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**PART 1 - GENERAL**

The work of this section includes the design, provision, and testing of a complete fire protection system and modifications and additions to the existing fire protection system including pipe, fittings, valves, flow indicators, gauges, alarms, drain pipe, test connections, sprinklers and all accessories.

**1.01 DESIGN CRITERIA**

**A. Drawings and Specifications:**

1. Provide the following systems as indicated on Drawings:
  - a. Wet pipe for heated interior areas.
  - b. Wet standpipe system for stair towers.
  - c. Combination wet standpipe/sprinkler system for the building as shown on the Drawings.
  - d. Dry pipe for unheated areas.
  - e. Dry standpipe system for stair towers.
  - f. Deluge system for areas.
  - g. Pre-action system for areas.

**1.02 REFERENCE STANDARDS AND CODES**

The publications of the organizations listed below form a part of this Specification to the extent referenced.

**A. National Fire Protection Association (NFPA) - Latest Edition:**

1. NFPA 10 Portable Fire Extinguishers.
2. NFPA 13 Installation of Sprinkler Systems.
3. NFPA 14 Standpipe and Hose Systems.
4. NFPA 15 Water Spray Fixed Systems for Fire Protections.
5. NFPA 20 Stationary Pumps for Fire Protection.
6. NFPA 24 Private Fire Service Mains and Their Appurtenances.
7. NFPA 25 Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
8. NFPA 30 Flammable and Combustible Liquids Code.
9. NFPA 51B Fire Prevention During Welding, Cutting, and Other Hot Work.
10. NFPA 70 National Electrical Code.

11. NFPA 72 National Fire Alarm Code.
  12. NFPA No. 409 Aircraft Hangers.
  13. NFPA No. 415 Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways.
  14. NFPA 407 – Aircraft Fuel Servicing
  15. NFPA 417 – Standard on Construction and Protection of Aircraft Loading Walkways
- B. Factory Mutual Engineering (FM):
1. Data Sheet 1-3 High Rise Buildings.
  2. Data Sheet 2-0 Installation Guidelines for Automatic Sprinklers.
  3. Data Sheet 2-8 Earthquake Protection for Water-Based Fire Protection Systems.
  4. Data Sheet 4-4N Standpipe and Hose Systems.
  5. FM P7825: Approval Guide - Equipment, Materials, Services for Conservation of Property; latest edition.
  6. Systems shall be designed in accordance with current codes and consistent with FM, although FM does not inspect or certify installations.
- C. Underwriters Laboratories (UL): Fire protection equipment directory; latest edition.
- D. All Work In This Section Shall Comply With The Following Code Requirements:
1. International Building Code (latest version).
  2. International Fire Code (latest version).
  3. Port of Seattle Applicable Standards.
  4. Applicable State and local codes and regulations.
- E. If there is any conflict between the requirements of the referenced codes, standards, regulations, and contract documents, then that requirement which is most restrictive shall take precedence over others. The Port Fire Department shall be consulted for interpretations of the fire code.

**1.03**

**DEFINITIONS**

- A. Apron (Ramp): Area and facilities used for aircraft gate parking and aircraft support and servicing operations. It includes the following sub-components:
- B. Aircraft Gate Parking Position used for parking aircraft to enplane and deplane passengers. The passenger loading bridge is considered part of the gate position.

- C. Aircraft Service Areas on or adjacent to an aircraft parking position. They are used by airline personnel/equipment for servicing/fueling aircraft and the staging of baggage and freight for loading and unloading of aircraft.
- D. Taxi Lanes: Reserved to provide taxiing aircraft with access to and from parking positions.
- E. Service/Fire Lanes: Identified rights of way on the apron designated for aircraft ground service vehicles and fire equipment.
- F. Fire hydrants or standpipe connections shall not be obstructed by airline vehicles or equipment. A 15-foot clear space shall be maintained.
- G. Concourse: Structure and/or facilities normally connecting the main terminal building and the aircraft gate positions. A passageway for circulation between main terminal and the aircraft gate positions.
- H. Main Terminal Building: Structure and facilities for the processing and servicing of passengers and baggage and includes:
  - 1. Lobbies, public areas for passenger circulation and services.
  - 2. Airline ticket counters/office areas.
  - 3. Terminal services, public and non-public facilities incidental to flight operations.
  - 4. Outbound/inbound baggage facilities.
  - 5. Federal inspection services.
  - 6. Airport administration and services.
- I. Public Way: Public Way is any street, alley, or similar parcel of land essentially unobstructed from the ground to the sky, which is deeded, dedicated or otherwise permanently appropriate to the public for public use and having a clear width of not less than 10-feet.
- J. Exit Discharge: For the purposes of exiting, the aircraft ramp area is considered a public way that provides a relative area of safety or refuge from the building.
- K. Temporary Structures: Trailers, carts, displays, vending carts.
- L. Airside: Airside is described as the West side, where aircraft resides.
- M. Landside: Landside is described as the East side, opposite of airside.

