USAF Built Infrastructure Inventory and Assessments Manual

Appendix for Facility Fire Protection Assessments (D40)

July 2017

Table of Contents

I. Overview

This manual covers the inventory and assessment process for the building "Fire Protection (D40)" system and components. This is an abbreviated manual and does not contain the same level of detail found in expanded manuals. Please see the Sustainment Management System (SMS) Playbook for additional information including:

- BUILDER™ SMS Concepts
- Overview of ASTM E 1557 UNIFORMAT II Standard Classification for BUILDER™
- BUILDER™ Inventory Overview
- BUILDER™ Assessment Overview
- BUILDER™ Remote Entry Database (BRED™)
- Working with Web-Based BUILDER™
- Quality Assurance
- Site Visit Preparation and Execution
- Site Visit Safety

A. D40 Fire Protection Description

1. UNIFORMAT II definition

- Fire Protection systems are automated or manual systems to detect and/or to extinguish or suppress the spread of fires protecting the building and contents.

2. Major components

- Fire Alarm and Detection Systems (D4010) – This subsystem includes fire alarm and mass notification control panels and distribution, fire detection devices, notification appliances, electromechanical releases, all electrical connections and other associated items.
- Fire Suppression Water Supply and Equipment (D4020) – This subsystem includes items located upstream of the suppression systems such as, backflow preventers, piping, fire pumps etc. supplying a single facility.
- Standpipe Systems (D4030) – This subsystem includes the standpipe risers, racks, cabinets, hoses, hose connections and all other associated piping, fittings and supports.
- Sprinklers (D4040) – This subsystem includes the water supply equipment and related piping, control valves, alarm valves and connections from the base of the riser to the sprinkler head.
- Other Fire Protection Systems (D4090) – This subsystem includes special fire detection and extinguishing systems.

3. Life Cycle characteristics

- Fire Protection System components are generally built-in items with static piping and operating or moveable parts requiring routine inspection, preventive maintenance and service. Other than the piping, fire protection system components are typically short-lived components that can show accelerated deterioration if not properly inspected or maintained.

II. Inventory

A. General D40 Inventory Guidance

This section presents common UNIFORMAT II D40 Fire Protection Systems Inventory Component Sections found across USAF installations as a guide for entering into the BUILDER™ SMS or BRED™ software. Inventory items are arranged by BUILDER™ SMS system with Material/Equipment Category, Component Subtype, Quantity, Year Installed and Inventory Notes. Each building's full or partial inventory can be captured in the field using the Inventory/Assessment Field Data Sheet(s) included in Section V and the AFCEC BUILDER™ SharePoint Site Documents Library. Section VI (D40 UNIFORMAT II Minimum Component Reference Table) provides a complete listing of USAF minimum required inventory D40 components.

Note: Bases may elect to inventory and assess other fire protection Component Sections. Inventory and assessment is required by the current AFCAMP Playbook as project support documentation for consideration in the project prioritization process.

Component Subtypes General, Other, and Unknown require a Section Name to further describe the Component Sections.

It is critical to confirm the year installed (default from Real Property Assets Database (RPAD)) or estimate the year installed. BUILDER™ SMS uses the Install Date, life cycle degradation curves and assessment observations to establish the Condition Index (CI) for each Component Section. If the assessor suspects the RPAD default date is not accurate or an addition or renovation has taken place, check the RPAD record for year renovated or check local as-built or renovation drawings to help determine the year installed. Estimated Install Dates decrease the Expected Service Life significantly. Every effort should be made to establish an Install Date and avoid the use of estimated.

If this is an initial assessment and no Fire Protection Systems inventory has previously been entered into BUILDER™ SMS, an inventory is required. When fire protection systems are not fully visible (such as piping), as-built drawings can be used to identify and quantify the components. If as-built drawings are not available, the assessor may use experience to make an assumption for the piping system and estimate quantities based on similar systems, consultation with local staff and other resources such as www.inspectapedia.com. A good website to review prior to conducting fire protection system assessments is http://www.iklimnet.com/hotelfires/sprinklerstandart.html.

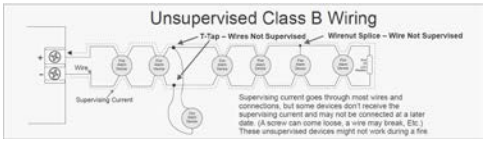
The remainder of this section provides photo examples of the most common USAF electrical inventory items categorized by major components and accompanied with appropriate Equipment Category, Component Subtype and Quantity from the BRED™ drop down menus. This information is supplemented with general and specific inventory notes as a guide for data entry by the assessor.

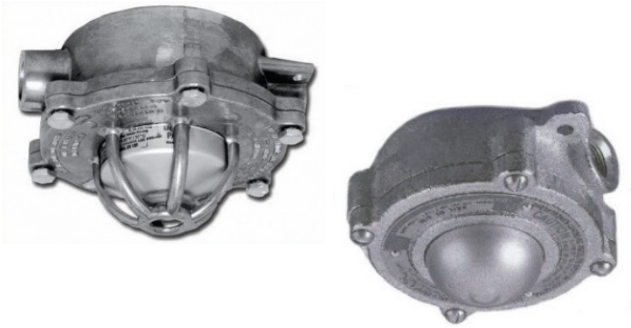
B. Inventory D4010 Fire Alarm and Detection Systems

Fire alarm and detections systems component section inventory for the USAF includes all wire, conduit, conduit support or fastening systems, fire alarm devices, fire detection devices, safety switches, mass notification, all electrical connections and other associated items. Typical fire alarm and detections systems on USAF bases are:

1. Equipment Category: D401001 Fire Alarm Distribution Component Subtype: Choose 1 of 3 • Fire Alarm Control Panel – non-addressable • Fire Alarm Control Panel, single zone - non addressable • Fire Alarm Control Panel, multi-zone (4) – non-addressable Quantity: EA Inventory Notes: • Enter Section Name: N/A • Collect make, model, serial number and capacity (zones) to enter in Section Details	
2. Equipment Category: D401001 Fire Alarm Distribution Component Subtype: Control equipment - fire alarm, addressable Quantity: SF Inventory Notes: • Enter Section Name: N/A • Enter manufacturer, model and serial number in Section Details	

3. Equipment Category: D401001 Fire Alarm Distribution Component Subtype: Control equipment - combination fire alarm and mass notification, addressable Quantity: SF Inventory Notes: • Enter Section Name: N/A • Enter manufacturer, model and serial number in Section Details	
4. Equipment Category: D401001 Fire Alarm Distribution Component Subtype: Control equipment - mass notification, addressable Quantity: SF Inventory Notes: • Enter Section Name: N/A • Enter manufacturer, model and serial number in Sections Details	

5. Equipment Category: D401001 Fire Alarm Distribution Component Subtype: General Quantity: SF Inventory Notes: • Enter Section Name: Unsupervised Class B Wiring • Section Name required	
6. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, fixed temperature heat detector Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section • Describe location and use "Missing" in the Section Name where areas lack required fire detection	 
7. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, fixed temperature heat detector Quantity: EA Inventory Notes: • Enter Section Name: Combination FTNR/ROR HD • Count total per section	

8. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, fixed temperature heat detector Quantity: EA Inventory Notes: • Enter Section Name: Combination FTNRHD/SD • Count total per section	
9. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, fixed temperature heat detector Quantity: EA Inventory Notes: • Enter Section Name: Explosion Proof FTNRHD • Count total per section	
10. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, rate of temperature rise detector Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section • Describe location and use "Missing" in the Section Name where areas lack required visual notification.	

