

**SECTION 21 05 11**  
**COMMON WORK RESULTS FOR FIRE SUPPRESSION**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. The requirements of this Section apply to all sections of Division 21.
- B. Definitions:
  - 1. Exposed: Piping and equipment exposed to view in finished rooms.

**1.2 RELATED WORK**

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Building Components for Attachment of Hangers: Section 05 31 00, STEEL DECKING.
- D. Section 07 92 00, JOINT SEALANTS.
- E. Section 09 91 00, PAINTING.
- F. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

**1.3 QUALITY ASSURANCE**

- A. Products Criteria:
  - 1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See other specification sections for any exceptions.
  - 2. Equipment Service: Products shall be supported by a service organization which maintains a complete inventory of repair parts and is located reasonably close to the site.
  - 3. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
  - 4. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
  - 5. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
  - 6. Asbestos products or equipment or materials containing asbestos shall not be used.
- B. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of

these recommendations shall be furnished to the Resident Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

C. Guaranty: In GENERAL CONDITIONS.

D. Extended Guarantee Period Services:

1. Qualifications: All service technicians assigned to perform work under this contract shall be qualified and factory trained by the Original Equipment Manufacturer (O.E.M.). Each technician shall have at least three years experience of working on comparable systems and shall be a full time employee of the contractor. The contractor shall furnish, for the Department of Veterans Affairs (VA) review and approval, resumes of all service technicians scheduled to service the equipment and systems. The resume shall include details of experience, training, and educational qualifications and performance evaluations.
2. Replacement Parts: The contractor shall be equipped with all replacement parts of all equipment and systems to be serviced and the manufacturer's standard service and repair procedures. All replacement parts shall be brand new and of current design. The replacement parts shall be O.E.M. items. Obsolete or refurbished parts are unacceptable. "Approved Equal" parts must have prior approval of the Contracting Officer. Contractor shall furnish evidence of guaranteed supply of parts for the life of the system.
3. Service Supplies: The services shall include, without any additional cost to the government, all replacement parts, special tools and equipment, and consumable materials, that is, lubrication oil, grease, and cleaning materials, as required. The requirement of UL listing, where applicable, shall not be voided by any replacement parts, components, software, or modifications provided by the contractor.
4. Scheduled and Emergency Call Service: The service shall include a scheduled monthly visit to perform systematic examination of equipment and/or systems and a 7 day, 24 hours call back service for emergency service. The emergency service is defined as a situation created by a breakdown or malfunction of any equipment or system warranting urgent attention. A qualified service representative shall respond to the VA request for emergency service within two hours and assess the problem either by telephone or remote diagnostic capability. If the emergency situation cannot be rectified by the VA

- personnel, on site emergency service shall be provided by sending a qualified service representative within 24 hours. For the rural locations of the VA medical centers, situated over 200 miles from the contractor's established service depot, the maximum response time of 48 hours shall be acceptable. The emergency service shall be limited to adjustments and repairs specifically required to protect the safety of the equipment for which the emergency service was required to be performed.
5. Licensing: The contractor shall be licensed to perform the contracted services. The contractor shall furnish details of all applicable local and state licensing requirements to the VA as a part of the qualification requirements. The licenses shall be current, valid through the term of the contract and in the name of the contractor.
  6. Documentation Requirements: The contractor shall maintain a separate log for each item of equipment and each system covered under the extended guarantee period service contract with the VA Medical Center (VAMC) Engineering Service. The log shall list dates and times of all scheduled and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency, steps taken to rectify the situations, and specific recommendations to avoid such conditions in the future.
  7. Reports: The contractor shall provide a quarterly report for the first year and twice a year for the remainder of the guarantee period for all equipment and systems serviced under the extended guarantee period contract. The report shall clearly and concisely describe the services rendered, parts replaced, and repairs performed. The report shall prescribe anticipated future needs of the equipment and systems for preventive and predictive maintenance.
  8. Quality Program: The contractor shall provide a description of the quality management and control program. The description shall include a tangible proof the existence of such program, names of at least three customers who have participated in the program, and specific information showing the applicability of program to the project.
  9. Training: During each scheduled service visit, the contractor shall actively involve the VAMC maintenance personnel in performing scheduled service and associated activities. The practical training during the scheduled service visits shall include parting oral and written instructions, for each specific task of the servicing contract, to the VAMC maintenance personnel who shall operate the hardware and software in accordance with the intent of the design and