#### **1.04 SUBMITTALS**

- A. Product Data, Hydraulic Calculations, Shop Drawings, Reflected Ceiling Plan, and Samples:

1. Minimum of six complete sets of submittal documents indicated below shall be provided. If submitting electronically, provide a minimum of three full size (24x36) hard copy wet stamped sets of drawings and three hard copies of wet stamped calculations (if required) to the Building Department. One copy is for the building department and two copies are for the Fire Department.
2. Product Data: Product Data for items including each type of sprinkler head, valves, piping, hangers, sway bracing, switches, and fire protection specialty specified. The Product Data submittal shall have a table of contents listing each device or piece of equipment with manufacturer's name, model number, and size if applicable. Submit complete brochures giving technical data and information of each item to be furnished.
3. Hydraulic Calculations: Hydraulic calculations shall be prepared in accordance with NFPA 13 identified as "Hydraulic Calculation Forms." Hydraulic calculations shall include a summary sheet, detailed work sheets, and a graph sheet. Hydraulic calculation reference nodes shall correspond to reference nodes on the Shop Drawings. Hydraulic calculations shall be signed and stamped a registered Fire Protection Engineer currently licensed in the State of Washington or state licensed fire sprinkler designer (NICET Level 3 minimum).
4. Shop Drawings: Shop Drawings shall be prepared in accordance with NFPA 13, identified as "Working Plans." Scale of working plans shall be 1/8 inch equals 1 foot (or larger). Working plans shall show sections, diagrams, hydraulic reference points, sprinkler heads, piping, hangers, bracing and supports, earthquake protection, couplings, pipe sizes, pipe lengths, control valves, and other equipment to be used as required to meet requirements of NFPA, International Building Code, and the Port of Seattle Standards. The Shop Drawings shall show sprinkler head layout coordinated with reflected ceiling plan, lights, speakers, grilles, diffusers, and other ceiling mounted devices. In existing remodeled areas, field verify existing piping and indicate the existing and new piping on the Shop Drawings. Submit a site plan with underground piping hydraulic reference points, available water supply, hydrants, and fire department connections.] Shop Drawings shall be prepared by a registered Fire Protection Engineer currently licensed in the State of Washington or state licensed fire sprinkler designer (NICET Level 3 minimum). Shop Drawings shall be prepared on AutoCAD Version 2009 or later.

5. Seismic restraint submittal and calculations must be designed and stamped by a licensed Washington State Professional Structural Engineer. Calculations shall utilize an importance factor of 1.5 for Life Safety Systems and 1.0 for others. Restraint detail submittals shall indicate loads imparted to the structure and be approved by the structural engineer prior to installations.
6. Approvals:
  - a. For purposes of code compliance, the Authority Having Jurisdiction shall be the Port Fire Department.
  - b. Submit Product Data, hydraulic calculations, and Shop Drawings, prepared as described above, to the Port of Seattle Representative for Port of Seattle's approval.
    - 1) Also submit reflected ceiling plans showing the location of sprinkler heads for Port of Seattle's approval. Sprinkler heads shall be centered in the ceiling tiles and between light fixtures. This symmetrical pattern may require additional sprinkler heads as compared to NFPA requirements.
    - 2) Also submit one sample of each type of sprinkler head and escutcheon for Port of Seattle's approval.
  - c. After receiving approval from the Port of Seattle's, submit Product Data, hydraulic calculations, and Shop Drawings to both the Building Department and the Fire Department. Submit one set of submittal documents to the Building Department and two sets to the Fire Department. Submit the Architect's notification letter per 2009 International Building Code section 107.3.4.2 to the Authorities Having Jurisdiction with the Product Data, hydraulic calculations, and Shop Drawings. There shall be no extras to the Contract for any changes necessary for this approval.
  - d. No Work shall be started until Product Data, hydraulic calculations, Shop Drawings, reflected ceiling plans, and Samples have been approved by the Port of Seattle Representative and Product Data, hydraulic calculations, and Shop Drawings have been approved by the Fire Department.