11. Equipment Category: D401002 Fire Alarm Devices

Component Subtype: Detectors with brackets, rate of temperature rise detector

Quantity: EA

Inventory Notes:

- Enter Section Name: Explosion Proof ROR HD
- Count total per section

12. Equipment Category: D401002 Fire Alarm Devices

Component Subtype: Detectors with brackets, rate of temperature rise detector

Quantity: EA

Inventory Notes:

- Enter Section Name: Rate Compensate HD
- Count total per section

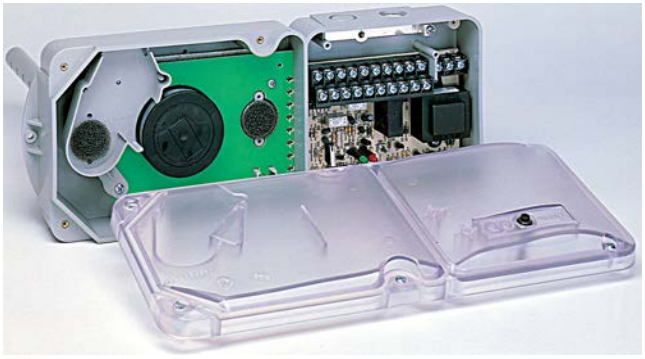
13. Equipment Category: D401002 Fire Alarm Devices

Component Subtype: Detectors with brackets, rate of temperature rise detector

Quantity: EA

Inventory Notes:

- Enter Section Name: Explosion Proof RC HD
- Count total per section

14. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, ion detector (smoke) detector Quantity: EA Inventory Notes: • Enter Section Name: Photoelectric SD • Count total per section	
15. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, ion detector (smoke) detector Quantity: EA Inventory Notes: • Enter Section Name: Ionization SD • Count total per section	
16. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, ion detector (smoke) detector Quantity: EA Inventory Notes: • Enter Section Name: Duct Detector • Count total per section	

17. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, ion detector (smoke) detector Quantity: EA Inventory Notes: • Combination RORHD/SD • Enter Section Name: RORHD/SD • Count total per section	
18. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, ion detector (smoke) detector Quantity: EA Inventory Notes: • Enter Section Name: Reflected Beam SD • Count total per section	
19. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Detectors with brackets, ion detector (smoke) detector Quantity: EA Inventory Notes: • Enter Section Name: Explosion Proof SD • Count total per section	

20. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Electric mechanical release Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	

21. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Manual pull station Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	

22. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Manual pull station Quantity: EA Inventory Notes: • Enter Section Name: Explosion Proof PS • Count total per section	

23. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Bell signaling device Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	

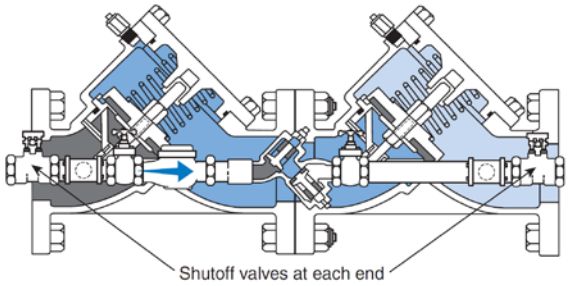
24. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Bell signaling device Quantity: EA Inventory Notes: • Enter Section Name: Explosion proof bell • Count total per section	
25. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Strobe Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section • Describe location and use "Missing" in the Section Name in areas lacking required visual notification	
26. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Strobe Quantity: EA Inventory Notes: • Enter Section Name: MNS Strobe • Count total per section	

27. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Strobe Quantity: EA Inventory Notes: • Enter Section Name: Explosion Proof Strobe or Explosion Proof MNS Strobe • Count total per section	
28. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Annunciator Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	
29. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Annunciator Quantity: EA Inventory Notes: • Enter Section Name: Explosion Proof Horn • Count total per section	
30. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Strobe/ Annunciator Combo Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	

31. Equipment Category: D401002 Fire Alarm Devices Component Subtype: Strobe/ Annunciator Combo Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	

C. Inventory D4020 Fire Suppression Water Supply and Equipment

Fire suppression water supply and equipment Component Section inventory for the USAF includes any items located upstream of the suppression systems such as PIV's, backflow preventers, strainers, etc. supplying a single facility. Equipment supporting multiple facilities is covered as a water utility.

1. Equipment Category: D402001 Fire Protection Water Piping And Equipment Component Subtype: Choose 1 of 7 • Backflow Preventer - 1" • Backflow Preventer – 1-1/2" • Backflow Preventer - 2" • Backflow Preventer - 3" • Backflow Preventer - 4" • Backflow Preventer - 6" • Backflow Preventer - 8" Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section • Collect manufacturer, model, serial number, size and type (DCA) to enter in Section Details	 

2. Equipment Category: D402001 Fire Protection Water Piping And Equipment

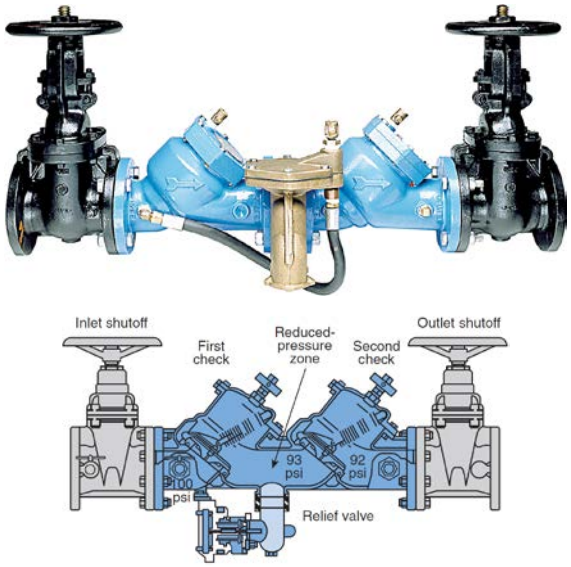
Component Subtype: Choose 1 of 7

- Backflow Preventer - 1"
- Backflow Preventer – 1-1/2"
- Backflow Preventer - 2"
- Backflow Preventer - 3"
- Backflow Preventer - 4"
- Backflow Preventer - 6"
- Backflow Preventer - 8"

