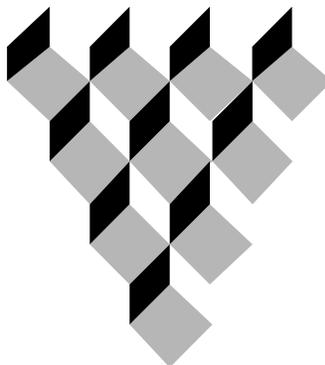


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TECHNICAL GUIDE
FOR
FIRE PROTECTION DESIGN



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NOTICE:

This edition of TG-1008 supersedes all previous editions. Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

1. Introduction

1.1 Purpose

This guide describes information, references and recommended practices relating to fire protection principles to ensure an adequate design for construction is functional, feasible and economical. The following technical guide identifies SOUTHNAVFACENGCOCM's (SODIVs) design philosophy on fire protection matters and clarifications to the MIL-HDBK-1008. Guidance in this technical guide takes precedence over NFPA codes and the MIL-HDBK-1008. Adherence to this criteria will significantly reduce A/E redesign efforts. Refer to the Appendices for additional guidance and sources of criteria.

1.2 Philosophy

To provide fire protection systems which reliably provide a reasonable degree of safety to life and property while requiring an absolute minimum amount of maintenance and supervision. To this end, wet pipe sprinkler protection is the preferred primary means of protection for most applications. Complex suppression systems such as pre-action, deluge, gaseous and complete detection systems should be utilized only when absolutely necessary.

1.3 A/E's Fire Protection Engineer

The A/E's fire protection engineer is more than just a sprinkler system or fire alarm system designer. The fire protection engineer is responsible for ALL aspects of life safety and fire protection design, including performing a comprehensive fire protection coordination review of all disciplines. The fire protection engineer is the vital link to ensuring all aspects of fire protection and life safety design are incorporated.

1.3.1 Qualifications of the fire protection designer.

The designer shall be a registered professional engineer with full time and *exclusive* experience designing and providing construction supervision of complex facility fire protection systems, and performing fire protection life safety and engineering analyses. Engineers obtaining their professional registration by successfully completing the Fire Protection Engineering discipline examination shall have a minimum of 4 years exclusive experience in fire protection design. Engineers obtaining their registration in disciplines other than fire protection shall have a minimum 8 years exclusive experience in fire protection design.

1.4 A/E Orientation/Pre-design Meeting

The A/E Orientation and/or pre-design meeting is a crucial part of any project to insure a firm understanding of our goals and expectations. The A/E's fire protection engineer must be in attendance for all briefings held at the A/E's office. Attendance is expected at briefings held away from the office when specialized systems are involved or assistance is desired. At this meeting a professional working relationship will be established between the designer and the Southern Division counterpart. Project scope should be secured and design strategy established. Expectations unique to the facility will be conveyed. It is the A/E's responsibility to contact SODIV Code 0743 to discuss fire protection requirements.

2. Design Submittal Requirements

This section identifies our expectations for detail and quality of submittals. While the extent of the detail provided in submittal documents may depend on the stage of the design, the following information is critical to ensure the documents are complete and biddable. Additional information with respect to design criteria and preferences is identified in the following sections.

2.1 Design Analysis

The following represents our requirements for the “Design Analysis” portion of a submittal. This portion is critical to our understanding of the designers intent and methodology of design. Although our contract documents are typically prepared as “performance specifications”, certain preliminary design information is critical to ensure the documents prepared are biddable. The following is a guide to the minimum design analyses required at the earliest stage possible in the design.

2.1.1 Code Analysis

A/Es should utilize all the NFPA codes as the principal building code. NFPA 101, the Life Safety Code (LSC), is the primary code to which we comply. We supplement the LSC with the Uniform Building Code (UBC) published by the International Conference of Building Officials, Whittier, California. The UBC should be used primarily to determine allowable building construction sizes for the specific occupancy and construction type (Table 5B). The UBC should also be used to address other building code criteria not covered by NFPA standards. (i.e. building separation requirements, minimum construction standards, etc.) Finally, the Factory Mutual Loss Prevention Data Sheets, as well as other industry standards, are utilized in the protection of common and special hazards.

2.1.1.1 Life Safety Analysis and Plan

Provide a plan which identifies the following:

- Building occupancy classification per UBC.
- Building construction type per UBC.
- Facility square footage (per floor & total) proposed and maximum permitted by the UBC.
- Identify required and provided separation distances from existing and planned facilities.
- Facility floor plans identifying all interior fire and/or smoke rated partitions with rating of each.
- Fire rating of each floor, ceiling system, and roofing system when applicable.
- Occupancy classification per NFPA 101.
- Maximum permitted travel distance, common path of travel, and dead end corridor length, graphical representation on floor plans demonstrating design meets these limits.
- Required and provided egress capacity (inches).
- Identify type/s of fixed detection/suppression systems to be provided.

2.1.2 Hydraulic Demand Analysis

The design analysis shall calculate the “anticipated” demand of a facility to establish the minimum water supply required.

2.1.2.1 *Sprinklered Buildings*

2.1.2.1.1 New Buildings.

- All facilities requiring sprinkler systems and exceeding 3,000 sq.ft. shall be hydraulically designed. Utilize the Hydraulic Demand Analysis Worksheet included in Appendix A. Refer to MIL-HDBK-1008 for hazard classifications and design criteria determination. Pipe schedule systems shall comply with NFPA 13 for the appropriate hazard as identified in MIL-HDBK-1008.

2.1.2.1.2 Existing sprinkler systems.

- Establish if the existing system is hydraulically designed or a pipe schedule system. Information on an existing system may be obtained from the base public works department or the fire department.
- Hydraulically Designed Systems. Indicate the size and location of all cross and feed main piping from the point of connection to the existing system back to the sprinkler riser. All grid branch line piping must be indicated for gridded systems. Identify the available water supply at the base of the riser. Do not assume the available water supply will be that identified with the existing design. Obtain current information. Utilize the Hydraulic Demand Analysis Worksheet included in Appendix A.
- Pipe Schedule Systems. Determine the hazard classification and whether the existing cross and feed mains, and the riser pipe sizes can support the new piping and sprinkler heads. Identify the size of the pipe at the point of connection. Identify all existing piping requiring replacement.

2.1.2.2 *Non-sprinklered Buildings*

Water demands for non-sprinklered facilities are identified in MIL-HDBK-1008.

2.1.3 Hydraulic Supply Analysis

Evaluating the available water supply is critical for both sprinklered and unsprinklered buildings. Documents can not be released for advertisement with expectations of the contractor determining the available water supply. We have to be certain that that available water supply can support the specified demand of a sprinkler system **prior to advertisement**. The A/E is responsible for obtaining water distribution maps, establishing flow testing procedures and coordinating flow testing with the base fire department and public works. Flow testing may be conducted by base personnel and witnessed by the A/E. The A/E shall be responsible for conducting the actual flow testing for facilities which are not on federal property. Flow tests shall be conducted to establish the static pressure and flow available at a residual pressure. The A/E shall graph the results for comparison with the anticipated hydraulic demand. This analysis is required for both sprinklered and non-sprinklered facilities.

2.1.3.1 Existing Water Distribution Systems

If the existing base water distribution system or dedicated fire main includes existing fire booster pumps, flow tests must be conducted in the vicinity of construction with a sufficient number of fire pumps running to ensure the available water supply will support the anticipated hydraulic demand. If, at the time of design, the booster pumps can not be run and accurate flow testing can not be conducted, the following information must be included in the contract documents;

- All water distribution piping back to the booster pumps. Show the location of water supplies such as elevated water storage tanks.
- Make, model, rated characteristics of each booster pump and the number of booster pumps expected to be operating based on the anticipated hydraulic demand.
- Available water supply (flow test data) at the suction side of the booster pump(s).

2.1.4 Evaluation of Hydraulic Supply vs. Demand

Plot the available water supply vs. the hydraulic demand on the $Q^{1.85}$ Hydraulic Graph Paper. The National Fire Protection Association (NFPA) and Society of Fire Protection Engineers (SFPE) handbooks provide guidance for determination and selection of booster pumps and supplementary water supplies. If this evaluation determines that a booster pump or supplemental water supply is required, provide appropriate supporting calculations. If the results from the Demand Analysis show the available water supply to be inadequate and a fire pump is not desired, contact SOUTHDIV Code 0743 for further direction.

2.1.5 Fire Pumps

Provide the following calculations verifying pump selection:

- Calculations supporting selected rated capacity and pressure.
- Power calculations for motor driven pumps.
- Fuel supply calculations for engine driven pumps.
- For electric pumps provide fault current calculations at the fire pump controller to establish equipment withstand ratings. Also provide an electrical flicker analysis.
- Calculations for suction supply tanks when applicable.
- Provide surge analysis of entire system on all Air Force projects.
- Maximum pump size permitted on Air Force projects is 2,500 GPM.

2.1.6 Special Systems

2.1.6.1 AFFF Extinguishing Systems

- Provide a statement identifying the intended design. Identify the type of foam supply and proportioning system.
- Provide a statement on design goals and methodology for foam waste containment.
- Include calculations for the foam concentrate quantity.

2.1.6.2 Gaseous Fire-Extinguishing Systems

- Provide calculations verifying agent quantity, number of required tanks and intended tank location.

- When systems are installed in existing facilities, ensure a structural analysis is provided for the intended tank location as required.

2.1.7 Fire Alarm/Detection and Reporting Systems

- Provide a statement identifying the type of interior system and accompanying base reporting system to be provided.
- Provide a description of the sequence of operations.
- Consider addressable fire alarm systems for large projects.
- State whether system is required to meet ADA criteria.

2.1.7.1 Modifications to existing systems

- Provide description of existing fire alarm system. Indicate make and model of the fire alarm panel, the number and descriptions of all existing zones and expansion capabilities.
- Verify that the existing fire alarm panel is still in current production. Specify replacement of existing system if parts are no longer available.
- Provide a power supply analysis. Determine power supply and standby battery capacity requirements of existing system and new devices. Ensure the power supply is capable of supporting the electrical load of the new devices.
- Provide a circuit analysis. Ensure the panel has the initiating and signaling expansion capabilities .
- If the existing system is to be replaced, reuse of existing conduit runs is acceptable. However, all conductors must be replaced.

2.2 Contract Drawings

The following identifies some of the minimum information required on the contract drawings. Additional required information may be identified in following sections or by the project reviewing engineer at SODIV.

2.2.1 Civil

- Identify exterior distribution piping and sizes.
- Provide a fire hydrant detail.
- Provide a detail of the fire main service entrance to the building. Identify a pipe sleeve in the floor slab.
- Identify P.I.V. and fire hydrants. Locate fire hydrants so all parts of the building are within a 350 ft hose lay from a hydrant. Locate a hydrant within 150 ft of a sprinkler system fire department connection.
- Provide fire department vehicular access in accordance with NFPA 1141.

2.2.2 Structural

Clearly delineate location and extent of all required fire proofing. May be shown on architectural drawings.

2.2.3 Architectural

- Identify location of fire rated partitions.
- Provide details for each fire rated partition, floor, and roof deck assembly and corresponding U.L. design numbers.
- Refer to Chapter 6 of NFPA 101 and Appendix E of NFPA 80 for required ratings of openings and corresponding classifications. Identify the letter classification and associated hourly rating of all fire doors in the door schedule.
- Provide details of sub-floor plenum dividers or rated partitions for computer or electronic facilities. Plenum dividers are required when different and adjacent sub-floor areas are protected with independent extinguishing systems.
- Identify the location of required fire extinguishers cabinets and mounting brackets.
- Provide a detail of any recessed fire extinguisher cabinets in fire rated partitions.
- If the reflected ceiling plan identifies the location of smoke detectors, exit signs, and/or emergency lighting fixtures, ensure coordination with the respective electrical plans.

2.2.4 Plumbing/Mechanical

- Identify location of fire dampers. Fire dampers in ducts penetrating one hour rated partitions are not required where duct is metallic, has an external cross sectional area of 100 square inches or less and runs continuously through the partition. Identify the associated U.L. Firestop System Number (Series WL7000). Ensure ceiling mounted supply diffusers/return grills have fire dampers where installed in a rated ceiling assembly. Refer to NFPA 90A, and the SMACNA HVAC Duct Construction Standards.
- Provide fire damper details for wall and floor penetrations.
- Identify location of duct smoke detectors in AHU elevation/detail and in control schematics. Detectors shall be 24V, powered and electrically supervised by the building fire alarm panel, and furnished under Division 16 (13852). The duct smoke detectors will be installed under Division 15. Provide access doors at all fire damper locations.
- Main drains for sprinkler systems and fire pumps shall discharge to a safe location at the exterior. Discharge to floor drains shall only be permitted as a last resort. When provided, ensure floor drains are sized to accommodate the anticipated flow. Recall that maintenance testing of sprinkler systems requires a 2 inch main drain test under full system pressure. Minimum floor drain pipe size shall be 6 inches. Utilize a long turn elbow where the pipe changes from the vertical to the horizontal. Frequently, drains are undersized and backup.

2.2.5 Fire Protection

Provide separate fire protection sheets all projects. Identify all aspects of fire protection on these sheets; i.e.: rated partitions, sprinkler systems, fire alarm systems, associated details and riser diagrams. Do not use drawings for other disciplines to show fire protection systems.

2.2.5.1 Fire Alarm Systems

- Show location of FACP, radio transmitter or master box, all initiating and signaling devices (including duct smoke detectors) and pump controller on plans, electromagnetic door holders, single station smoke detectors, fire protection releasing panels, fire protection system air compressors and fire pump/jockey pump controllers.
- Fire alarm zoning: per wing/floor, manual stations, corridor smoke detectors, sprinkler system pressure/flow switches, valve tamper switches, duct smoke detectors, fire pump supervision. Provide a separate radio transmitter zone schedule when radio systems are utilized and when the fire alarm panel zone schedule exceeds that provided by respective radio transmitters.
- Transmit specific zones for complex or large projects. i.e.: CO₂ systems, zones per floor, etc.
- Provide surge arrestors for all fire alarm panels and radio transmitters.
- Provide a riser diagram showing hierarchy, arrangement and zoning of the system. Identify all typical circuits, interconnections and interlocks necessary for associated controls. It is not necessary to identify every field device individually, such as smoke and heat detectors if the devices are shown on the floor plans.
- Provide a Controls Matrix. See Appendix B for sample.

2.2.5.2 Sprinkler Systems

- Show locations of sprinkler risers, exterior water flow alarms, fire department connections, post indicator valves, and back flow preventers. Show the location of all isolation control valves. Do not show sprinkler branch lines or feed main piping, unless a specific routing is required. i.e.: single feed to computer room or elevator equipment room and hoistway.
- Do not indicate sizes of above ground sprinkler piping. Only indicate underground piping sizes. Allow the contractor to size the system based on their design.
- If a fire pump is required, show location of pump and arrangement, jockey pump, associated controllers. If diesel pump, show location of fuel tank, muffler, exterior wall penetration locations for tank fill, vent and exhaust.
- Provide complete layout of pump room showing equipment and piping to scale.