- B. Certifications: Submit certifications of qualifications and satisfactory performance as follows:
1. Fire Sprinkler Subcontractor Qualifications: Contractor's license and sprinkler experience.
  2. Fire sprinkler designer's certificate of qualifications.
  3. Fire sprinkler permits.
  4. Overhead materials and testing certificates per NFPA 13.
  5. Welder qualifications and procedures.
  6. Disinfection as required.
  7. Certificates of approval from the Authorities Having Jurisdiction.
- C. Record Drawings: A set of working drawings shall be "red-lined" daily during construction to reflect progress and the accurate as-built record condition. Submit reproducible drawings reflecting "red-lines" and the "red-lined" drawings to the Architect as part of the Operations and Maintenance Manual.
- D. AutoCAD (scaled) drawings, details and in accordance with NFPA 13, with additional requirements in this standard and per POS Fire Department requirements.
- E. Operations and Maintenance Manual: Submit an operations and maintenance manual which shall address specified equipment and materials provided by the Contractor. Manual shall have tabbed sections of the following:
1. Aboveground pipe, fittings, supports, and firestopping.
  2. Sprinkler heads, valves, switches, etc.
  3. Fire pump, controller, and appurtenances.
  4. Jockey pump, controller, and appurtenances.
  5. Test certificates, certifications, and warranties.
  6. Applicable portions of NFPA 25.
  7. Record drawings and calculations.

#### **1.05 SYSTEM DESIGN**

- A. Coordinate fire sprinkler design with Port of Seattle Fire Department. For purposes of Code compliance, Port of Seattle Fire Department shall be the Authority Having Jurisdiction (AHJ).
- B. The fire protection systems can be fully engineered for the contract bid or issued as a design bid system. In the case of design bid, the riser locations, fire flow and pressure, mains (3" and larger), and areas to be designed and installed shall be shown on the contract drawings.

- C. The spacing of sprinklers shall not exceed 130 square feet per sprinkler for ordinary hazard areas. Where the design basis is for a light hazard system, the sprinkler spacing shall not exceed 168 square feet.
- D. In multi-level buildings a floor control valve and drain assembly shall be provided for every floor including penthouses. The floor control assembly shall be detailed and shown on the contract documents.
- E. The contract documents for every new project and renovation shall include a complete riser diagram and shall show riser locations, main header location with details, and Fire Department connection (FDC) location. All mains 3" and larger shall be identified and coordinated on drawings. Fire protection design areas shall be designated for the Fire Protection Engineer to design (Drawings shall indicate areas for bid purposes). Each floor of a multi-story building shall be shown on the riser diagram.
- F. The Architect, the Project Manager and the Port of Seattle Fire Chief (or his designee), shall together determine the type of sprinkler head to be used in areas with finished ceilings. Refer to sprinkler head manufacturer and models allowed in the Part 2, Products section.
- G. A post indicator valve (PIV) shall be reviewed for every new-sprinklered building. The PIV should be located at least 40-feet from the building, shown on the contract documents, and shall be a minimum 6-inch valve. All piping between the PIV and the building including the double-check backflow preventer shall be shown on the contract documents.
- H. Every new sprinkler system shall include a double-check backflow preventer. Existing buildings being extensively remodeled or renovated (total contract cost of renovation in excess of \$150,000.00), with existing sprinkler system not already having a PIV or double-check backflow preventer shall have these items added to the system. Double-check backflow preventers shall be installed above grade in the position approved for use (Horizontal or vertical).
- I. Aircraft Fueling Areas: Aircraft fueling areas shall be designed such that aircraft may be parked entirely within the lease boundary lines. Aircraft fueling areas used for aircraft maintenance or aircraft fueling will be designed with electrical grounding points for dissipation of static electricity and spaced to accommodate every method of fueling employed. All aircraft fueling shall occur in areas tributary to the Industrial Waste System (IWS). Fueling is prohibited in areas, which discharge to the Storm Drainage System.