Quantity: EA

Inventory Notes:

- Enter Section Name: N/A
- Count total per section
- Collect manufacturer, model, serial number, size and type (RPA) to enter in Section Details



3. Equipment Category: D402002 Fire Pump

Component Subtype: Jockey Pump includes controller and disconnects

Quantity: EA

Inventory Notes:

- Enter Section Name: N/A
- Count total per section

4. Equipment Category: D402002 Fire Pump Component Subtype: Test header, flow meters, recirculation system Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	
5. Equipment Category: D402002 Fire Pump Component Subtype: Test header, flow meters, recirculation system Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	
6. Equipment Category: D402002 Fire Pump Component Subtype: Hydraulic transit controls (surge arrestors) Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	

7. Equipment Category: D402002 Fire Pump Component Subtype: 3000 and greater GPM includes controller and relief devices Quantity: EA Inventory Notes: • Enter Section Name: N/A • Count total per section	  

D. Inventory D4030 Standpipe Systems

Standpipe systems Component Section inventory for the USAF includes the complete standpipe system to include standpipe risers and all other piping, fittings and supports. Siamese connections, roof manifolds, cabinets, hoses, racks and other fire department connections are included. All equipment including pumps, tanks, etc. with all required fittings and specialties for hookup are included.

1. Equipment Category: D403001 Standpipe Equipment & Piping
 	
Component Subtype: Wet standpipe, Class I Riser , 4", One Floor
 	
Quantity: 1 EA
 	
Component Subtype: Wet standpipe, Class I Riser , 4", Additional Floor
 	
Quantity: 2 EA
 	
Inventory Notes:
• A minimum of two sections are required per standpipe:
  • One section for the first floor
  • One section for additional floors
• This is an example of 4-in riser spanning 3 stories
	

E. Inventory D4040 Sprinklers

Sprinklers Component Section inventory for the USAF includes the water supply equipment and related piping from the equipment to the sprinkler head.

1. Equipment Category: D404001 Sprinklers and Releasing Devices

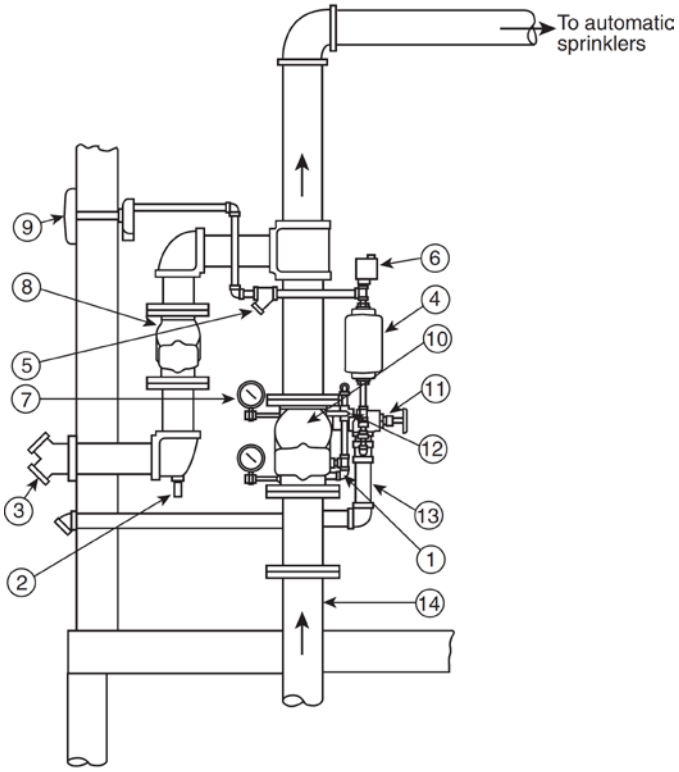
Component Subtype: Choose from three:

- Wet Pipe Systems - light hazard
- Wet Pipe Systems - ordinary hazard
- Wet Pipe Systems - extra hazard

Quantity: SF

Inventory Notes:

- Enter Section Name only when required.
- Describe location and use "Missing" the in Section Name where areas lack required coverage.
- Most common sprinkler system
- Not typically used where subject to freezing
- Each system typically requires one section per hazard category in system
- Use FM Global Data Sheet 3-26 to find hazard categories for non-storage occupancies and NPFA 13 for storage occupancies



1 Alarm valve trim
2 Automatic drip valve
3 Fire department connection
4 Retard chamber
5 Alarm line strainer
6 Alarm pressure switch
7 System side water gauge
8 Check valve
9 Water motor alarm
10 Alarm check valve
11 Main drain valve
12 Alarm test shutoff valve
13 Main drain piping
14 Underground supply

2. Equipment Category: D404001 Sprinklers and Releasing Devices

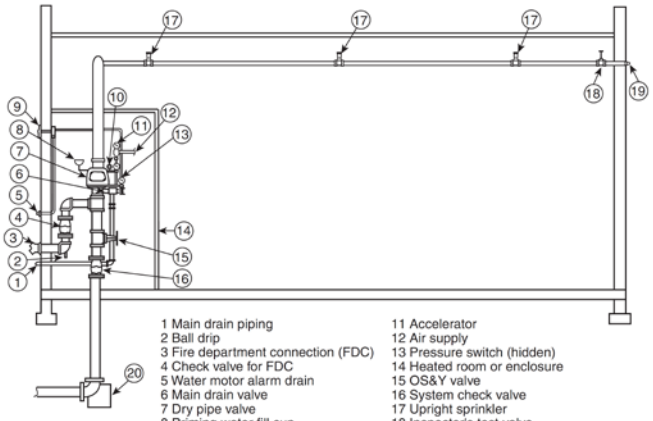
Component Subtype: Choose from three

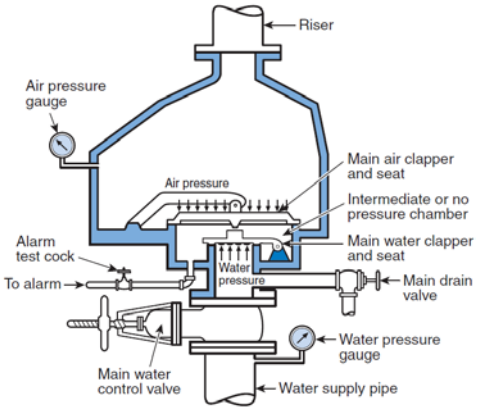
- Dry Pipe Systems - light hazard
- Dry Pipe Systems - ordinary hazard
- Dry Pipe Systems - extra hazard

Quantity: SF

Inventory Notes:

- Enter Section Name only where required
- Describe location and use "Missing" the in Section Name where areas lack required coverage
- Used where pipe is subject to freezing temperature (attic space, exterior storage, loading dock)
- Not used over communications or electronic equipment installations
- Not typically used in hangars
- Each system typically requires one section per hazard category in system
- Use FM Global Data Sheet 3-26 to find hazard categories for non-storage occupancies and NPFA 13 for storage occupancies





3. Equipment Category: D404001 Sprinklers and Releasing Devices

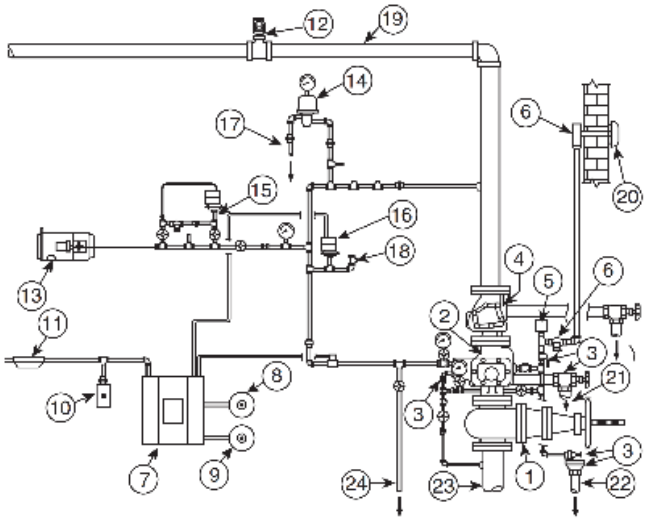
Component Subtype: Choose from three

- Preaction Systems - light hazard
- Preaction Systems - ordinary hazard
- Preaction Systems - extra hazard

Quantity: SF

Inventory Notes:

- Enter section name only where required
- Describe location and use "Missing" the in Section Name where areas lack required coverage
- Used over communications or electronic equipment installations.
- Uses same valve body as deluge system.
- Supplementary heat detection systems are common
- There are three kinds of preaction systems:
  1. Non-interlock admits water to sprinkler piping upon operation of detection devices or automatic sprinklers
  2. Single interlock admits water to sprinkler piping upon operation of detection devices
  3. Double interlock admits water to sprinkler piping upon operation of both detection devices and automatic sprinklers
- Each system typically requires one section per hazard category in system
- Use FM Global Data Sheet 3-26 to find hazard categories for non-storage occupancies and NPFA 13 for storage



1 System control valve
2 Deluge valve
3 Basic trim kit (deluge valve)
4 Check valve (preaction)
5 Waterflow pressure switch
6 Mechanical alarm
7 Releasing control panel (optional)
8 Alarm annunciator (optional)
9 Trouble annunciator (optional)
10 Manual emergency station (optional)
11 Detector (optional)
12 Automatic sprinkler
13 Air compressor
14 Accelerator (optional)
15 Pressure maintenance device
16 Pressure switch
17 Vent
18 Vent
19 Dry piping with supervising air pressure
20 Water motor gong
21 Drain
22 Drain
23 Water supply
24 Drain

4. Equipment Category: D404001 Sprinklers and Releasing Devices

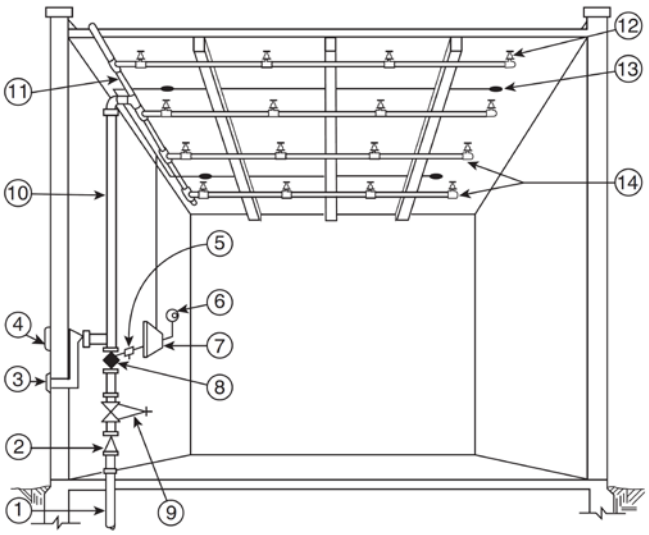
Component Subtype: Choose from four

- Deluge Systems - light hazard
- Deluge Systems - ordinary hazard
- Deluge Systems - extra hazard

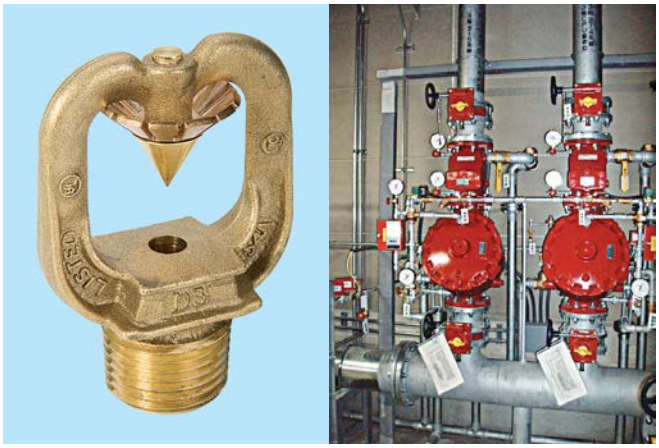
Quantity: SF

Inventory Notes:

- Enter Section Name only where require
- Describe location and use "Missing" in the Section Name where areas lack required coverage
- Foam water deluge system sections are located in D409002 FOAM GENERATING EQUIPMENT
- Supplementary heat detection systems are required
- Uses open sprinklers or nozzles
- Each system typically requires one section per hazard category in system
- Use FM Global Data Sheet 3-26 to find hazard categories for non-storage occupancies and NPFA 13 for storage occupancies



1 Water supply
2 Check valve
3 Fire department connection
4 Local waterflow alarm
5 Solenoid releasing valve
6 Alarm bell
7 Releasing control panel
8 Deluge valve
9 OS&Y gate valve to control water supply to system
10 System riser
11 Cross main
12 Open sprinkler
13 Electronic fire or smoke detectors
14 Branch lines