2.2.5.3 Gaseous Fire Extinguishing Systems

- Show the location of storage cylinders, sub-floor smoke detectors, releasing devices, main/reserve transfer switches, audio/visual devices and control devices such as dampers, shunt trip breakers for computer equipment shutdown, and air conditioning units to be shutdown, and electromagnetic door hold-open devices if provided.
- Identify the sequence of operations for release.
- Provide a releasing system riser diagram. Identify all zones, circuit inputs and circuit outputs necessary for controls.
- Provide a Controls Matrix. See Appendix B for sample.

2.2.5.4 AFFF Foam Systems

- Provide a complete layout of the pump room showing location of fire and foam pumps, concentrate storage tanks, and all associated equipment drawn to scale.
- Provide an AFFF riser detail showing foam proportion method, test line connection, and all associated valves.
- Provide a AFFF monitor detail.
- Show locations of all risers, monitors, manual releases, UV/IR detectors, control panel, pumps, concentrate tanks, test connections,
- Identify the sequence of operations for foam release.
- Provide a releasing system riser diagram. Identify all zones, circuit inputs and circuit outputs necessary for controls.
- Provide a Controls Matrix. See Appendix B for sample.

2.2.6 Electrical

The following minimum information shall be shown. Ensure coordination with the fire protection sheets.

- Location of fire alarm and suppression system devices requiring 120V power supply or greater. i.e.; fire alarm control panel, fire suppression system control panel, fire suppression system air compressor, fire pump and jockey pump controllers. Ensure power connections for fire pumps are in strict compliance with NFPA 20.
- Identify the location of all exit signs and emergency lighting fixtures.
- Identify the location and limits of all “hazardous areas” as defined in NFPA 70.

2.3 Specifications

- The guide specifications are just that, guides. Edit the specifications appropriately and as needed for the specific project. However, design performance and criteria shall not be less than that identified in the guide specs unless otherwise directed herein. Don't hesitate to call if there is a question about design or SOUTHNAVFAC requirements.
- The project specifications shall be prepared utilizing the "SPECSINTACT" system of the "Construction Criteria Base" (CCB). Note the emphasis on the requirement to use the "SPECSINTACT" system; merely subscribing to CCB and then developing specifications by any other method, other than "SPECSINTACT", will not be acceptable.
- Ensure the most current editions of referenced publications are identified.
- Refer to Appendix C for typical modifications to the guide specifications.

2.4 Typical Conflicts

- Division 01 (Submittals). Ensure the submittal register is properly edited with respect to review of fire alarm and fire protection system submittals.
- Division 02 (Exterior Water Distribution Systems) and sprinkler system specifications in Division 13 with respect to under ground piping, post indicating valves, back flow preventers, valve pits, etc. Typically referenced in both sections. Sprinkler sections should only specify under ground materials from the building up to 5 feet beyond the building.

- Door holders should not be powered by the fire alarm control panel. They must be 110V powered by a local source. Actuation of the fire alarm panel will open relays to discontinue power to the door holders.
- Power supply for FACP. Specifications usually indicate connections ahead of the main with a separate disconnect switch. Drawings usually show power supplied from a breaker in a distribution panel. Refer to Section 3 for requirements.
- Identification of fire rated doors in door legend. Coordination with plans and proper label identification. Refer to Appendix E of NFPA 80.
- Required U.L. Design numbers for rated partition details are typically not provided.
- Pay close attention to vertical shafts/chases for HVAC and plumbing systems with respect to NFPA 90A requirements and constructibility. We have experienced reoccurring problems in multi-story barracks projects.
- Do not reference compliance with military handbooks or design manuals on drawings or in specifications.
- The UL, FM, and NFPA references in Paragraph 1.1 of specifications sections typically do not reference the current publication.
- Coordination of Division 14 for elevators with respect to fire protection requirements of Specifications Section 13852 and Section 13930.
- Coordination of shutdown requirements of special fire extinguishing systems. (i.e. Shutdown of electronic equipment and room air conditioners upon activation of CO₂ system.)

2.5 Design/Build - Source Select Projects

- If a sprinkler system is provided, the available water supply **MUST** be identified in the specifications. The contractor can not design a system without this information. We can not rely on the contractor to perform the tests. The available water supply must be established prior to design release to ensure the water supply will support the specified design parameters.
- Designs may only reference National codes for design criteria. However, since Navy has some requirements that are more stringent, any special requirements must be identified in the body on the specifications i.e.: Navy requirements for Child Development Centers are typically more stringent than National requirements. Navy permits staffing levels less than that required by NFPA 101, therefore the Navy increased other aspects of fire protection.

3. System Design

This section identifies our requirements and expectations for different aspects of fire protection design. Refer to Section 4 for applications towards specific hazards and occupancies.

3.1 Water Supply

3.1.1 Water Distribution Systems

- Do not locate any fire mains under buildings.

- Consider provision of looped mains with adequate sectionalizing valves for facilities of significant value or mission criticality.
- Avoid operating buried mains at high pressure (over 100 psi) whenever possible. Incorporate surge protection on all installations where fire pumps feed buried mains.
- Do not provide fire hydrants on buried mains supplied by fire booster pumps.
- Design and specify compliance with NFPA 24 for fire mains on facility property.
- Minimum size for fire main shall be 6 inches in diameter. Conservatively size mains on the combined demands of domestic and fire protection systems as reflected in the preliminary calculations.
- Specify backflow prevention for all sprinkler systems supplied by potable water systems. Typically double check valve assembly will suffice. However, some activities or host states may require reduce pressure type backflow prevention. Concur with the activity environmental department. Locate the backflow preventer in the sprinkler riser room.

3.1.2 Fire Pumps

3.1.2.1 Type

- Electric motors are the preferred driver for fire pumps. See MIL-HDBK 1008 for criteria to ascertain “reliability” of commercial power. If commercial power cannot meet reliability requirements, an electric pump with secondary power from an on-site generator is preferred. Following this an electric pump backed up by a diesel engine driven pump is the next preferred alternative. The least preferred arrangement is a single engine driven pump (due to high maintenance requirements and overall lack of long term reliability in the absence of necessary maintenance).
- For diesel engine driven pumps insure that electric circuits are provided for both the pump controller and the engine block heater.
- Do not use vertically orientated split case pumps.
- AIR FORCE PROJECTS: Contact the host major claimant fire protection engineer for pump driver preference.

3.1.2.1.1 Horizontal Split-Case

- Do not use horizontal tee and elbow fittings on the suction side of pumps. Refer to Chapter 2-9.6 of NFPA 20.
- Provide circulation relief valve and bowl drains piped independently to a closed drain. NFPA 20 no longer permits recirculation of relief valve discharge to suction piping.

3.1.2.1.2 Saltwater Applications

Contact SODIV Code 0743 for specific criteria for salt water rated vertical turbine pumps when provided for pier systems.

3.1.2.1.3 Controllers/Hydraulic Surge Control

- Electric Driven Pumps: Use reduced voltage, solid state soft, starting controllers when supplied from a generator, when electric booster pump net pressures ratings exceed 50

psi, when electric fire pump net pressures exceed 80 psi, when pump discharge pressures approach 175 psi, or when pump discharge piping runs underground.

- Engine Driven Pumps: Provide surge arresting bladder tanks for the above conditions.
- Every pump controller shall be supervised for *pump operating* and *pump trouble* conditions by the building fire alarm system. Both conditions shall transmit independently as a supervisory condition via the radio transmitter.
- Provide an exterior grade 10 inch trouble bell which sounds for both pump running and pump trouble conditions when the base fire reporting system is not capable of transmitting trouble or supervisory conditions.
- Jockey pumps should not be supervised.

3.1.2.2 Location

- Provide amply sized pump rooms to allow access and maintenance of all equipment
- Engines and controllers should not be exposed to exterior conditions, and must be protected from freezing conditions.

3.1.2.3 Design

- Pump sizing shall be based on accurate preliminary hydraulic calculations.
- Limit pump net pressures to the minimum necessary to minimize extreme operating pressures on entire system.
- Maximum sprinkler demand and interior standpipe demands not to exceed 120% of pump capacity, exterior hose allowance is not supplied by booster pumps.
- Insure suction supply can supply 150% of pump rated capacity.

3.1.2.4 Power Supply

Follow Chapter 7-8 of NFPA 20 explicitly concerning power transfer for alternate power supply. Also refer to Figure A-7-8 of NFPA 20.

3.1.2.5 Testing

Convenient, easy to use, flow testing facilities encourage frequent performance testing of pumps, thereby increasing reliability of overall system. Incorporate the following into all pump installations:

- Locate and orient a straight line style test header manifold on building exterior which permits flow testing directly from header without laying hose. Attention should be given to management of water discharged during testing.
- Locate a flow meter such that both test loop and flows through the header are metered. This provides a means to periodically check flow meter accuracy. Valve downstream of meter shall be a globe valve.
- Where pumps exceed 1250 gpm or at remote locations, specify that contractor is to provide a sufficient number of Underwriters play-pipes with 1-3/4 inch outlets for periodic testing. Contractor shall provide a steel cabinet in the pump room for storage of nozzles. Typical enclosure would be a residential grade gun cabinet. Cabinet should be secured to building.

3.1.3 Water Storage Tanks

- Specify compliance with NFPA 22.
- Preference is for welded tanks verses bolted.
- Include cathodic protection, water level indicator, low level supervisory switch and low temperature supervision (where applicable).
- Discharge lines from flow meters and pressure relief valves and fill line shall return to tank over the top. Provide a positive air gap.
- Note that tank capacity of that portion of tank which is below the centerline of the fire pump(s) is unusable and shall not be considered as available capacity.

3.2 Fire Suppression Systems

Refer to Section 3 for guidance on control releasing panels required for automatic operation of special systems such as aqueous film forming foam and carbon dioxide systems.

3.2.1 Water Based

3.2.1.1 Sprinkler Systems

- Provide concrete splash blocks at main drain and inspector test connection discharge locations.
- Locate sprinkler piping isolation valves for areas such as elevator machine rooms and computer rooms at the main sprinkler riser (if economical).
- For multi-story buildings where individual floor isolation valves are provided, locate the inspector's test connections at the remote area of the systems instead of at floor control valve. Locate additional isolation valves and drains at each respective floor connection as required.
- Identify thrust block, retaining rods and pipe sleeve on sprinkler riser detail.
- Backflow prevention is required for every sprinkler system supplied by potable water systems. Locate in building at sprinkler riser. Do not locate outside if freeze protection is necessary. Heat trace is not acceptable. Systems utilizing AFFF shall be provided with reduced pressure principle backflow prevention.
- If valve tamper switches are required, they shall be provided for all sprinkler system control, valves including post indicator valves and isolation valves on backflow preventers.
- Edit the guide specs in the piping sections to permit steel piping with a U.L. corrosive resistive rating (CRR) of not less than 1.00. Refer to the appropriate paragraphs in Appendix C for guidance.
- Edit the guide specs to permit the use of butterfly valves.
- Do not specify mechanical water motor alarms. Specify 10 inch exterior mounted electric sprinkler alarm bells. If a new fire alarm system is provided under the project, or the existing one is modified, specify a 24 volt bell powered by the fire alarm panel. In this case, the bell should be provided by the fire alarm contractor. If the project does not include a fire alarm system, specify a 120 volt bell. Provide power from the nearest unswitched circuit. Specify system flow/pressure switches with two SPDT contacts for connection to the building fire alarm system and electric bell circuit.

- If specs identify painting of sprinkler piping in unfinished or concealed spaces, omit requirement for painting. Edit the specs to require red identification bands for sprinkler piping in unfinished or concealed spaces.
- Specify painting of ferrous steel piping/fittings or use of galvanized piping when systems are installed in humid, salt air, or corrosive environments, or when specifically requested by the customer.

3.2.1.2 Wet Pipe

- First choice for simple reliable property protection.
- Utilize conservative densities and design areas as given in MIL HDBK 1008.
- Typically, do not specify or detail alarm check valves. Where the sprinkler system consists of only one wet pipe riser, the riser shall consist of a backflow preventer with associated control valves and pressure gauges, two inch weld-o-let and associated valve and pipe for the sprinkler system main drain, 1/2 inch weld-o-let for a system pressured gauge, and a flow switch. Where the sprinkler system consist of multiple risers, each wet pipe riser shall consist of a control valve, check valve, main drain, system pressure gauge and flow switch. The flow switch shall be provided with two sets of SPDT contacts for connection to the building fire alarm panel and exterior electric alarm bell.
- Utilize new technology (quick response (QR), early suppression fast response (ESFR) sprinklers, etc.) where appropriate. Utilize QR sprinklers in all facilities with child care, berthing, non-ambulatory patients, light hazard occupancies and where beneficial.
- Criteria for elevator protection is outlined in Appendix F. This direction reflects our interpretation of both ANSI and NFPA requirements.
- FM approved CPVC pipe and fittings may be allowed in NFPA 13R retrofit applications and NFPA 13D systems only. Plastic piping shall not be installed exposed as allowed by UL listings.
- Show and specify vane type water flow switches for all Air Force projects.

3.2.1.3 Dry Pipe

- Limit individual systems to 15,000 sq.ft. maximum and avoid manifolded risers in large warehouses to prevent delivery time problems.
- Monitor low air pressure on a per riser basis as a supervisory function with the building fire alarm system. “Shop air” and compressed gas cylinders are not acceptable sources of pressurized air.

3.2.1.4 Preaction/Deluge

- Utilize only where absolutely required.
- Actuate with electric heat detectors through a panel listed for releasing service, use rate compensated detectors in dirty, damp, exterior areas, or spaces with fluctuating temperatures. Do not actuate with smoke detection, except in child development centers.
- Specify bracing for seismic zone 3 **regardless of location** to provide thrust restraint of piping for deluge systems.

- Generally, provide a preaction releasing panel independent of the building fire alarm panel. Locate the releasing panel either adjacent to the preaction sprinkler risers or adjacent to the building fire alarm panel. The building fire alarm panel shall supervise the releasing panel for common alarm and trouble conditions. Where more than four preaction systems are controlled by one releasing panel and the releasing panel is physically separated from the building fire alarm panel, the fire alarm panel shall supervise each preaction zone for alarm conditions in addition to a common releasing panel trouble condition.
- If the preaction system initiating devices comprise of 75% or more of the entire facility alarm initiating devices, a combined preaction releasing/building fire alarm system panel may be used.

3.2.1.5 Standpipe

- Provide where required and when requested by base.
- Specify a Class I type system. Do not design a Class II or III system.
- Follow NFPA 14 with exception that most installations can use a 65 psi outlet discharge pressure, consult SODIV Code 0743 for specific guidance.