- J. Fuel Systems: All work and materials for fuel systems must meet the requirements of the IFC, regulations of the NFPA and the American Petroleum Institute. Fuel systems that may be encountered include aircraft, diesel, gasoline, CNG, LPG, and other. Project specific details shall be discussed and coordinated with the Fire Department, Aviation Facilities & Infrastructure, and Aviation maintenance prior to completing design.
- K. Standpipes: Standpipe systems and hose connections shall be provided for all airport terminal buildings in excess of two stories (35 ft.) in height or 200-feet in shortest horizontal dimension. Such standpipe and hose system shall be Class III systems installed in accordance with NFPA 14, Standard for the Installation of Standpipe and Hose Systems (UBC 905 and Ref Std. 35).
- L. Portable Fire Extinguishers: Portable fire extinguishers shall be provided throughout the airport terminal buildings in accordance with NFPA 10, Standard for Portable Fire Extinguishers (IBC 906).
- M. Hydrants: Fire hydrants shall be provided on both the ramp and street sides of airport terminal buildings. Such hydrants shall be located at an approximate interval of every 300-feet.
- N. Design for New Systems and Design for Existing Systems:
1. All areas of the building are to be fully sprinklered, including any areas above ceilings or any voids required to formally meet requirements of NFPA, IBC, Factory Mutual and Port of Seattle Fire Department.
  2. Design and provide complete fire protection systems as specified and in accordance with NFPA 13 and 14 and applicable codes, standards, and regulations modifications and additions to the existing wet pipe sprinkler system as specified, as required to suit new floor plans, in accordance NFPA 13 and applicable codes, standards, and regulations and as required by the Port of Seattle Fire Department and as restricted by this standard. Extend piping to areas shown on Drawings from the existing sprinkler system. The sprinkler system shall hydraulically satisfy both code requirements and the requirements in this Section. Sprinkler systems shall be hydraulically designed in accordance with the following design criteria.
  3. New Buildings: The design for new buildings will be based on hydraulically calculated system as follows:
    - a. Ticketing, Offices, General Public Areas, Concourses, Satellites:
      - 1) 0.15 gpm per square foot over most remote 2,200 sq. ft.
      - 2) Head Spacing: 130 sq. ft per head maximum.
      - 3) 1/2-inch orifice sprinkler heads rated at 165 F.



- b. Non-Public Ramp Level Area:
  - 1) 0.25 gpm per square foot over most remote 2,500 sq. ft.
  - 2) Head Spacing: 100 sq. ft per head maximum.
  - 3) 1/2-inch orifice upright sprinkler heads rated at 212 F.
- c. Baggage Claim:
  - 1) 0.15 gpm per sq. ft. over most remote 2,000 sq. ft.
  - 2) Head Spacing: 130 sq. ft per head maximum.
  - 3) 1/2-inch orifice sprinkler heads rated at 165 F.
- d. Boiler and Chiller Rooms:
  - 1) 0.25 gpm per sq. ft. over most remote 3,000 sq. ft.
  - 2) Head Spacing: 100 sq. ft per head maximum.
  - 3) 1/2-inch orifice upright sprinkler heads rated at 286 F.
- e. Mechanical Rooms:
  - 1) 0.20 gpm per sq. ft. over most remote 2,000 sq. ft.
  - 2) Head Spacing: 100 sq. ft per head maximum.
  - 3) 1/2-inch orifice upright sprinkler heads rated at 286 F.
- f. Equipment Storage Rooms:
  - 1) 0.20 gpm per sq. ft. over most remote 2,500 sq. ft.
  - 2) Head Spacing: 100 sq. ft per head maximum.
  - 3) 1/2-inch orifice upright sprinkler heads rated at 286 F.
- g. Electrical Rooms:
  - 1) 0.20 gpm per sq. ft. over most remote 2,000 sq. ft.
  - 2) Head Spacing: 100 sq. ft per head maximum.
  - 3) 1/2-inch orifice upright sprinkler heads rated at 212 F.
- 4. Existing Buildings: The design for existing buildings will be based on hydraulically calculated system as follows:
  - a. Existing building or areas currently not sprinklered: Provide sprinkler system in accordance with new buildings design parameters.
  - b. Existing building remodel, currently sprinklered: Provide sprinkler system to match the basis for the existing system wherever possible.
- 5. Air Handling Units (installed with pre-filters, final filters, or gas phase filters):
  - a. Units 15-feet in width or less: Three sprinkler (dry) heads located at centerline of unit, one upstream of pre-filter and final filter, one upstream of gas phase filter and one downstream of gas phase filter.