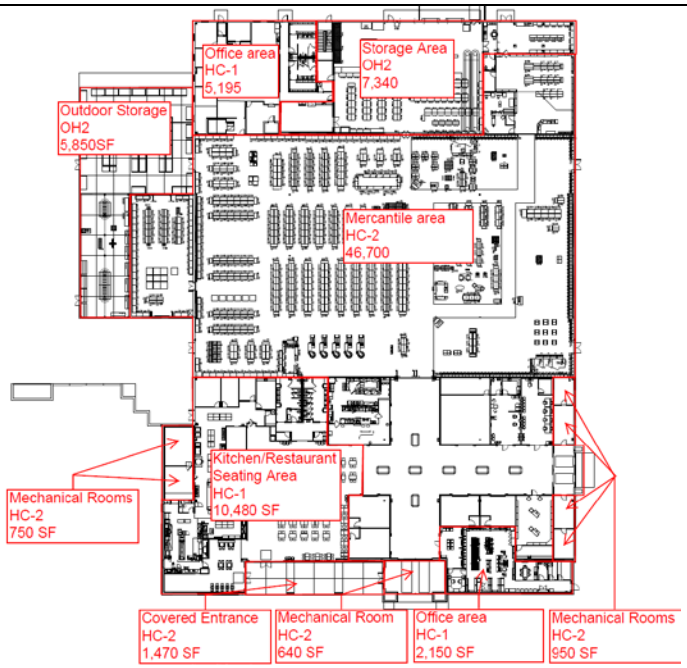
5. Equipment Category: D404001 Sprinklers and Releasing Devices

Component Subtype:

- Wet Pipe Systems - light hazard
- Quantity: 17,825 SF
- Wet Pipe Systems - ordinary hazard
- Quantity: 56,380 SF
- Dry Pipe Systems - ordinary hazard
- Quantity: 7,320 SF
- Section name: N/A

Inventory Notes:

- Two wet pipe risers and two dry pipe risers are present in mechanical room
- Ideally each riser has at least one section; inventory might not be possible without shop drawings
- HC-1 is equivalent to light hazard
- HC-2 is equivalent to ordinary hazard
- HC-3 is equivalent to extra hazard



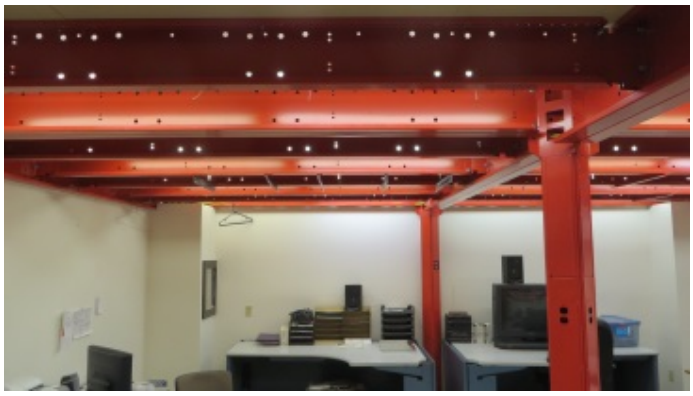
6. Equipment Category: D404001 Sprinklers and Releasing Devices

Component Subtype: Wet Pipe Systems - light hazard

Quantity: 500 SF

Inventory Notes:

- Section Name: Missing Sprinkler Coverage



F. Inventory D4090 Other Fire Protection Systems

Other fire protection systems Component Section inventory for the USAF includes all other protection systems: carbon dioxide systems, foam generating equipment, clean agent systems and other systems including UV/IR3 detectors.

Typical inventory at USAF bases includes:

- Chemical – Dry Chemical SF
- Chemical – Foam SF
- Clean Agent Systems SF
- High sensitivity smoke detection systems SF
- Optical detection systems SF
- Foam water deluge sprinkler system SF

- Low-level high expansion system SF
- Low-level (in trench) grate nozzle system SF

Other Fire Protection Systems D4090 Inventory Hints

- Dry chemical systems may be found in dining facility cooking areas.
- Foam systems are generally found in hangars or other industrial areas where liquid fuels are used.
- Clean agent fire suppression systems are generally found in facilities housing communications, information processing, electronic equipment and flight simulators.
- Do not inventory hand held or portable extinguishing equipment.

III. Assessment

A. General D40 Assessment Guidance

Fire protection Component Sections are assessed using Direct Condition Rating (DCR). The assessor provides ratings using Direct Condition Rating (DCR) Definitions chart below for major components D4010, D4020, D4030, D4040 and D4090. The "Rating" reflects observed deterioration, serviceability, reliability, fire safety deficiencies and repair requirements based on the assessor's professional judgment. Fire protection components are either visible or hidden (such as piping, wiring and devices located above ceiling tiles or below raised flooring) by other construction elements. Even though fire protection system components might not be visible, fire protection maintenance is required by UFC 3-601-02 (which references NFPA 25, 72 etc.). The assessor can evaluate the system by performing the ITM, reviewing associated records or interviewing maintenance personnel. Shop drawings and inspection, testing and maintenance records are required to be retained. Therefore, if records are not available, assume the ITM has not been performed. Fire protection deficiencies generate repair projects. Deficiencies are required to be captured in BUILDER™ SMS IAW current AFCAMP Playbook. The assessor should obtain and review Fire Prevention Inspection Report (AF Form 1487), and incorporate deficiencies using the Direct Condition Assessment Matrix. Missing fire protection features are added as an inventory items and rated RED-.

Under no circumstances should age be factored into a DCR or Distress Survey assessment. Ratings are based on condition, operability and/or survivability only. BUILDER™ SMS already factors in the age from the Install Date when BUILDER™ calculates Condition Index (CI).

The assessor must provide an Inspection Comment for any Amber+ or lower DCR or BUILDER™ calculated Distress Survey rating. Photographs documenting defects must be taken and attached to the assessment.

NOTE: Red highlighted text is provided as an example of a lifecycle of typical components and should be adjusted as needed to represent other various components.

Direct Condition Rating (DCR) Definitions	
Rating	**Observation**
Green (+)	Fully Operational - Free of Known or Observable Defects Keep doing PM required to maintain warranty - no action required

Green	Fully Operational - Slight Deterioration or Minimal wear Keep doing PM - no action required
Green (-)	Fully Operational – Normal wear and/or serviceability defects Keep doing PM - need to start planning for rehabilitation
Amber (+)	Reduced Operation – Minor wear and/or serviceability defects Repairs could be accomplished and replacement planned within next eight to ten years (Investment of resources could extend life)
Amber	Reduced Operation – Moderate wear and/or serviceability defects Repairs could be accomplished and replacement planned within next six to seven years (Investment of resources could extend life)
Amber (-)	Reduced Operation – Significant wear and/or serviceability defects Repairs could be accomplished and replacement planned within next three to five years (Investment of resources could extend life)
Red (+)	Loss of Operation – Moderate wear and/or serviceability failure Repairs could be accomplished and replacement planned within next two years (Run to failure - further investment unwise)
Red	Loss of Operation – Significant wear and/or serviceability failure Repairs could be accomplished and replacement planned within the next year (Run to failure - further investment unwise)
Red (-)	Loss of Operation – Complete wear and/or serviceability failure Replacement needs to be planned immediately

