SECTION 21 05 00 COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. This section supplements all sections in this division, including pipe, fittings, valves, and connections for sprinkler standpipe and fire hose combination sprinkler and standpipe systems.

1.2 REFERENCES

A. General: Comply with appropriate standards.
   1. National Fire Protection Association: NFPA.
   2. Underwriter Laboratories, Inc.: U.L.
   3. Factory Mutual Standards: FM.

1.3 SUBMITTALS

A. 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. Submit data and shop drawings to indicate pipe materials, fittings, accessories, equipment and methods of installation.

B. Manufacturer's Installation Instructions: Submit installation instructions for all system components.

C. Project Record Documents: Record actual locations of components and tag numbering.

D. Operation and Maintenance Data: Submit spare parts lists, exploded assembly views and recommended maintenance intervals.

1.4 WARRANTY

A. Furnish one-year minimum.

1.5 CLOSEOUT

A. Submit spare parts and maintenance products.

B. Furnish two sets of valves stem packing for each size and type of valve installed.

C. Submit two sets of As-Built drawings and CDs drawn in latest version of AutoCAD and Elite Software or approved equal.

PART 2 – PRODUCTS

2.1 VALVES

A. Gate Valves:

1. Up to and including 2 inches: Bronze body and trim, rising stem, hand wheel, solid wedge or disc, threaded ends.
2. Over 2 inches and less than and equal to 4 inches: Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, hand wheel, OS&Y, solid bronze or cast iron wedge, flanged, grooved ends.
3. Over 4 inches: Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends.

B. Angle Valves:

1. Up to and including 2 inches: Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable rubber disc, threaded ends, with back seating capacity.
2. Over 2 inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

C. Ball Valves:

1. Up to and including 2 inches: Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle, threaded ends.
2. Over 2 inches: Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive hand wheel for sizes 10 inches and over, flanged.

D. Butterfly Valves:

1. Up to and Including 2 Inches Bronze Body: Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, hand wheel and gear drive and integral indicating device, and built-in tamper proof switch rated 10 amp at 115 volt AC.
2. Over 2 Inches Cast or Ductile Iron Body: Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends. With extended neck, hand wheel and gear drive and integral indicating device external tamper switch rated 10 amp at 115 volt AC.

E. Check Valves:

1. Up to and including 2 inches: Bronze body and swing disc, rubber seat, threaded ends.
2. Over 2 inches and less than and equal to 4 inches: Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends.
3. 4 inches and over: Iron body, bronze disc with stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

F. Drain Valves:

1. Compression Stop: Bronze with hose thread nipple and cap.

2. Ball Valve: Brass with cap and chain, ¾ inch hose thread.

2.2 MATERIALS

A. Electrical

1. All electrical components furnished or installed under Fire Suppression shall be in complete compliance with the Electrical Specifications.
2. Wiring Diagrams. A wiring diagram of work not in Fire Suppression but necessary to operate equipment shown in this section shall be submitted for review as a shop drawing.

B. Equipment Identification.

1. Provide as required per NFPA.

C. Access to Equipment.

1. All valves, control devices, equipment, specialties, etc. shall be located for easy access for operation, repair and maintenance. If items are concealed, provide access doors of size required for easy access to the items. Provide access doors as required.

2.3 BURIED PIPING

A. Ductile Iron Pipe, Class 350, AWWA C151, grooved ends.

1. Steel Fittings: ASME B16.5, steel flanges and fittings.
2. Ductile Iron Joints: ANSI/AWWA C-606.
3. Ductile Iron Coupling Housings: ASTM A536, Grade 65-45-12.
4. Install piping with double-layer half over-lap 10 mil polyethylene tape.

2.4 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53 / A53M, Standard Weight, Schedule 40 Black-Steel Pipe, Type E, Grade B, ERW pipe (unless otherwise noted on the drawings), or ASTM A106, Grade B, seamless steel pipe. Pipe ends maybe factory or field formed to match joining method.

1. Threaded Fittings:
   a. Malleable-Iron Fittings: ASTM B16.3, Class 300.
   b. Flanges and Flanged Fittings: ASME B16.5, Class 300, unless Class 600 is indicated.
2. Grooved-End Fittings: ASTM A47 malleable Iron or ASTM A536 Ductile Iron, with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2.5 PIPE HANGERS AND SUPPORTS

A. Provide as required per NFPA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

B. Verify adequacies of all site utilities and points-of-connection for existing buildings and/or structures.

3.2 PREPARATION

A. Remove scale and foreign material, from inside and outside, before assembly.

B. Prepare piping connections to sprinkler heads and as required.

C. Ream pipe and tube ends. Remove burrs.

3.3 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Group piping whenever practical at common elevations.

D. Install pipe sleeve at piping penetrations through footings partitions, walls, and floors. Seal pipe and sleeve penetrations to maintain fire resistance equivalent to fire separation.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Pipes, fittings, hangers and supports located interior of the building and exterior where exposed to corrosive ambient air conditions shall be prime coated with one coat (min. 1 mil thickness) of anticorrosive primer and two coats (min. 2 mils thickness) of Fire Red enamel finish.

G. Pipe Hangers and Supports:

1. Install in accordance with NFPA 13 and NFPA 14.
2. Install hangers to with minimum 1/2 inch space between finished covering and adjacent work.
3. Place hangers within 12 inches of each horizontal elbow.
4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

6. Where installing several pipes in parallel and at same elevation, provide multiple or trapeze hangers.

H. Slope piping and arrange systems to drain at low points. Install eccentric reducers to maintain top of pipe level.

I. 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.

J. Do not penetrate building structural members without approval of LAWA and Engineer of Record.

K. Where more than one piping system material is specified, install compatible system components and joints. Install flanges, union, and couplings at locations requiring servicing.