3.2.2 Foam/Water Based - Aqueous Film Forming Foam (AFFF)

3.2.2.1 Low Expansion Foam

- Suitable primarily for flammable liquids fire control (aircraft hangars, flammable liquid storage/handling facilities).
- Maintain design as simple as possible. Bladder tank systems are preferred over pump/skid systems when economically feasible (Navy & Marine Corps) to eliminate concentrate pumps and pressure balancing valves.
- Horizontal bladder tanks are preferred to vertical tanks based on decreased susceptibility of bladder tearing occurring during improper filling procedures. Vertical tanks should not be used on new installations. Locate tanks so that bladders can be replaced with tank in place.
- Plans and specifications development require a high degree of expertise for a clean, well functioning installation. Most A/E firms should contract design out to a specialty FPE firm.
- Provide foam concentrate jockey pumps where foam concentrate lines to the injection points are run either underground or where they run above ground for more than 50 ft.
- Design with close consultation with SODIV Code 0743.
- Provide means to flow test proportioner(s) through a closed loop into a tanker truck for test solution management.
- On wet pipe systems, provide a means to conveniently drain system into 55 gallons drums (i.e. drain connections terminating 5 ft above finished floor with hose connections in locations accessible to fork lift trucks).
- Designs which eliminate normally closed concentrate control valves are preferred.
- Coordinate with SODIV Code 0753 for retention/run-off requirements. Permits may be required.

3.2.2.2 High Expansion Foam

- Suitable for flammable liquids protection where control of runoff is of major importance. Typically cannot be used for protection of polar solvents.
- Installations are costly to build and challenging to maintain, keep design as simple as possible.
- Plans and specifications development require a high degree of expertise for a clean, well functioning installation. Most A/E firms should contract design out to a specialty FPE firm.
- Installations will typically require a small capacity booster pump due to high pressure requirements of foam generators. Provide surge management of pressures.
- Design with close consultation with SODIV Code 0743.
- Full discharge test crucial for determining acceptance.

3.2.3 Gaseous

3.2.3.1 Carbon Dioxide (CO₂) Extinguishing Systems

- Multiple systems are permitted to be controlled by a common releasing panel. The releasing panel shall be separate from the building fire alarm panel, unless approved by SODIV Code 0743. The releasing panel shall be electrically supervised for common alarm and trouble conditions at the building fire alarm panel.
- Provide interlock to shut down all computer equipment power and associated room air conditioner power prior to agent discharge.
- Provide separate storage bottles/manifold for each hazard. Do not design multiple hazard protection using a selector valves and a common manifold.
- Do not identify quantities of CO₂ on the contract documents. Only show all information contractors need to calculate the necessary quantities.
- Ensure adequate space is available for the CO₂ storage cylinders and the floor can structurally support the weight.
- Consider using low pressure systems when appropriate and cost effective.
- Inhibit switches not permitted per NFPA 12.
- Show all necessary interconnections/interlocks on respective mechanical, electrical and/or fire protection sheets.
- Provide a under-floor purge system to evacuate the CO₂ after testing and/or discharge.
- Specify that the storage bottle manifold be provided with scales for weighing cylinders.

3.2.3.2 Halon Extinguishing Systems

- The use of halon, or any other ozone depleting substances, is strictly prohibited for any new construction projects. Existing fixed fire extinguishing systems currently utilizing Halon 1301 must be replaced with an accepted substitute or removed by the year 2000.
- Projects involving the demolition of existing Halon 1301 fire extinguishing systems shall include the removal, and shipping of the storage cylinders to the Defense Depot in Richmond VA. The construction contract shall include securing, packing and shipping of the cylinders to the Defense Depot.

- Refer to Appendix D for Shipping instructions and National Serial Numbers (NSNs) for the appropriate cylinders.

3.2.3.3 Halon Replacement Gases

- Utilize only where justified.
- Agent must have EPA SNAP list and UL listing or FM approval.
- Design in accordance with products listing and NFPA 2001.
- Presently the FM 200 product appears to be the best available replacement agent.
- Obtain SODIV Code 0743 concurrence prior to design development.

3.2.4 Wet Chemical Extinguishing System

- Specify wet chemical systems for protection of commercial grade cooking equipment.
- System activation shall be supervised by the building fire alarm panel as a separate zone.
- Identify interlocks to cooking surface fuel/power supplies when for automatic shutdown. Ensure coordination with the appropriate mechanical and electrical drawings.

3.2.5 Residential Grade Kitchen Hood Extinguishing System

These types of devices are strongly discouraged, especially in units provided with sprinkler systems. When specifically requested by the customer and approved by the SODIV Fire Protection Engineer, each system shall consist of a pre-assembled extinguisher kit, piping kit, and detection kit to be installed in the kitchen cabinet over the range hood and stove. The system shall automatically detect and extinguish stove top fire, shut off the cooking appliance, and sound an alarm. Detection shall be by means of reusable bi-metallic thermal links. Provide one thermal link over each burner. Each wet chemical system shall be provided with no less than 2.5 pounds of a solution of water based chemical or a combination thereof which forms an extinguishing agent. Wet nozzles shall be of corrosion resistant material. Wet system nozzles shall provide complete coverage of the entire cooking surface. The automatic alarm shall sound an 85 dBA alarm signal when activated. Provide internal wiring required for system to be complete and ready for use. The automatic wet chemical fire extinguisher system shall, as a system, have a current U.L. label and U.L. listing.

3.3 Fire Alarm/Detection

3.3.1 Building Fire Alarm Systems

3.3.1.1 Control Panel Functions

- Smoke detector verification shall be specified for detection systems that may be subjected to momentary environmental changes that may cause nuisance alarms. Detector verification shall only be used for smoke detectors and shall not be used for detectors controlling automatic fire suppression systems, duct detectors, or detectors used for elevator recall.

- Conventionally zoned initiating circuits shall be specified on smaller less complex systems. Point addressable initiating circuits should be considered for larger, complex systems or systems that point annunciation is desirable or required. Consult station on their preference towards conventional or addressable systems.
- Branch circuit surge suppressers shall be specified for fire alarm AC power sources.
- Control panel battery capacity shall be 24 hours standby capacity and 30 minutes alarm for fire alarm panels provided with auxiliary power supplied from an emergency generator. Battery capacity shall be 60 hours standby capacity and 30 minutes alarm for all other systems. Deviations from these requirements shall be confirmed with the SODIV Fire Protection Engineer.
- The location of the fire alarm control panel shall be coordinated with the local fire department and the user. If the control panel cannot be located in plain view at the fire department emergency point of entry, a remote annunciator shall be located at that location. The zoning of the remote annunciator shall duplicate the fire alarm control panel zoning with common trouble indicator light and key silenceable audible trouble indication. Panel shall also be provided with a key-operated alarm silence switch, which when activated will silence all building alarms. Panels located in finished spaces shall not be aesthetically obtrusive.
- VAC power for fire protection equipment shall be obtained from a dedicated circuit breaker equipped with a “lock-on” device which must be removed before the breaker can be de-energized. The face of the breaker shall be painted red.
- The building fire alarm system shall be configured to report to the central dispatch point via the base wide fire reporting system. The appropriate radio transmitter/coded masterbox/telephone interface shall be provided. Refer to Appendix E for a listing of base reporting type per activity.
- Do not specify a remote trouble bell for fire alarm systems monitored by base reporting system capable of reporting general alarm and trouble signals to the base fire department.
- When the base fire reporting system is not capable of transmitting trouble conditions, and when the fire alarm panel is not located in an area not normally occupied where the internal trouble sounder may not be heard, a remote trouble indication shall be specified. The preference is a remote annunciator panel with audible trouble indication or remote trouble sounder. The remote annunciator should be provided with a key operated silence switch.
- The building fire alarm system shall monitor all manual stations, automatic detection, sprinkler flow and supervisory functions, local releasing panels, and fire pump running and supervisory functions.
- Auxiliary functions which require interfacing with line voltage sources shall be accomplished by field located relays. The only line voltage permitted in fire alarm or releasing panels is operating power.
- Consider tasking contractor with layout of notification devices per NFPA 72 and ADA. Specify that acceptance will be based on measuring satisfactory sound levels with a sound meter in all spaces with normal ambient noise and provisions of indicating devices per ADA. Expected ambient noise levels must be identified in the contract

documents. Refer to the Appendix of NFPA 72 and the NFPA 72 Handbook for guidance.

3.3.1.2 Initiating Devices

- Specify dual action manual pull stations in gyms and similar areas where the manual stations are subject to false activation from mechanical jarring.
- Smoke detection shall be specified for computer room style under-floor voids containing combustible material including wiring. Under-floor detectors shall be equipped with a graphic annunciator panel showing the detector location with respect to the floor plan.
- Smoke detection shall be used in areas requiring detection except for spaces which are subjected to dust infiltration or steam (i.e. attics, mechanical rooms, etc.) Heat detection shall be specified for these areas.
- Combination rate-of-rise fixed temperature heat detectors shall be used in areas where rapid temperature swings are not expected. Specify fixed temperature heat detectors where rapid swings are expected (i.e. over ovens, fuel fired equipment, etc.). The temperature rating of the fixed temperature elements shall be based on the maximum ambient temperature expected in conjunction with the manufacturer's recommendations.
- Place duct type and spot type smoke detectors on dedicated zones. Do not combine spot type smoke detectors on initiating zones with duct smoke detectors or contact type initiating devices. Duct smoke detectors shall not be on a verified circuit. Activation of a duct smoke detector shall cause shutdown of the air handling unit(s) and initiation of an alarm condition.
- Provide each duct smoke detector with the detector manufacturer's remote indicator/test station located in an accessible space. Utilize photoelectric detection only.
- Limit valve tamper switches to a maximum of 3 devices per zone.

3.3.1.3 Signaling Devices

- Combination audio visual units shall be specified for indicating circuits except where visual only units supplement audio visual units or are specifically required by ADA, i.e., rest rooms.
- Visual unit's candela output and frequency shall meet both NFPA and ADA requirements.
- Flashing visual units shall be synchronized with each other throughout the evacuation area for all occupancies.
- Signal circuits shall be wired Style Z (Class A).
- Use of notification circuit "power extender panels" is prohibited on new installations.
- Visual circuits shall be separate from audible device circuits. Visual devices shall not be affected by operation of the alarm panel signal silence switch.
- In projects where the A/E identifies the location of audio/visual devices, specify the minimum acceptable U.L. listed outputs. Audio devices should be referenced by the U.L. sound pressure output value.

3.3.2 Residential Systems

120 VAC, single station smoke detectors shall be provided with battery back-up. Detectors shall be interconnected with other detectors in the same living unit such that activation of any one detector shall cause all detectors within that unit to sound.

3.3.3 Fire Extinguishing Agent Releasing Panels

- A control panel listed for releasing service shall be specified for monitoring, and operation of automatic extinguishing systems.
- All initiating circuits shall be Style D (Class A).

4. Special Hazards/Occupancies

This section identifies our requirements with respect to specific hazards, occupancies and applications. Also provided are clarifications and/or exceptions to the requirements of MIL-HDBK-1008.

4.1 Bachelor Quarters (BQs)

- MIL HDBK 1008 provides criteria.
- All new and renovated Qs to be fully sprinklered with QR sprinklers to NFPA 13 or 13R.

4.1.1 Smoke Detection

- Provide as a minimum, system connected smoke detectors in corridors and public lobbies. (This takes precedence over MIL-HDBK-1008 guidance) All system connected smoke detector circuits shall be wired Class A. Provide single station smoke detectors in sleeping and lounge areas. Interconnect all single station detectors within the same living unit(s) for common operation. Provide an 85 dBA alarm sounder in each sleeping room which is connected to the building fire alarm system. Provide single station smoke detectors with ADA type strobes in 20% of the first floor rooms.
- When the station specifically requests individual room detection annunciation, and as an option to the above, provide system analog addressable smoke detectors with sounder bases in each lounge/sleeping room. Operation of a room smoke detector shall result in activation of the room sounder base and common point annunciation at the front desk and notification of the fire department as a living space detector. Provide a pre-alarm sequence which will actuate building alarms after 5 minutes if no action is taken. Activation of the building wide alarm system should actuate sounders in the base of all lounge/sleeping room detectors. Do not provide this system in facilities which contain lounge/sleeping room cooking surfaces.
- In lounge/sleeping rooms which contain cooking surfaces, locate the smoke detector as far distant as possible from the cooking surface.
- Specify wall mounted smoke detectors in rooms with ceiling fans.
- When location of ceiling and wall mounted smoke detectors are shown on contract documents, ensure coordination with mechanical sheets with respect to location of air diffusers. Detectors shall be located no closer than 3 feet from supply registers.
- Do not locate smoke detectors on furred-down ceilings or adjacent to bathrooms.

4.2 Aircraft Hangars

- Secure services of a fire protection engineering firm experienced in hangar protection.
- Piping support designed for seismic zone 3 for preaction/deluge piping.
- Closely coordinate design with SODIV Code 0743 FPE's.
- Perform accurate preliminary hydraulic analysis, resolve water supply challenges early.
- Refer to MIL-HDBK-1008 for specific criteria and other references.
- When supplemental underwing protection is required, provide a self recycling flow control valve at each monitor. Provide a weatherproof deadman type abort station which when activated, closes all flow control valves. Locate abort stations at all exits from the hangar bay or within 10 feet of each monitor. Specify identification signs and that abort stations and weatherproof enclosures be painted yellow.
- Activation of any single manual release station or any two optical detectors in a hangar bay shall cause foam monitors in that immediate hangar bay to operate. If the hangar consists of multiple bays, the initiating sequence identified above may necessitate monitors in adjacent bays to operate. This supersedes the requirements of MIL-HDBK-1008.
- Specify 175°F, QR glass rod type sprinklers for the overhead AFFF systems in the hangar bay area. This supersedes the requirements of MIL-HDBK-1008.
- Do not specify interior AFFF hose reels, unless specifically requested by the activity.
- Follow current Air Force Engineering Technical Letter 96-01 criteria for their projects.
- Coordinate with SODIV Code 0753 for retention/run-off requirements. Permits may be required.
- Utilize 114dB (UL rated) synchronized electronic sirens with 110 candela strobes in hangar bays for signaling.
- For Navy and Marine Corp. projects only, provide electric powered oscillating nozzles. Provide power feed for nozzles through a listed and supervised limited service fire pump controller arranged in accordance with NFPA 20. Primary activation shall be via dry contacts in the foam releasing panel terminating at the "remote start" function of the controller. Secondary means of activation shall be a flow switch(es) located in the common supply line(s) of the monitors connected to the controller via the "deluge valve" function. Supply power from a building automatic transfer switch in a non-standard manner when backup power is available in the facility.