B. Assessment D4010 Fire Alarm and Detection Systems

D4010 Assessment Criteria

- Fire alarm distribution and control equipment are graded based on serviceability, reliability and condition. To determine the serviceability the assessor should interview the maintenance staff to determine parts availability or if panel changes require other system upgrades. If parts cannot be obtained through normal commercial channels, the fire alarm control panel will be rated AMBER. Reliability criteria is based on UFC 3-601-01, s2-2.2. Assessors will rate fire alarm control panels and wiring using on the following criteria:
  - Any fire alarm system in a trouble condition requires immediate maintenance. A trouble status is not considered a normal or acceptable alarm status. In addition, significant variability of issues can cause a trouble status. If the assessor can determine the cause is the distribution system, part of the distribution system or a device, the assessor can provide a rating based on the corrective action. If the assessor is unable to determine the cause, the fire alarm control panel and distribution will be rated AMBER.
  - Any fire alarm systems with more than two trouble conditions are outside their minimum tested or listed operating parameters and are significantly less reliable. If the assessor can determine which devices cause the troubles, he can degrade those devices. Otherwise, the assessor will rate the system as RED.
  - Most fire alarm control panels continuously monitor components and wiring. Therefore, unless a trouble can be traced to a specific device, the alarm distribution will be graded AMBER.
  - Any fire alarm system with more than three explained activations resulting from non-fire

events being mistaken for actual fires, should be evaluated by a technician or engineer to determine if corrective actions are necessary. If it has been evaluated the system can be rated based on the required corrective action. If it has not been evaluated, the system should be rated as AMBER.
    - Any fire alarm system with more than three unexplained activations in a 6 month period is experiencing a system instability that should be rated RED.
- Fire detection devices and notification are graded based observable distresses and testing results identified in UFC 3-601-02 and NFPA 72. If required ITM is not preformed, rate the detector AMBER.
    - Inspect heat detectors for mechanical or water damage, paint on heat sensing element and proper location. Provide a rating of RED for these detectors having these deficiencies.
    - Non-restorable fixed temperature heat detectors are required to laboratory tested or replaced after 15 years of service (NFPA 72, Table 14.4.3.2 17 (d)). If these heat detectors are not tested properly, they should be rated AMBER after thirteen years of operation and RED after 15 years.
    - Missing notification appliances or detection devices will be rated as RED-.

Examples of typical fire alarm and detection systems equipment distresses or conditions include:

1. Typical Distress: Fire Alarm Panel in Trouble Status

2. Typical Distress: Painted Heat Detector

3. Typical Distress: Broken Heat Detector

4. Typical Distress: Missing Heat Detector

5. Typical Distress: New Partition Created Space with No Automatic Fire Detection

6. Typical Distress: Redundant Heat Detection

7. Typical Distress: Lack of Visual Notification in Office (Facility Constructed after 1968)

C. Assessment D4020 Fire Suppression Water Supply and Equipment

D4020 Assessment Criteria

- Visually examine backflow preventers for leaks. Examine inspection tag and review backflow prevention program documentation to ensure devices are tested regularly. Backflow preventers must be tested IAW UFC 3-60-01 Table 2-26: reduced pressure devices must be tested every two years, double check devices must be tested every five years. If the backflow preventer is not tested, provide an AMBER rating. If the backflow preventer did not pass use professional judgment based on the corrective action to determine the

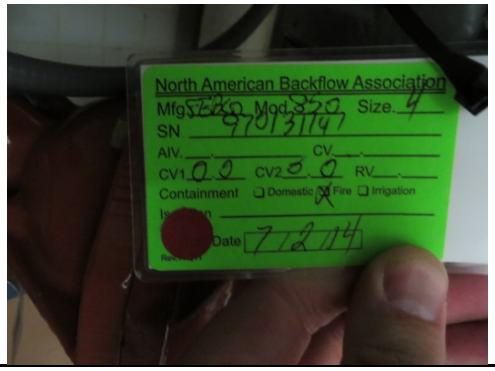
rating. More information can be found in the Cross Connection Control Manual, Chapter 5. http://water.epa.gov/infrastructure/drinkingwater/pws/crossconnectioncontrol/crossconnectioncontrol_manual.cfm

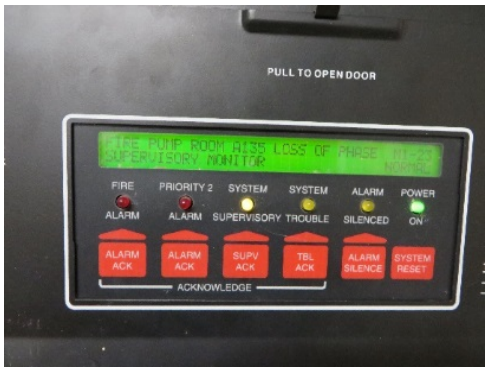
- Air Dryers are typically filled with a chemical desiccant; normally white, the desiccant turns purple when it is no longer capable of absorbing moisture; provide a RED rating.
- Inspect hose connections on the pump test headers for missing covers and corrosion. Use professional judgment when determining the rating based on the corrective action.
- Surge arresters should be inspected for physical damage. In addition, they should be connected using a three inch line; if they are installed using a 1 inch line the surge arrester can rated as AMBER.
- Centrifugal fire pumps must be examined visually. Check the packing glands to ensure that shaft bed packing is lubricated. Packing glands should drip at a rate of 1 drop per second; anything less indicates that packing glands are over tightened. If packing glands are not lubricated it leads to excessive wear on the impeller shaft. Verify that there is no standing water in the drip pocket. Standing water in the drip pocket enables water to be sucked into the pump case contaminating bearing oil; this is the leading cause of bearing failure. Use professional judgment when determining the rating based on the corrective action.
- The assessor should also examine the pump controller to verify it is in normal status. If the pump controller reads, "loss of phase", provide a rating of RED.

Examples of typical fire suppression water supply and equipment distresses or conditions include:

1. Typical Distress: Air Dryer Desiccant

2. Typical Distress: Backflow Preventer Failed Inspection



3. Typical Distress: Backflow Preventer Installed Backwards 	4. Typical Distress: Fire Pump – Corrosion and Overtightened Packing Glands 
5. Typical Distress: Fire Pump – Standing Water in Drip Pocket 	6. Typical Distress: Fire Pump – Fire Pump Controller Showing Loss of Phase 

D. Assessment D4030 Standpipe Systems

D4030 Assessment Hints

Maintenance criteria for standpipes is given in UFC 3-601-02 section 2-2.10 and NFPA 25 Chapter 6.
Assessments for standpipe systems are performed by visual inspection, and testing or review of test records.
During the visual inspection the assessor will identify missing caps, leaking, corrosion, and physical damage to the standpipe, gauges, and hose connections. The rating will depend on the extent of deficiency but will be no better than Amber+.