L. 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.

M. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

N. Install gate or butterfly valves for shut-off or isolating service.

O. Provide label over the access panels with “Fire Man’s Hat” symbol for each isolation valve located above ceiling and in wall.

P. Install drain valves at main shut-off valves, low points of piping and apparatus.

Q. Where inserts are omitted, Engineer of Record shall provide stamped and signed sketches and calculations to LADBS and LAWA.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Inserts:

1. Install inserts for placement in concrete forms.
2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Install hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.5 PAINTING

A. Primer: Factory applied one coat (min. 1 mil) of anticorrosion primer paint.

B. Finish: Factory applied two coats (min 2 mils) of Fire Red enamel finish.

C. Paint fire suppression systems, equipment, and components prior to installation. It is not permissible to paint sprinkler heads.

D. Provide interior and exterior painting schedule indicating the type of prime coat, intermediate coat and top coat for all substrates applicable to your project.

E. Damage and Touch-up: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CLEANING

A. Clean entire system after other construction is complete.

3.7 TRAINING AND MAINTENANCE

A. See LAWA DCH Guide Specification 01 79 00 “Demonstration and Training” for demonstration and training requirements.

B. Provide minimum of 12 hours (3 shifts total) of classroom and hands-on training to LAWA Maintenance personnel.

C. Submit manufacturer’s operation and maintenance data.

D. Include written maintenance data on components of system, servicing requirements, and Record Drawings.

E. Include maintenance, and inspection data, replacement and part numbers and availability, location and numbers of service depot.

F. Provide demonstration, training for minimum of 12 hours (3 shifts total), and manuals for LAWA Maintenance personnel.

3.8 EXECUTION

A. Install in accordance with NFPA 13.

END OF SECTION 21 05 00

SECTION 21 05 16 EXPANSION FITTINGS AND LOOPS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Flexible pipe connectors.
2. Expansion joints.
3. Expansion compensators.
4. Pipe alignment guides.
5. Swivel joints.
6. Pipe anchors.

1.2 REFERENCES

A. General: Comply with appropriate standards.

1. American Welding Society: AWS.
2. Underwriters' Laboratories: U.L.

1.3 DESIGN REQUIREMENTS

A. Provide structural work and equipment required for expansion and contraction of piping. Verify anchors, guides, and expansion joints provide and adequately protect system.

B. Expansion Compensation Design Criteria:

1. Installation Temperature: 50 degrees F.
2. Fire Protection System Temperature: 75 degrees F.
3. Safety Factor: 20 percent.

1.4 SUBMITTALS

A. Submit data on all materials.

B. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints. Drawings shall be sealed by a registered professional engineer. Include information for piping expansion compensation in shop drawings for all fire suppression piping system as needed.

C. Product Data:

1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

D. Design Data: Indicate criteria and show calculations. Submit sizing methods calculations sealed by a registered professional engineer.

E. Manufacturer's Installation Instructions: Submit special procedures.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Welders' Certificate: Include welders' certification of compliance with AWS D1.1.

H. Manufacturer's Field Reports: Indicate results of inspection by manufacturer's representative.

I. Operation and Maintenance Data: submit adjustment instructions.

1.5 WARRANTY

A. Furnish five year manufacturer warranty for leak free performance of packed expansion joints.

PART 2 - PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS

A. Manufacturers:

1. Mason Ind.
2. Metraflex.
3. Or Approved Equal.

B. Steel Piping:

1. Inner Hose: Carbon Steel, Stainless Steel or Bronze.
2. Exterior Sleeve: Double braided stainless steel or bronze.
3. Pressure Rating: 200 psig WOG and 250 degrees F.
4. Maximum offset: 1 inch on each side of installed center line.

C. Copper Piping:

1. Inner Hose: Bronze
2. Exterior Sleeve: Braided bronze.
3. Pressure Rating: 200 psig WOG and 250 degrees F.
4. Maximum offset: 1 inch on each side of installed center line

2.2 EXPANSION JOINTS

A. Manufacturers:

1. Mason Ind.
2. Metraflex.
3. Or Approved Equal.

B. Stainless Steel Bellows Type:

1. Pressure Rating: 200 psig WOG and 250 degrees F.
2. Maximum Compression: 1-3/4 inch.
3. Maximum Extension: 1/4 inch.
4. Application: Steel piping 3 inch and smaller.

C. External Ring Controlled Stainless Steel Bellows Type:

1. Pressure Rating: 225 psig and 70 degrees F.
2. Maximum Compression: 1-1/4 inch.
3. Maximum Extension: 5/16 inch.
4. Maximum Offset: 5/16 inch.
5. Accessories: Internal flow liner.
6. Application: Steel piping 3 inch and larger.

D. Double Sphere, Elbow or Flexible Compensators:

1. Body: Teflon or Neoprene and nylon.
2. Working Pressure: 225 psi.
3. Maximum Temperature: 80 degrees F.
4. Maximum Compression: 1-1/8 inch.
5. Maximum Elongation: 7/8 inch.
6. Maximum Offset: 7/8 inch.
7. Maximum Angular Movement: 30 degrees.
8. Accessories: Control rods or Control cables.
9. Application: Steel piping 2 inch and larger.

E. Two-ply Bronze Bellows Type:

1. Construction: Bronze with anti-torque device, limit stops, internal guides.
2. Pressure Rating: 200 psi WOG and 250 degrees F.
3. Maximum Compression: 1-3/4 inch.
4. Maximum Extension: 1/4 inch.
5. Application: Copper piping.

F. Copper with Packed Sliding Sleeve:

1. Maximum Temperature: 250 degrees F.
2. Copper or steel piping 2 inches and larger.
3. Application: Copper or steel piping 2 inch and larger.