4.3 Fuel Storage Facilities

Fire protection is no longer required for storage of JP-5, JP-8 and diesel fuels used for ship board readiness when the storage tanks have fixed roofs, internal honeycombed floating pans, and capacities exceeding 100,000 gallons (2,500 barrels). However, fire protection may still be included in some projects. If provided, include the following:

- Identify a connection for a pressure gauge in each foam chamber riser downstream of the orifice plate.
- When utilizing semi-fixed design, provide an engraved sign at the fire department connection stating minimum system operating pressure.
- Specify freeze protected AFFF concentrate when concentrate storage tanks are in areas subject to freezing.

4.4 General Storage

- Follow MIL-HDBKs 1008 *Fire Protection for Facilities & 1032/2 Covered Storage* along with NFPA 231 *General Storage*, 231C *Rack Storage of Materials*, 231D *Rubber Tires*, Factory Mutual data sheets 8-9 *Storage of Class 1, 2, 3, and 4 Plastic Commodities*.
- Use of new protection technologies (i.e. ESFR and large drop sprinklers) is encouraged where applicable.
- Accurate storage classifications and preliminary hydraulic calculations are needed by the 35% design phase. Challenges with inadequate water supplies need to be resolved by this point.
- Note that in rack sprinkler protection layouts are specifically dictated by Section 3.7.5.1 of MIL-HDBK 1032/2. Inclusion of figures 19-21 of this document should be provided in contract drawings as applicable.
- Use of solid shelving in racks will typically require in rack sprinkler protection on every level.

4.5 Cold Storage Facilities

- Utilize *double interlocked* pre-action sprinkler systems in areas maintained below 40° F.
- Utilize a line type thermal detection system such as manufactured by the Protectowire Company.
- Follow Factory Mutual data sheet 8-29 *Refrigerated Storage* explicitly.
- Pre-action sprinkler system compressed air shall be taken from the coldest storage compartment and dehydrated after the last pressure regulator by an oversized chemical desiccant dryer. Do not use twin tower self regenerating dryers.
- Also follow directions in *General Storage* section.

4.6 Hazardous/Flammable Storage

- Provide protection in accordance with NFPA 30 *Flammable & Combustible Liquids Code* and Factory Mutual data sheet 7-29.
- Ensure compliance with SODIV Code 18 environmental requirements.
- Provide appropriate fixed protection (wet pipe sprinkler, foam-water sprinkler, or high expansion foam).
- Explosion proof electric's typically required per NFPA 70 *National Electrical Code*.

4.7 Computer/Electronic Facilities

- MIL-HDBK-1008 requires these facilities to be protected with a wet pipe sprinkler system. We will entertain the use of a preaction type system, but only as explicitly requested by the customer. If used, automatic actuation shall be initiated by heat detection only. Separate area smoke detectors connected to the building fire alarm system will still be required.
- Computer areas protected by a wet pipe system shall be supplied by a dedicated main with a supervised control valve, check valve, flow switch, and test connection similar to a floor control valve assembly. The flow switch shall have two sets of SPDT contacts for connection to the building fire alarm system and to discontinue power to critical

equipment and supporting air condition units. A means shall be provided to test the flow switch.

- Provide an excess pressure pump located at the main wet pipe system riser, unless the building system is supplied by a dedicated fire pump.
- An under-floor extinguishing system is only required if plenum rated cable or conduit can not be provided.
- Specify an equal number of photoelectric and ionization smoke detectors in the sub-floor space. Specify that the sub-floor smoke detectors be U.L. listed for the anticipated air velocities.
- Under-floor air conditioning units for the computer equipment are considered critical equipment.. These units shall be shutdown upon activation of the first sub-floor smoke detector in the associated room, or upon activation of the pressure switch at the CO₂ manifold. This shutdown function shall not be initiated by the building fire alarm system.
- Power to the computer/electronic equipment shall be discontinued upon activation of the sprinkler system and/or under-floor extinguishing system **servicing that particular room or hazard.** These shutdown functions shall not be initiated by the building fire alarm system.
- Where multiple computer or electronic equipment rooms are located in one area, concur with the customer on the shutdown requirements. If all adjacent areas may be considered as one, with power to all discontinued simultaneously, the entire area may be protected by one sprinkler system and sub-floor extinguishing system. However, if the customer requires each area to operate independently of the other, separate shutdown capabilities must be provided. This will necessitate dedicated systems for under-floor protection and dedicated feed mains and associated flow switches for each area.
- Area or ceiling smoke detectors shall be provided for all areas. These detectors shall be electrically supervised by the building fire alarm panel, and may be zoned separately depending on customers needs or designers preference.
- Facilities consisting solely of PC server based equipment typically does not warrant special extinguishing system protection.

4.8 Ordnance Facilities

- Protection shall be in strict compliance with Section 4.9 of MIL-HDBK 1008.
- Design shall be provided by a fire protection engineering firm experienced in munitions protection where ultra-high speed deluge or high speed systems are required.
- Design shall include detailed testing/acceptance procedures/criteria.

4.9 Child Development Centers (CDCs)

- MIL HDBK 1008, MIL HDBK 1037/2, and Section 10-7 of NFPA 101 apply to CDCs of all the services.
- Navy CDCs shall also comply with *OPNAVINST 1037/2*.
- Air Force CDCs shall also comply with the Air Force *Facility Design & Planning Guide for Child Development Centers*.
- Utilize quick response (QR) sprinklers throughout all space conditioned areas of CDCs.

- Avoid use of dry type sprinkler systems whenever possible. When necessary, provide a non-interlocked combination preaction/dry pipe sprinkler system with QR dry pendent sprinklers. Operation of any single smoke detector shall activate the preaction function or the control valve through a fire alarm panel which is listed for releasing service.
- Fire alarm systems shall utilize dedicated electronic chimes with synchronized strobes meeting ADA requirements. Equip each classroom with an A/V chime. Prohibit the use of “mulit-tone alarm sounders”.
- Fire alarm system initiating circuits shall be wired Class A.

4.10 Family Housing

4.10.1 Single Family And Two Family (Duplex) Residences

Sprinkler protection is not required in unless specifically requested by the customer.

4.10.2 Multi-family Housing

- Defined as anything more than 2 living units in a building.
- Provide one hour construction between every unit, including attic spaces.
- Provide two hour separation between every other unit.
- Provide NFPA 13D systems (One & Two family residences) based on the two hour fire separation subdividing the townhouse into a series of “duplexes”.
- Prohibit sprinkler piping in attic spaces in climates subject to freezing. Upper story piping should be run only in walls (preferably interior) with side wall sprinklers.
- Attic sprinklers are not required.
- Carports and garages should be sprinkler in moderate climates where freezing is not a concern.

APPENDIX A

PRELIMINARY HYDRAULIC ANALYSIS WORKSHEET

Refer to MIL-HDBK-1008

1. **WATER QUANTITY:**

a. **Density * Design Area * 130%** = _____ gpm.
 (Increase the area by 30% for dry-pipe systems and dual-action type preaction systems.)

b. **Outside Hose Stream Demand** = _____ gpm.

c. **Other** = _____ gpm.
 (Includes water supply for in-rack sprinklers, inside hose streams, oscillating nozzles or other special interior systems.)

d. **Domestic Demand** = _____ gpm.

TOTAL WATER DEMAND (a+b+c+d) = _____ gpm.

2. **WATER PRESSURE:**

a. **End-Head-Pressure** = _____ psi.
 $[density * (area/hd) / k-factor]^2$
 Minimum 7 psi. K-factor is 5.6 for a 0.5 inch orifice, 8.1 for a 0.53 inch orifice, and 11 for a 0.64 inch orifice.

b. **Elevation Loss** = height * .433 = _____ psi.

c. **Outside Friction Loss** = _____ psi.
 (Include a reduced pressure back flow preventer for foam systems or a double check valve assembly back flow preventer for all other types of systems.)

d. **Inside Friction Loss** = _____ 20 psi.

TOTAL PRESSURE (a+b+c+d) = _____ psi.

The pressure required for special interior systems (i.e. rack, oscillating nozzles) must be taken into account.

3. **WATER DEMAND:** The quantity and pressure must be within the limits shown by water supply data. Provide a water supply graph showing the supply and the calculated demand of the system. We are not asking the designer to upgrade the facility water supply, but show that the system specified can be installed with the supply available. This data is needed at the 35% design phase so corrective action can be taken to improve the water supply or change the scope of this project.

APPENDIX B

FIRE ALARM SYSTEM SEQUENCE of OPERATION MATRIX

INITIATION ACTION	Manual Pull Station	Area Smoke Detector	Fire Alarm Sub-Panel (if used)	Duct Smoke Detector	Smoke Det., Elev Lobby or Elev MechRm	Smoke Det., Elev Lobby - Designatd Flr	WaterFlow Switch	WaterFlow Switch, Elev. Machine Rm	Sprinkler Valve Tampr Switch	Fire Pump Running	Fire Pump Loss of Power	Fire Pump Power Phase Reversal
Activate Fire Alarm Horn & Strobe Lights on all Floors	X	X	X		X	X	X	X				
Display Alarm Indication @ FACP & Remote Annunciator	X	X	X		X	X	X	X		X		
Transmit Alarm Signal to the Base Fire Dept.	X	X	X	X	X	X	X	X		X		
Record Information on Printer & CPU	X	X	X	X	X	X	X	X	X	X	X	X
Close All Fire/Smoke Dampers Serving Alarm Zone or Floor	X	X	X		X	X	X	X				
De-Energize All Electromatgnetic Door Holders on all Floors	X	X	X		X	X	X	X				
Release All Locked Stair Re-Entry Doors within the Bldg	X	X	X		X	X	X	X				
Shut Down Associated AHU				X								
Disconnect Power to Elevator Controllers in Associated Machine rm								X				
Recall Elevators to Designated Level					X							
Recall Elevators to Alternate Level						X						
Display Supervision Condition @ FACP				X					X		X	X
Transmit Supervisory Signal to the Base F.D.									X		X	X

SAMPLE MATRIX

APPENDIX C

Guide Specifications Revisions

The following general specifications revisions should be incorporated into the respective specifications whenever these sections are utilized. Additional project specific revisions should also be made as usual. Always check and revise the edition dates of the references given in section 1.1 of each specification, especially the NFPA codes, these are not necessarily revised automatically.

Paragraph

Revision

Section 01330A Submittal Process

1.3.3.c: In the first sentence change **30** days to **90** days.
Scheduling

Submittal Register “Generally” Southern Division provides review of 13000 series fire protection submittals.

Section 07810A Spray Applied Fireproofing

General Comment Type II (fibrous) spray on fire proofing is not acceptable on Southern Division produced designs. Specify only a Type I (cementitious) product. The following revisions edit the Type II product out of our specifications. When fireproofing is required in a location subject to high humidity, dampness, exterior exposure, or mechanical abrasion, specify provision of the manufacturer’s exterior grade product.

2.1: Spray-Applied Fire proofing Delete: “...or **Type II, \240 kilograms per cubic meter \\ 15 pounds per cubic foot density, Class (a)**”

2.2 & 2.3 Delete these paragraphs for Bonding Adhesive and Sealer in their entirety.

3.5: Application Delete the following sentences: “**Apply bonding adhesive and sealer for type II materials, when not an integral part of the fireproofing material, in strict accordance with the manufacturer’s recommendations. Apply adhesive to the substrate prior to applying fireproofing material. Tamp or trowel fireproofed surfaces after application of Type II fireproofing material and prior to application of sealer when required by the manufacturer’s instructions. Apply sealer to clean, dry fireproofed surfaces in accordance with manufacturer’s recommendations.**”

Section 13209T Water Storage Tanks

General Comment	Revise this specification as follows when tank is used as a suction supply for listed fire pump(s). Further edit specification to disallow bolted tanks unless there is an anticipated significant price advantage towards bolted over welded.
1.1: References	Add: “National Fire Protection Association, NFPA 22, Water Tanks for Private Fire Protection (1996)”
2.1.1: Elevated Steel Tank	Change name of paragraph title to: “Ground Storage Reservoir” . Add: “Construct in accordance with NFPA 22” .

Section 13852 Interior Fire Alarm Systems

General Comment	This specification is written for conventionally zoned fire alarm systems. A/Es desiring to utilize an addressable or multiplex system must edit the specification appropriately throughout. Specific call outs for accomplishment of this are not provided.
1.4.1: Submittals	Add: “Annotate descriptive data to show specific model, type and size of each item.”
1.4.1	Add “Electric Water Flow Alarm” for projects with sprinkler systems.
1.4.1.u	Add: “u. Line and low voltage surge arrestors”
1.4.1.v	Add: “v. wiring”
1.5.1: Quals. of Installer	Unless specifically requested by code 0743, do not include the bracketed requirements for a UL certified installer.
2.1.4.1: Batteries	Refer to TG section 3.3 regarding battery duration. Delete any sentences from this paragraph which state: “Cabinet shall have twice the volume..., Each battery shall have an integral device..., Batteries shall have a clear or transparent...”
2.1.5 :Wiring	Specify use of style D (class A) initiating circuits and style Z (class A) indicating circuits for all Air Force facilities. Always select #14 AWG conductors for low voltage wiring.
2.1.5: Wiring	Add the following to all projects: “Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. All control panels shall be dressed out in a professional manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped. Conduit may not enter the top of control panel cabinet. Provide panel in the

manufacturer’s NEMA 4 enclosure for panels subject to water spray/runoff and/or located in damp/dirty locations or relocate to a suitable dry location at the direction of the Contracting Officer. Provide conduit seals for all raceway terminating at the control panel cabinet.”

2.2.1: Main Control Panel

Always include the requirement for: “...a set of normally open alarm contacts for each zone for connection to the (*future*) radio transmitter...”
Do not specify normally closed trouble contacts for each zone.

2.2.9.1: New Paragraph

Add this new paragraph: “*Sleeping Room Notification Devices. Sleeping room notification devices shall be electrically polarized electronic piezo fire alarm sounders (mini horns) which flush mount using a single gang box. Unit shall produce a minimum of 83 db(a) @ 10’ (UL rating) with an 18ma maximum current draw and shall be powered by the building fire alarm system notification circuits. Unit face shall measure 2.75” wide by 4.5” high and shall be white or beige in color. Devices installed in rooms designated as handicapped accessible shall include an integral white strobe (110 candela minimum) located a minimum of 25 inches beneath the ceiling.*”

(Audiovisual Alarms)

2.2.10: Visual Alarms

Usually revise specification to require ADA compliant synchronized strobes.