Examples of typical standpipe systems distresses or conditions include:

1. Typical Distress: Severely Corroded Manual Dry Standpipe 	2. Typical Distress: Corroded Hose Connection - Cap Made of Dissimilar Metal 

E. Assessment D4040 Sprinklers

D4040 Assessment Criteria

- Inspect sprinkler heads and for leakage, corrosion, mechanical damage, loss of fluid in glass bulb, loading, and painting (NFPA 25 5.2.1.1.2). The system can be rated GREEN- through AMBER- depending on the extent; alternatively, a distress rating can be provided. In addition, sprinkler heads must be replaced or laboratory tested periodically (UFC 3-601-02/NFPA 25 Table 5.1.1.2). Testing should occur two years prior to the deadline; if testing indicates replacement is required or there is no test data available the system should be rated AMBER+.
- Inspect pipes and fittings and document mechanical damage, leakage, and corrosion (NFPA 25 5.2.2.1). The system can be rated Amber + through RED- depending on the extent; alternatively, a distress rating can be provided.
- In order to provide a reasonable assurance that corrosion and obstructions are identified, NFPA 25 14.2.1.1 requires an internal assessment of piping condition every 5 years. If the assessment is not performed the system rated AMBER, otherwise the system will be graded based on the corrective action.
- UFC 3-601-02/NFPA 25 require an internal assessments of alarm check, dry pipe, pre-action and deluge valves to verify the operation of the clapper and the condition of the valve seats, as well as to look for evidence of corrosion or obstructing material. Alarm check valves are required to be internally assessed every five years (UFC 3-601-02 Table 2-2). If the PM records or shop interview that there is significant corrosion the assessor shall provide a rating of AMBER.
- Dry pipe, deluge, and pre-action valves are required to be tested and internally assessed every two years (UFC 3-601-02, Tables 2-3 through 2-5) during the full trip test. If the inspection reveals significant corrosion, the assessor should provide a rating of Amber or if flow during the trip test delays compared to previous tests, demonstrating that the system does not operate in manner consistent with the design, then the system shall be Amber or Red depending on the required action to restore the system to normal condition. If the PM records are unavailable then the assessor shall provide a rating of Amber.
- If assessment "Rating" is Amber + or below, enter a comment to describe the reason. A comment should also be entered regardless of DCR rating, if a significant localized issue needs to be highlighted, which may not necessarily impact the overall component section DCR rating.
- Missing sprinkler coverage in a new space will be rated as RED-.

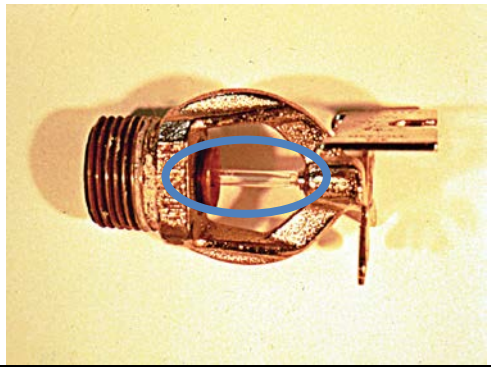
Examples of typical sprinkler distresses or conditions include:

1. Typical Distress: Severly Corroded Sprinkler

2. Typical Distress: Corroded Sprinkler

3. Typical Distress: Painted Sprinklers

4. Typical Distress: Glass Bulb Sprinkler without Fluid



5. Typical Distress: Sprinkler Piping with Corrosion and Leaking

6. Typical Distress: Elbow with Leakage and Corrosion

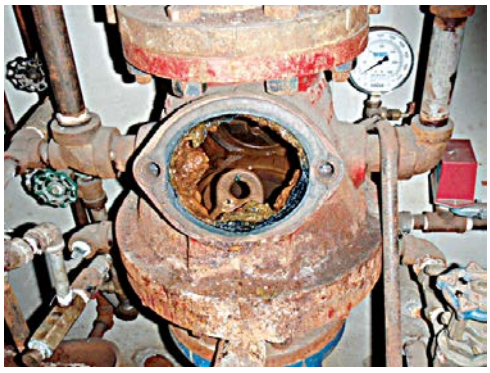
7. Typical Distres: Corrosion on Welded Outlet

8. Typical Distress: Coupling Corrosion Caused by Leak

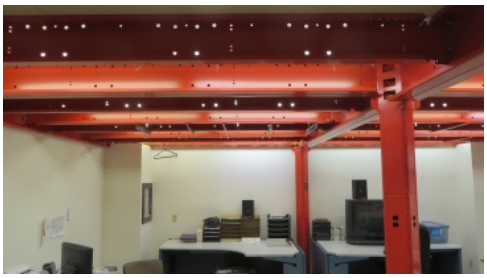
9. Typical Distress: Interior Corrosion

10. Typical Distress: Plugged Sprinkler

11. Typical Distress: Interior Valve Corrosoin



12. Typical Distress: Missing Sprinkler Coverage in New Space



F. Assessment D4090 Other Fire Protection Systems

D4090 Assessment Criteria

- Verify required inspection, testing and maintenance is being performed in accordance with UFC 3-601-02.
- Leaks are the most common visible deficiency.

Examples of typical other fire protection systems distresses or conditions include:

1. Typical Distress: Leaking AFFF Storage Tank

2. Typical Distress: Leaking Hi-Ex Foam Generator

3. Typical Distress: Ultrasensitive Smoke Detection System in Trouble Status

IV. Inventory and Assessment Rules of Thumb

A. Assessor Qualifications

- The assessor should have 5+ years of building construction or maintenance experience with specific experience related to fire protection systems. The assessor should understand the uses for common fire protection systems to assist in identifying the Component Sections. The assessor should also have experience in identifying common problems related to fire protection systems.

B. Year Installed

- Additions, new wings, or major renovations likely require identifying separate sections with a different age.
- Older buildings may have retro-fitted fire protection systems. Do not automatically assume the sprinkler system dates to the year the building was built.

C. Inventory/Assessment

- If as-builts can be located, they should indicate fire protection systems type, material, and quantity.
- If an inspection or testing tag is located, enter the date on the tag in Inspection Comments.

V. Inventory/Assessment Data Collection Sheet

The following data collection forms are included as a recommendation and may also be found in the AFCEC BUILDER SharePoint Site Documents Library. Many assessors also use floor plans or a notebook. Use whatever collection method works best for the individual assessor.

(See Next Page)

Building #:				**Date:**						
SF:				**24/7:**						
Contact:										
									BRED	
Fire:									SCORE	WHY
Pull Stations:										
Smoke Detectors:										
Heat Detectors:										
Duct Detectors:										
Fire Strobes:										
Fire Strobe/Annunciator Combo:										
MNS Strobes:										
MNS Strobe/Annunciator Combo:										
Annunciator:										
Sprinkler Riser:										
Fire Panels:										
Extra Sprinklers:		Area:			SF:					
Water:										
Lavatory:										
Water Closet:										
Urinal:										
Kitchen Sink:										
Shower:										
Mop Sink:										
Water Fountain:										
Water Heaters:		Type:				# Gallons:				
Recirc Pumps:										
Wash Stations:										
Eye Wash Stations:										

VI. D40 UNIFORMAT II Minimum Component Reference Table

The following table provides SMS MINIMUM inventory and condition assessment requirements. The table effectively provides a list of WHAT will be inventoried, WHERE within the SMS the component inventory will reside and HOW a component is to be condition assessed. The structure of the list is within UNIFORMAT II to be consistent with BUILDER™ SMS. Currently all components are Direct condition assessed. Eventually, Distress assessments may be conducted on selective components.