G. Pipe Alignment Guides: Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

H. Swivel Joints: Fabricated steel Bronze Ductile Iron Cast steel body, double ball bearing race, field lubricated, with rubber (Buna-N) O-ring seals.

2.3 FLEXIBLE EXPANSION LOOPS

A. Manufacturers:

1. **Flex Hose.**
2. **Metraflex.**
3. **Or Approved Equal.**

B. Flexible Expansion Loops shall consist of two parallel sections of corrugated metal hose, braid and a 180 degree return bend, or three equal length sections of annular corrugated close-pitch hose with over-braid, with inlet and outlet 90 degree elbow connections.

C. Type 304 Stainless steel braids shall be used with type 321 stainless steel hose. Fitting materials of construction and end fitting type shall be consistent with pipe material and equipment/ pipe connection fittings.

D. The loops shall be engineered to move in all three planes, and shall impart no thrust loads to system anchors.

E. Field fabricated loops shall not be acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Provide line size flexible connectors.

B. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

C. Rigidly anchor pipe to building structure. Provide pipe guides to direct movement only along axis of pipe. Erect piping so strain and weight is not on cast connections or apparatus.

D. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints as required.

E. Provide grooved piping systems with minimum one joint per inch pipe diameter instead of flexible connector supported by vibration isolation. Grooved piping systems need not be anchored.

3.2 PIPE BEND AND LOOP INSTALLATION

A. Install pipe bends and loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Attach pipe bends and loops to anchors.

1. Steel Anchors: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

2. Concrete Anchors: Attach by fasteners. Follow fastener manufacturer's written instructions.

3.3 MANUFACTURER'S FIELD SERVICES

A. Furnish inspection services by flexible pipe manufacturer's representative for final installation and certify installation is in accordance with manufacturer's recommendations and connectors are performing satisfactorily.

END OF SECTION 21 05 16

SECTION 21 12 00 FIRE-SUPPRESSION STANDPIPES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes entire standpipe system from fire department connection to fire hose connection.

1.2 REFERENCES

A. General: Comply with appropriate standards.

1. American Welding Society: AWS.
2. Underwriter Laboratories, Inc.: U.L.
3. Factory Mutual Standards: FM.

1.3 SUBMITTALS

A. Submit data on all materials, including manufacturers' installation instructions.

B. Shop Drawings: Indicate supports, components, accessories, and sizes.

C. Product Data: Submit manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories.

D. Field Test Reports: Indicate compliance with specified performance.

E. Manufacturer's Installation Instructions: Submit with product data.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

G. Operation and Maintenance Data: Submit spare parts lists, exploded assembly views and recommended maintenance intervals.

1.4 WARRANTY

A. Provide one-year minimum.

PART 2 - PRODUCTS

2.1 FIRE HOSE CABINETS

A. Manufacturers:

1. Potter-Roemer.
2. Larsen.

3. American Fire Hose & Cabinets.

B. Hose Cabinets:

1. Style: Recessed, Semi-recessed, or Surface mounted. Fire rated when installed in fire rated assemblies.
2. Tub: 20 gauge thick steel with 18 gauge steel frame, prepared for pipe and accessory rough in.
3. Door: 20 gage thick steel, flush, or glazed, with 1/4 inch thick wired glass full panel, hinged, positive latch device.
4. Finish: Prime Coated or Enameled.

C. Hose Rack: Steel; with polished chrome finish; swivel or stationary type with pins and water stop.

D. Hose: 1 inch or 1-1/2 inch diameter; mildew and rot-resistant.

E. Nozzle: Chrome plated brass combination fog, straight stream, and adjustable shut-off.

2.2 VALVES

A. Manufacturers:

1. Clow.
2. Nibco.
3. Viking.

B. Hose Station Valve: Angle type, brass or chrome plated finish, 1-1/2 inch nominal size, with automatic ball drip.

C. Hose Connection Valve: Angle type; brass or chrome plated finish; 2-1/2 inch size, thread to match fire department hardware, 300 psi working pressure, with threaded cap and chain of chrome plated finish.

D. Pressure reducing Valve: Angle or Straight away type; brass finish with inner hydraulic controls. 1-1/2 inch size, fire department thread, 400 psi inlet pressure, with threaded cap and chain of chrome plated finish.

E. Hose Connection Valve Cabinets:

1. Style: Recessed, Semi-recessed, or Surface mounted. Fire rated when installed in fire rated assemblies.
2. Tub: 20 gauge thick steel with 18 gauge steel frame, prepared for pipe and accessory rough in.
3. Door: 20 gauge thick steel, flush, or glazed, with 1/4 inch thick wired glass full panel, hinged, positive latch device.
4. Finish: Prime Coated or Enameled.

2.3 FIRE DEPARTMENT CONNECTION

A. Type: Flush mounted wall type with brass or chrome plated finish. Free standing type shall be with ductile iron pedestal with red enamel finish.

B. Outlets: Two-way with fire department thread size. Threaded dust cap and chain of matching material and finish.

C. Drain: 3/4 inch automatic drip, outside connected to approved receptor.

D. Label: "Standpipe - Fire Department Connection".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify blocking in place for cabinet installation.

3.2 INSTALLATION

A. Install cabinets plumb and level. Secure to adjacent surfaces.

B. Install hose station valve in cabinet between 36 to 60 inches above floor. Install hose-connection valve under hose station valve and not closer than 4 inches from side or bottom of cabinet.

C. Connect standpipe system to water source ahead of domestic water connection.

D. Where static pressure exceeds 100 psi but is less than 100 psi at any hose station, furnish pressure orifice disc in discharge of hose station valve to prevent pressure on hose exceeding 90 psi.