- b. Units greater than 15-feet in width: Six sprinkler (dry) heads located at centerline of unit, equally spaced, two upstream of pre-filter and final filter, two upstream of gas phase filter and two downstream of gas phase filter.
6. A 500 gpm hose allowance shall be added to the base of each riser demands.
7. Obtain latest water supply engineering test data prior to design. The proposed sprinkler system demand must be 10-percent or 10 psi (whichever is greater) below the water supply curve. Contact Port of Seattle Fire Department 206-433-4650 for water supply information.
8. Sprinklers and piping smaller than three inches should not (in general), be shown on the A/E documents except where the head or pipe layout in the ceiling is critical, the pipe is exposed in finished spaces or where the ceiling spaces are limited requiring careful coordination by the A/E and the construction trades. Where heads or piping is shown on the drawings, notes shall be included to install the system per applicable codes and specifications. Exposed piping elevations shall be shown.
9. Existing piping shall be shown for the complete system on the A/E drawings with elevation, pressure and supply connections etc. per NFPA 13 for new work connecting to existing systems on remodel projects.
10. Earthquake bracing for the sprinkler systems shall be designed in accordance with FM Global Data Sheets 2-0 "Installation Guidelines for Automatic Sprinklers" and 2-8, "Earthquake Protection for Water-Based Fire Protection Systems." Earthquake bracing design calculations are to be submitted to the Port of Seattle for review and approval.
11. Precautions Against Freezing: In general, sprinkler systems with more than six heads subjected to freezing conditions shall be provided with independent dry type sprinkler protection system. Provide dry pendent or sidewall heads for sprinkler system with six or less sprinkler heads subjected to freezing conditions with wet piping in heated space. Heat tape is not permitted.
12. Where spaces have sloped ceilings as defined in NFPA 13, the hydraulic remote area for that space specified in this Specification shall be increased by 30 percent in addition to other required remote area increases.
13. Where other requirements from code or the Fire Department is more stringent than these requirements, the more restrictive requirements shall be followed.

14. Provide guards where clear height under sprinkler head is less than 7'-0."
15. Testing: Test piping systems to 150 psi and base results on NFPA (any allowed leakage).
16. Contractor is responsible to review system requirements, including any special or unusual requirements, with the Port of Seattle Fire Department and Facilities and Infrastructure during the bid period.

**1.06 QUALITY ASSURANCE**

- A. Fire Sprinkler Subcontractor Qualifications: The fire sprinkler subcontractor shall be licensed in the State of Washington and regularly engaged in the installation of automatic sprinkler equipment as listed by UL or other nationally recognized testing laboratories. The site sprinkler foreman shall have at least 6 years full-time sprinkler experience with an aggregate crew experience average of 4 years.
- B. The Port of Seattle Representative's and the Fire Marshal's approval shall not relieve the Contractor from his responsibilities to perform Work in accordance with the Contract Documents.

**PART 2 - PRODUCTS**

**2.01 COMPONENT LISTING AND RATINGS**

All fire suppression components furnished under this Section shall be UL listed in the UL Fire Protection Equipment Directory and FM approved in the FM Approval Guide for fire suppression use. Components shall be new and rated for a working pressure of 175 psig unless required to be higher by the fire marshal.

**2.02 PIPING**

- A. Shop drawings shall clearly show the type of pipe and fitting intended for use at all locations.
- B. Below Grade Piping shall be Standard AWWA C151 with AWWA C111 rubber jacketed joints. Piping below grade shall be dielectrically separated from bedding material and be wrapped with ASME C105 polyethylene jacket or double layer half lapped 10 mil polyethylene tape. Schedule 10, 20, 30 and flow piping are not allowed at Port of Seattle Aviation Facilities.
- C. Below Grade Fittings shall be Standard AWWA C110 or steel in accordance with ASME B16.9 welded or cast iron in accordance with ASME 16.1 flanged. Joints shall be AWWA C111, rubber gasketed. Fittings below grade shall include polyethylene jacket with heat shrink sleeves. Thrust restraint for

below grade fittings shall be concrete thrust blocks and shackles or as approved by Aviation Facilities & Infrastructure. Thrust restraints shall be shown on the drawings and engineered in the contract documents or designed and approved by the design team. Mechanical Grooved Couplings are not allowed below grade.