under direct supervision of the service contractor's qualified service technician. At the end of the first year of the service contract, the contractor shall obtain a certificate from the VAMC Engineering Service confirming completion of training to the authorized VA representatives.

#### **1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Submit under the pertinent section rather than under this section.
  - 1. Equipment and materials identification.
  - 2. Hangers, inserts, supports and bracing. Provide load calculations for variable spring and constant support hangers.
  - 3. Wall, floor, and ceiling plates.
- C. Coordination Drawings: Provide detailed layout drawings of all piping systems. Provide details of the following.
  - 1. Mechanical equipment rooms.
  - 2. Interstitial space.
  - 3. Hangers, inserts, supports, and bracing.
  - 4. Pipe sleeves.
  - 5. Equipment penetrations of floors, walls, ceilings, or roofs.
- D. Maintenance Data and Operating Instructions:
  - 1. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS, Article, INSTRUCTIONS, for systems and equipment.
  - 2. Provide a listing of recommended replacement parts for keeping in stock supply, including sources of supply, for equipment. Include in the listing belts for equipment.

#### **1.5 APPLICABLE PUBLICATIONS**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
  - A36/A36M-2001.....Carbon Structural Steel
  - A575-96.....Steel Bars, Carbon, Merchant Quality, M-Grades R  
(2002)
  - E84-2003.....Standard Test Method for Burning Characteristics  
of Building Materials

E119-2000.....Standard Test Method for Fire Tests of Building  
Construction and Materials

C. National Fire Protection Association (NFPA):

90A-96.....Installation of Air Conditioning and Ventilating  
Systems

101-97.....Life Safety Code

**PART 2 - PRODUCTS**

**2.1 LIFTING ATTACHMENTS**

Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

**2.2 EQUIPMENT AND MATERIALS IDENTIFICATION**

- A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings and shown in the maintenance manuals. Identification for piping is specified in Section 09 91 00, PAINTING.
- B. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 48 mm (3/16-inch) high of brass with black-filled letters, or rigid black plastic with white letters specified in Section 09 91 00, PAINTING permanently fastened to the equipment. Identify unit components such as coils, filters, fans, etc.
- D. Control Items: Label all temperature and humidity sensors, controllers and control dampers. Identify and label each item as they appear on the control diagrams.
- E. Valve Tags and Lists:
  - 1. Valve tags: Engraved black filled numbers and letters not less than 13 mm (1/2-inch) high for number designation, and not less than 6.4 mm(1/4-inch) for service designation on 19 gage 38 mm (1-1/2 inches) round brass disc, attached with brass "S" hook or brass chain.
  - 2. Valve lists: Typed or printed plastic coated card(s), sized 216 mm (8-1/2 inches) by 280 mm (11 inches) showing tag number, valve function and area of control, for each service or system. Punch sheets for a 3-ring notebook.

**2.3 GALVANIZED REPAIR COMPOUND**

Mil. Spec. DOD-P-21035B, paint form.

**2.4 PIPE PENETRATIONS**

- A. Install sleeves during construction for other than blocked out floor openings for risers in mechanical bays.