2.2.13-2.2.14.3: Radio Trans. & R.T. Interface

These 8 pages of specs should be replaced with the following when adding a new transmitter to an existing base-wide radio system:

“2.2.13 Radio Alarm Transmitter

Provide a {__} zone radio fire alarm transmitter of the same manufacturer of that currently installed on the base[(King-Fisher) (Monaco) (Signal Communications) (Seaboard) (Motorola) (Harlow)]. Transmitter shall be factory assembled and tested complete with manufacturer’s locking cabinet, 60 hour rechargeable battery set, automatic battery charger, (interface panel), omni-directional antenna with mounting system, (antenna surge arrestor), and coaxial cable. Installation shall be in strict accordance with the manufacturer’s recommended practices, product listings or approvals, and NFPA 70, 72, and 1221. Ground transmitter and antenna to a driven ground rod and the facility electrical ground system. [Mount transmitter adjacent to the fire alarm panel.] [Transmitter zoning shall replicate that of the fire alarm panel.] [Monitor the fire alarm panel common trouble contacts as a supervisory signal on transmitter zone ____.] Supply power to transmitter through a line voltage surge arrestor from the fire alarm circuit. Transmitter frequency and identity shall be as directed by the Contracting Officer. [Program new transmitter identity code and zoning into the receiving consoles as directed by the Contracting Officer.] Notwithstanding any other provisions of this contract, no other product

will be accepted.” Include requirement for an *interface panel* for when specifying King Fisher radio transmitters. Include requirement for *antenna surge arrestors* when specifying Monaco and Harlow equipment.

2.3: New Paragraph

Add the following paragraph to all projects:

2.3 Line Voltage Surge Arrestor

Provide line voltage surge arrestors to suppress all voltage transients which might damage fire alarm panel/transmitter components. Unit shall wire in series to the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330 volt suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction which includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. One such acceptable product is a model HSP-121BT2 as manufactured by Edco of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

2.4: New Paragraph

Add the following paragraph to all projects:

2.4 Low Voltage Surge Arrestor

Provide low voltage surge arrestors to suppress all voltage transients on initiating , signaling, transmitter tripping, and auxiliary control circuits. Provide protection for all circuits which leave the building shell and as shown on the contract drawings. When circuits interconnect two or more buildings provide an arrestor at the conductor entrance to each building. Unit(s) shall be UL 497B listed with a 30 volt clamping level and have a maximum response time of 5 nanoseconds. Device shall feature multi stage construction and both differential/common mode protection. Install units in strict accordance with the manufacturer’s recommendations. One such acceptable product is a model P264 as manufactured by Edco Inc. of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

2.5: New Paragraph

For installations where Appendix E lists an integrated fire alarm panel/transmitter as “Preferred” and a conventional system is designed, edit and add the following paragraph:

At the contractor’s option provide a single integrated fire alarm panel/transmitter as manufactured by [(King Fisher) (Monaco)] in lieu of the fire alarm panel specified in section 2.2.1 and the transmitter as specified in section 2.2.14. Provide unit complete with manufacturer’s 60 hour battery set with zoning as specified earlier. All spot type smoke

detectors shall be verified by the control panel prior to initiating an alarm. Provide proof of UL or FM cross listing/approval of the control panel and any provided two wire smoke detectors.

2.6: New Paragraph

Include this paragraph for any projects with water based fire suppression systems.

Local Sprinkler Waterflow Alarm

Provide a 24 volt DC operated 10 inch diameter weather proof rated bell and backbox for local annunciation of sprinkler water flow conditions in accordance with section 2-9 of NFPA 13 *Installation of Sprinkler Systems*. Bell shall be powered by the fire alarm panel and shall sound continuously upon flow of sprinkler water. Alarm panel signal silence and reset functions shall not affect bell operation. Conductors supplying bell need not be electrically supervised, control of bell via contacts on sprinkler system flow switch(es) is acceptable. Locate this bell on the exterior building wall a minimum of 8 feet above grade adjacent to sprinkler riser unless otherwise noted on contract drawings.

3.1.1: New Paragraph

Provide on all projects specifying addressable or multiplex systems:

3.1.1 Software/hardware

Provide all necessary programming/setup/initialization software necessary to write initial and edit existing software. Provide all access codes to allow complete access to all maintenance, testing, and programming levels. Provide 2 copies each of all complete software/programming and installation, maintenance, troubleshooting, repair, and operation manuals. Provide factory patchcord necessary to interface control panel to a personnel computer serial port connector. Provide original licensed manufacturer's copies of all software on 3 1/2 inch floppy disks.

3.1.2: New Paragraph

Provide this paragraph on all projects specifying or allowing addressable or multiplex systems, and when otherwise requested by the station:

3.1.2 Training

Provide 8 hours minimum hands on training complete with all necessary manuals and service literature to Public Works alarm technicians. Provide sufficient training to enable technicians to understand system hierarchy/operations, to be able to trouble shoot system down to each replaceable component, and to be able to write/edit software as necessary to reconfigure/modify or add programming for new devices or desired operations. Training shall be provided on site and may utilize the control panel installed under this contract as a training aid. Should the panel be used as a training aid, this should occur prior to the final acceptance test.

3.4 - Formal Insp. & Testing

Add: **"Provide necessary equipment to test all smoke detectors in accordance with the detector manufacturer's written recommendations."**

Section 13920A Fire Pumps

2.1.2: Alarms	Typically edit this paragraph to require only dry contacts for interfacing with the building fire alarm system.
2.1.4.2: Controllers	When utilizing electric motor driven pumps, typically edit the fourth sentence to state: “ Controller shall be of the solid state reduced voltage soft start type with... ”. (See section 4.2 for further information). Also note that withstand rating can be increased from typically 30,000 amps RMS (standard) to 100,000 amperes RMS (intermediate) for an additional \$30. Typically recommend specifying the intermediate rated product.
2.1.5: Diesel Engine Driver	Add; “ Engine cooling shall be by closed circuit heat exchanger. Radiators are not permitted. ”
2.2.5: Hose Valve Manifold Test Header	Revise the second sentence to state: “ Provide \ASME/ANSI B16.5\, Class 150 flanged inlet connection to straight line type hose valve manifold. Arrange and brace manifold to permit flow testing directly from the test header without damaging surrounding property. ”
3.7.3: Formal Insp. & Tests	In the second sentence, change 15 days to 45 days.
3.7.3: Formal Insp. & Tests	Insert after the third sentence: “ Provide playpipes, hose, and a stable, safe nozzle rack for conducting flow tests. For electric motor driven pumps, provide a technician which can take voltage and current draw measurements. Provide manufacturer’s representatives for the controller and pump. ”

Section 13930 Wet-Pipe Fire Suppression Sprinklers

General Comment	Do not specify or detail alarm check valves. Where the sprinkler system consists of only one wet pipe riser, the riser shall consist of a backflow preventer with associated control valves and pressure gauges, two inch weld-o-let and associated valve and pipe for the sprinkler system main drain, 1/2 inch weld-o-let for a system pressured gauge, and a flow switch. Where the sprinkler system consist of multiple risers, each wet pipe riser shall consist of a control valve, check valve, main drain, system pressure gauge and flow switch. The flow switch shall be provided with two sets of SPDT contacts for connection to the building fire alarm panel and exterior mounted electric alarm bell.
1.3: Sprinkler System Design	Include seismic design requirements for facilities located in Charleston, Beaufort, or Sumter, South Carolina or Memphis, Tennessee.
1.4.1: Man. Catalog Data	Delete item (b) for alarm valves. Delete reference to “Water Motor Alarms”. Include “ Electric water flow alarms ” only if an electric water flow alarm is not provided under Section 13852 (Interior Fire Alarm Systems).

1.4.4.1: Quals. of Installer	Include the bracketed requirements for System Technician Qualifications for all Southern Division projects.
2.1:Aboveground Piping Systems	Add: “Single piece mechanical grooved reducing fittings which do not feature tapered reducing passageways are not acceptable.”
2.1.1: Sprinkler Piping	<p>Replace this entire paragraph with the following:</p> <p>Sprinkler Piping NFPA 13, except as modified herein. Steel piping shall have a U.L. corrosion resistance ratio (CRR) of not less than 1.00. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied will not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be U.L. listed under the category of Fittings, Rubber Gasketed (VIZM) and shall be approved for use in wet [dry] pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Side outlet tees using rubber gasketed fittings shall not be permitted. Sprinkler pipe and fittings shall be metal. Roll grooved fittings shall not be used with internally galvanized steel pipe.</p>
2.1.2: Sprinkler Heads	Edit this paragraph to require quick response, ESFR, 0.64 inch (16.3 mm) orifice, concealed, dry sidewall, extended coverage, or other special sprinklers as applicable. Specify the use of quick response sprinklers in light hazard occupancies.
2.1.4: Alarm Valves	Omit this paragraph.
2.1.5: Water Motor Alarms	Delete this paragraph if the electric bell is provided under Section 13852, Interior Fire Alarms. If a fire alarm system is not included in this project, change the paragraph title to “Electric Water Flow Alarms”. Change the first sentence to read “..., to sound locally upon activation of the corresponding flow switch(es).” Delete the last sentence referring to drain piping. Add “Bell shall be 10 inches in diameter and powered from the nearest unswitched 120 VAC source.”
2.1.6: Pressure/ Flow Switch	Specify only flow switches. Change the first sentence to: “Provide switch with two sets of SPDT contacts for the automatic transmittal of an alarm over the facility fire alarm system and for operation of the electric water flow alarm.”
2.1.6: Pressure/ Flow Switch	If the project includes an elevator, add: “Provide dedicated flow switch(es) with SPDT contacts to initiate elevator power shutdown.”

2.1.6: Pressure/ Flow Switch	If the project includes an electronic or computer room which requires a CO ₂ extinguishing system or may require equipment power shutdown upon sprinkler activation, add: “Provide dedicated flow switch(es) with two sets of SPDT contacts to initiate equipment power shutdown and for the automatic transmittal of an alarm over the facility fire alarm system.”
2.1.13: Excess Pressure Pump	Specify use of an excess pressure pump anytime a sprinkler water flow switch is controlling a shunt trip for elevator or computer room power.
3.1: Installation	Add: “Use of any type of “anti-leak” products in sprinkler systems is strictly prohibited.”
3.1.2: Disinfection	Revise the last sentence to state: “Disinfection of systems supplied by non-potable water and piping downstream of back-flow preventers is not required.”
3.2.2: Formal Tests & Insp.	In the second sentence change 15 days to 45 days.

Section 13935 Dry-Pipe Fire Suppression Sprinklers

1.3: Sprinkler System Design	Include seismic design requirements for any facilities located in Charleston, Beaufort, or Sumter, South Carolina or Memphis, Tennessee.
1.4.1: Man. Catalog Data	Delete reference to “Water Motor Alarms”. Include “Electric water flow alarms” only if an electric water flow alarm is not provided under Section 13852 (Interior Fire Alarm Systems).
1.4.4.1: Quals. of Installer	Include the bracketed requirements for System Technician Qualifications for all Southern Division projects.
2.1: Aboveground Piping Systems	Add: “Single piece mechanical grooved reducing fittings which do not feature tapered reducing passageways are not acceptable.”
2.1.1: Sprinkler Piping	Replace this entire paragraph with the following: Sprinkler Piping NFPA 13, except as modified herein. Steel piping shall have a U.L. corrosion resistance ratio (CRR) of not less than 1.00. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied will not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be U.L. listed under the category of Fittings, Rubber Gasketed (VIZM) and shall be approved for use in wet [dry] pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Side outlet tees

	using rubber gasketed fittings shall not be permitted. Sprinkler pipe and fittings shall be metal. Roll grooved fittings shall not be used with internally galvanized steel pipe.
2.1.2: Sprinkler Heads	Edit this paragraph to require quick response, ESFR, 0.64 inch (16.3 mm) orifice, concealed, dry sidewall, extended coverage, or other special sprinklers as applicable. Specify quick response sprinklers in light hazard occupancies. Specify quick response sprinklers in light hazard occupancies.
2.1.5: Water Motor Alarms	Delete this paragraph if the electric bell is provided under Section 13852, Interior Fire Alarms. If a fire alarm system is not included in this project, change the paragraph title to “Electric Water Flow Alarms”. Change the first sentence to read “..., to sound locally upon activation of the corresponding flow switch(es). ” Delete the last sentence referring to drain piping. Add “ Bell shall be 10 inches in diameter and powered from the nearest unswitched 120 VAC source. ”
2.1.6: Pressure Switch	Add; “Provide switch with two sets of alarm contacts for connection to the building fire alarm system and exterior electric sprinkler system alarm”. Delete selection option for mechanical diaphragm controlled retard device.
2.1.7: Low Air Pres. Supervisory Panel	On all facilities which have an interior fire alarm system (which should be virtually all) replace this paragraph with the following: “ Provide a low air pressure supervisory switch which transfers upon drop in system air pressure of halfway between normal air pressure and dry pipe valve trip point air pressure for connection to the building fire alarm system. ”
3.1: Installation	Add: “ Use of any type of “anti-leak” products in sprinkler systems is strictly prohibited. ”
3.1.2: Disinfection	Revise the last sentence to state: “ Disinfection of systems supplied by non-potable water and piping downstream of back-flow preventers is not required. ”
3.2.2: Formal Tests & Insp.	In the second sentence change 15 days to 45 days.

Section 13945 [Deluge][Preaction] Fire Suppression Sprinklers

1.3: Sprinkler System Design	Include seismic design requirements for any facilities located in Charleston, Beaufort, or Sumter, South Carolina or Memphis, Tennessee and in all facilities with deluge systems.
1.4.1: Manufacturer’s Catalog Data	Add: “ p. Line voltage surge arrestor ” Delete reference to “Water Motor Alarms”. Include “ Electric water flow alarms ” only if an electric water flow alarm is not provided under Section 13852 (Interior Fire Alarm Systems).

1.4.2.1: Detail Drawing	Do not add the bracketed requirement for drawings signed by a registered PE.
1.4.4.1: Quals. of Installer	Include the bracketed requirements for System Technician Qualifications for all Southern Division projects.
2.1: Aboveground Piping Systems	Add: “Single piece mechanical grooved reducing fittings which do not feature tapered reducing passageways are not acceptable.”
2.1.1: Sprinkler Piping	Replace this entire paragraph with the following: Sprinkler Piping NFPA 13, except as modified herein. Steel piping shall have a U.L. corrosion resistance ratio (CRR) of not less than 1.00. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied will not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be U.L. listed under the category of Fittings, Rubber Gasketed (VIZM) and shall be approved for use in wet [dry] pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Side outlet tees using rubber gasketed fittings shall not be permitted. Sprinkler pipe and fittings shall be metal. Roll grooved fittings shall not be used with internally galvanized steel pipe.
2.1.2: Sprinkler Heads	Edit this paragraph to require quick response, ESFR, 0.64 inch (16.3 mm) orifice, concealed, dry sidewall, extended coverage, or other special sprinklers as applicable.
2.1.5: Water Motor Alarms	Delete this paragraph if the electric bell is provided under Section 13852, Interior Fire Alarms. If a fire alarm system is not included in this project, change the paragraph title to “Electric Water Flow Alarms”. Change the first sentence to read “..., to sound locally upon activation of the corresponding flow switch(es).” Delete the last sentence referring to drain piping. Add “Bell shall be 10 inches in diameter and powered from the nearest unswitched 120 VAC source.”
2.1.6: Pressure Switch	Add; “Provide switch with two sets of SPDT contacts for connection to the building fire alarm system and exterior electric sprinkler system alarm”. Delete selection option for mechanical diaphragm controlled retard device.
2.5: Detection Devices	Detection means should always be electric, do not specify pneumatic or hydraulic. Edit out references to piping and tubing,
2.5.1: Spot Heat Detectors	Edit paragraph to require rate compensated heat detectors when installations are subject to moisture or high ambient temperatures.