PM Inspection/Testing Directive column gives information on any Air Force applicable publication providing Preventative Maintenance (PM) actions that, once conducted, provides information on a component's condition assessment. Preventive Maintenance Task Lists (PMTLs) or other inspections may be considered a Distress type assessment in the future for some components.

Condition assessment frequency is not to exceed 5 years. Condition assessments conducted as part of a PMTL may be entered into SMS but should not be more often than an annual assessment.

AMP reflects the AMP to which the component is assigned:

F: Facility AMP

(See Next Page)

D	SERVICES				DEFINITION						
Unf L1	Unf L2	Unf L3	WBS L4		Includes all methods of conveying, plumbing, HVAC, fire protection, and electrical.	In Builder/ Fueler/ Paver/ Railer/ Utility	PM Inspection/ Testing Directive	Insp/ Assess Freq	SMS Type Insp	Assessment Method	AMP/ Sub-AMP
	D40	FIRE PROTECTION			This system includes standard and special fire protection systems.						
		D4010	*FIRE ALARM AND DETECTION SYSTEMS*		This subsystem includes fire alarm and mass notification control panels and distribution, fire detection devices, notification appliances, electromechanical releases, and all electrical connections and other associated items.						
			D401001	FIRE ALARM DISTRIBUTION	Assemblies include general (wiring, conduit, conduit support or fastening systems, switches and connections); conventional fire alarm control panel (single, multi-zone); addressable fire alarm systems, mass notification systems, and combination systems.	B	AFI 32-10141, UFC 3-601-02/NFPA 72, UFC 3-600-01, Architectural Barriers Act, PMTL D5035 710 1950 1 thru 9	A,2,5 yr	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
			D401002	FIRE ALARM DEVICES	Assemblies include notification appliances and detection devices: alarm bell, annunciator, strobe, strobe/annunciator combo, battery backup, fixed temperature heat detector, smoke detector, rate of rise heat detector, manual pull station, rate compensate heat detector, combination heat/smoke detectors, duct detectors, and explosion proof devices such as, detectors, pull stations, and notification appliances.	B	AFI 32-10141, UFC 3-601-02/NFPA 72, UFC 3-600-01, Architectural Barriers Act, PMTL D5035 710 1950 1 thru 9	A,2,5, 15 yr	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
		D4020	*FIRE SUPPRESSION WATER SUPPLY AND EQUIPMENT*		This subsystem includes items located upstream of the suppression systems such as, backflow preventers, piping, fire pumps etc. supplying a single facility. Equipment supporting multiple facilities is covered as a water utility.						
			D402001	FIRE PROTECTION WATER PIPING AND EQUIPMENT	Assemblies include air compressor, air dryer, reduced pressure backflow preventers, and double check valve backflow preventers.	B	AFI 32-10141, UFC 3-601-02/NFPA 25 UFC 3-600-01, PMTLs D4015 100 1950, D4015 100 2950.	A	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
			D402002	FIRE PUMP	Assemblies include fire pumps (including controller), jockey pump including (controller and disconnects); fire pump test header, flow meters, and recirculation system; and hydraulic transience controls (surge arrestors).	B	AFI 32-10141, UFC 3-601-02/NFPA 20, 25 UFC 3-600-01, PMTLs D4015 210 1950, D4015 250 1950	2,5 yr	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
		D4030	*STANDPIPE SYSTEMS*		This subsystem includes the standpipe risers, racks, cabinets, hoses, hose connections, and all other piping, fittings, and supports associated.						
			D403001	STANDPIPE EQUIPMENT & PIPING	Assemblies include wet or dry, class I, II, or III, hose connections for ground floors, and each additional floor.	B	AFI 32-10141, UFC 3-601-02/NFPA 25 UFC 3-600-01, PMTLs D4015 150 1950 01	A,2,5,	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
		D4040	*SPRINKLERS*		This subsystem includes the water supply equipment and related piping, control valves, alarm valves, and connections, from the base of the riser to the sprinkler head.						
			D404001	SPRINKLERS AND RELEASING DEVICES (SYSTEMS)	Assemblies include wet-pipe, dry pipe, pre-action, deluge, and multi-cycel systems spanning mulitple hazard categories.	B	AFI 32-10141, UFC 3-601-02/NFPA 25 UFC 3-600-01, PMTLs D4015 150 1950, D4015 180 1950. D4015 310 1950	A,2,5, 15,25,50 yr	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
			D404002	SPRINKLER WATER SUPPLY EQUIPMENT AND PIPING	Assemblies include alarm valves, flow control valves, pipe and fittings from equipment to sprinkler heads, including all supports and wall or floor sleeves. All equipment including tanks, pumps, and other associated equipment, fittings and specialties required for hook-up are in this assembly. The unit of measure at the assembly level is each sprinkler head.	B?	N/A	5 yr	Direct	Visual	
		D4090	*OTHER FIRE PROTECTION SYSTEMS*		This subsystem includes special fire detection and extinguishing systems.						
			D409001	CARBON DIOXIDE SYSTEMS	Assemblies include carbon dioxide systems.	B	AFI 32-10141, UFC 3-601-02/NFPA 11, 25 UFC 3-600-01, UFC 4-211-01, PMTLs D4095 210 1950, D4095 220 1950	A,2 yr	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
			D409002	FOAM GENERATING EQUIPMENT	Assemblies include all high expansion foam, AFFF, and foam-water deluge systems.	B	AFI 32-10141, UFC 3-601-02/NFPA 11, 25 UFC 3-600-01, UFC 4-211-01, PMTL D4095 100 1950	A,2,5 yr	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
			D409003	CLEAN AGENT SYSTEMS	Assemblies include all halon, clean agent, and inert gas systems.	B	Manufacturer Guidance, PMTLs D4095 450 1950, D4095 XXX 1950	Manu-facturer Specific	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F
			D409090	OTHER FIRE PROTECTION SYSTEMS	Assemblies include ultasensative smoke detection systems, UV/IR3 detectors.	B	AFI 32-10141, UFC 3-601-02/NFPA 72, UFC 3-600-01,PMTL D5035 710 1950 1 thru 9	A,2,5,15 yr	Direct	Visual, PMTL, NFPA ITM Report, Fire Prevention Deficiency Report	F/F