 3. Misalignment: Capable of 20 degree hanger rod misalignment.
- B. Neoprene Pad Isolators:
 - 1. Rubber or neoprene waffle pads.
 - a. Hardness: 30 durometer.
 - b. Thickness: Minimum 1/2 inch.
 - c. Maximum Loading: 50 psi.
 - d. Rib Height: Maximum 0.7 times width.
 - 2. Configuration: Single layer.
 - 3. Configuration: 1/2 inch thick waffle pads bonded each side of 1/4 inch thick steel plate.
- C. Rubber Mount or Hanger: Molded rubber designed for 0.4 inch deflection with threaded insert.
- D. Seismic Fittings and Braces:

1. Earthquake bracing is required and shall conform to the minimum requirements of NFPA-13 and the State Fire Marshall requirements.
2. Calculate and show on the submittal drawings the type of earthquake bracing to be used and its UL listing or FM approval.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

- A. Inspect isolated equipment after installation and submit report.

END OF SECTION 210548

SECTION 210553 - IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT**PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.

1.2 RELATED REQUIREMENTS

- A. General Painting Section - Painting: Identification painting.

1.3 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.4 SUBMITTALS

- A. See General Section – for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 - PRODUCTS**2.1 IDENTIFICATION APPLICATIONS**

- A. Automatic Controls: Tags.
- B. Control Panels: Nameplates.
- C. Instrumentation: Tags.
- D. Major Control Components: Nameplates.
- E. Piping: Tags.
- F. Relays: Tags.

- G. Small-sized Equipment: Tags.
- H. Valves: Namplates and ceiling tacks where above lay-in ceilings.

2.2 NAMEPLATES

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 2. Seton Identification Products: www.seton.com.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch (6 mm).
 - 3. Background Color: Black.
 - 4. Thickness: 1/8 inch (3 mm).
 - 5. Plastic: Conform to ASTM D 709.

2.3 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 4. Seton Identification Products: www.seton.com.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.4 STENCILS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 3. Seton Identification Products: www.seton.com.
- B. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
 - 4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
 - 5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
 - 6. Equipment: 2-1/2 inch high letters.
- C. Stencil Paint: As specified in Painting Section, semi-gloss enamel, colors conforming to ASME A13.1.

2.5 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 3. MIFAB, Inc.: www.mifab.com.
 - 4. Seton Identification Products: www.seton.com.
- B. Color: Conform to ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Fire Quenching Fluids: Red with white letters.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Painting Section - Painting for stencil painting.

3.2 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Painting Section.
- D. Install plastic pipe markers completely around pipe in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 210553

SECTION 211300 – WET PIPE FIRE SUPPRESSION SPRINKLERS**PART 1 - GENERAL****1.1 SECTION INCLUDES**

- A. Wet-pipe sprinkler system.
- B. System design, installation, and certification.
- C. Fire department connections.

1.2 RELATED REQUIREMENTS

- A. Section 21 0500 - Common Requirements for Fire Suppression: Pipe, fittings, and valves.
- B. Section 21 0548 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment.
- C. Section 21 0553 - Identification for Fire Suppression Piping and Equipment.
- D. Section 26 0519 – Line Voltage Electrical Power Conductors and Cables: Electrical characteristics and wiring connections.
- E. Section 26 6411 – Automatic Fire Alarm and Detection System.

1.3 REFERENCE STANDARDS

- A. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.4 SUBMITTALS

- A. See Section 01 3300 – for submittal procedures.
- B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Shop Drawings:
 - 1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
 - 2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
 - 3. Submit shop drawings to authority having jurisdiction for approval. Submit proof of approval to Architect.
- D. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
- E. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.

- F. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
 - 3. Sprinkler Wrenches: For each sprinkler type.

1.5 QUALITY ASSURANCE

- A. Maintain one copy of referenced design and installation standard on site.
- B. Conform to UL requirements.
- C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State of Colorado.
- D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- E. Equipment and Components: Provide products that bear UL label or marking.
- F. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Sprinklers, Valves, and Equipment:
 - 1. Tyco Fire Suppression & Building Products: www.tyco-fire.com.
 - 2. Viking Corporation: www.vikinggroupinc.com.
 - 3. Reliable: www.reliablehvac.com
 - 4. Central: www.aecinfo.com
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.2 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for entire building.
- B. Occupancy: Comply with NFPA 13 for hazard classification..
- C. Water Supply: Determine volume and pressure from water flow test data.
 - 1. Revise design with test data available prior to submittals.
- D. Provide fire department connections where indicated.
- E. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.3 SPRINKLERS

- A. Suspended Ceiling Type: Semi-recessed pendant type with matching screw on escutcheon plate.
 - 1. Finish: Enamel, color white.
 - 2. Escutcheon Plate Finish: White.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- B. Concealed Ceiling Type: Fully recessed with surface cap.
 - 1. Finish: Enamel, color white.
 - 2. Surface Cap Finish: White.
 - 3. Fusible Link: Fusible solder link type, tempered rated for specific area hazard.
- C. Exposed Area Type: Pendant upright type with guard.
 - 1. Finish: Brass.
 - 2. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- D. Sidewall Type: Semi-recessed horizontal sidewall type with matching screw on escutcheon plate.
 - 1. Finish: Brass.
 - 2. Escutcheon Plate Finish: Brass.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- E. Dry Sprinklers: Standard pendant type with matching screw on escutcheon plate.
 - 1. Finish: Brass.
 - 2. Escutcheon Plate Finish: Brass.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- F. Furnish and install special sprinkler heads on each side of all windows or doors with windows in the two hour fire rated walls as required by I.B.C. 715.
 - 1. White enamel finish.
 - 2. Liquid filled bulb link.
 - 3. White escutcheon plates.
- G. Guards: Finish to match sprinkler finish.
- H. Spray Nozzles: Brass with solid cone discharge, 30 degrees of arc with blow-off dust cap.