2.5.2: Smoke Detectors	Smoke detection generally should not be used for deluge or pre-action system activation.
2.5.3: Control Panel	Include the last bracketed sentence (UL/FM approved for releasing device service). For deluge systems, include the following: “Control panel shall not be microprocessor based but shall operate of diode matrix/relay logic.”
2.5.4.a: Storage Batteries	Edit paragraph for 60 hours of standby and 30 minutes of alarm. Add the following: “For releasing panels which are Factory Mutual Approved only, provide battery sets in accordance with the approval (90 hour).”
2.5.5: Wiring	All low voltage circuits shall use #14 AWG conductors. Add: “All initiating circuits shall be wired Style D (Class A).”
2.5.5.1: New Paragraph	<p>Add the following paragraph:</p> <p>2.5.5.1 Line Voltage Surge Arrestor</p> <p>Provide line voltage surge arrestors to suppress all voltage transients which might damage fire alarm panel/transmitter components. Unit shall wire in series to the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330 volt suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction which includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. One such acceptable product is a model HSP-121BT2 as manufactured by Edco of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.</p>
2.5.6: Supervision	On all facilities which have an interior fire alarm system (which should be virtually all) replace the third sentence of this paragraph with the following: “Provide a low air pressure supervisory switch which transfers upon loss of supervisory air pressure for connection to the building fire alarm system. Supervisory air pressure should typically not exceed 1.5 psi (10.3 kPa)”
2.5.7: Manual Remote	For stations releasing deluge systems add: “Enclose manual release stations in cast metal cottage shell style fire alarm station enclosures which features side hinge doors. One such enclosure is a Faraday model F01.”
2.6.4: Trouble Alarm	Delete this bell as long as the facility fire alarm system supervises the low air pressure switch.
3.1: Installation	Add: “Use of any type of “anti-leak” products in sprinkler systems is strictly prohibited.”

3.1.2: Disinfection Revise the last sentence to state: “**Disinfection of systems supplied by non-potable water and piping downstream of back-flow preventers is not required.**”

3.2.2: Formal Tests & Insp. In the second sentence change **15** days to **45** days.

Section 13956 Foam Fire Extinguishing for Aircraft Hangars

1.3.1: Design Requirements Include seismic design requirements for all facilities.

1.3.1: Design Requirements Add: “**All foam proportioning equipment shall be supplied and certified by a single source to function as a unified system.**”

1.4.1: Manufacturer’s Catalog Data Add: “**ac. Line voltage surge arrestor**”
Delete reference to “Water Motor Alarms”. Include “**Electric water flow alarms**” only if an electric water flow alarm is not provided under Section 13852 (Interior Fire Alarm Systems).

1.4.3.1.a: Calculations Add: “**Provide software copy of all hydraulic calculation data files on 3.5 inch floppy disk**”.

2.1.1: Sprinkler Heads Revise paragraph to require quick response 175-190 degree F sprinklers for all closed head systems.

2.1.3: [Deluge] [Preaction] Valves Add: “**Valves shall be suitable for use with foam water solutions. Provide manufacturer’s data sheet or certification indicating this suitability.**”

2.2.1: Control Panel Always specify Style D (Class A) initiating circuits.

2.2.1: Control Panel Add: “**Control panel shall not microprocessor based but shall operate of diode matrix/relay logic. Provide individual releasing modules with supervised disconnect switches for each water, foam water, or foam concentrate valve. Modules shall have a yellow trouble lamp. Configure panel in strict accordance with the manufacturer’s requirements and recommendations and the respective listings or approvals.**”

2.2.2.1: Storage Batteries Add: “**For releasing panels which are Factory Mutual Approved only, provide battery sets in accordance with the approval (90 hour).**”

2.3: Pneumatic Detection Sys. Detection means should always be electric, do not specify pneumatic or hydraulic. Edit out references to piping and tubing,

- 2.4: Piping Supervision On all facilities which have an interior fire alarm system (which should be virtually all) replace the third sentence of this paragraph with the following: **“Provide a low air pressure supervisory switch which transfers upon loss of supervisory air pressure for connection to the building fire alarm system. Supervisory air pressure should typically not exceed 1.5 psi (10.3 kPa)”**
- 2.5: Manual Release Stations Add: **“Enclose manual release stations in cast metal cottage shell style fire alarm station enclosures which features side hinge doors. One such enclosure is a Faraday model F01.”**”
- 2.6: Heat Detectors Edit paragraph to require rate compensated heat detectors.
- 2.8: Combination UV-IR Flame Detectors Add: **“Detectors shall be able to discriminate between background radiation sources (lighting, infra red heaters, etc.) and true fire sources. Detectors which exhibit any malfunction, including activation of the UV portion of the sensor, from background radiation shall be removed and replaced with a product capable of providing this discrimination.”**
- 2.9.1: Wiring Add: **“All initiating circuits shall be wired Style D (Class A). Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. All control panels shall be dressed out in a professional manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped. Conduit may not enter the top of control panel cabinet. Provide panel in the manufacturer’s NEMA 4 enclosure for panels subject to water spray/runoff and/or located in damp/dirty locations or relocate to a suitable dry location at the direction of the Contracting Officer. Provide conduit seals for all raceway terminating at the control panel cabinet.”**
- 2.9.1.1: New Paragraph Add the following paragraph:
2.9.1.1 Low Voltage Surge Arrestor
Provide low voltage surge arrestors to suppress all voltage transients on initiating , signaling, transmitter tripping, and auxiliary control circuits. Provide protection for all circuits which leave the building shell and as shown on the contract drawings. When circuits interconnect two or more buildings provide an arrestor at the conductor entrance to each building. Unit(s) shall be UL 497B listed with a 30 volt clamping level and have a maximum response time of 5 nanoseconds. Device shall feature multi stage construction and both differential/common mode protection. Install units in strict accordance with the manufacturer’s recommendations. One such acceptable product is a model P264 as

manufactured by Edco Inc. of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

2.9.2.1: New Paragraph

Add the following paragraph:

2.9.2.1 Line Voltage Surge Arrestor

Provide line voltage surge arrestors to suppress all voltage transients which might damage fire alarm panel/transmitter components. Unit shall wire in series to the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330 volt suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction which includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. One such acceptable product is a model HSP-121BT2 as manufactured by Edco of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

2.11.1: Water Motor Alarms

Delete this paragraph if the electric bell is provided under Section 13852, Interior Fire Alarms. If a fire alarm system is not included in this project, change the paragraph title to “Electric Water Flow Alarms”. Change the first sentence to read “**..., to sound locally upon activation of the corresponding flow switch(es).**” Delete the last sentence referring to drain piping. Add “**Bell shall be 10 inches in diameter and powered from the nearest unswitched 120 VAC source.**”

2.11.3.1 :Pressure Switch

Change first sentence to require two sets of SPDT contacts.

2.13: AFFF Concentrate

Specify a glycol ether free MIL SPEC concentrate when available. Add: “**and listed on the Qualified Products List (QPL)**”. Add: “**and listed on the Qualified Products List (QPL)**”.

2.16: Oscillating Monitor Nozzles

Specify electric motor powered oscillating monitors on Navy and Marine Corps projects.

2.18: Wall Foam Hydrants

Revise paragraph to provide a flow meter in the foam hydrant header line when closed circuit foam discharge into a tanker truck is contemplated for testing (the norm).

2.19.1: Sprinkler Piping

Replace this entire paragraph with the following:

Sprinkler Piping

NFPA 13, except as modified herein. Steel piping shall have a U.L. corrosion resistance ratio (CRR) of not less than 1.00. Pipe nipples \^150

mm[^] \~6 inches~\ long and shorter shall be Schedule 80 steel pipe. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Rubber gasketed grooved end pipe and fittings with mechanical couplings shall only be permitted in pipe sizes [^]40 mm[^] \~1 1/2 inches~\ and larger. Use of restriction orifices, reducing flanges, single piece mechanical grooved reducing fittings which do not feature tapered reducing passageways are not permitted. Plain-end fittings with mechanical couplings (which use steel gripping devices to bite into the pipe when pressure is applied) are not permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be U.L. listed under the category of Fittings, Rubber Gasketed (VIZM) and shall be approved for use in wet [dry] pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Side outlet tees using rubber gasketed fittings shall not be permitted. Sprinkler pipe and fittings shall be metal. Roll grooved fittings shall not be used with internally galvanized steel pipe.

2.19.1.1: AFFF Concentrate Pipe and Fittings
(New Paragraph)

Add this new paragraph:
AFFF Concentrate Pipe and Fittings. Pipe and fittings in contact with AFFF concentrate shall be red brass with silver brazed fittings or stainless steel with welded or flanged fittings only. Screwed or mechanical fittings will not be permitted.

2.19.4.1: Sway Bracing
(New Paragraph)

Add this new paragraph:
Sway Bracing. Provide sway bracing on all piping sufficient to prevent any pipe movement upon tripping of deluge/preaction valves. Utilize base type elbows secured to floor slabs at bottom of deluge risers and monitors.”

2.19.7: Inspector’s Test Connection

Specify provision of test connections terminating 5 feet above finished floor with a 1/2 inch blind orifice and hose connection to permit collection of test flows.

2.19.11: F.D. Inlet Connection

Do not provide fire department connections on systems that serve only hangar spaces.

3.4: Disinfection

Revise the last sentence to state: **“Disinfection of systems supplied by non-potable water and piping downstream of back-flow preventers is not required.”**

3.8.2: Formal Insp. & Tests

Change **15** days to **45** days.

3.8.3: Environmental Protection Add: **“Provide a tanker/suction truck(s) capable of containing all test and wash down flows. Contractor is responsible for off base disposal of solutions including any necessary permits, fees, and reporting requirements.”**

3.10: Training Requirements Change **4** hours to **8** hours minimum.

Section 13957 Foam Fire Extinguishing for Fuel Tanks

1.3.1: Design Requirements Include seismic design requirements for any facilities located in Charleston, Beaufort, or Sumter, South Carolina or Memphis, Tennessee and in all facilities with deluge systems.

1.3.1: Design Requirements Add: **“All foam proportioning equipment shall be supplied and certified by a single source to function as a unified system.”**

1.4.1: Man. Catalog Data Add: **“ac. Line voltage surge arrestor”** when applicable.
Delete reference to “Water Motor Alarms”. Include **“Electric water flow alarms”** only if an electric water flow alarm is not provided under Section 13852 (Interior Fire Alarm Systems).

1.4.3.1.a: Calculations Add: **“Provide software copy of all hydraulic calculation data files on 3.5 inch floppy disk”.**

2.1.1: Tankside Foam Chambers Add: **“Provide tank inlet blank off plates and diversion adapter/goosenecks with threaded hose connections to permit performance testing system without discharging agent into tank or onto ground.”**

2.1.2: Deluge Valves Add: **“Valves shall be suitable for use with foam water solutions. Provide manufacturer’s data sheet or certification indicating this suitability.”**

2.2.1: Control Panel Always specify Style D (Class A) initiating circuits.

2.2.1: Control Panel Add: **“Control panel shall not microprocessor based but shall operate of diode matrix/relay logic. Provide individual releasing modules with supervised disconnect switches for each water, foam water, or foam concentrate valve. Modules shall have a yellow trouble lamp. Configure panel in strict accordance with the manufacturer’s requirements and recommendations and the respective listings or approvals.”**

2.2.1: Control Panel If a line type heat detection is utilized, specify that the control panel and line type heat detection system be supplied by the same manufacturer. Specify provision of the manufacturer’s line coverage alarm point identification meter.

- 2.2.2.1: Storage Batteries Add: **“For releasing panels which are Factory Mutual Approved only, provide battery sets in accordance with the approval (90 hour).”**
- 2.3: Manual Release Stations Add: **“Enclose manual release stations in cast metal cottage shell style fire alarm station enclosures which features side hinge doors. One such enclosure is a Faraday model F01.”**
- 2.4.1: Spot-Type Heat Detectors If spot type detectors are utilized, edit paragraph to require rate compensated type.
- 2.5.1: Wiring Add: **“All initiating circuits shall be wired style D (class A). Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. All control panels shall be dressed out in a professional manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped. Conduit may not enter the top of control panel cabinet. Provide panel in the manufacturer’s NEMA 4 enclosure for panels subject to water spray/runoff and/or located in damp/dirty locations or relocate to a suitable dry location at the direction of the Contracting Officer. Provide conduit seals for all raceway terminating at the control panel cabinet.”**
- 2.5.1.1: New Paragraph Add the following paragraph:
2.5.1.1. Low Voltage Surge Arrestor
Provide low voltage surge arrestors to suppress all voltage transients on initiating , signaling, transmitter tripping, and auxiliary control circuits. Provide protection for all circuits which leave the building shell and as shown on the contract drawings. When circuits interconnect two or more buildings provide an arrestor at the conductor entrance to each building. Unit(s) shall be UL 497B listed with a 30 volt clamping level and have a maximum response time of 5 nanoseconds. Device shall feature multi stage construction and both differential/common mode protection. Install units in strict accordance with the manufacturer’s recommendations. One such acceptable product is a model P264 as manufactured by Edco Inc. of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.
- 2.5.2: New Paragraph Add the following paragraph:
2.5.2 Line Voltage Surge Arrestor
Provide line voltage surge arrestors to suppress all voltage transients which might damage fire alarm panel/transmitter components. Unit shall wire in series to the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330 volt

suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction which includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. One such acceptable product is a model HSP-121BT2 as manufactured by Edco of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements

2.7.1: Water Motor Alarms

Delete this paragraph if the electric bell is provided under Section 13852, Interior Fire Alarms. If a fire alarm system is not included in this project, change the paragraph title to “Electric Water Flow Alarms”. Change the first sentence to read “**..., to sound locally upon activation of the corresponding flow switch(es).**” Delete the last sentence referring to drain piping. Add “**Bell shall be 10 inches in diameter and powered from the nearest unswitched 120 VAC source.**”

2.7.3.1: Pressure Switch

Change first sentence to require two sets of SPDT contacts.

2.11: AFFF Concentrate

Specify a glycol ether free MIL SPEC concentrate when available. Specify a freeze protected concentrate when tanks are exterior to eliminate insulating and heat tracing. Specify Qualified Products List (QPL) listing.