E. Install two-way Fire Department outlet on roof.

3.3 CLEANING

A. Flush entire system of foreign matter.

END OF SECTION 21 12 00

SECTION 21 13 13 WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wet-pipe sprinkler system, system design, installation, and certification.

1.2 REFERENCES

A. General: Comply with appropriate standards.

1. American Welding Society: AWS.
2. Underwriter Laboratories, Inc.: U.L.
3. Factory Mutual Standards: FM.

1.3 SCHEDULES

A. System Hazard Areas: Per NFPA 13.

1.4 SUBMITTALS

A. Submit data on all materials including manufacturers' installation instructions.

B. Shop Drawings: Indicate complete layout of all system components, including: coordinated sprinkler locations, detailed pipe layout, hangers and supports, components, accessories and system controls.

C. Samples: Submit two of each style of sprinkler specified.

D. Design Data: Submit signed and sealed design calculations.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Operation and Maintenance Data: Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.5 WARRANTY

A. Provide one-year minimum.

1.6 EXTRA MATERIALS

A. Furnish extra sprinklers of each sprinkler type per NFPA 13.

B. Furnish suitable wrenches for each sprinkler type.

C. Furnish metal storage cabinet in location designated by LAWA representative.

PART 2 - PRODUCTS

2.1 SPRINKLERS

A. Manufacturers:

1. Viking.
2. Reliable.
3. Tyco Simplex Grinnell.

B. Suspended Ceiling Type:

1. Type: Standard or Extended Coverage, Recessed or Concealed pendant type with matching adjustable escutcheon plate.
2. Construction: All brass frame with metal Belleville spring seal, Teflon coated, brass or chrome finish.
3. Escutcheon Plate Finish: Chrome plated.
4. Fusible Link: Glass bulb type, temperature rated for specific area hazard.

C. Exposed Area Type:

1. Type: Standard or Extended Coverage upright type, with guard.
2. Factory applied corrosion-resistant coating.
3. Fusible Link: Glass bulb type, temperature rated for specific area hazard.

D. Side wall Type:

1. Type: Standard or Extended Coverage, Semi-recessed or Recessed horizontal side wall type with matching adjustable escutcheon plate and guard.
2. Construction: All brass frame with metal Belleville spring seal, Teflon coated, brass or chrome finish.
3. Escutcheon Plate Finish: Brass. Chrome plated. Enamel, color as selected.
4. Fusible Link: Glass bulb type temperature rated for specific area hazard.

E. Guards: Finish to match sprinkler finish.

2.2 ABOVE GROUND PIPING

A. Pipe shall be Standard Weight, Schedule 40 Black-Steel Pipe: ASTM A53 / A53M, Type E, Grade B, ERW pipe or ASTM A106, Grade B, seamless steel pipe. Pipe ends may be factory or field formed to match joining method.

1. Threaded Fittings:
    a. Malleable-Iron Fittings: ASTM B16.3, Class 300.

b. Flanges and Flanged Fittings: ASME B16.5, Class 300, unless Class 600 is indicated.

2. Grooved-End Fittings: ASTM A47 malleable Iron or ASTM A536 Ductile Iron, with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2.3 BURIED PIPING

A. Ductile Iron Pipe, Class 350, AWWA C151, grooved ends.

1. Steel Fittings: ASME B16.5, steel flanges and fittings.

2. Ductile Iron Joints: ANSI/AWWA C-606.

3. Ductile Iron Coupling Housings: ASTM A536, Grade 65-45-12.

4. Install piping with double-layer half over-lap 10 mil polyethylene tape.

2.4 PIPING SPECIALTIES

A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm or electric alarm, with pressure retard chamber and variable pressure trim; test and drain valve; strainer and gages.

B. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy red enameled gong and motor housing, nylon bearings, and inlet strainer.

C. Electric Alarm: Electrically operated red enameled gong with pressure alarm switch.

D. Water Flow Switch: Vane or paddle type switch with u-bolt mounting, horizontal or vertical, with adjustable alarm delay0-120 second range.

E. Fire Department Connections:

1. Type: Flush mounted wall type with chrome plated finish or free standing type with ductile iron pedestal with red enamel finish.

2. Outlets: Two-way with fire department thread size. Threaded dust-cap and chain of matching material and finish.

3. Drain: 3/4 inch min. automatic drip.

4. Label: "Sprinkler - Fire Department Connection"

2.5 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Controls: Supervisory switches, Water Level Supervisory Switches, Tank Temperature Supervisory Switches, Room Temperature Supervisory Switches.

B. Disconnect Switch: Factory mount in control panel and/or on equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install buried shut-off valves in valve box, furnish post indicator as required.

B. Install and/or indicate location of approved double check valve assembly at sprinkler system water source connection and Fire Department Connection.

C. Install outside alarm-gong on building wall.

D. Place pipe runs to minimize obstruction to other work.

E. Install piping in concealed spaces above finished ceilings.

F. Locate sprinklers in coordination with architectural reflected ceiling plan.

G. Install and connect to existing fire pump system as required.

H. Install guards on sprinklers as required.

I. Hydrostatically test entire system.

J. Under the direction of L.A.F.D. Inspector of Record and LAWA.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Verify signal devices are installed and connected to fire alarm system.

3.3 LABELLING AND SIGNS

A. Provide as required per NFPA.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish. Remove after painting. Replace painted sprinklers with new.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Prepare test and inspection reports.

C. Wet Sprinkler System will be considered defective if it does not pass tests and inspections.

3.6 CLEANING

A. Flush entire piping system of foreign matter.

B. Remove and replace sprinklers with paint other than factory finish.

3.7 TRAINING

A. See LAWA DCH Guide Specification 01 79 00 “Demonstration and Training” for demonstration and training requirements.

B. Engage a factory-authorized service representative to train LAWA Maintenance personnel to adjust, operate, and maintain Wet-Pipe Sprinkler System.