- B. Penetrations are not allowed through beams or ribs, but may be installed in concrete beam flanges. Any deviation from this requirement must receive prior approval of Resident Engineer.
- C. Sheet Metal, Plastic, or Moisture-resistant Fiber Sleeves: Provide for pipe passing through floors, interior walls, and partitions, unless brass or steel pipe sleeves are specifically called for below.
- D. Cast Iron or Zinc Coated Pipe Sleeves: Provide for pipe passing through exterior walls below grade. Make space between sleeve and pipe watertight with a modular or link rubber seal. Seal shall be applied at both ends of sleeve.
- E. Galvanized Steel or an alternate Black Iron Pipe with asphalt coating Sleeves: Provide for pipe passing through concrete beam flanges, except where brass pipe sleeves are called for. Provide sleeve for pipe passing through floor of mechanical rooms, laundry work rooms, and animal rooms above basement. Except in mechanical rooms, connect sleeve with floor plate.
- F. Brass Pipe Sleeves: Provide for pipe passing through quarry tile, terrazzo or ceramic tile floors. Connect sleeve with floor plate.
- G. Sleeves are not required for wall hydrants for fire department connections or in drywall construction.
- H. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation. Interior openings shall be caulked tight with fire stopping material and sealant to prevent the spread of fire, smoke, and gases.
- I. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS.

## **2.5 TOOLS AND LUBRICANTS**

- A. Furnish, and turn over to the Resident Engineer, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Grease Guns with Attachments for Applicable Fittings: One for each type of grease required for each motor or other equipment.
- C. Tool Containers: Hardwood or metal, permanently identified for intended service and mounted, or located, where directed by the Resident Engineer.
- D. Lubricants: A minimum of 0.95 L (one quart) of oil, and 0.45 kg (one pound) of grease, of equipment manufacturer's recommended grade and

type, in unopened containers and properly identified as to use for each different application.

## **2.6 WALL, FLOOR AND CEILING PLATES**

- A. Material and Type: Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve. Use plates that fit tight around pipes, cover openings around pipes and cover the entire pipe sleeve projection.
- B. Thickness: Not less than 2.4 mm (3/32-inch) for floor plates. For wall and ceiling plates, not less than 0.64 mm (0.025-inch) for up to 80 mm (3-inch pipe), 0.89 mm (0.035-inch) for larger pipe.
- C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, in finished areas only. Use also where insulation ends on exposed water supply pipe drop from overhead. Provide a watertight joint in spaces where brass or steel pipe sleeves are specified.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Coordinate location of piping, sleeves, inserts, hangers, and equipment. Locate piping, sleeves, inserts, hangers, and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.
- B. Protection and Cleaning:
  - 1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Resident Engineer. Damaged or defective items, in the opinion of the Resident Engineer, shall be replaced.
  - 2. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly exposed materials and equipment.
- C. Concrete and Grout: Use concrete and shrink compensating grout 25 MPa (3000 psi) minimum, specified in Section 03 30 00, CAST-IN-PLACE CONCRETE.
- D. Install gages, valves, and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position

gages to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

H. Inaccessible Equipment:

1. Where the Government determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Government.
2. The term "conveniently accessible" is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

**3.4 STARTUP AND TEMPORARY OPERATION**

Start up equipment as described in equipment specifications. Verify that vibration is within specified tolerance prior to extended operation. Temporary use of equipment is specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT.

**3.5 OPERATING AND PERFORMANCE TESTS**

- A. Prior to the final inspection, perform required tests as specified in Section 01 00 00, GENERAL REQUIREMENTS, Article, TESTS and submit the test reports and records to the Resident Engineer.
- B. Should evidence of malfunction in any tested system, or piece of equipment or component part thereof, occur during or as a result of tests, make proper corrections, repairs or replacements, and repeat tests at no additional cost to the Government.
- C. When completion of certain work or system occurs at a time when final control settings and adjustments cannot be properly made to make performance tests, then make performance tests for heating systems and for cooling systems respectively during first actual seasonal use of respective systems following completion of work.

**3.6 INSTRUCTIONS TO VA PERSONNEL**

Provide in accordance with Article, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.

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**SECTION 21 08 00**  
**COMMISSIONING OF FIRE SUPPRESSION SYSTEMS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. The requirements of this Section apply to all sections of Division 21.
- B. This project will have selected building systems commissioned. The complete list of equipment and systems to be commissioned is specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. The commissioning process, which the Contractor is responsible to execute, is defined in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS. A Commissioning Agent (CxA) appointed by the VA will manage the commissioning process.