- D. Above Grade Piping 4" and under shall be steel Schedule 40 ASTM A53 seamless or ERW. Piping over 4" shall be Standard Schedule ASTM A53 seamless or ERW. Schedule 10, 20, 30 and flow piping are not allowed at Port of Seattle Aviation facilities. Provide galvanized piping per ASTM A123 and fittings for all dry systems, deluge system, and systems installed in unconditioned spaces. Dry pipe fittings with welds shall have all welds epoxy primed. All systems installed outdoors shall be painted including piping, joints, fittings, couplings, hangers, and appurtenances. Paint to match color of surroundings and. Flexible type piping or adjustable type drop nipples located on branches for the purpose of sprinkler head installation is not allowed.
- E. Above Grade Fittings shall be steel in accordance with ASME B16.9 welded, B16.25 welded, B16.5 flanged, B16.11 welded/threaded, ASTM A234 welded, cast iron in accordance with ASME 16.1 flanged, ductile iron in accordance with ASTM A536 grooved, or malleable iron in accordance with ASME B16.3 threaded per ASTM A47. Fittings to be standard pattern flow type or short pattern with flow characteristics equal to standard pattern. Fittings above grade shall be actual elbows, tees, reducers, etc... Coupling reducers, coupling tees, or mechanical tees are not allowed. Plain end fittings or drain elbows are not allowed.
- F. Couplings shall consist of two standard weight ASTM A536, Grade 65-45-12 ductile iron housings, and pressure responsive EPDM or nitrile gasket for service temperatures of -20 deg F to 180 deg F minimum, and ASTM A183 Grade 2 zinc-electroplated steel bolts and nuts conforming to ASTM A563. Rigid couplings to be utilized that are in conformance with ANSI B31.1 and allow for working pressures up to 750 psi when used on standard roll or cut grooved pipe. Flexible couplings to be utilized in vibration transmission applications or seismic. Flexible couplings shall not be used in place of expansion joints. Flange adapters to comply with type of grooved system utilized. All dry type systems shall utilize flushseal type gaskets.
- G. Weld-o-lets, thread-o-lets, or actual tees with mechanical couplings are the only connections allowed at pipe connections where more than two connections are required (tees/crosses). Coupling tees and mechanical tees are not allowed. Existing systems shall be drained and temporary fire watch

coordinated/provided prior to embarking upon work. Standard Port of Seattle shut-down procedures shall be followed.

H. In-Air grooving is not allowed.

### **2.03 SEISMIC LOOPS**

- A. Seismic loops shall be UL Listed flexible expansion loops for fire sprinkler applications.
- B. Flexible loops shall impart no thrust loads to system support anchors or building structure. Loops shall be located at, or near, the building seismic joint. A vertical support hanger, located within 4 pipe diameters, shall be installed on each side of the flexible loop. Each hanger shall be transversely and longitudinally braced per local codes. Seismic bracing shall not pass through building seismic joint and shall not connect or tie together different sides or parts of building structure. Flexible loops shall be capable of movement in the plus or minus X, plus or minus Y, and plus or minus Z planes. Flexible loop connections to sprinkler piping shall be installed, inspected, and tested in accordance with current NFPA 13.
- C. Flexible loops shall consist of two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return. Loops shall include a factory supplied, center support nut located at the bottom of the 180 degree return, and a drain/air release plug. Materials of construction shall be stainless steel hose and braid with Schedule 40 black steel fittings with threaded end connections for pipe 1-1/2 inches and smaller, threaded or grooved end connections for pipe 2 inch, and with grooved end connections for pipe 2-1/2 inches and larger.

### **2.04 HANGERS**

Hangers to be per NFPA 13, Chapter 9 (with following exceptions) and be UL listed and FM approved. Side beam clamps shall be tandem with channel support. Single side beam clamps not allowed. U hooks are not allowed for longitudinal bracing. All hanger systems to be approved by a structural engineer licensed in Washington State. Pipes are not to be used for support of systems, including substitution for channel. Pipe supports typically to be clevis, malleable iron type, or strut systems, pipe used as a support not allowed.

### **2.05 VALVES (GENERAL)**

Cast or ductile iron gate valve, outside screw and yoke (OS&Y), bronze mounted, 250 psi rated working pressure, double disc, parallel seats, grooved or flanged

ends. Valve shall be equipped with FM & UL approved tamper switch. Refer to valve standard for other valves (ie ball valves). All fire valves to be UL listed and FM approved for fire service.