C. Provide minimum of 12 hours (3 shifts total) of classroom and hands on training to LAWA Maintenance personnel.

END OF SECTION 21 13 13

SECTION 21 13 16 PRE-ACTION / DRY-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes dry-pipe sprinkler system, system design, installation, and certification.

1.2 REFERENCES

A. General: Comply with appropriate standards.

1. American Welding Society: AWS.
2. Underwriter Laboratories, Inc.: U.L.
3. Factory Mutual Standards: FM.

1.3 SUBMITTALS

A. Submit data on all materials, including manufacturers' installation instructions.

B. Shop Drawings: Indicate complete layout of all systems, including: coordinated sprinkler locations, detailed pipe layout, hangers and supports, components, accessories and system controls.

C. Product Data: Submit data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

D. Design Data: Submit signed and sealed design calculations.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Operation and Maintenance Data: Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

G. System Hazard Areas: Per NFPA 13.

1.4 WARRANTY

A. Provide one-year minimum.

1.5 EXTRA MATERIALS

A. Furnish extra sprinklers for each sprinkler type per NFPA 13.

B. Furnish suitable wrenches for each sprinkler type.

C. Furnish metal storage cabinet in location designated by LAWA representative.

PART 2 - PRODUCTS

2.1 PRE-ACTION CABINET

A. Manufacturers:
1. Fireflex Systems Inc.
2. Reliable
3. Or Approved Equal.

B. Cabinet shall be a self-contained type and integrate a pre-action double interlock system, containing all hydraulic, pneumatic, devices, and electrical components required for the control of a pre-action system.
1. Sturdy free-standing, min. 14 gauge steel cabinet.
2. Textured rust proof coating, inside and outside, fire red, oven baked polyester powder on phosphate base (powder coated).
3. One or two locked access door(s), depending on cabinet size, to reduce frontal clearance required for opening.
4. Individual access doors for the hydraulic section and the emergency release.

C. Integrated Pre-action System
1. Deluge valves 1-1/2" (40 mm) through 8” (200mm) diameter controlled with supervised butterfly control valve, releasing trim rated at 250 psi and all the necessary accessories. Trim shall include a mechanical latching device to prevent system from resetting in case of loss of power to the release solenoid. Systems provided with solenoid only, without this mechanical latching device, shall not be accepted. Every valve shall be clearly identified as to its operation with arrows indicating all positions to facilitate system operation. System shall be double interlocked with an electric/pneumatic release.
2. Pressure gauges to indicate water supply, priming water and air pressures of the system. Each pressure gauge must be provided with its own three-way valve.
3. Release trim with solenoid valve, pneumatic actuator and every supervisory and alarm device required shall be Schedule 40 galvanized steel.
4. Schedule 40 steel pipe header painted fire red, with grooved ends to be connected to supply water from either side.
5. Schedule 40 steel pipe drain manifold of 2" diameter painted fire red, with grooved ends for drain connections from either side.
6. Trim shall include properly identified contractor test ports factory mounted into the trim piping to facilitate system testing and commissioning.
7. The programmable releasing control panel shall be provided as part of the assembled pre-action system unit. The unit shall be domestically manufactured, assembled, and tested.
8. The system shall have an Integrated Releasing Circuit Disconnect Switch to allow the system to be tested without actuating pre-action fire suppression system as required per NFPA 72, 2010 Edition. Operation of the Disconnect Switch shall cause a supervisory signal at the releasing service fire alarm control unit. The disconnect switch shall be a physical switch and not be accomplished by using software.

9. Field wiring terminal block and junction box integrated with the cabinet for connection of field wiring.
10. The cabinet assembly shall be pre-assembled, pre-wired and factory tested under ISO- 9001 conditions, as a system.
11. The system shall be complete in all ways.
12. The system shall incorporate all components required for complete system operation.

D. System Description
1. The cabinet assembly shall contain a self-contained pre-action double interlock system, with releasing panel integrated into the cabinet, pre-assembled, pre-wired and factory tested under ISO-9001 manufacturing and quality control procedures.
2. The integrated unit shall be California State Fire Marshall Approved, UL Listed and FM Approved as an assembled unit. All system components shall be compatible, UL Listed and FM Approved.
3. System shall have unique serial number for easy traceability.

E. System Options Required
1. Shut-off valve – Provide a Listed and Approved supervised butterfly valve installed on the system riser inside the cabinet for full flow test purposes. An integrated sight glass shall be part of this arrangement for visually confirming water flow through the main drain upon system actuation.

F. Integrated releasing control panel
1. The releasing control panel shall be fully integrated to the cabinet enclosure. It shall be pre-assembled, pre-wired, programmed and tested at the factory. It shall be FM Approved and cULus listed to UL 864-9 standard. The panel shall include four programmable Class B, Style B initiating zones, two class B supervisory zones, and four programmable output circuits. Onboard, menu-driven programming with preinstalled programs for ease of set-up must also be provided. Batteries shall be sized to provide emergency power as per UL (24 hours) or FM (90 hours) requirements. The control panel shall include both an LCD Annunciator and a set of yellow & red LED lamps identifying alarm, trouble, supervisory and flow conditions. Easy to operate control buttons shall also be included for the operation of the panel functions.
2. 10 minutes of alarm after 90 hours stand-by (FM).

G. Automatic & Manual Detection Devices
1. Supply and install a complete electrical detection system including conduit, wiring, heat and/or smoke detectors, manual pull stations, and connections to auxiliary functions.

H. Notification Devices and Signs
1. Supply and install a complete notification system including conduit, wiring, and notification devices.
2. The NAC devices (24 Vdc bell, horn or strobe) must be compatible with the release control panel.