**1.2 RELATED WORK**

- A. Section 01 00 00 GENERAL REQUIREMENTS.
- B. Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
- C. Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

**1.3 SUMMARY**

- A. This Section includes requirements for commissioning the Fire Suppression systems, subsystems and equipment. This Section supplements the general requirements specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.
- B. The commissioning activities have been developed to support the United States Green Building Council (USGBC) LEED™ rating program and to support delivery of project performance in accordance with the Contract Documents developed with the approval of the VA.
  - 1. Commissioning activities and documentation for the LEED™ section on "Energy and Atmosphere" prerequisite of "Fundamental Building Systems Commissioning".
  - 2. Commissioning activities and documentation for the LEED™ section on "Energy and Atmosphere" requirements for the "Enhanced Building System Commissioning" credit.
  - 3. Activities and documentation for the LEED™ section on "Measurement and Verification" requirements for the Measurement and Verification credit.
- C. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for more details regarding processes and procedures as well as roles and responsibilities for all Commissioning Team members.

#### **1.4 DEFINITIONS**

- A. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for definitions.

#### **1.5 COMMISSIONED SYSTEMS**

- A. Commissioning of a system or systems specified in this Division is part of the construction process. Documentation and testing of these systems, as well as training of the VA's Operation and Maintenance personnel, is required in cooperation with the VA and the Commissioning Agent.
- B. The following Fire Suppression systems will be commissioned:
  - 1. Clean agent fire suppression.

#### **1.6 SUBMITTALS**

- A. The commissioning process requires review of selected Submittals. The Commissioning Agent will provide a list of submittals that will be reviewed by the Commissioning Agent. This list will be reviewed and approved by the VA prior to forwarding to the Contractor. Refer to Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, and SAMPLES for further details.
- B. The commissioning process requires Submittal review simultaneously with engineering review. Specific submittal requirements related to the commissioning process are specified in Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3- EXECUTION**

#### **3.1 PRE-FUNCTIONAL CHECKLISTS**

- A. The Contractor shall complete Pre-Functional Checklists to verify systems, subsystems, and equipment installation is complete and systems are ready for Systems Functional Performance Testing. The Commissioning Agent will prepare Pre-Functional Checklists to be used to document equipment installation. The Contractor shall complete the checklists. Completed checklists shall be submitted to the VA and to the Commissioning Agent for review. The Commissioning Agent may spot check a sample of completed checklists. If the Commissioning Agent determines that the information provided on the checklist is not accurate, the Commissioning Agent will return the marked-up checklist to the Contractor for correction and resubmission. If the Commissioning Agent determines that a significant number of completed checklists for similar equipment are not accurate, the Commissioning Agent will select a broader sample of checklists for review. If the Commissioning Agent determines that a

significant number of the broader sample of checklists is also inaccurate, all the checklists for the type of equipment will be returned to the Contractor for correction and resubmission. Refer to SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS for submittal requirements for Pre-Functional Checklists, Equipment Startup Reports, and other commissioning documents.

### **3.2 CONTRACTORS TESTS**

- A. Contractor tests as required by other sections of Division 21 shall be scheduled and documented in accordance with Section 01 00 00 GENERAL REQUIREMENTS. The Commissioning Agent will witness selected Contractor tests. Contractor tests shall be completed prior to scheduling Systems Functional Performance Testing.

### **3.3 SYSTEMS FUNCTIONAL PERFORMANCE TESTING:**

- A. The Commissioning Process includes Systems Functional Performance Testing that is intended to test systems functional performance under steady state conditions, to test system reaction to changes in operating conditions, and system performance under emergency conditions. The Commissioning Agent will prepare detailed Systems Functional Performance Test procedures for review and approval by the Resident Engineer. The Contractor shall review and comment on the tests prior to approval. The Contractor shall provide the required labor, materials, and test equipment identified in the test procedure to perform the tests. The Commissioning Agent will witness and document the testing. The Contractor shall sign the test reports to verify tests were performed. See Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS, for additional details.