2.18.1: Sprinkler Piping

Replace this entire paragraph with the following:

Sprinkler Piping

NFPA 13, except as modified herein. Steel piping shall have a U.L. corrosion resistance ratio (CRR) of not less than 1.00. Pipe nipples $\sqrt{150}$ mm $\sqrt{\sim 6}$ inches \sim long and shorter shall be Schedule 80 steel pipe. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Rubber gasketed grooved end pipe and fittings with mechanical couplings shall only be permitted in pipe sizes $\sqrt{40}$ mm $\sqrt{\sim 1 \frac{1}{2}}$ inches \sim and larger. Use of restriction orifices, reducing flanges, single piece mechanical grooved reducing fittings which do not feature tapered reducing passageways are not permitted. Plain-end fittings with mechanical couplings (which use steel gripping devices to bite into the pipe when pressure is applied) are not permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be U.L. listed under the category of Fittings, Rubber Gasketed (VIZM) and shall be approved for use in wet [dry] pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Side outlet tees using rubber gasketed fittings shall not be permitted. Sprinkler pipe and fittings shall be metal. Roll grooved fittings shall not be used with internally galvanized steel pipe.

2.18.1.1: AFFF Concentrate Pipe and Fittings (New Paragraph)	Add this new paragraph: AFFF Concentrate Pipe and Fittings. Pipe and fittings in contact with AFFF concentrate shall be red brass with silver brazed fittings or stainless steel with welded or flanged fittings only. Screwed or mechanical fittings will not be permitted.
3.4: Disinfection	Revise the last sentence to state: “Disinfection of systems supplied by non-potable water and piping downstream of back-flow preventers is not required.”
3.8.2: Formal Insp. & Tests	Change 15 days to 45 days.
3.8.3: Environmental Protection	Add: “Provide a tanker/suction truck(s) capable of containing all test and wash down flows. Contractor is responsible for responsible off base disposal of solutions including any necessary permits, fees, and reporting requirements.”
3.10: Training Requirements	Change 4 hours to 8 hours minimum.

Section 13958 Foam Fire Extinguishing for Haz/Flam Material Facilities

1.3.1: Design Requirements	Include seismic design requirements for any facilities located in Charleston, Beaufort, or Sumter, South Carolina or Memphis, Tennessee and in all facilities with deluge systems.
1.3.1: Design Requirements	Add: “All foam proportioning equipment shall be supplied and certified by a single source to function as a unified system.”
1.4.1: Man. Catalog Data	Add: “dd. Line voltage surge arrester” Delete reference to “Water Motor Alarms”. Include “Electric water flow alarms” only if an electric water flow alarm is not provided under Section 13852 (Interior Fire Alarm Systems).
1.4.3.1.a: Calculations	Add: “Provide software copy of all hydraulic calculation data files on 3.5 inch floppy disk”.
2.1.1: Sprinkler Heads	Revise paragraph to require quick response 175-190 degree F sprinklers for all closed head systems.
2.1.3: [Preaction] [Deluge] Valves	Add: “Valves shall be suitable for use with foam water solutions. Provide manufacturer’s data sheet or certification indicating this suitability.”
2.2.1: Control Panel	Always specify style D (class A) initiating circuits.

- 2.2.1: Control Panel Add: **“Control panel shall not microprocessor based but shall operate of diode matrix/relay logic. Provide individual releasing modules with supervised disconnect switches for each water, foam water, or foam concentrate valve. Modules shall have a yellow trouble lamp. Configure panel in strict accordance with the manufacturer’s requirements and recommendations and the respective listings or approvals.”**
- 2.2.2.1: Storage Batteries Add: **“For releasing panels which are Factory Mutual Approved only, provide battery sets in accordance with the approval (90 hour).”**
- 2.3: Pneumatic Detection Detection means should always be electric, do not specify pneumatic or hydraulic. Edit out references to piping and tubing,
- 2.4: Piping Supervision On all facilities which have an interior fire alarm system (which should be virtually all) replace the third sentence of this paragraph with the following: **“Provide a low air pressure supervisory switch which transfers upon loss of supervisory air pressure for connection to the building fire alarm system. Supervisory air pressure should typically not exceed 1.5 psi (10.3 kPa)”**
- 2.5: Manual Release Stations Add: **“Enclose manual release stations in cast metal cottage shell style fire alarm station enclosures which features side hinge doors. One such enclosure is a Faraday model F01.”**
- 2.6: Heat Det. Edit paragraph to require rate compensated heat detectors.
- 2.8: Combination UV-IR Flame Detectors Add: **“Detectors shall be able to discriminate between background radiation sources (lighting, infra red heaters, etc.) and true fire sources. Detectors which exhibit any malfunction, including activation of the UV portion of the sensor, from background radiation shall be removed and replaced with a product capable of providing this discrimination.”**
- 2.9.1: Wiring Add: **“All initiating circuits shall be wired style D (class A). Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. All control panels shall be dressed out in a professional manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped. Conduit may not enter the top of control panel cabinet. Provide panel in the manufacturer’s NEMA 4 enclosure for panels subject to water spray/runoff and/or located in damp/dirty locations or relocate to a suitable dry location at the direction of the Contracting Officer. Provide conduit seals for all raceway terminating at the control panel cabinet..”**

2.9.1.1: New Paragraph

Add the following paragraph:

2.9.1.1 Low Voltage Surge Arrestor

Provide low voltage surge arrestors to suppress all voltage transients on initiating , signaling, transmitter tripping, and auxiliary control circuits. Provide protection for all circuits which leave the building shell and as shown on the contract drawings. When circuits interconnect two or more buildings provide an arrestor at the conductor entrance to each building. Unit(s) shall be UL 497B listed with a 30 volt clamping level and have a maximum response time of 5 nanoseconds. Device shall feature multi stage construction and both differential/common mode protection. Install units in strict accordance with the manufacturer’s recommendations. One such acceptable product is a model P264 as manufactured by Edco Inc. of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

2.9.2.1: New Paragraph

Add the following paragraph:

2.9.2.1 Line Voltage Surge Arrestor

Provide line voltage surge arrestors to suppress all voltage transients which might damage fire alarm panel/transmitter components. Unit shall wire in series to the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330 volt suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction which includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. One such acceptable product is a model HSP-121BT2 as manufactured by Edco of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

2.11.1: Water Motor Alarms

Delete this paragraph if the electric bell is provided under Section 13852, Interior Fire Alarms. If a fire alarm system is not included in this project, change the paragraph title to “Electric Water Flow Alarms”. Change the first sentence to read “**..., to sound locally upon activation of the corresponding flow switch(es).**” Delete the last sentence referring to drain piping. Add “**Bell shall be 10 inches in diameter and powered from the nearest unswitched 120 VAC source.**”

2.11.3.1: Pressure Switch

Change first sentence to require two sets of SPDT contacts.

2.13: AFFF Concentrate	Specify a glycol ether free MIL SPEC concentrate when available. Specify Qualified Products List (QPL) listing. Specify Qualified Products List (QPL) listing.
2.18: Wall Foam Hydrants	Revise to provide a flow meter in the foam hydrant header line when closed circuit foam discharge into a tanker truck is contemplated for testing (the norm).
2.19.1: Sprinkler Piping	<p>Replace this entire paragraph with the following:</p> <p>Sprinkler Piping</p> <p>NFPA 13, except as modified herein. Steel piping shall have a U.L. corrosion resistance ratio (CRR) of not less than 1.00. Pipe nipples ≤ 150 mm ≤ 6 inches long and shorter shall be Schedule 80 steel pipe. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Rubber gasketed grooved end pipe and fittings with mechanical couplings shall only be permitted in pipe sizes ≥ 40 mm $\geq 1\frac{1}{2}$ inches and larger. Use of restriction orifices, reducing flanges, single piece mechanical grooved reducing fittings which do not feature tapered reducing passageways are not permitted. Plain-end fittings with mechanical couplings (which use steel gripping devices to bite into the pipe when pressure is applied) are not permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be U.L. listed under the category of Fittings, Rubber Gasketed (VIZM) and shall be approved for use in wet [dry] pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Side outlet tees using rubber gasketed fittings shall not be permitted. Sprinkler pipe and fittings shall be metal. Roll grooved fittings shall not be used with internally galvanized steel pipe.</p>
2.19.1.1: AFFF Concentrate Pipe and Fittings	<p>Add this new paragraph:</p> <p>AFFF Concentrate Pipe and Fittings.</p>
(New Paragraph)	<p>Pipe and fittings in contact with AFFF concentrate shall be red brass with silver brazed fittings or stainless steel with welded or flanged fittings only. Screwed or mechanical fittings will not be permitted.</p>
2.19.7: Inspector's Test Connection	Specify provision of test connections terminating 5 feet above finished floor with a 1/2 inch blind orifice and hose connection to permit collection of test flows.
3.4: Disinfection	Revise the last sentence to state: “Disinfection of systems supplied by non-potable water and piping downstream of back-flow preventers is not required.”

3.8.2: Formal Insp. & Tests Change **15** days to **45** days.

3.8.3: Environmental Protection Add: **“Provide a tanker/suction truck(s) capable of containing all test and wash down flows. Contractor is responsible for responsible off base disposal of solutions including any necessary permits, fees, and reporting requirements.”**

3.10: Training Requirements Change **4** hours to **8** hours minimum.

Section 13961A Carbon Dioxide Fire Extinguishing (High Pressure)

1.3.1: Man. Catalog Data Add: **“t. Line voltage surge arrester”**

2.1.1: Underfloor Total Flooding Systems Utilize only the higher flooding rate (1 pound carbon dioxide per 10 cubic feet of space) regardless of under-floor volume.

2.1.2: Underfloor Total Flooding Systems Supply We normally do not require connected reserve agent supplies. Add: **“Any agent quantities specified here and/or indicated on drawings are absolute minimum quantities to be provided. It is the contractor’s responsibility to determine the final quantity of agent necessary after taking into account leakage rates, true space size, etc.”**

2.5.2: Sequence of Operation Edit the sequence to require air condition power to shut down upon activation of the first smoke detector. Computer equipment power shall only shut down upon activation of the system pressure switch. Do not shut down equipment power upon acitvation of a second smoke detector.

2.5.2: Sequence of Operation NFPA 12 does not permit inhibit switches. Delete item (b) referencing the inhibit switch.

2.5.4: Pressure-Operated Equipment Switch Rewrite as follows: **“For each protected space, provide a switch to automatically shut down the computer equipment air conditioning equipment upon the discharge of carbon dioxide. Disregard note to omit if no air handling system. If there are no dedicated room A/C units, only specify shut down of computer equipment power.**

2.5.5.3: New Paragraph Add the following paragraph:
2.5.5.3 Wiring
“All initiating circuits shall be wired Style D (Class A). Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. All control panels shall be dressed out in a professional

manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped. Conduit may not enter the top of control panel cabinet. Provide panel in the manufacturer’s NEMA 4 enclosure for panels subject to water spray/runoff and/or located in damp/dirty locations or relocate to a suitable dry location at the direction of the Contracting Officer. Provide conduit seals for all raceway terminating at the control panel cabinet.”

2.5.6.1: Storage Batteries

Add: “For releasing panels which are Factory Mutual Approved only, provide battery sets in accordance with the approval (90 hour).”

2.6.1: Smoke Detectors

Edit the first sentence to require both ionization and photoelectric type smoke detectors.

2.6.1.1: Ionization Detectors

Add: ”Detectors shall be U.L. Listed for the anticipated air velocities.”

2.7: Inhibit Switch

Omit this paragraph. Inhibit switches are not permitted by NFPA 12.

2.12.1: Operating Power

Add the following paragraph:

2.12.1 Line Voltage Surge Arrestor

Provide line voltage surge arrestors to suppress all voltage transients which might damage fire alarm panel/transmitter components. Unit shall wire in series to the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330 volt suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction which includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. One such acceptable product is a model HSP-121BT2 as manufactured by Edco of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

3.5.2: Formal Inspection & Tests

Change 15 days to 45 days. Add: **“Conduct a complete discharge/concentration test. Provide a currently calibrated and certified three channel recording concentration meter, agent, materials, and experienced technicians to conduct the test. Provide means to ventilate discharged agent from the facility after the test. Installations failing to achieve the NFPA 12 concentration within 1 minute will constitute test failure. Failure of the system to achieve the NFPA 12 concentration during acceptance tests will require the contractor to provide the necessary additional agent capacity at no additional cost to the**

government. Contractor shall make necessary corrections including the provision of additional agent capacity if necessary and repeat the test at a time mutually agreeable with the Contracting Officer. On multi-zoned systems with independently partitioned sub-floor spaces, a minimum of two sample points shall be recorded for each zone. On multi-zoned systems with independently partitioned sub-floor spaces, a minimum of two sample points shall be recorded for each zone.

Section 13962 Carbon Dioxide Fire Extinguishing (Low Pressure)

- 1.5.1: Man. Cat. Add: **“t. Line voltage surge arrestor”**

- 2.1.1.2:
Underfloor
Flooding Sys. Utilize only the higher flooding rate (1 pound carbon dioxide per 10 cubic feet of space) regardless of under-floor volume.

- 2.1.2: Systems
Supply Add: **“Any agent quantities specified here and/or indicated on drawings are absolute minimum quantities to be provided. It is the contractor’s responsibility to determine the final quantity of agent necessary after taking into account leakage rates, true space size, etc. Failure of the system to achieve the NFPA 10 concentration during acceptance tests will require the contractor to provide the necessary additional agent capacity at no additional cost to the government.”**

- 2.6.6.3: New
Paragraph Add the following paragraph:
2.6.6.3 Wiring

All initiating circuits shall be wired style D (class A). Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. All control panels shall be dressed out in a professional manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped. Conduit may not enter the top of control panel cabinet. Provide panel in the manufacturer’s NEMA 4 enclosure for panels subject to water spray/runoff and/or located in damp/dirty locations or relocate to a suitable dry location at the direction of the Contracting Officer. Provide conduit seals for all raceway terminating at the control panel cabinet.”

- 2.6.7.1: Storage
Batteries Indicate a 60 hour and 30 minute battery set. Add: **“For releasing panels which are Factory Mutual Approved only, provide battery sets in accordance with the approval (90 hour).”**

2.13.1: New Paragraph

Add the following paragraph:

2.13.1 Line Voltage Surge Arrestor

Provide line voltage surge arrestors to suppress all voltage transients which might damage fire alarm panel/transmitter components. Unit shall wire in series to the power supply of the protected equipment with screw terminations. Unit shall be UL 1449 listed with a 330 volt suppression level and have a maximum response time of 5 nanoseconds. Unit shall also meet IEEE C62.41 category B tests for surge capacity. Device shall feature multi stage construction which includes inductors and silicon avalanche zener diodes. Device shall feature a long life indicator lamp (light emitting diode or neon lamp) which extinguishes upon failure of protection components. Any unit fusing shall be externally accessible when this feature is available. One such acceptable product is a model HSP-121BT2 as manufactured by Edco of Florida (Ocala, FL). Provide detailed manufacturer’s submittal data demonstrating compliance with all the above listed requirements.