**2.06 CHECK VALVE**

Ductile iron body swing check valve, stainless or bronze trimmed, 250 psi rated working pressure, suitable for vertical or horizontal position.

**2.07 ALARM CHECK VALVE**

Cast or ductile iron water flow alarm check valve, 225 psi rated working pressure, grooved or flanged ends. The valve internal components shall be replaceable without removing the valve from the installed position.

**2.08 WATERFLOW DETECTOR**

- A. Wet Pipe System: Pressure type, 2 SPDT, form C contacts; System sensor Model EPS10-2.
- B. Wet Pipe System (Remote Riser and Floor): Vane type, 2 SPDT, form C contacts; System sensor Model WFD.
- C. Dry Pipe System: Pressure type, 2 SPDT, form C contacts; System sensor Model EPS10-2.

**2.09 SUPERVISORY SWITCHES**

- A. UL Listed, FM approved, and conforming to NFPA 72.
- B. Valves: System Sensor Model OSY2, PIBV2.
- C. High/Low Air Supervisory Switch (at each dry valve assembly): System Sensor Model EPS40-2. Wet Pipe System: Pressure type, 2 SPDT, form C contacts; System sensor Model EPS10-2.

**2.10 DRY PIPE VALVE**

Cast or ductile iron, low-differential type, 300 psi rated working pressure, grooved or flanged ends. The valve internal components shall be replaceable without removing the valve from the installed position. The valve shall be externally resettable and initially set at 13 psi minimum.

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**2.11 DRY STANDPIPE SYSTEM**

- A. Hose Valves: Provide 2-1/2 inch hose valves with a chrome finish; Potter-Roemer 4065 or equal. Threads shall match fire department requirements. The cap is to have a 1/8 inch diameter hole drilled in the face to relieve any water pressure.
- B. Exterior Hose Valve Supply Valves: Provide an additional non rising stem control valve for roof and outside wall mounted hose connections. Provide model with an extended valve control stem to provide freeze protection of piping. Provide galvanized steel wall plate and red handwheel.

**2.12 PRE-ACTION VALVE**

- A. Valve shall be operated by a detection system. Pre-action valve clappers shall incorporate a latching mechanism that shall not be affected by pressure changes in the water system. In addition to automatic operation, arrange each valve for manual release at the valve. Provide pressure gages and other appurtenances at the pre-action valve.
  - 1. Provide a pre-action valve releasing panel to control the pre-action valve. Each valve shall be opened on a signal from its detection system.
  - 2. Alarm outputs from the pre-action valve releasing panel and the low pressure switch shall be connected to the building fire alarm system.
  - 3. Provide a shutoff valve with a tamper switch at each riser assembly.

**2.13 DELUGE VALVE**

- A. Valve shall be operated by a detection system. Deluge valve clappers shall incorporate a latching mechanism that shall not be affected by pressure changes in the water system. In addition to automatic operation, arrange each valve for manual release at the valve. Provide pressure gages and other appurtenances at the deluge valves.
- B. Provide a deluge valve releasing panel to control the deluge valve. Each valve will be opened on a signal from its detection system.
- C. Alarm outputs from the deluge valve releasing panel and the low pressure switch shall be connected to the building fire alarm system.
- D. Provide a shutoff valve with a tamper switch at each riser assembly.



**2.14      ALARM BELL**

10-inch diameter, Red 24 VDC, System Sensor Model SSM, Viking, Reliable, or approved equal.

**2.15      AUTOMATIC BALL DRIP VALVES**

Bronze body and ball: Designed to drain water (leak) in open position and to close when flow of water exceeds 4 through 10 gallons per minute; 175 psi rated working pressure.