### **3.4 TRAINING OF VA PERSONNEL**

- A. Training of the VA operation and maintenance personnel is required in cooperation with the Resident Engineer and Commissioning Agent. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the VA Resident Engineer after submission and approval of formal training plans. Refer to Section 01 91 00 GENERAL COMMISSIONING REQUIREMENTS and Division 21 Sections for additional Contractor training requirements.

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**SECTION 21 10 00**  
**CLEAN AGENT FIRE-SUPPRESSION SYSTEM**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. The design and installation of a clean agent FE-25 (HFC-125) automatic fire suppression system complete and ready for operation, for the Secure IT Room (123) and the Grave Locator Room (105) in the PIC/Administration Building.

**1.2 RELATED WORK**

- A. One 120 VAC power source for the SHP PRO suppression control panel (SCP). (20 amp dedicated fused circuit with lockout provided by electrician.)
- B. Power and control circuits for HVAC and dampers to be provided by electrician. The SHP PRO Control Panel shall provide necessary contacts to facilitate shutdowns.
- C. Tie-in to Building Fire Alarm System provided by Building Alarm Contractor or General Contractor. The SHP PRO Control Panel shall provide necessary Trouble and Alarm contacts to notify building alarm system.
- D. The General Contractor as needed shall provide automatic door closers, door sweeps and weather stripping.
- E. Sealing of openings, cracks and penetrations shall be provided by the General Contractor.

**1.3 DESIGN CRITERIA**

- A. The contractor shall furnish and install a Fike FE-25 Fire Suppression and Alarm System or equal complete and ready for operation, including charged storage containers, piping, nozzles, control panel, detectors, manual release stations, abort stations, audible and visual alarms, instructional signs, 24VDC wiring and any other equipment necessary for a complete, operational system.
- B. The system shall be installed by a Fike Factory Authorized contractor in accordance with manufacturer's guidelines and instructions in the installation of FE-25 Fire Suppression Systems.

**1.4 QUALIFICATIONS:**

- A. The installing contractor shall hold a State of Florida Class I Fire Protection license.

- B. The installing contractor shall hold a State of Florida Alarm System Contractor I (EF) license.
- C. The same Qualifier shall hold both the Fire Protection and Electrical licenses. Additionally, the Qualifier shall be NICET Level III Certified in Special Hazard Fire Protection Technology.
- D. The installing contractor must be regularly engaged in the design, installation, servicing and maintenance of Clean Agent Fire Suppression Systems. Said contractor shall show proof (upon request) of completion for projects of a similar size and nature.
- E. The installing contractor shall be an authorized, stocking and factory trained distributor of Fike Engineered FE-25 systems. A single contractor shall complete the entire system installation.  
Subcontracting either the mechanical or electrical portion of the installation shall NOT be accepted.

#### **1.5 SUBMITTALS**

- A. Submit as one package in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The following shall be submitted for approval prior to commencing installation:
  - 1. Fire Protection System Design Engineer of Record qualifications.
  - 2. Complete drawings showing system component locations, piping layout, electrical diagrams, elevations, notes and details.
  - 3. Manufacturer's data sheets on all components included in the system.
  - 4. UL listed hydraulic calculations for FE-25 system piping networks.
- C. Acceptable Manufacturers
  - 1. Fike Corporation, 704 South 10<sup>th</sup> Street, Blue Springs, MO. 64015
  - 2. Approved Equal

#### **1.6 AS-BUILT DOCUMENTATION**

- A. One copy of final CADD drawing files and PDFs shall be provided electronically for each drawing.
- B. PDF of Manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- C. Hydraulic calculations for each Clean Agent Fire Suppression system updated to include submittal review comments and any changes to the installation which affect the calculations including one electronic set in PDF format.