3.5.2: Final Accept. Testing

Change **15** days to **45** days.

3.5.2: Final Accept. Testing

Add: “Conduct a complete discharge/concentration test. Provide a currently calibrated and certified three channel recording concentration meter, agent, materials, and experience technicians to conduct the test. Provide means to ventilate discharged agent from the facility after the test. Installations failing to achieve the NFPA 10 concentration within 1 minute will constitute test failure. Contractor shall make necessary corrections including the provision of additional agent capacity if necessary and repeat the test at a time mutually agreeable with the Contracting Officer. On multi-zoned systems with independently partitioned sub-floor spaces, a minimum of two sample points shall be recorded for each zone. On multi-zoned systems with independently partitioned sub-floor spaces, a minimum of two sample points shall be recorded for each zone.

Section 13971A Dry Chemical Fire Extinguishing for Kitchen Cabinet

General Comment

Generally wet systems are always the preferred agent. Edit specification for wet systems only. When protection is provided for automatic water wash hood systems, provide coordination between this spec and Section 11400.

3.2.2: Formal Tests & Insp.

Change **15** days to **45** days.

APPENDIX D

HALON CYLINDER SHIPPING AND TRANSPORTATION GUIDANCE

- I. When shipping ODSs refer to the following regulations if needed:
 - A. Mil-Std-129L, Military Standard marking for Shipment and Storage.
 - B. DLAR 4145.25, Storage and Handling of Compressed Gases and Liquids in Cylinders, and of Cylinders or the following applicable service regulations:
 - 1. AR-700-68
 - 2. NAVSUPINST 4440.128C
 - 3. MCO 10330.2C
 - 4. AFR 67-12
 - C. Code of Federal Regulations 49, 173.301, Requirements for the Shipment of Compressed Gas Cylinders.
 - D. DoD Regulation, 4000.25-1-M

- II. Once the shipment is ready, ship to the following ODS Reserve return address:
 - Defense Depot Richmond Virginia
 - SW0400
 - Cylinder Operations
 - Jefferson Davis Highway
 - Richmond, VA 23297-5000

- III. Include the appropriate National Stock Numbers (NSNs) with the cylinders being shipped. NSNs for empty cylinders and cylinders containing recovered halons/fire extinguishers are as follows:

EMPTY RECOVERY CYLINDER NSN's FOR HALONS

Product Type	Cylinder Capacity Size (lbs)	Empty Recovery Cylinder NSNs
1202	160	8120-01-356-1781
1211	200	8120-01-356-1248
	1500	8120-01-356-1249
1301	117	*8120-01-371-0533
	150	
	1240	

(*) Denotes a high pressure cylinder of 600 psi plus

NSN's FOR CYLINDERS CONTAINING
RECOVERED HALONS/FIRE EXTINGUISHERS

Product Type	Cylinder Capacity Size (lbs)	Empty Recovery Cylinder NSNs
1211	1-5	6830-01-376-8013
	6-10	6830-01-376-8014
	11-20	6830-01-376-8015
	21-60	6830-01-376-8016
	61-125	6830-01-376-8017
	126-200	6830-01-356-1209
	201-340	6830-01-376-8018
	341-1500	6830-01-356-1211
1202	160	6830-01-356-1780
1301	1-5	6830-01-376-8394
	6-10	6830-01-376-8395
	11-20	6830-01-376-8396
	21-70	6830-01-376-8397
	71-100	6830-01-376-8398
	101-117	6830-01-371-0501
	118-125	6830-01-376-8399
	126-150	6830-01-356-9752
	141-200	6830-01-376-8400
	201-260	6830-01-376-8401
	261-350	6830-01-376-8402
	351-530	6830-01-376-8403
	531-600	6830-01-376-8404
601-1240	6830-01-356-5958	

APPENDIX E**LISTING OF ACTIVITIES
AND BASE WIDE FIRE REPORTING SYSTEMS**

Activity	State	IP	Type	Manufacturer
Andros Island	Bahamas		Telephonic	
NAS Cecil Field	Florida	P	Radio	King Fisher
NTTC Corry Station	Florida	P	Radio	Monaco
NAS Jacksonville	Florida		100 mil-loop	(contact SODIV)
NFSD Jacksonville	Florida		Radio	Seaboard
NAS Key West	Florida	P	Radio	King Fisher
NS Mayport	Florida		Telephonic	(contact SODIV)
NTC Orlando	Florida		Radio	Signal Communications
NCSC Panama City	Florida	P	Radio	Monaco
NETPMSA Saufley Field, Pensacola	Florida	P	Radio	Monaco
NAS Whiting Field	Florida	P	Radio	King-Fisher
MCLB Albany	Georgia		Radio	Signal Communications
NAS Atlanta	Georgia		Radio	Motorola
NTTC Athens	Georgia		Radio	Signal Communications
NSB Kings Bay	Georgia		Radio	Seaboard
NAS Glenview	Illinois	P	Radio	King Fisher
NTC Great Lakes	Illinois		Radio	Signal Communications
NSWC Crane	Indiana		Radio	Signal Communications
Barksdale AFB	Louisiana	P	Radio	Monaco
NAS New Orleans	Louisiana		Radio	G H Harlow
NSA New Orleans	Louisiana		100 mil-loop	

IP Integrated fire alarm panel/transmitter availability

P Preferred by activity

Appendix E

Activity	State	IP	Type	/Manufacturer
CBC Gulfport	Mississippi	P	Radio	Monaco
Keesler AFB	Mississippi	P	Radio	Monaco
NAS Meridian	Mississippi		Radio	G H Harlow
NS Pascagoula	Mississippi	P	Radio	Monaco
Stennis Space Center	Mississippi		Radio	Motorola
MCAS Beaufort	South Carolina		Radio	King Fisher
Charleston AFB	South Carolina		Radio	Monaco
NWS Charleston	South Carolina		Radio	King Fisher
MCRD Parris Island	South Carolina	P	Radio	King Fisher
Shaw AFB	South Carolina	P	Radio	Monaco
NAS Memphis	Tennessee		Radio	Signal Communications
NAS Carswell	Texas	P	Radio	King Fisher
NAS Corpus Christi	Texas	P	Radio	Monaco
NS Ingleside	Texas	P	Radio	Monaco
NAS Kingsville	Texas	P	Radio	King Fisher
Ascension Island	United Kingdom	P	Radio	Monaco

IP Integrated fire alarm panel/transmitter availability
P Preferred by activity
R Required by activity

Appendix E

Manufacturer	Transmitter	Integrated Fire Alarm/Transmitter	Zone Capacity
G H Harlow	X		8, 16, 24, 32, 40, 48
King Fisher	X	X	8 1-20, 1-52
Monaco	X	X	5, 16, 32 1-58
Motorola	X		8
Signal Communications	X		1-10, 16
Seaboard Electronics	X		6, 8

Notes:

1. The zone capacity for the King Fisher integrated fire alarm panel/transmitter is reduced in half when class A zone cards are utilized (panels then have zone capacities of 10 and 26 zones respectively).
2. The King Fisher integrated panel is approved for releasing device service while the Monaco product is not.
3. Costs for each company's integrated panels are roughly the same as their transmitters (i.e. around \$4,500 for a 16 zone unit).

APPENDIX F

FIRE PROTECTION CRITERIA FOR THE DESIGN AND CONSTRUCTION OF ELEVATORS

Sprinkler Protection:

1. Provide wet-pipe, intermediate temperature, automatic sprinkler heads in the elevator pit. (Note: Intermediate temperature sprinkler heads are in the 175 - 225 degrees Fahrenheit range, with the preference being 212 degrees Fahrenheit). Operation of sprinklers in the pit shall not cause shutdown of the main power supply to the elevators.
2. Provide wet-pipe, intermediate temperature, automatic sprinkler heads in the elevator machine room. Provide a control valve, check valve and a water flow switch in the branch line supplying the sprinklers in the elevator machine room. Provide a test connection with drain to facilitate testing of flow switch. Provide a sign at the test connection stating "ELEVATOR POWER SHUTDOWN TEST CONNECTION". Provide an excess pressure pump at the main sprinkler riser. The flow switch shall be provided with two sets of contacts, one for connection to the building fire alarm system and the other for connection to the elevator controller. Activation of the water flow switch shall initiate a building alarm and cause the main power supply to elevators controlled from that elevator machine room to be automatically disconnected with no time delay. (See Figure a)
3. Automatic sprinklers are not required at the top of the elevator hoistways except where a roped hydraulic or a holeless hydraulic elevator has been installed, or where a hydraulic elevator's pressurized supply line runs at points above the first landing level. If automatic sprinklers are installed at the top of the elevator hoistway, their activation does not require shutdown of the main power supply to the elevators.

Elevator Car Warning Light and Audible Signal:

1. Provide a warning light and audible signal in the cab of each elevator. The warning light shall be a minimum of 3 inches in height and 4 inches in width, and shall be mounted prominently in, above or adjacent to the car's operation panel. The light shall not be obscured by the elevator's protective pads. The design of the warning light shall be such that it cannot be read when not illuminated. The warning light shall read: "DANGER! FIRE!" "EXIT THE ELEVATOR NOW". The audible alarm shall be a bell, buzzer or electronic tone that is louder than any other audible signal being used in the cab. The power source for both the warning light and audible warning device shall be supplied from the elevator's main controller.
2. The activation of the warning sign and audible warning device in the elevator cab shall be simultaneous and shall be activated by a 135 degree Fahrenheit, rate-compensated heat detector mounted in the elevator machine room. Mount the heat detector adjacent to the sprinkler head, or equidistant between sprinkler heads when there is more than one sprinkler head in the elevator machine room. Heat detectors shall be provided under Section 13852. Each heat detector base shall be equipped with two sets of contacts. One set shall be for connection to the building fire alarm system, and the other for connection to the elevator controller.

Appendix F

Smoke Detection and Elevator Controller Interface:

Provide smoke detectors in elevator machine room, elevator hoistway and at elevator lobbies in accordance with NFPA 72 and Rule 211.3b of ANSI A17.1a. Smoke detectors shall be electrically supervised by the building fire alarm panel. Smoke detector base shall be provided with auxiliary contacts for connection to the elevator controller. Conduit, wiring and connections from the smoke detectors to the fire alarm panel shall be accomplished under Division 16. Conduit, wiring and connections from the elevator controller to the respective auxiliary contacts of the smoke detectors shall be accomplished under Division 14. Actuation of an above mentioned smoke detector shall initiate an alarm condition in the building fire alarm panel and initiate Phase I Recall via the elevator controller. (See Figure b)

Initiating devices used for elevator control functions:

All smoke and heat detectors used to initiate Phase I recall and illuminate the elevator cab warning light shall be provided under Section 13852. The detector base of each device shall be provided with auxiliary contacts for direct connection to the elevator controller. Likewise, water flow switches used to discontinue elevator equipment power shall be provided under Section 13930, and shall be provided with auxiliary contacts for direct connection to the elevator controller. Connections from each initiating device auxiliary contact to the elevator controller shall be accomplished under Division 14. There shall be no direct interface between the building fire alarm control panel and the elevator controller. See Figures a and b. Identify all of the aforementioned devices on the fire alarm plans and riser diagram.

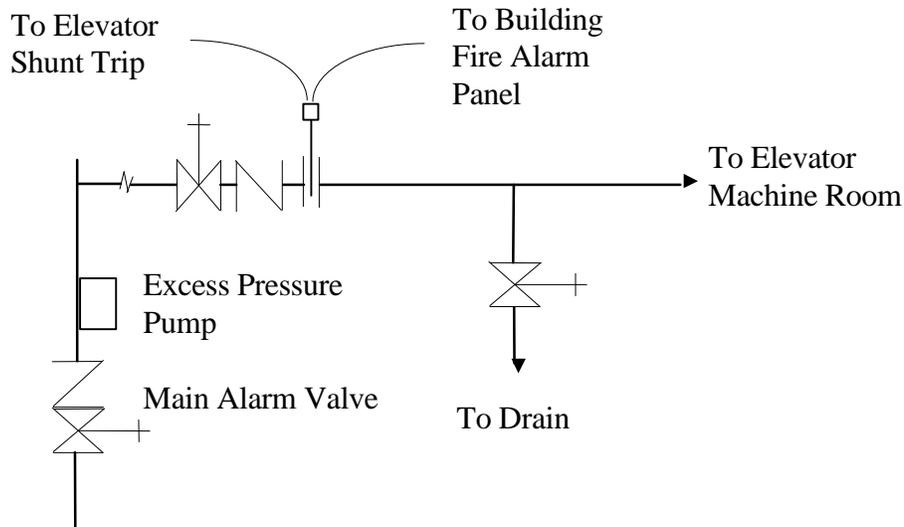


Figure (a) Schematic of sprinkler piping to elevator machine room

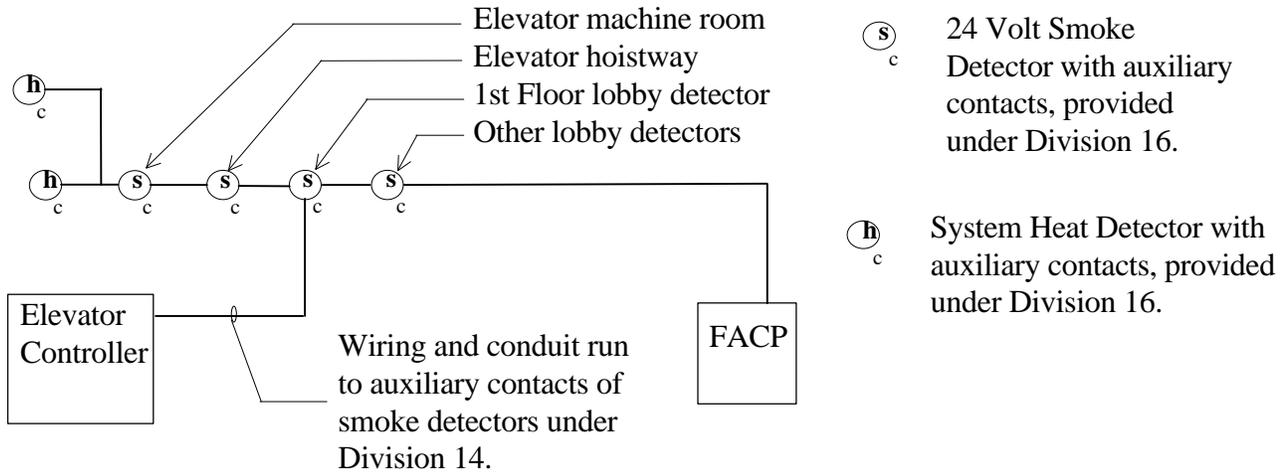


Figure (b). Riser Diagram for Elevator Smoke Detectors.