I. System Operation

1. The integrated releasing control panel sequence of operation shall be factory programmed to perform the following:
   a. The activation of the electric detection AND the opening of an automatic sprinkler is necessary to cause the deluge valve actuation.
   b. The activation of the electric detection alone will not cause water to enter the system piping.
   c. The opening of an automatic sprinkler OR damage to system piping without the detection condition satisfied will activate the "very low air" alarm pressure switch but water will not enter the system piping.
   d. Activation of the electric detection AND the "very low air" alarm pressure switch will activate the solenoid valve open, causing the deluge valve to open and allowing water to enter the system piping. The alarm pressure switch will activate. Water will flow out of any open sprinklers and/or any openings on the system.
   e. Operation of the emergency manual release will depressurize the priming chamber, causing the deluge valve to open and allowing water to enter the system piping. The alarm pressure switch will activate, Water will flow out of any open sprinklers and/or any openings on the system.
   f. When AC Power and DC power supplied by the backup batteries is lost, the system shall “fail-safe” and function as a dry pipe system. The normally open solenoid will remain open, and the pneumatic actuator is the only device holding the priming water in the priming chamber. When a sprinkler operates, air pressure is lost and the pneumatic actuator opens. Priming water is drained from the priming chamber, causing the deluge valve to open and allowing water to enter the system piping. The alarm pressure switch will activate. Water will flow out of any open sprinklers and/or any openings on the system.
   g. Trouble condition on detection zones, or "very low air" alarm zone, or the normally closed solenoid output will disable the normally open solenoid and the pneumatic actuator is the only device holding the priming water in the priming chamber. When a sprinkler operates, air pressure is lost and the pneumatic actuator opens. Priming water is drained from the priming chamber, causing the deluge valve to open and allowing water to enter the system piping. The alarm pressure switch will activate. Water will flow out of any open sprinklers and/or any openings on the system.

J. Air Supply: The automatic sprinkler piping is supervised by air from a compressed air source installed inside the pre-action riser room. The air supply must be regulated and of the proper size in order to be able to restore normal system air pressure within 30 minutes.

K. Detection & Signaling System: Supply and install a complete electrical detection system including all conduit, wiring, smoke detectors, signaling devices, control panel and connections to auxiliary functions. A bell or a horn shall be installed near the riser room.

L. Provide necessary relays for fire alarm interface.

2.2 SPRINKLERS

A. Manufacturers:

1. Viking.
2. Reliable.
3. Grinnell.

B. Suspended Ceiling Type:

1. Type: Standard, Semi-recessed, Recessed, or Concealed pendant type with matching adjustable semi-recessed escutcheon plate.
2. Construction: All brass frame with metal Belleville spring seal, Teflon coated, brass or chrome finish.
3. Escutcheon Plate Finish: Chrome plated.
4. Fusible Link: Glass bulb type, temperature rated for specific area hazard.

C. Exposed Area Type:

1. Type: Standard upright type, with guard.
2. Factory applied corrosion-resistant coating.
3. Fusible Link: Glass bulb type, temperature rated for specific area hazard.

D. Side wall Type:

1. Type: Standard, Semi-recessed, or Recessed horizontal side wall type with matching adjustable escutcheon plate and guard.
2. Construction: All brass frame with metal Belleville spring seal, Teflon coated, brass or chrome finish.
3. Escutcheon Plate Finish: Brass. Chrome plated. Enamel, color as selected.
4. Fusible Link: Glass bulb type temperature rated for specific area hazard.

E. Dry Sprinklers:

1. Type: Standard, upright or side wall with matching plate.
2. Construction: All brass frame with metal Belleville spring seal, Teflon coated, brass or chrome plated.
3. Fusible solder link type, temperature rated for use.

F. Guards: Finish to match sprinkler finish.

2.3 PIPING MATERIALS

A. Pipe shall be Standard Weight, Schedule 40 Black-Steel Pipe: ASTM A53 / A53M, Type S, Grade B or ASTM A106, Grade B, seamless steel pipe. Pipe ends may be factory or field formed to match joining method.

1. Threaded Fittings:

a. Malleable-Iron Fittings: ASTM B16.3, Class 300.

b. Flanges and Flanged Fittings: ASME B16.5, Class 300, unless Class 600 is indicated.

2. Grooved-End Fittings: ASTM A47 malleable Iron or ASTM A536 Ductile Iron, with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2.4 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/or electric alarm, with accelerator, test and drain.

B. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy red enameled gong and motor housing, nylon bearings, and inlet strainer.

C. Electric Alarm: Electrically operated red enameled gong with pressure alarm switch.

D. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts.

E. Air Compressor: Shall be single unit type/electric motor driven with air maintenance device, 1/3 H.P. 120/1/60 minimum.

F. Fire Department Connections:

1. Type: Flush mounted wall type with chrome plated finish or free standing type with ductile iron pedestal red enamel 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 min. automatic drip.

4. Label: "Sprinkler - Fire Department Connection"

2.5 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Controls: Supervisory switches, Water Level Supervisory Switches, Tank Temperature Supervisory Switches, Room Temperature Supervisory Switches.

B. Disconnect Switch: Factory mount in control panel on equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install buried shut-off valves in valve box furnish post indicator as required.

B. Install and/or indicate location of approved double check valve assembly at sprinkler system water source connection and fire department connection.