**2.16      SPRINKLER HEADS**

A. Location, Type, and Finish:

1. Wet Sprinkler System:

- a. UL listed and FM approved for use intended; pendant, upright, and sidewall types, quick response heads. Temperature ratings shall be per NFPA 13 and design criteria. Reliable F1FR(wet)/F3QR (Dry) or Viking Microfast series/QREC.
- b. Finished Areas: Recessed sprinkler, 1/2-inch orifice, pendent deflector, recessed cup, chrome finished.
- c. Finished Areas with limited clearance: Concealed.
- d. Unfinished Areas, Ceiling Spaces, and Mechanical Rooms: Upright or pendent, 1/2-inch orifice, plain brass finish, deflector.
- e. Unheated Areas subjected to Freezing (supplied from Wet Pipe Sprinkler System): Dry pendent or sidewall, 1/2-inch orifice, chrome finish.
- f. Dry System Sprinklers: Upright or sidewall, 1/2-inch orifice, chrome finish.
- g. Cages shall be provided in all low clearance (below 10') unfinished areas including all baggage conveyor areas.
- h. Deluge System: Viking spray nozzle, Model D-2, K=4.7, 60 degree pattern.
- i. Deluge Window Sprinklers: Open window sprinkler, 1/2 inch orifice, K=7.0; bronze finish.

B. Extra Heads: Provide a sprinkler head cabinet complete with extra sprinkler heads and one head wrench for each type of sprinkler head. The number and types of extra sprinklers shall be as specified in NFPA 13. Mount cabinet where directed by the Port of Seattle Representative.

- C. Provide sprinkler head guards where head clearance is less than 10 feet unfinished areas including all baggage conveyor areas.

**2.17 DOUBLE CHECK VALVE ASSEMBLY**

- A. Two internally loaded approved one-piece, cast iron body check valves, 175 psi rated working pressure, flanged ends, low pressure loss, installed as a unit between two gate valves, bronze tin plated seats, stainless steel shafts, bronze clapper arm. Hersey, Watts, Cla Val, Febco as approved for installation by State DOH.
- B. Install as specified and shown, with adequate space for servicing and maintenance or as directed by the Port of Seattle.

**2.18 DETECTOR CHECK ASSEMBLY**

- A. One-piece, cast iron body check valve and meter assembly, 175 psi rated working pressure, flanged ends, low pressure loss, meter in bypass with check and gate valve, bronze tin plated seats, stainless steel shafts, bronze clapper arm. Watts, Hersey, Cla Val or Febco as approved for installation by WA State DOH.
- B. Install in approved vault or otherwise as specified, shown, or as directed by the water purveyor.

**2.19 ESCUTCHEONS**

Flanged steel, hinged, with set screws, nickel-plated finish. Escutcheons shall be listed, supplied, and approved for use with the sprinkler.

**2.20 PRESSURE GAGES**

3-1/2-inch diameter, dial face, phosphor bronze bourbon type, steel or brass case, glass lenses, 0-300 psi range. UL listed and FM approved.

**2.21 IDENTIFICATION SIGNS**

Drain valves, test valves, control valves and alarm valves shall be fitted with approved enameled signs indicating their use. Signage shall be in accordance with NFPA 13.

**2.22 FIRE DEPARTMENT CONNECTION**

- A. Fire Department Connections shall be in accordance with Port of Seattle Fire Department Standards. Pumper connections or wall hydrants shall be installed no less than 28-inches, nor more than 38-inches above the surrounding grade

unless otherwise directed by Owner's representative. (Contractor shall coordinate with Owner's representative prior to installation).

- B. Pumper Connection: Full Size Storz valve and pipe per in accordance with Port of Seattle Fire Department requirements; 2 1/2 x 2 1/2 x 4 inches; dust caps and chains; brass finish; two individual clappers; lettered AUTO SPKR.
- C. Wall Hydrants: Full Size Storz valve and pipe per Port of Seattle Fire Department requirements; 2 1/2 x 2 1/2 x 4 inches; dust caps and chains; brass finish; plate lettered WALL HYDRANT.
- D. Fire Department large Stortz Connection: valve and pipe in accordance with Port of Seattle Fire Department requirements; 6 "x 5" inches; cast brass escutcheon plate , hard coated aluminum stortz cap with attachment cable; aluminum finish; lettered FIRE DEPT. CONN.

## **2.23 AIR COMPRESSOR**

- A. Provide oilless, automatic type, tank mounted, air compressor including pressure switch, air piping, and tank.
- B. Compressor shall have a minimum capacity capable of charging the complete sprinkler system to normal system air pressure within 30 minutes and within 15 minutes for the pre-action system pneumatic detection system. Provide an approved automatic air maintenance device for each system.

## **2.24 AIR PIPING**

Piping and valves shall be the same as specified for sprinkler piping. Suitable drips with automatic drain valves shall be provided on the low points of the compressed air mains. Compressed air mains shall pitch not less than 1/8 inch per foot toward the drips.

END OF SECTION