2.4 SPRINKLER HEADS

- A. Sprinkler head orifice sizes shall be in accordance with National Fire Protection Association.
- B. Any change in spacing must be in straight rows with lights and walls.
- C. Sprinkler heads shall be automatic and conventional (spray) type approved by a nationally recognized testing laboratory.
- D. Each head shall have an orifice of nominal 1/2" diameter.
- E. Sprinkler heads shall be pendant type where installed above a hung ceiling.

2.5 PROTECTIVE GUARDS

- A. Heavy wire protective guard shall be provided for sprinkler heads located in heavy use areas where damage may result including, but not limited to:

- B. Gyms, Wrestling rooms
- C. Locker rooms
- D. Multi-purpose rooms
- E. Shops
- F. Equipment rooms

2.6 PIPING SPECIALTIES

- A. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm and electric alarm, with pressure retard chamber and variable pressure trim ; with test and drain valve.
- B. Electric Alarm: 24 volt D.C. electrically operated chrome plated gong with pressure alarm switch.
- C. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
- D. Fire Department Connections:
 - 1. Type: Flush mounted wall type with brass finish.
 - 2. Outlets: Two way with thread size to suit fire department hardware; threaded dust cap and chain of matching material and finish.
 - 3. Drain: 3/4 inch (19 mm) automatic drip, outside.
 - 4. Label: "Sprinkler - Fire Department Connection".
- E. Post indicator valves.

PART 3 - EXECUTION

3.1 INSPECTION

- A. It is the responsibility of the Fire Sprinkler Contractor to inspect the job site prior to fabricating materials. The Fire Sprinkler Contractor shall coordinate the design with all plans and other contractors so that construction can be done without problems. The Fire Sprinkler Contractor shall call for a meeting with all trades to coordinate and sequence installation with the progress of other mechanical and structural systems, and work out spaces for all of the work. By doing so, the project will proceed at the General Contractor's completion schedule.

3.2 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Work to begin inside building, at base of flange to underground fire protection water main.
- D. Install system in compliance with methods detailed in NFPA-13, including seismic requirements for Area 3.
- E. Offset as needed for other trades. Avoid conflict in areas of tight construction. Do not obstruct access to air control boxes, access doors, lights or other ceiling mounted equipment.

- F. Submit piping and equipment data sheets for review by the Architect prior to the start of the installation.
- G. Install piping straight and true to bear evenly on hangers and supports. Keep the interior and ends of new piping thoroughly cleaned of foreign matter by closing pipe openings with caps or plugs during installation. Cover and protect components of the system against dirt, chemical or mechanical injury.
- H. Piping shall only be installed in areas where temperatures will not drop below 40°F. If piping must be installed in areas where temperature is not maintained above 40°F, the piping must be fitted with an antifreeze loop and filled with an antifreeze solution per the requirements of NFPA-13.
- I. Fire sprinklers shall be centered in ceiling tile in one direction and a minimum of 4-inches from acoustical ceiling ("T") grid. Provide piping offsets or flexible offsets as required that meet the code. Install fire sprinkler head guards on fire sprinklers lower than 7-feet above finished floor and as identified in 2.05.
- J. Fire sprinkler piping that is exposed shall be approved and coordinated with the Architect, prior to any pipe fabrication and/or installation of fire sprinkler piping. Care shall be used in locating exposed fire sprinkler piping.
- K. Install inspectors test valve at an accessible height, without the use of a ladder, or having to remove ceiling tiles. Location to be approved by the Architect.
- L. Provide concrete splash blocks for drains, test valve discharge, etc. Concrete splash blocks shall be pre-fabricated, 2-1/2inches thick.
- M. Install special sprinkler heads on each side of windows or doors with windows in the two hour rated fire walls as required by I.B.C. 715.
- N. Provide white painted escutcheons around exposed piping, where piping passes through walls or ceilings in a finished area.
- O. Field Changes: Do not make field changes for piping layout or sizing without prior approval, after the approval of the fire sprinkler drawings.
- P. Provide approved double check valve assembly at sprinkler system water source connection.
- Q. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
- R. Locate outside alarm gong on building wall as indicated.
- S. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- T. Flush entire piping system of foreign matter.
- U. Hydrostatically test entire system.
- V. Require test be witnessed by Fire Marshal.

- W. Conduct an inspection and operational test at the end of the one year warrantee period in accordance with NFPA-25. Provide a written report to the Owner at the completion of the inspection.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Ensure required devices are installed and connected as required to fire alarm system.
- B. Work with Fire Alarm Contractor to insure system alarms properly when activated.
- C. Work with Electrical Contractor to insure that all control devices are properly wired with electrical power and connected to power and alarm systems.

3.4 ACCEPTANCE

- A. Acceptance of installation is subject to final inspection and approval by:
 - 1. Colorado State Fire Marshal's Office.
 - 2. Local Fire Department.
 - 3. Architect or his Representative

END OF SECTION 211300

END OF DIVISION 21