C. Install outside alarm-gong on building wall.

D. Place pipe runs to minimize obstruction to other work.

E. Install piping in concealed spaces above finished ceilings.

F. Locate sprinklers in coordination with architectural reflected ceiling plan.

G. Install and connect to existing fire pump system as required.

H. Install guards on sprinklers.

I. Hydrostatically test entire system.

J. Under the direction of LAFD. Inspector of Record and LAWA

3.2 INTERFACE WITH OTHER PRODUCTS

A. Verify signal devices are installed and connected to fire alarm system.

3.3 LABELLING AND SIGNS

A. Provide as required per NFPA.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Apply masking tape or paper cover to protect sprinklers not receiving field paint. Remove after painting. Replace painted sprinklers with new.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Prepare test and inspection reports.

C. Pre-Action System will be considered defective if it does not pass tests and inspections.

3.6 CLEANING

A. Flush entire piping system of foreign matter.

B. Remove and replace sprinklers with paint other than factory finish.

3.7 TRAINING

A. See LAWA DCH Guide Specification 01 79 00 “Demonstration and Training” for demonstration and training requirements.

B. Engage a factory-authorized service representative to train LAWA Maintenance personnel to adjust, operate, and maintain Pre-Action System.

C. Provide minimum of 12 hours (3 shifts total) of classroom and hands- on training to LAWA Maintenance personnel.

END OF SECTION 21 13 16

SECTION 21 22 00 CLEAN AGENT FIRE SUPPRESSION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes design, installation and certification of Clean Agent Fire Suppression Systems Addressable Detection.

1.2 REFERENCES

A. General: Comply with appropriate standards.

1. American Welding Society: AWS.
2. Underwriter Laboratories, Inc.: U.L.
3. Factory Mutual Standards: FM.

1.3 SUBMITTALS

A. Submit data on all materials, including manufacturers' installation instructions.

B. Shop Drawings: Indicate complete layout of all system components, including: coordinated nozzle locations, detailed pipe layout, hangers and supports, required components, accessories and system controls.

C. Design Data: Submit signed and sealed design calculations for the complete system, including battery stand-by power calculations for the control panel and the battery stand-by power supply.

D. Provide Manufacturers Certificate.

1.4 WARRANTY

A. All System components furnished under this contract shall be guaranteed against defect in design, material and workmanship for the full warranty time which is standard with the manufacturer and/or supplier, but in no case less than one year.

1.5 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to LAWA.

1. Detection Devices: Not less than 10 percent of amount of each type installed.
2. Audible Devices: Not less than 10 percent of amount of each size and type installed.
3. Visual Devices: Not less than 10 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 INTEGRATED FIRE SUPPRESSION SYSTEMS

A. Manufacturers:

1. Fike Corp.
2. Ansul.
3. Viking.

2.2 PERFORMANCE REQUIREMENTS

A. Design clean-agent extinguishing system and obtain approval from authorities having jurisdiction. Design system for Class A, B, or C fires as appropriate for areas being protected and include safety factor. Use clean agent indicated and in concentration suitable for normally occupied areas.

B. The system shall be complete in all ways necessary for a functional, UL listed and/or FM approved, clean agent suppression system. It shall include: All mechanical and electrical installation, all detection and control equipment, agent storage containers, clean agent, nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, caution/advisory signs, functional checkout testing, and training.

C. Performance Requirements (Agent): Per manufacturer's data.

D. Performance Requirements (Detection): Per manufacturer's data.

E. System Operating Sequence: As described by manufacturer.

2.3 PIPING MATERALS

A. Steel Pipe: ASTM A53, Type S, Grade B or ASTM A106, Grade B; Schedule 40, seamless steel pipe.

1. Threaded Fittings:

a. Malleable-Iron Fittings: ASME B16.3, Class 300.

b. Flanges and Flanged Fittings: ASME B16.5, Class 300, unless Class 600 is indicated.

2. Grooved-End Fittings: FMG approved and NRTL listed, ASTM A47 malleable iron or ASTM A536 ductile iron, with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2.4 VALVES

A. General: Brass; suitable for intended operation.

B. Container Valves: With rupture disc or solenoid and manual-release lever, capable of immediate and total agent discharge and suitable for intended flow capacity.

2.5 EXTINGUISHING-AGENT CONTAINERS

A. Description: Steel tanks complying with ASME Boiler and Pressure Vessel Code: Section VIII, for unfired pressure vessels. Include minimum working-pressure rating that matches system charging pressure, valve, pressure switch, and pressure gage.

1. Finish: Red and white enamel or epoxy paint.
2. Storage-Tank Brackets: Factory- or field-fabricated retaining brackets consisting of steel straps and channels; suitable for container support, maintenance, and tank refilling or replacement.
3. Each cylinder shall have a low-pressure switch to provide visual and electrical supervision of the container pressure. The low-pressure switch shall be wired to the control panel to provide an audible and visual "Trouble" alarm in the even the container pressure drops below 272 psi.
4. Each cylinder shall be fitted with a liquid level device to determine the clean agent quantity without removing the cylinder from its mounting bracket, disconnecting the distribution piping, or removing the clean agent system from service. (35 lb. and 60 lb. cylinders are excluded).

2.6 FIRE-EXTINGUISHING CLEAN AGENT

A. Manufacturers:

1. Fike Corporation.
2. Ansul.
3. Viking.

B. Clean Agent: HFC-227ea, heptafluoropropane.

2.7 DISCHARGE NOZZLES

A. Equipment manufacturer's standard one-piece brass or aluminum alloy of type, discharge pattern, and capacity required for application.

1. Deflector plates shall be used with the nozzles when sensitive ceiling tiles must be protected.
2. A maximum nozzle flow rate of 17 lbs./sec shall be designed for all areas with false ceilings or delicate operations. Higher flow rates may dislodge objects, which could damage or affect equipment and/or process.

2.8 FIRE SUPPRESSION RELEASING CONTROL PANEL

A. Control panel and its components shall be listed and approved type.

B. The addressable control panel shall be UL listed and Factory Mutual Global (FMG) approved for use as a local fire alarm system, and/or releasing clean agent, deluge and pre-action sprinkler fire suppression systems.