- D. PDF of operation and maintenance data updated to include submittal review comments and any equipment substitutions including one copy of NFPA 25.

#### **1.7 WARRANTY**

- A. All work performed and materials and equipment furnished under this contract shall be free from defects for a period of one year from date of acceptance by the government.
- B. All new piping and equipment incorporated into the new system shall be hydrostatically tested and warranted as new.

#### **1.8 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. National Fire Protection Association (NFPA)
  - 70-2011.....National Electrical Code
  - 72-2010.....National Fire Alarm Code
  - 2001 - 2012.....Standard on Clean Agent Fire Extinguishing Systems
- C. American Society for Testing and Materials (ASTM)
  - F442-09.....Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe
  - A53-06.....Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless
  - A197-2011.....Standard Specification for Cupola Malleable Iron
- D. Contractor shall provide all necessary test equipment, parts and labor to perform required maintenance.
- E. All inspections, testing and maintenance work required by 2001 NFPA 13 and recommended by the equipment manufacturer shall be provided. Work shall include operation of sprinkler system alarm and supervisory devices.
- F. Non-included Work: Maintenance service shall not include the performance of any work due to improper use, accidents or negligence for what the contractor is not responsible.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

All devices and equipment shall be Underwriters Laboratories Inc. listed for their intended purpose.

### **2.2 FIRE SUPPRESSION SYSTEM**

- A. The system shall be a total flooding FE-25 Fire Suppression System designed to provide a uniform concentration in the protected area(s).
- B. Each protected zone shall have its own FE-25 supply with nozzles and piping networks.
- C. The FE-25 system shall utilize central storage container(s) super pressurized with nitrogen to 360 PSI at 70 degrees Fahrenheit. The container shall be constructed of high strength alloy steel, meeting the requirements of the Department of Transportation for refillable pressure vessels, and must conform to NFPA 2001 standards. The container shall have a pressure gauge for visual inspection, and shall have the ability to be electrically supervised for low pressure. The container shall be designed to safely vent over-pressurization due to high temperatures. It shall also be capable of being reconditioned and refilled on site without repair or replacement parts.
- D. The FE-25 container shall be securely mounted to the structural frame.
- E. All cylinders of 100 lb capacity and larger must be equipped with a liquid level indicator. This shall enable the agent weight to be determined without disconnecting the cylinder from the discharge pipe.
- F. FE-25 discharge nozzles shall be one piece construction and orifice sizes shall be drilled. Manufacturers Part Numbers shall be permanently marked on the nozzle.
- G. Distribution piping shall be galvanized Schedule 40 steel pipe, ASTM A53, Grade A, ERW in sizes up to eight (8) inches. Fittings shall be threaded or grooved, galvanized 300lb malleable iron conforming to ASTM A197. All piping must be reamed, blown clear, and swabbed with appropriate solvents to remove burrs, mill varnish, and cutting oil before assembly. The piping network shall be free of particulate matter and oil residue before installation of nozzles. Pipe dope shall be used for screwed fittings, and shall be applied to male threads. All piping must be solidly anchored to walls, building structure, etc., for support and thrust block.
- H. FE-25 discharge time shall not exceed ten (10) seconds.

- I. All system functions shall be controlled and supervised by the SHP PRO Control Panel.
  1. The SHP PRO Control Panel shall have a functional call back feature (last event recall) to display the previous panel status after system reset.
  2. All control equipment must comply with Part 15 of the FCC Rules.