C. Control panels shall be capable of networking with similar panels to allow for internal and external NOC communications.

D. Power Requirements: 120-Vac; with electrical contacts as described in manufacturers data.

E. The control-panel shall include the following features:

1. Electrical contacts for shutting down fans, activating dampers, and operating system electrical devices.
2. Automatic switchover to standby power at loss of primary power.
3. Storage container, low-pressure indicator.
4. Service disconnect to interrupt system operation for maintenance with visual status indication on the control panel.

F. Standby Power: Lead-acid or nickel-cadmium batteries with capacity to operate system for 24 hours and alarm for minimum of 5 minutes. Include automatic battery charger, with varying charging rate between trickle and high depending on battery voltage that is capable of maintaining batteries fully charged.

2.9 DETECTION DEVICES

A. These shall include ionization detectors and remote air-sampling detector system. Including air-sampling pipe network, a laser-based photoelectric detector, a sample transport fan, and a control unit.

2.10 MANUAL STATIONS WITH DIGITAL COUNTDOWN TIMER

A. General Description: A manual release shall also consist of a digital countdown timer and abort switch combined as one unit.

B. Manual Release: “AGENT RELEASE” caption, and red finish. Unit shall have a metal housing with a dual action release configuration to prevent accidental system discharge.

C. Abort Switch: “ABORT” caption, momentary contact, with yellow button.

D. Countdown Timer: The countdown timer provides a digital readout, indicating the number of seconds remaining until the clean agent discharges. There shall be a label stating “Seconds Remaining to Discharge” at the digital readout.

E. Each manual release and abort station shall include a contact monitor module to provide for a custom message and device location at the control panel.

2.11 SWITCHES

A. Listed and approved type, 120-Vac or low voltage compatible with controls. Include contacts for connection to control panel.

1. Low-Agent Pressure Switches: Pneumatic operation.
2. Door Closers: Magnetic retaining and release device or electrical interlock to cause the door operator to drive the door closed.

2.12 ALARM DEVICES

A. Low voltage and surface mounting, unless otherwise indicated.

B. Bell: Minimum 6-inch diameter.

C. Horns: 90 to 94 dBA.

D. Strobe Lights: Translucent lens, with “AGENT” or similar caption.

2.13 AUXILIARY PANELS

A. Maintenance By-Pass Switch/Panel: Shall be located adjacent to the clean agent releasing control panel. The maintenance by-pass switch/panel shall have a key-switch which, when operated, will place the clean agent control panel in a “TEST” mode without affecting the detection system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with hazard-area leakage requirements, installation tolerances, and other conditions affecting work performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Verification of existing conditions before starting work.

3.2 PIPING APPLICATIONS

A. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.

B. Fitting Working Pressure: 620 psig minimum.

C. Flanged Joints: Class 300 minimum.

D. NPS 2 and Smaller: ASTM B88, Type L, ASTM B88M, Type B, copper tube; copper, solder-joint fittings; and brazed joints.

E. NPS 2 and Smaller: Schedule 40, steel pipe; malleable-iron threaded fittings; and threaded joints.

F. NPS 2-1/2 and NPS 3: ASTM B88, Type L, ASTM B88M, Type B, copper tube; copper, solder-joint fittings; and brazed joints.

G. NPS 2-1/2 and NPS 3: Schedule 40, steel pipe; forged-steel welding fittings; and welded joints.

H. NPS 2-1/2 and NPS 3: Schedule 40, steel pipe; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.

I. NPS 4 and Larger:

1. Schedule 40, steel pipe; steel, grooved-end fittings; keyed couplings; and grooved joints.
2. Schedule 40, steel pipe; forged-steel welding fittings; and welded joints.

J. Piping between Storage Containers and Orifice Union:

1. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.
2. Fittings Working Pressure: 2175 psig minimum.
3. Flanged Joints: Class 600 minimum.
4. All sizes: Schedule 80, steel pipe; forged-steel welding fittings; and welded joints.

K. Piping Downstream from Orifice Union:

1. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.
2. Fittings Working Pressure: 1000 psig minimum.
3. Flanged Joints: Class 300 minimum.
4. All sizes: Schedule 40, steel pipe; forged-steel welding fittings; and welded joints.

3.3 CLEAN-AGENT EXTINGUISHING PIPING INSTALLATION

A. Install clean-agent extinguishing piping and other components level and plumb.

B. Install pipe and fittings, valves, and discharge nozzles as required.

C. Support piping shall include required seismic restraints.

3.4 CONNECTIONS

A. Install control panels, detection system components, alarms, and accessories, complying with requirements of NFPA 2001, Section “Detection, Actuation, and Control Systems”, as required for supervised system application.

B. Install piping adjacent to extinguishing-agent containers to allow service and maintenance.

C. Connect electrical devices to control panel and for interfacing to building’s fire alarm system.

3.5 LABELING AND SIGNS

A. Provide as required per NFPA.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Apply masking tape or paper cover to protect discharge nozzle head not receiving field paint. Remove after painting. Replace painted discharge nozzle head with new.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Prepare test and inspection reports.

C. Clean Agent System will be considered defective if it does not pass tests and inspections.

3.8 CLEANING

A. Flush entire piping system of foreign matter.

B. Remove and replace discharge nozzle head with paint other than factory finish.

3.9 TRAINING

A. See LAWA DCH Guide Specification 01 79 00 “Demonstration and Training” for demonstration and training requirements.

B. Train LAWA Maintenance personnel to adjust, operate, and maintain clean-agent extinguishing systems.

C. Provide minimum of 12 hours (3shifts) of classroom and hands on training to LAWA Maintenance personnel.

END OF SECTION 21 22 00