### **PART 3 - EXECUTION**

#### **3.1 SEQUENCE OF OPERATION**

- A. Actuation of a single detector shall:
  - Initiate 1<sup>st</sup> Zone Alarm LED on Control Panel and sound solid tone alert.
  - Sound Alarm Bell within protected space.
  - Transfer Alarm relay contacts.
  - Latch LED on detector.
- B. Actuation of a second detector shall:
  - Initiate 2<sup>nd</sup> Zone Alarm LED on Control Panel.
  - Sound pre-discharge Horn/Strobe within protected Space. Horn to pulse during time delay countdown or abort hold.
  - Start 0-30 second adjustable time delay.
  - Shutdown HVAC systems and close dampers.
  - Transfer pre-discharge relay contacts.
  - Send Alarm signal to Building Fire Alarm System.
- C. Expiration of the adjustable time delay shall:
  - Sound horn/strobe in steady mode within the protected space.
  - Transfer Discharge relay contacts.
  - Flash Strobe outside protected area.
  - Energize release circuit, which discharges FE-25 agent into the protected space.
- D. When a manual pull station is activated, the SHP PRO Control Panel shall immediately sound all alarms, illuminate appropriate LED's, transfer relay contacts, and discharge the FE-25 agent.
- E. When an abort station is activated, the FE-25 discharge will be canceled as long as the abort button is depressed. Upon release of the abort button, the time delay will reset and resume counting. A manual pull station shall override an Abort station as required by NFPA 2001.
- F. If a trouble occurs, the SHP PRO Control Panel shall:

- Illuminate the Trouble LED on Control Panel
- Sound a pulsing in the Control panel
- Send a Trouble signal to the Building Fire Alarm System.

G. The Control Panel shall be equipped with battery backup capable of powering the system for 24 hours plus 10 (ten) minutes of alarm.

### 3.2 DETECTION

- A. A combination of ionization and photoelectric detectors shall be used for automatic detection. The ionization detector shall use solid-state circuitry and be of the dual chamber configuration. The photoelectric detector shall utilize solid-state circuitry, a pulsed infrared LED light source, and a silicon photo diode receiving element.
- B. Ceiling detectors shall alternate ionization and photoelectric detectors. Subfloor detectors (if a subfloor exists) shall be photoelectric detectors only.
- C. Detector mounting and spacing shall be based on NFPA 72 guidelines, but in no case shall exceed 250 square feet per detector.

### 3.3 SIGNAGE

- A. Instructional signs shall be installed to provide a system in which the function of each device is easy to understand.
- B. At each horn/strobe within the protected space the following sign shall be provided:
- WARNING
- When Alarm Sounds
- Vacate at Once
- Extinguishing Agent
- Being Released
- C. At each strobe outside the protected space the following sign shall be provided:
- CAUTION
- When Light Is Flashing
- Agent Has Discharged
- D. At each door entering the protected space the following sign shall be provided:
- Keep Door Closed
- Area Protected
- By FE-25

- E. Signs shall be red with engraved white lettering. Lettering shall be at least 1/4 inch high.

### **3.4 SYSTEM INSTALLATION**

- A. The FE-25 system shall be installed in strict accordance with project drawings and specifications, all applicable codes and in a professional, workmanlike manner.
- B. All wiring shall be in EMT, kept separate from other building wiring and shall conform to the latest edition of the National Electric Code. The use of Fire Alarm cable shall *NOT* be accepted.

### **3.5 TESTING**

- A. After the installation is complete, the system shall be thoroughly checked for proper functioning, proper container and piping support, proper ground, resistance and detector operation. Each circuit shall be functionally tested, including auxiliary circuits and Building Fire Alarm contacts.
- B. The room will be fan tested in accordance with NFPA 2001 Appendix B and Retrotec's guidelines. A retention time of at least 10 (ten) minutes shall be achieved. The FE-25 contractor shall be an authorized user of the fan test equipment.
- C. The FE-25 contractor shall aid the General Contractor in determining how much additional room sealing is required to achieve the desired retention time; however, actual sealing is to be done by the General Contractor.

### **3.6 TRAINING**

- A. Prior to final acceptance the FE-25 system the Contractor shall provide Operation Training for the owner's personnel. The training session shall include emergency procedures, system operations, abort functions, trouble procedures, maintenance inspection requirements, safety requirements and complete system operation.

### **3.7 WARRANTY**

- A. All components of the FE-25 system shall be guaranteed against defects in design, materials and workmanship for a period of one year from final acceptance of the system.

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